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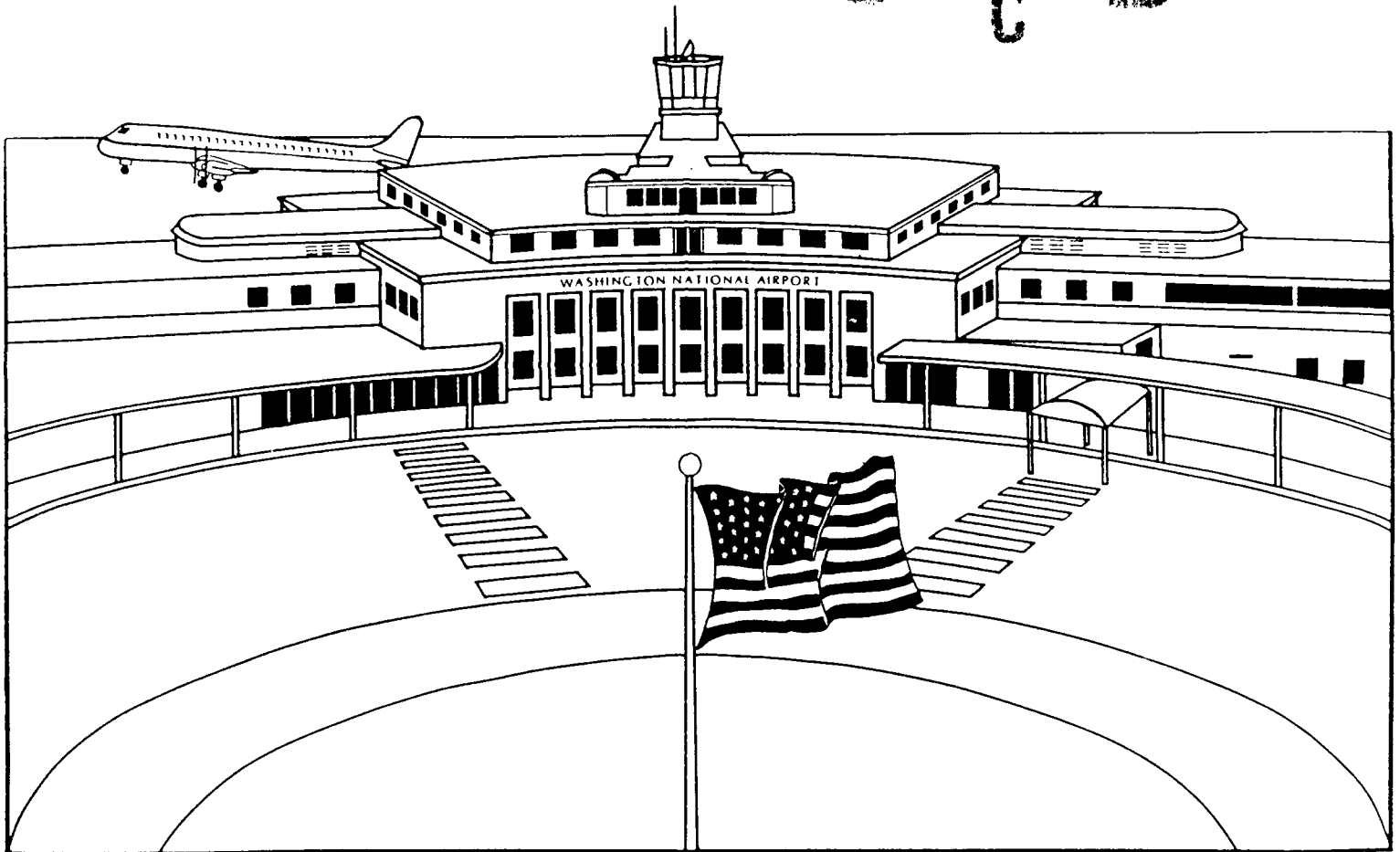
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U.S. Department
of Transportation
Federal Aviation
Administration

FIRST ANNUAL FAA GENERAL AVIATION FORECAST CONFERENCE PROCEEDINGS

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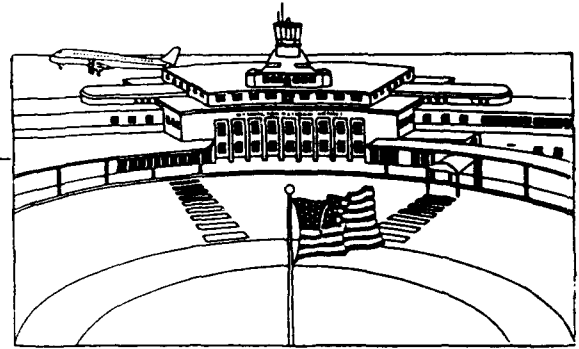
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Taking Stock of General Aviation: Challenges and Opportunities



March 7, 1991

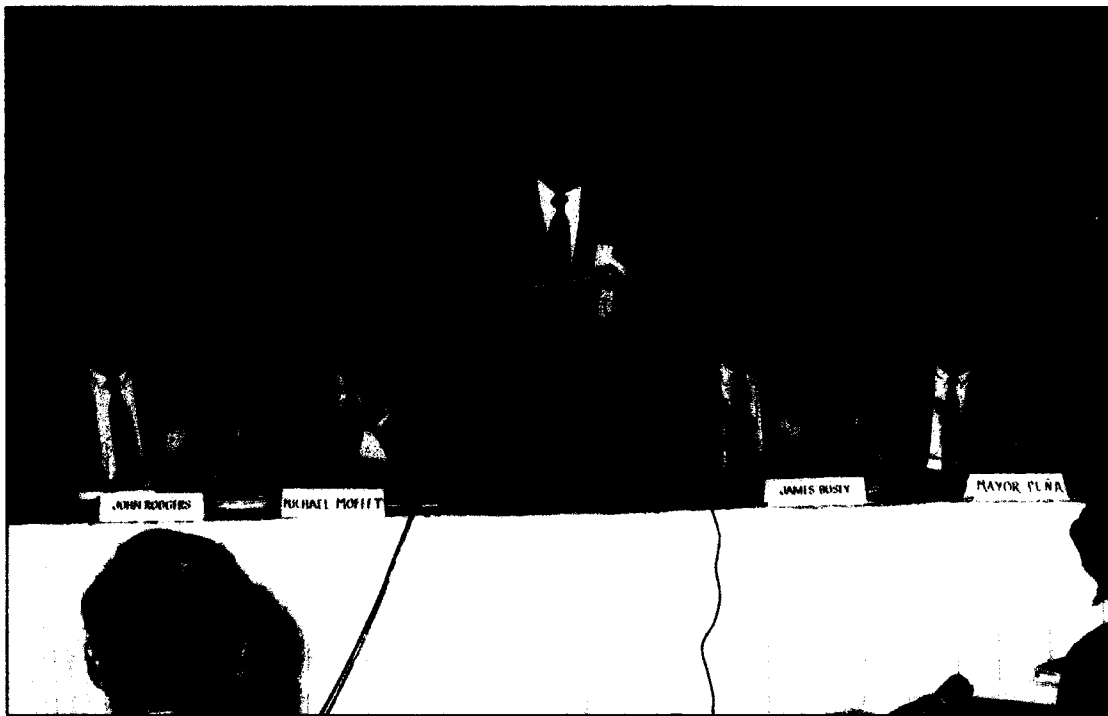


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U.S. Department of Transportation
Federal Aviation Administration



FAA Regional Administrator Frederick M. Isaac welcomes Federico Peña, Mayor of Denver, and conference participants to the 1st Annual FAA General Aviation Forecast Conference.



Mayor Federico Peña welcomes FAA conference participants to the city of Denver.

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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 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

EXECUTIVE SUMMARY

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 of destructive fare wars, a 1.4 percent increase in average fares. However, the

EXECUTIVE SUMMARY

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 prices, inflation should remain moderate through the decade. The projected growth of

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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
AIR CARRIER											
Enplanements (Millions)											
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
RPM's (Billions)											
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
COMMUTERS/REGIONALS											
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
FLEET											
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
HOURS FLOWN (Millions)											
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

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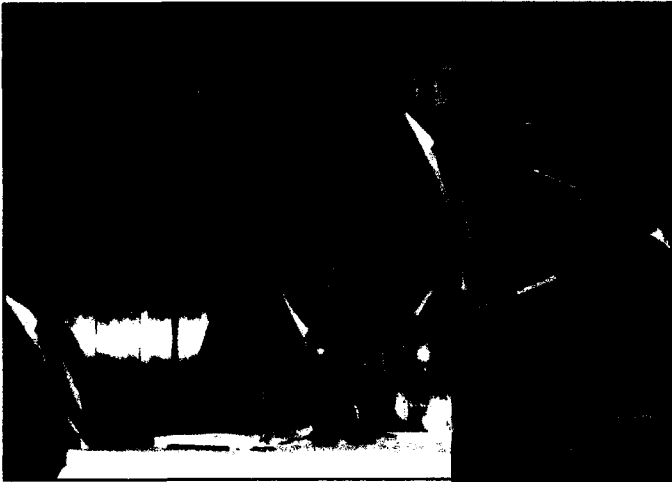
Table 3
FAA WORKLOAD MEASURES
FISCAL YEARS 1991 - 2002

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
Aircraft Operations											
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	37.8	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
Instrument Operations											
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
IFR Aircraft Handled											
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
Flight Services											
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

EXECUTIVE SUMMARY





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.

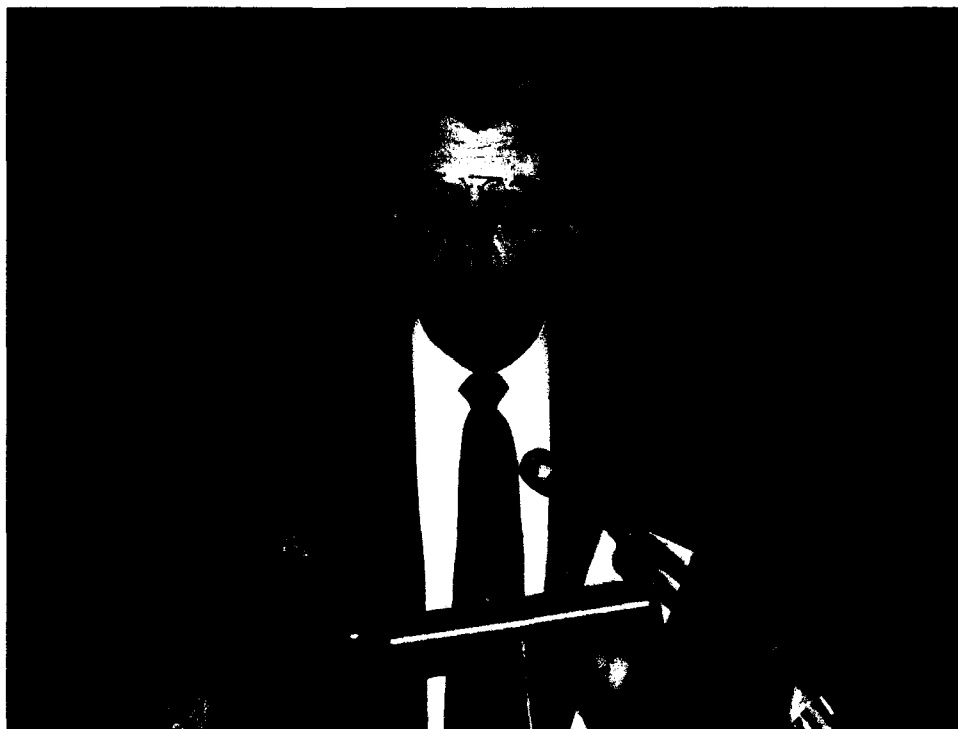
Mr. Busey is a native of Urbana, Ill. He attended the University of Illinois in Urbana and the Naval Postgraduate School where he received a bachelor's degree in management.

Summary

A strong and healthy general aviation economy is a vital factor to this country, however, high costs prevent general aviation from being as healthy as it could be. FAA is aware of this and other problems and is ready to work with the general aviation community to find the right solutions.

For example, there soon will be more money to spend on improving general aviation airports; we are on the verge of completing the LORAN-C system in this country; and the new compliance and enforcement policies we set in place about a year ago are working. Also, last year was the safest year for general aviation since the NTSB started keeping track back in the 1960's.

We will continue to focus on the difficult problems facing general aviation and find ways of working together to resolve them.



KEYNOTE ADDRESS

Good morning, and welcome to the FAA's first annual general aviation forecast conference. It's good to see all of you today.

For the past fifteen years, our forecast conference covered the entire spectrum of American aviation. But this year we're doing it differently. We're sponsoring two annual forecast conferences -- one for commercial aviation and one for general aviation.

We've split it up this way because we think it's time to focus more directly on the problems and challenges facing general aviation today. We want this conference to serve as a forum for better communications with general aviation.

If you heard any of my speeches during my first few months in this job, you heard me say that one of my major goals for the FAA is to build better communications with every segment of American aviation.

I didn't say that just because it sounded good. I felt then, and I still feel today, that we must work together to improve America's air system. In order to work together effectively, we must communicate effectively. There's no other way.

General aviation plays a pivotal role and, if its problems go unsolved and its challenges unmet, the future development of our entire air transport system could be adversely affected.

If American aviation is to remain strong, then we must have a strong, growing general aviation sector. And that means we must solve the pressing problems confronting general aviation.

Now this is a job for everyone. Some things can only be done by the industry itself. Some can only be done by the FAA. And some are going to require joint action.

But whatever we do, I know we can all benefit from the advice and counsel of industry experts. We need the judgment of experienced industry leaders. And that's why we're here today.

So I'm glad to see you. This is a good beginning.

There's no question that America leads the world in aviation. We've been the leaders since that first flight at Kitty Hawk. Today, we have the safest, most efficient, most productive air transport system in the world.

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.

But we can't rest on our laurels. No matter how important aviation is today, it will be even more so in the future.

KEYNOTE ADDRESS

Our challenge, in this last decade of the Twentieth Century, is to make American aviation even better. Just because we are the best in the world today does not mean that we can't be better tomorrow. We can.

How can we become better? What kind of a system should we be building?



*Well, first, it's got to be the safest in the world -- no question about that -- a system that will provide for the safety of everyone who flies.

*Second, it's got to have greatly increased capacity. It must be able to accommodate more planes, more flights, and more traffic -- and do so without the delay and congestion that too often choke the flow of traffic today. It should become a system in which operational and weather delays will be mostly memories of the past.

*Third, it must be highly efficient, with no wasted resources, no wasted motion. It must produce more transportation for every pound of fuel burned and every dollar invested.

*Fourth, the future system must serve all user needs -- from the student pilot to the ATP, from the small FBO to the major airline.

*Fifth, the system must be flexible enough to take advantage of rapidly evolving technology.

*Sixth, the system must accommodate the full range of aircraft -- from today's single-engine piston planes to tomorrow's hypersonic transports.

*Seventh, the system must be sensitive to the environmental consequences of flying. We cannot continue to grow--as we must--if people do not find us to be a good neighbor.

*Eighth, our air system must be truly international. Our technology, systems, and operating procedures must be in harmony with those of other nations. And I might mention here that we're already taking a lead role in moving toward the harmonization of our regulations with those of other aviation nations around the world.

Now, how are we building such a system?

Well, the short answer is that we're building more runways, and beginning to build more airports. And we're right in the middle of a massive, multi-billion dollar modernization of our air traffic control system.

KEYNOTE ADDRESS

We're getting the advanced technology that we need for greater safety, capacity, and efficiency throughout the system.

As you know, this effort was originally known as the National Airspace System Plan, or NAS Plan, for short. But the NAS Plan didn't reflect the fact that a capital investment program for something as dynamic as the nation's air system must be a never-ending process that rolls forward in time, keeping pace with advancing technology.

So now we've just released a new planning document, which we call the Capital Investment Plan, or CIP, that goes well beyond the original NAS Plan and is designed to accommodate growth and change.

The CIP, which will be updated every year, covers a ten-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 CIP, but they represent less than half of the total capital needs that we anticipate over the next ten years. The CIP is a planning document. It does not represent an absolute commitment to every project and program it describes. It presents our best estimate of the technology we intend to use -- but the schedules and the programs are not set in concrete.

On the money side, we expect our investments in Facilities and Equipment to increase at a reasonable pace over the next three to five years. We're also looking for growth in R&D spending so we can keep up with the new technology that's coming along.

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

For example, it is wrong to think that satellite technology will eliminate the need for many of our current or planned improvements. The new technology coming on line 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.

The projects described in the CIP will transform our air transport system. They will give us capabilities that no one dreamed possible a short while ago. They will improve every operational area -- traffic control, surveillance, navigation, communications, and weather.

The CIP is, in fact, a blueprint for building the most modern air system in the world, an air transport system that will serve the nation well in the next century. In order to build the most modern air system in the world, we must look not only to the CIP and its airway system projects, but also to expanding and modernizing

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our nation's airports. In this regard, I would like to take this opportunity once again to commend Mayor Pena and the citizens of Denver as well as the surrounding jurisdictions for their foresight in approving the construction of a major new airport complex.

This airport complex -- including the new Front Range Airport, a major new general aviation facility -- will reduce delays and help handle an increasing number of passengers. Construction of this new airport complex is providing a major economic catalyst for this area.

When completed, this airport complex will continue to be a strong magnet by providing an incentive for local and regional economic development for years to come. Because of this new airport complex -- and the excellent commercial and general aviation transportation it will provide -- businesses will want to locate in this area, thereby creating new jobs and stimulating all aspects of the regional economy.

A strong and healthy general aviation economy is a vital factor to this area and to the country as a whole. Without it, our air system will not be able to provide the full range of air services that America has come to expect.

It doesn't take a genius to determine the importance of general aviation.

Just consider the range of services it provides: Efficient business travel, crop dusting, pipeline patrol, offshore oil servicing, pilot training, and a lot more -- not the least of which is personal pleasure flying. We must preserve this FUN aspect of aviation.

What kind of an air system would we have without all of that?

Even if general aviation did only one thing -- provide basic training for our future pilot supply -- it would be essential.

So we need a strong, healthy general aviation segment. And here the picture is not so good.

For 12 consecutive years now, sales of new general aviation aircraft have gone down. Sales of single-engine piston aircraft went down a whopping 40 percent last year.

Although we expect a 50 percent increase in the general aviation turbine powered fleet in the next 12 years, the number of single engine piston aircraft will remain about what it is today. There'll be no growth in this segment.

Last year, we saw a slight increase in the number of student pilots, commercial pilots, and airline transport pilots -- but the number of private pilots went down. And we expect virtually no increase in private pilots remaining over the next dozen years.

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Nor will there be much of an increase in the number of hours flown by single-engine piston planes in the years ahead. It'll be less than a half of a percent a year. Certainly nothing to shout about.

Over the next dozen years, the entire general aviation fleet will increase its hours flown by only 1.4 percent a year, compared to an average of six percent a year during the 1960's and '70's, which is four times higher.

Now I could go on citing facts and figures. But I've said enough to prove my point, which is that general aviation is not as healthy as you or I would like it to be.

There is some strength in business aviation, but not as much as we'd like to see. And there is obvious and continuing weakness in the sector that includes private pilots flying single-engine, piston-powered aircraft.

We must not ignore this weakness. It could lead to a slow-down in the growth of general aviation and eventually a reduced supply of new pilots that our commercial operators, businesses, and airlines will need in order to serve rising demand in future years.

Now why, in the world's leading aviation nation, is general aviation not in better shape?

I think you all know the answer. It's two one-syllable words: High costs. With each passing year, it costs more to buy a plane, to insure it, to maintain it, and to put fuel in the tanks. Our figures show that it costs 83 percent more to operate a single-engine piston plane today than it did twelve years ago. And it wasn't cheap then.

High costs are the major threat to general aviation. They have driven a lot of pilots out of the air. They have kept a lot of would-be pilots from learning to fly. And they have virtually destroyed our light-plane manufacturing industry.

I don't think there are any easy or obvious solutions to this problem. But that doesn't mean that there's nothing we can do to help general aviation.

What can we do? Let's talk about the really difficult things first.

Probably the most difficult of all will be to find new ways to bring down the cost of flying. The FAA's new recreational pilot license and the new standards for a basic primary aircraft were part of that effort. Unfortunately, so far they have not paid off the way we had hoped.

We're also trying to find a way to reduce the extremely high cost of product liability insurance for aircraft manufacturers.

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The cost of liability coverage is the largest single factor in the price of a new single-engine airplane -- and it has boosted the price of new planes well beyond the reach of most general aviation pilots.

We've just got to get product liability costs down. And that's why the Bush Administration supports proposed legislation that would provide relief to the general aviation manufacturing industry by establishing consistent, predictable nationwide standards for determining personal injury and property damage liability in general aviation accidents.

As Secretary Skinner has written, "...the tort liability system, as it works today in the field of general aviation, is inequitable and unfair." I would only add that it will also be difficult to change.

Another bit of bad news for general aviation concerns the possibility that 100 octane low-lead and regular avgas may disappear in the mid-1990's, as a result of the recent amendments to the Clean Air Act.

Under the law as it now stands, engines requiring leaded fuel cannot be manufactured after 1992, and there can be no lead in motor fuel after 1995.

Now that strikes right at the heart of general aviation. As Phil Boyer of the AOPA noted, virtually the entire general aviation fleet could be grounded.

I know that we're all in favor of protecting the environment. I also know that, somehow or other, we must find a balance between environmental needs and the nation's need for strong general aviation.

Thanks to recent action in the Congress with enactment of the Noise and Capacity Act of 1990, we are beginning to find that balance on the noise front. We now need to extend that creative thinking to other environmental concerns.

I don't have any answers. But I want you to know that we're aware of the problem and we're ready to work with all of you to find the right solution.

Now let's get off the bad news and on to the good. And, believe it or not, there really is some good news.

For example, we're soon going to have more money to spend on improving general aviation airports.

Airports collecting the new Passenger Facility Charge will forego a portion of their Federal airport grants -- and some of this money will be used to improve reliever and general aviation airports. It's too early to say how much money we'll get for this purpose, but I believe it will be quite substantial.

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Another piece of good news for general aviation is that we're right on the verge of completing the LORAN-C system in this country. We think this is going to usher in a new era in aviation.

Up to 1,800 airports may qualify for LORAN nonprecision approaches, and we'll be setting up many of these approaches over the next few years.

My final good news item today has to do with the new compliance and enforcement policies we set in place about a year ago.

The reports I'm getting indicate they're working.

You may remember that one of my main goals was to re-instill trust and confidence in the FAA -- to build a better atmosphere -- to improve communications between the FAA and pilots.

I felt that was the only way we could strengthen compliance with the rules and regulations. In our country, that's the foundation of air safety -- compliance.

Unfortunately, that trust and confidence on the part of thousands of our pilots had been undermined.

We had gone too far in using harsh, mandatory punishments. We had moved away from working with pilots. We were not doing everything we could to help them to fly better and safer. We were relying too much on punitive actions and not enough on counseling and remedial training.

And I felt that we could undermine our high level of safety if we continued to do things that way. I could not allow that to happen.

So we made lots of changes -- too many, in fact, to review in detail. But, in essence, we're being more humane, more flexible, and -- I think -- more effective.

We want our inspectors to do more to improve safety than hand out punishments. We're encouraging them to use their own discretion and judgment. We want them to consider all the facts and circumstances, including mitigating factors. And, most importantly, we're putting much greater reliance on counseling and remedial training.

For one thing, I rescinded the mandatory 60-day suspension for TCA incursions. I believe it's unnecessary to ground a pilot automatically for 60 days. I'd rather have him or her become a safer pilot. I want to keep people flying where possible. I don't like them to have to hire lawyers to defend themselves.

So now we're handling many cases with remedial training that will teach the pilot what he did wrong and how to keep from doing it again.

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Our new compliance and enforcement program involves 34 action plans, most of which have now been fully implemented.

As I said, the program is going well.

So far, we've had just over 200 remedial training programs. About 175 have been completed successfully. I understand that the pilots involved seem to have a better attitude and are now more certain to comply. That's exactly the result I wanted to see.

So I think we're on the right track.

In fact, I think we're all on the right track. Last year was the safest year for general aviation since the NTSB started keeping track back in the 1960's. The Air Safety Foundation's goal of lowering the accident rate per 100,000 hours flown from approximately 7.5 percent to 4.5 percent by 1995 is a super objective and I'm convinced it is achievable.

Now that's really good news.

Yes, general aviation has some difficult problems. But we'll deal with them. I have no doubt about that.

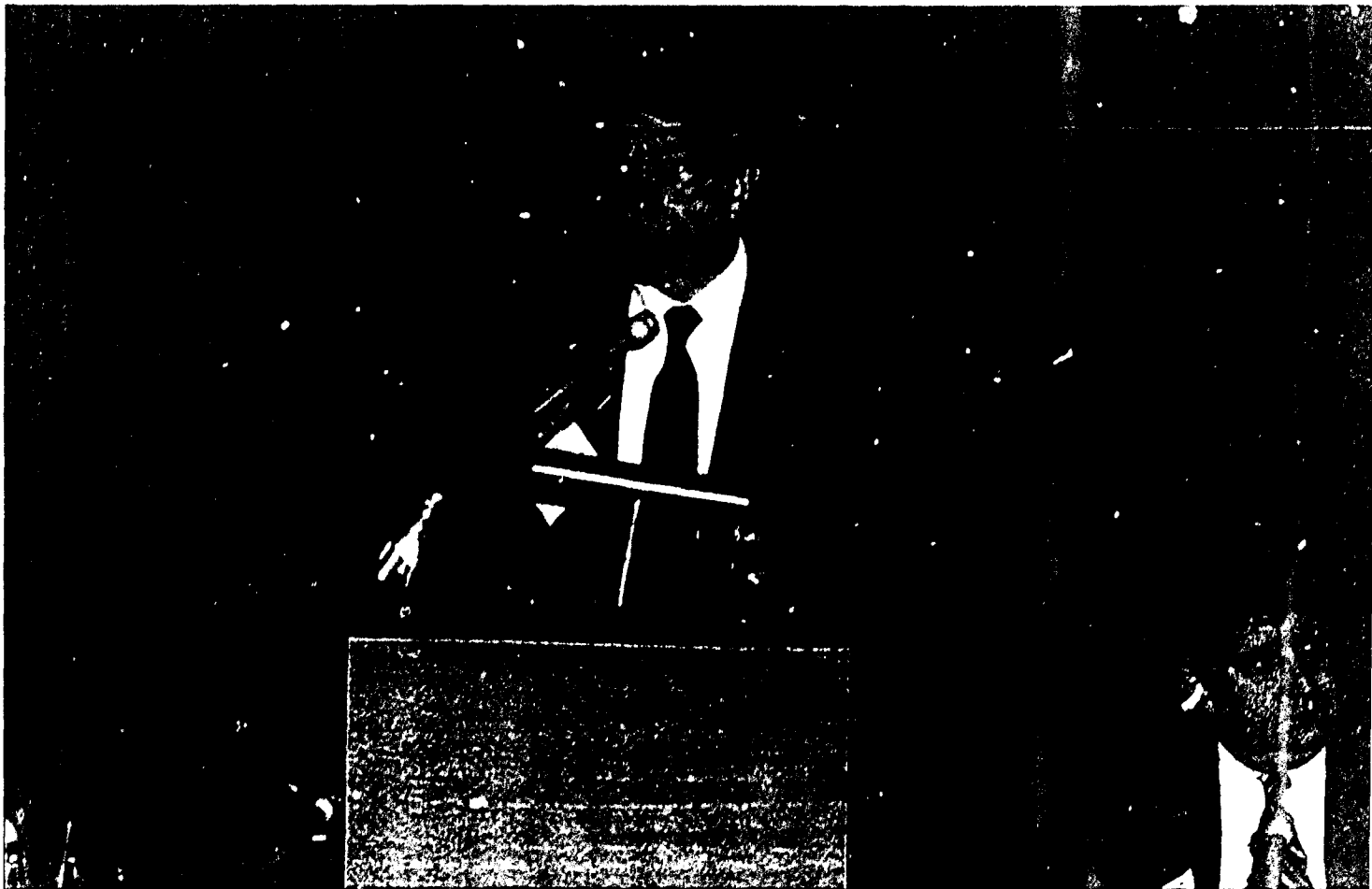
I've said it before and I'll say it again. If we didn't have a general aviation sector, we'd be busy inventing one right now. So we will find the answers. And I look forward to working with all of you to do exactly that.

It's been a real pleasure being with you today.

Thank you very much.

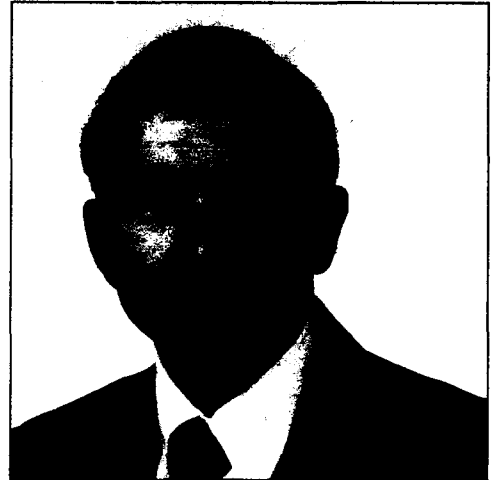


FAA FORECAST OVERVIEW



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

The outlook for general aviation is not as bright as for commercial aviation, but general aviation has faced challenges in the past and created new opportunities for growth. This conference seeks to open new avenues of communication for the FAA with this significant segment of the aviation community to assure that the FAA meets general aviation demand in a way that provides safe and efficient transportation for those who use and depend upon the National Airspace System.

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Good morning ladies and gentlemen. I am John Rodgers. Welcome to the First Annual FAA General Aviation Forecast Conference. I am particularly pleased and consider it very appropriate that this first general aviation conference is here in Denver -- a city which has provided the general aviation community with so many excellent facilities. Over the past thirty years, GA activity in the Denver area has expanded much more rapidly than the local population growth. In 1960 there were 330 annual general aviation operations per thousand population. In 1989 this had increased to 450 per thousand population. Our forecast for the area is that GA activity will continue to grow at approximately the same rate as population. This means over a forty percent growth in general aviation activity by the year 2010. General aviation truly constitutes an important element of the national and Colorado aviation system.

Our industry has had a record of strong growth. But, suddenly, we have been 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, commercial and general aviation. I, therefore, predict that the airline industry will survive these abnormal events, and will meet future challenges, and will discover new opportunities for growing again. What we are experiencing has been an aberration. The worst is probably now over. The war is won, oil prices have retreated, and the economy should soon be recovering. I am pleased to say that this is the scenario that we utilized in the fall of 1990 as the FAA forecasts were being developed. Aviation will emerge from these clouds and retain its reputation as a growth industry.

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 early 1990. Jet fuel price increases in late 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,

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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 with another \$1 billion loss in January, 1991 alone. 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. Again, Colorado provides us an excellent example of aviation growth by these carriers as reflected in the Denver Hub Forecast that you received today. Besides Denver Stapleton, an additional 14 of the 65 open to public use Colorado airports provide many small Colorado communities with commercial air transportation. The other 50 airports are served exclusively by private general aviation. 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. There is still some cause for concern, however, as the single engine piston aircraft market is the base on which general aviation activity builds. Historically, 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, as it has since 1978, it signals the slowing of expansion in the general aviation fleet and, consequently, a slowing in the rate of growth of activity at some FAA facilities. 1990, however, did signal some resurgence in general aviation activity at FAA towers, up over 3 percent.

A number of reasons have been advanced for this slowing in general aviation manufacturing, chiefly rapid price increases, high interest rates, and expensive fuel. A portion of the price increases can be attributed to massive awards assessed against manufacturers in product liability lawsuits which triggered extreme increases in liability insurance premiums, driving up manufacturers' costs. However, with further congestion and delay developing at major air carrier airports as the commercial industry expands, the demand for business general aviation may be increasing. Also, we hope there will be further expansion in "GI Bill" benefits for flight school training as more and more colleges and universities are initiating

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and expanding flight departments. A critical issue facing all of us in aviation during the nineties will be attracting and retaining the future leaders of aviation in the next century.

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.

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. With moderating oil prices, inflation should remain in check during the decade. Our forecasts beyond 1991 assumed 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 growing more strongly than domestic traffic in the past. It increased 10 percent per year between 1977-1990. With the Middle East Crisis now resolved, 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, we expect these increases to be moderate and, given that airlines will experience lower fuel costs, ticket prices may actually decline. 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

FAA FORECAST OVERVIEW

growth. As a result, I am afraid that the airport congestion and delay could continue through the decade of the nineties and beyond. Your new airport, however, will do a lot to reduce delays here in Denver, and Denver, the mayor, and its citizens are to be commended for their foresight.

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 prospect 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 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, today it looks like our relatively optimistic assumptions will be valid.

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.

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.

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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.

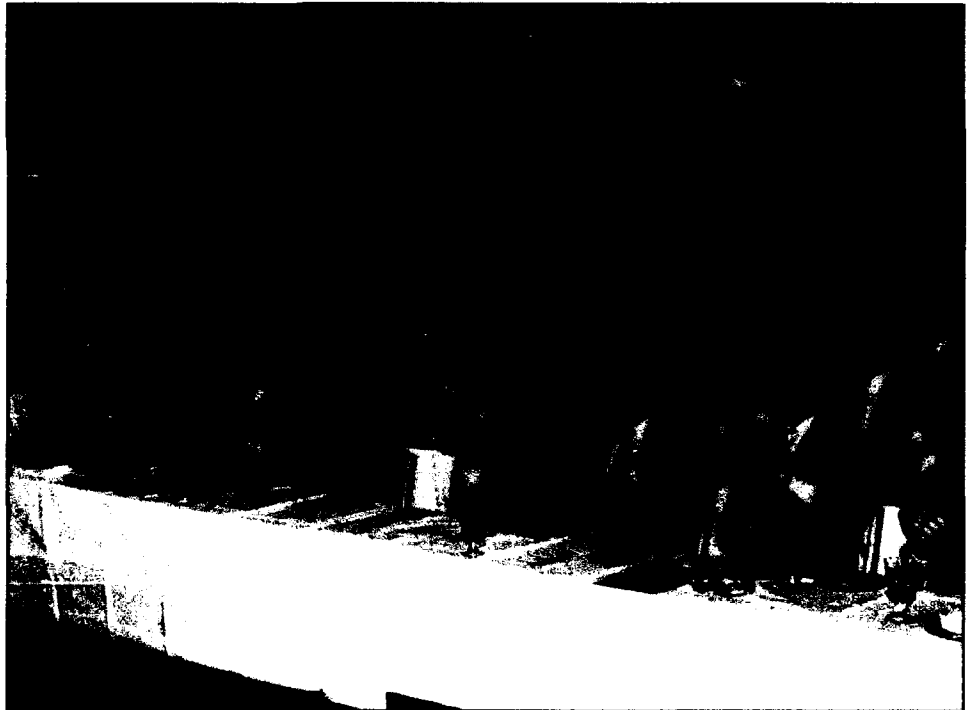
Conclusions

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 and shallow downturn in the first half of 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.

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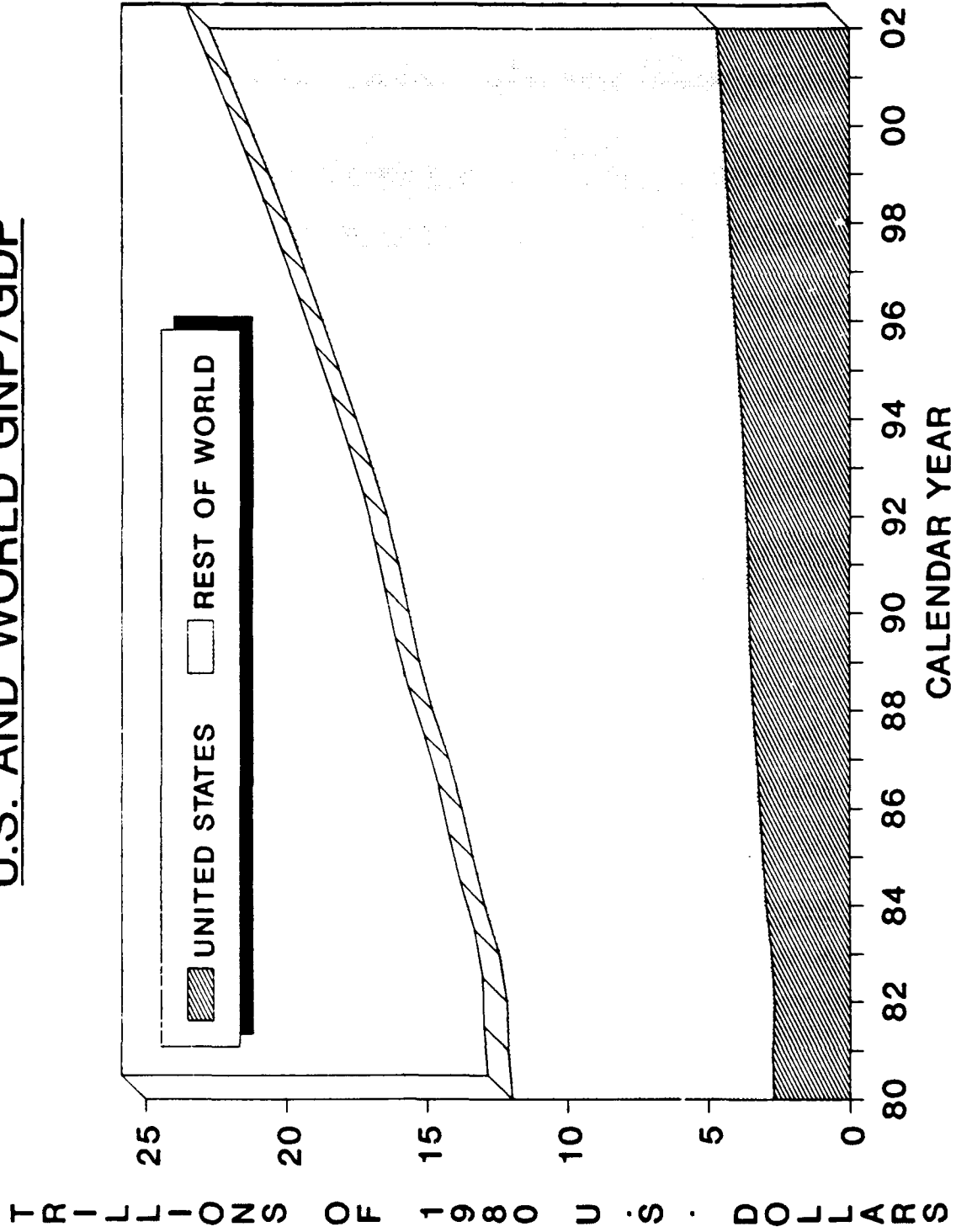
Forecasting is not an exact science. It is a reflection of economic and political assumptions with some math on the side. Though forecasting is a difficult process, it is manageable if economic and political uncertainties are narrow. This year, however, was one of many uncertainties. The cost and availability of oil, and the depth and length of the economic recession were highly debatable issues when we developed our forecasts. Fortunately, I think we made the right assumptions and, hence, I believe we have a highly defensible and reasonable set of forecasts for your review and use.

Thank you very much and I hope that this conference is valuable and productive for each of you.



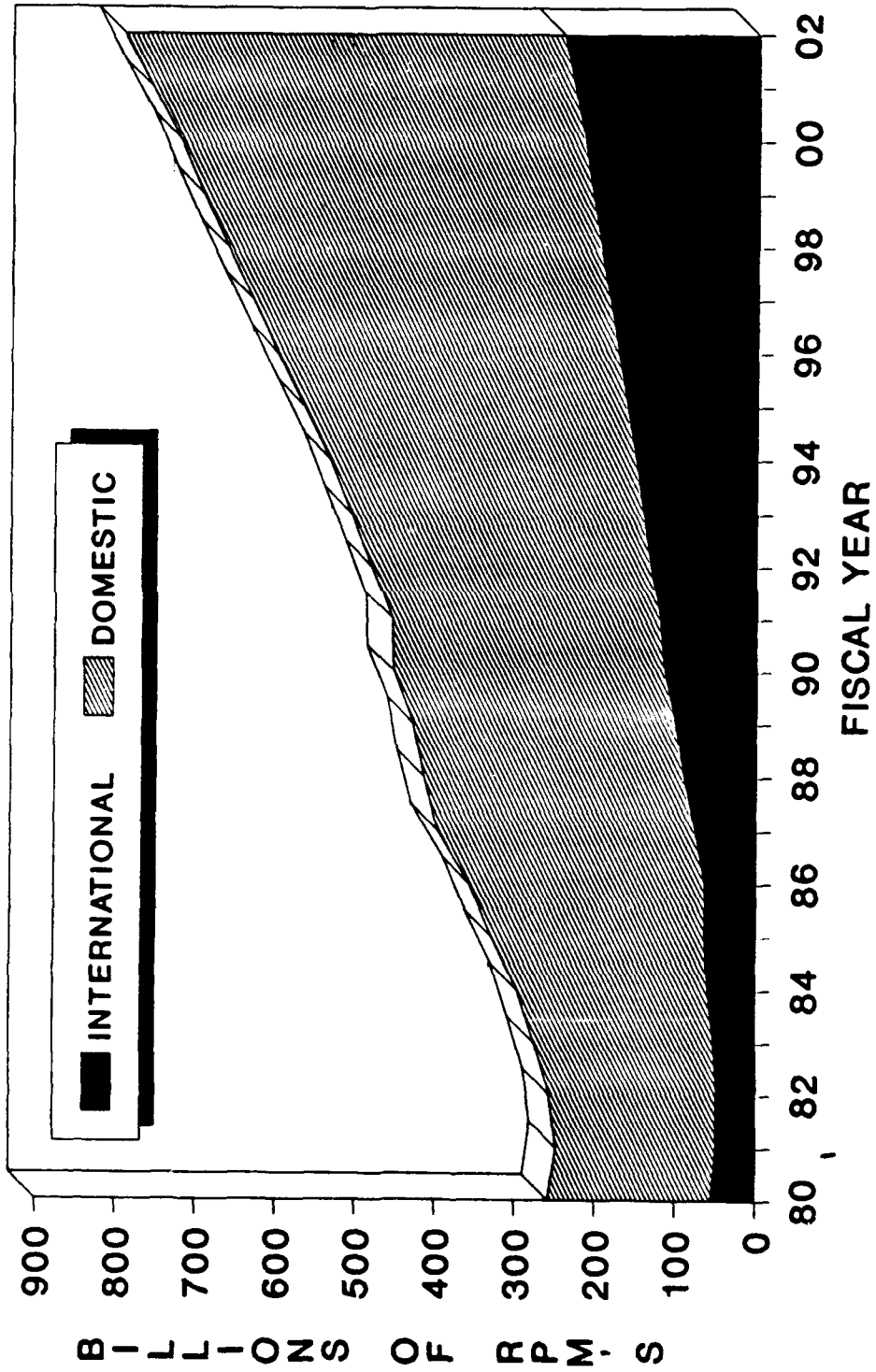
U.S. AND WORLD GNP/GDP

Chart 1



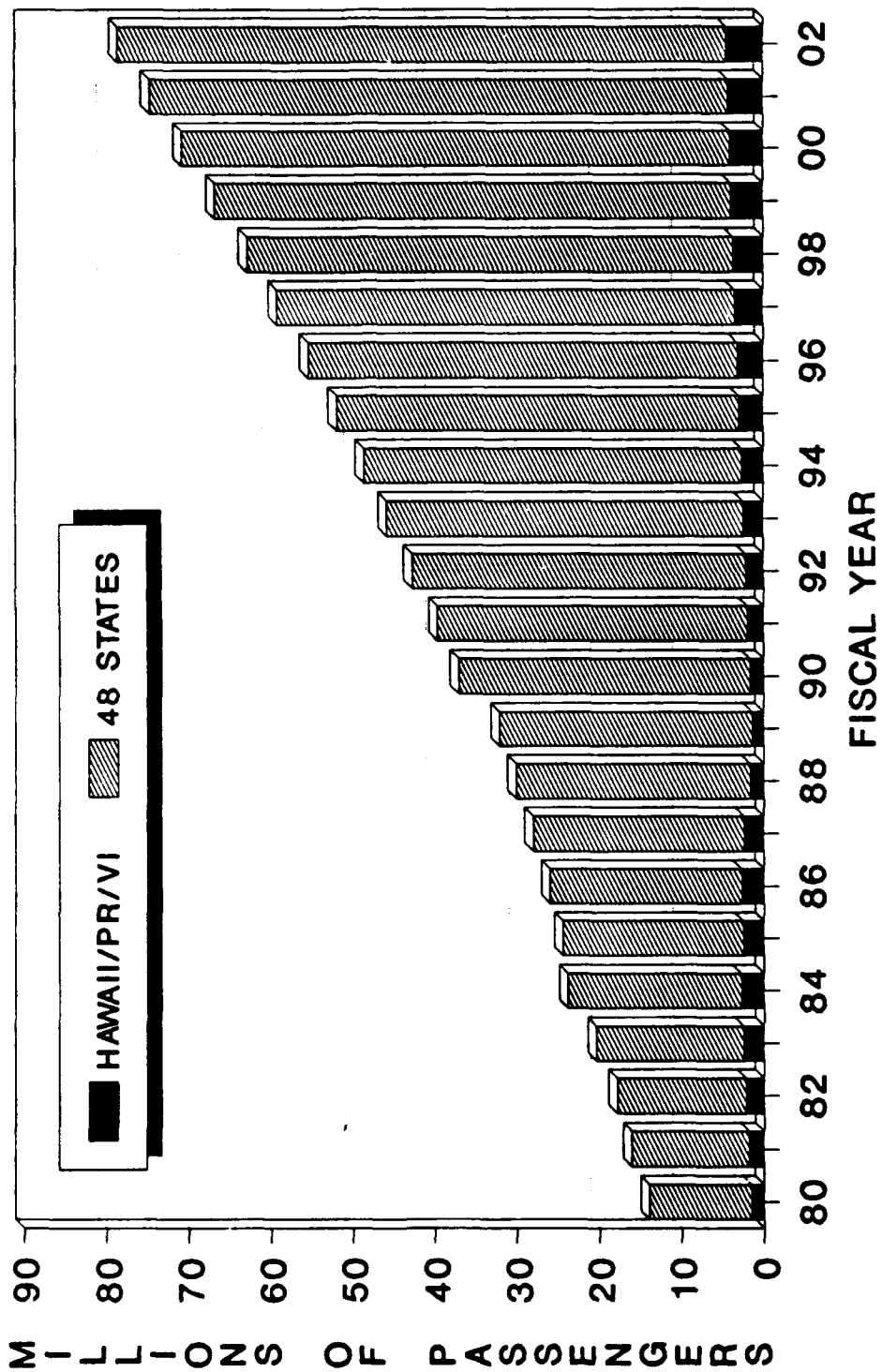
U.S. COMMERCIAL AIR CARRIERS
SCHEDULED REVENUE PASSENGER MILES

Chart 2



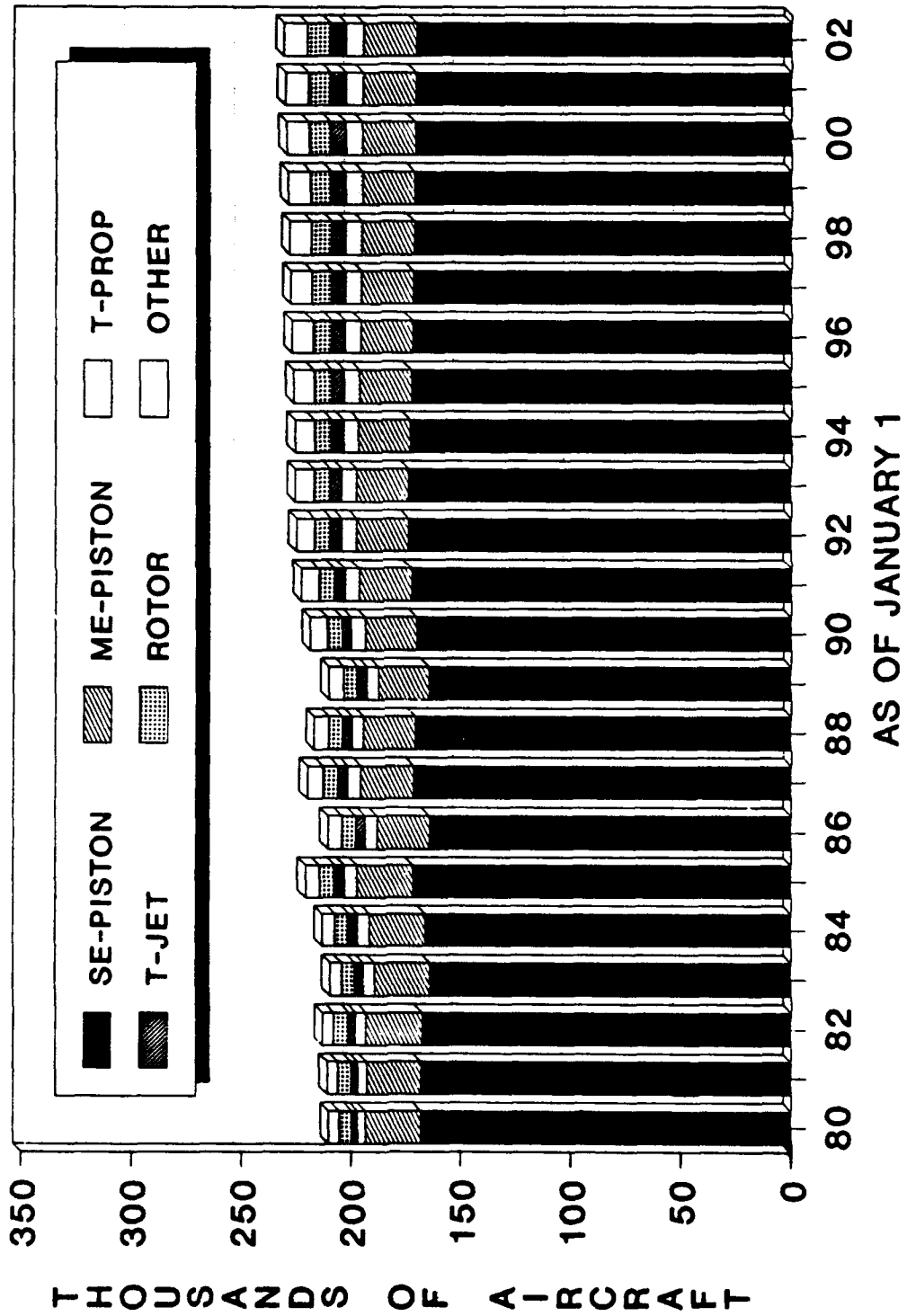
U.S. REGIONALS/COMMUTERS
SCHEDULED PASSENGER ENPLANEMENTS

Chart 3



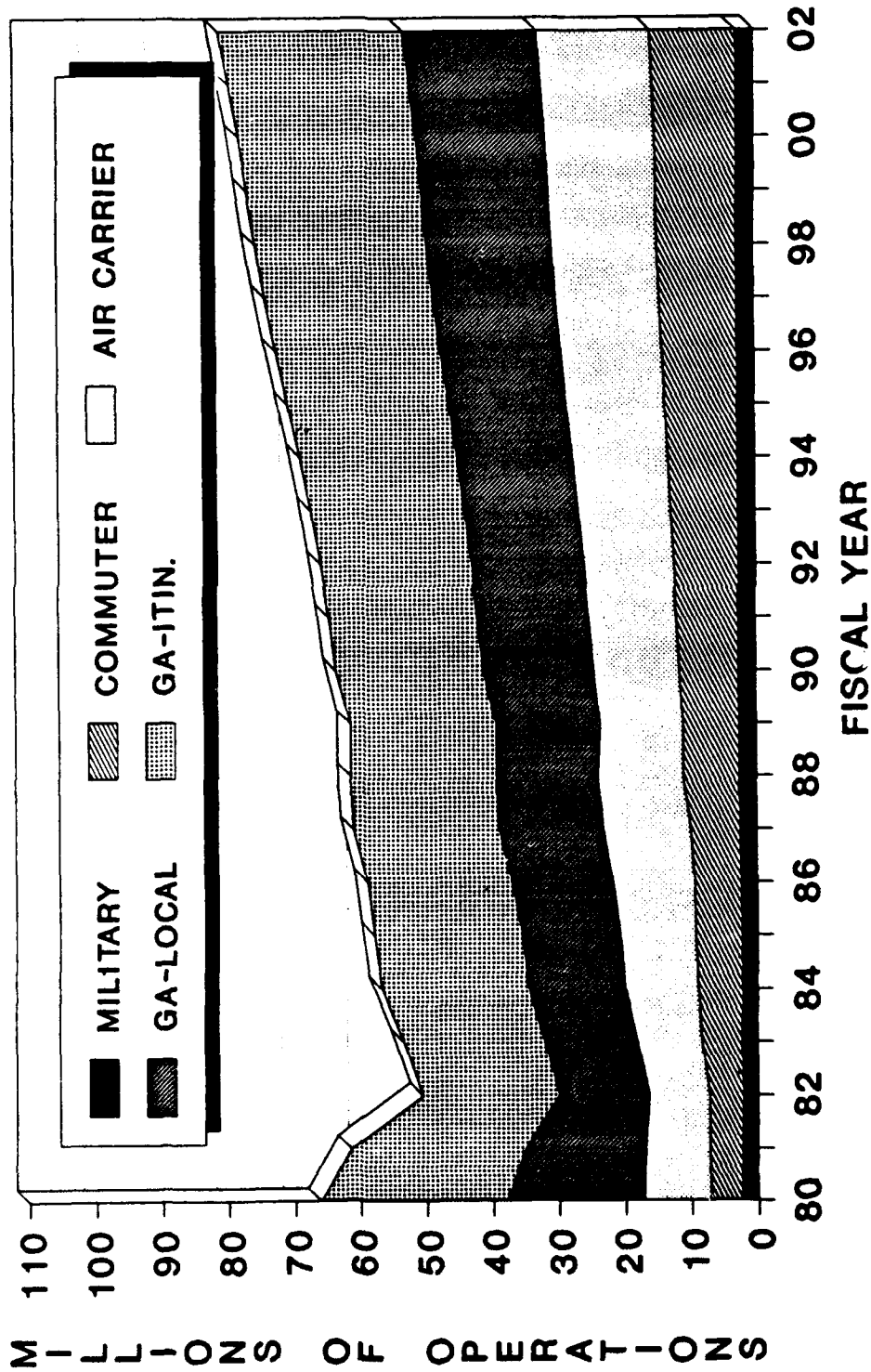
ACTIVE GENERAL AVIATION AIRCRAFT

Chart 4



AIRCRAFT OPERATIONS AT AIRPORTS
WITH FAA TRAFFIC CONTROL SERVICE

Chart 5



PANEL I

State and Future of the General Aviation Industry - An Overview



PANEL I

Andrew Chase

Senior Associate

Booz, Allen & Hamilton, Inc.



Biographical Highlights

Andrew Chase is a management consultant with Booz Allen & Hamilton in Bethesda, Maryland, where he leads the firm's aviation practice. He and his staff assist aviation clients worldwide in the areas of market strategy, financial and operations analysis, economics, technology assessment, and policy and regulatory analysis.

Prior to joining Booz Allen, Mr. Chase worked with the Consolidated Rail Corporation as a strategic planner and Bechtel Power Corporation as a structural engineer. He holds a Masters of Business Administration from the Wharton School of the University of Pennsylvania, and a Bachelors and Masters of Structural Engineering from Rensselaer Polytechnic Institute.

Mr. Chase is a low time, low end of the market, but high interest private pilot.

Summary

The tremendous growth in General Aviation (GA) aircraft sales and fleet size in the late 1970's followed by a sudden halt to growth in annual hours flown and slow attrition of the existing fleet initiated a graveyard spiral in purchases. This paper discusses the environment in which GA prospered and faltered and got to its current state, because this history has implications for the future.

The environment in which GA use and sales grew in the past may be favorable again in the future. However, the industry cannot sit passively waiting for things to change. The ability to build and sustain the GA market in the environment will depend on industry developing a market strategy addressing the needs of today's potential fliers.

PANEL I

The State of General Aviation - How We Got Here

"General Aviation (GA) aircraft sales have plummeted over 7,000 units in 4 years but the industry expects a complete recovery". Sounds like events of the early 1980's? Actually, it describes the late 1960's and the complete recovery in the 1970's!

Most likely, you are familiar with the GA events of the 1980's, which featured plunging general aviation aircraft sales, and this discussion must start at that same point to look at why and what that means for the future. Exhibit 1 shows the ups and downs of general aviation sales in the United States over almost 30 years. Clearly this is not the best of times. One conclusion that can be drawn is that the current state of GA is not typical. Another, though, is that the glory days of 15,000 sales per year must be put in perspective because they are also not typical.

General Aviation Sales In The United States

The tremendous growth in sales and fleet size in the late 1970's followed by a sudden halt to growth in annual hours flown and slow attrition of the existing fleet, initiated a grave yard spiral in purchases. The following sections discuss what caused the tremendous growth cycles of the mid 1960's, late 1970's, and early 1980's to examine the extent to which another growth cycle may come about.

GA AIRCRAFT SALES ARE DRIVEN BY THE DIFFERENCE BETWEEN THE NUMBER OF AIRCRAFT NEEDED TO SATISFY USER DEMAND AND THE NUMBER THAT ARE IN THE FLEET

Exhibit 2 shows the conceptual relationship between the need for GA aircraft and the supply that existed in the fleet over time. Purchases are driven by the difference between aircraft needed to satisfy user demand and the number of aircraft in the fleet. In the mid to late 1960's the need for aircraft was pushed up by the growing demand for flight time (annual hours flown). The existing fleet was not big enough to satisfy the need, so purchases were made and the fleet size grew. In the late 1960's and early 1970's there was a brief leveling off of aircraft need to satisfy demand for flight time, which in turn slowed the push for new aircraft -- the existing fleet was adequate to support the need.

A similar cycle occurred, more dramatically, recently and has resulted in the current state of the industry. The tremendous growth in sales in the 1970's is explained by the continuing growth in annual hours flown above levels ever seen. Only the building of the fleet through new purchases could satisfy the growth in demand. As soon as the growth in demand declined or even just leveled off in the 1980's, the existing fleet was able to satisfy the need for aircraft and new purchases were not required. That is, increased use of the existing fleet obviated the need for new aircraft.

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Conceptual Relationship Among GA Aircraft Needed, Available, & Purchased

The relationship described above, whereby continued growth of the underlying market is necessary to stimulate purchases, is typical of durable goods. This is in sharp contrast to non-durable goods where purchases will continue at a constant level when need for the good levels off -- the product is purchased, expended, and repurchased over a short cycle. In some durable good industries, new purchases of the product may be brisk even without strong growth in demand. This is due to the supply side of the equation -- availability of the product in the existing national fleet or inventory. If attrition of the existing fleet or inventory is high (short economic life of the product), replacements will have to be purchased to satisfy even a static demand. GA sales however, have not been stimulated by attrition. Very low attrition rates, except for the oldest, noisy turbojets, have resulted in relatively stable fleet sizes.

The concepts discussed above can be translated into a model of what drives GA aircraft purchases. While the concepts are simple, they encompass several factors as shown in Exhibit 3. The difference between user need for aircraft and aircraft available in the fleet is the shortfall which is made-up largely through purchases of new aircraft. In contrast if the number of aircraft available in the fleet is greater than the need, a surplus exists. In order for substantial purchases to occur, the need for aircraft has to grow, the existing fleet has to shrink, or both.

The Drivers Of GA Aircraft Purchases

THE DRIVERS OF USER DEMAND VARY BY AIRCRAFT TYPE AND USER SEGMENT

When assessing user demand we must start at hours of flight time. This is an important measure because part of the industry's condition (FBOs, for example) is reflected better by hours of use than by purchases. We consider seven user segments and four aircraft types. The demand for each aircraft type depends on the hours flown by each user segment and the types of aircraft most frequently used by each segment. As shown in Exhibit 4, 82 percent of the hours flown in single engine pistons are for training and rental, personal, or self-piloted business use; 91 percent of multi-engine piston hours for personal, business, executive, or commuter and air taxi use; 82 percent of turboprop hours for executive or commuter use; and 74 percent of business jet hours for executive use.

Users Of Each Aircraft Type

The question that needs to be addressed then is what has affected the demand of the user segments. The paragraphs below discuss what has happened to each user segment's use of GA. The conclusions are supported by statistically significant regression analyses, each of which had a coefficient of multiple determination greater than 85 percent.

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Training and Rental includes basic and advanced flight instruction and time flown in rental aircraft either for instruction or personal use. Ninety-four percent of training and rental hours are spent in single engine piston aircraft. After 4 consecutive years of growth, annual hours flown are still 25 percent less than their peak in 1979.

The Training and Rental segment's use of GA has been driven by demographics and economic conditions. As shown in Exhibit 5, Training and Rental hours increased through the 1970s as the Baby Boomers grew up, putting more people in flying age groups and increasing the discretionary time and income available for their parents. In the 1980's, the Baby Boomers started to raise families of their own which decreased their discretionary time and income for flying. The termination in 1980 of flight training as an option under the GI Bill also resulted in fewer training hours being flown.

Training & Rental Use Of General Aviation

Personal use of GA also is primarily -- 94 percent -- in single engine pistons. After three consecutive years of growth, annual hours flown are 10 percent less than their peak as shown in Exhibit 6.

Personal use has been most affected by demographic factors. As with the Training and Rental segment, Personal use increased as the Baby Boomer generation grew up and declined when they started their families. Changes in annual hours flown by this segment are positively correlated to the population between 45 and 64 years old and negatively correlated to the population under 5 years old. Disposable income has not had a significant impact on Personal use, perhaps because this segment owns their airplane and because operating costs have not increased in real terms over the last 10 years.

Personal Use Of General Aviation

Business and Executive use of GA includes two segments -- Business, which is aircraft used for business and piloted by the person conducting the business; and Executive, which is aircraft used for business and piloted by a professional crew. Sixty-five percent of Business hours are flown in single engine pistons and 29 percent in multi-engine pistons. Professionally crewed executive hours are flown in jets (33 percent), turboprops (30 percent), and multi-engine pistons (22 percent). Combined, annual hours flown by these segments are 42 percent less than their peak in 1981, as shown in Exhibit 7. Most of the reduction has been in the use of single and multi-engine piston aircraft.

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Both Business and Executive use have increased with national economic growth and slowed or leveled in recessions. They have also increased following airline deregulation in 1978 when commercial air service to other than hub airports began to decline. The Business segment then declined as real airline yields declined, reducing the cost of flying commercially (perhaps the frequent flyer programs further enhanced the relative cost-effectiveness of flying commercially versus GA). Executive use of jets has remained strong in the last eight years, even while the rest of Business and Executive use has declined, due to increased awareness of hijackings and bombings. Also, while the PATCO strike slowed commercial air travel, Executive users were able to avoid many delays by flying in uncontrolled air space and to non-towered airports.

Business & Executive Use Of General Aviation

Commercial use includes primarily commuter and charter operations in aircraft with 30 seats or fewer. Twenty-one percent of this segment's hours are in single engine pistons (air taxi), 36 percent in multi-engine pistons (mostly air taxi), and 18 percent in turboprops (commuter). Hours flown in this segment are 2 percent greater than their peak, as shown in Exhibit 8. Use has been driven by economic conditions -- Commercial GA has declined or the growth rate has slowed during each of the recessionary periods since 1970. Also airline deregulation in 1978 had a positive effect on Commercial GA as commuter carriers and air taxi operators filled service gaps left by major airlines.

Commercial Use Of General Aviation

The sections above indicate that demographics, economic trends, airline yields, and several industry events have driven the use of GA and the need for aircraft. The next section looks at what drives the number of aircraft in the fleet.

FLEET ATTRITION IS NOT A MAJOR STIMULUS TO SALES

As discussed earlier, purchases in the 1960's and 1970's created the large fleet that exists today. Attrition is not expected to be a key factor in GA sales, however the historical pattern of purchases has resulted in a substantial number of old aircraft that will have to be replaced if utilization increases. Exhibit 9 illustrates the age of the GA fleet and the number expected to be retired from service by the year 2000.

Expected Attrition Of GA Aircraft - Today's Fleet Remaining In 2000

The older an aircraft is, the greater the expected rate of attrition. The average age of the piston fleet is about 20 years old, and the largest single age group is 25 years and older. As a result, over the next 10 years attrition will take about 2,300 (1.5 percent) single engine and 350 (1.7 percent) multi-engine piston aircraft per

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year from the current fleet. The turbine engine fleet is substantially younger than pistons, about 12 years old. While their relatively low age tends to lower expected turbine attrition, two other factors act to increase attrition -- technology and user segment preferences. The advent of turbo-fan engines and increased community sensitivity to aircraft noise has made the older, noisier business jets in the fleet less transferrable on the used aircraft market. Also, the users of both turboprop aircraft and jet aircraft (commuter carriers and corporate/executive users) generally require newer aircraft than piston aircraft users for better fuel efficiency, lower maintenance, improved range and/or payload, perceived safety, and sometimes the status that comes with owning a new jet.

MANY OF THE SALES SINCE THE EARLY 1980's HAVE BEEN FOR SPECIAL REASONS RATHER THAN TO ALLEVIATE A SHORTAGE OF AIRCRAFT IN THE FLEET

Despite the flat or declining trend of GA hours flown in the 1980's, aircraft were still sold. This is due to several factors:

Imperfect information in the used aircraft market does not allow every airplane in the fleet to be fully utilized.

Some customers will only buy new aircraft.

Capabilities of some new aircraft cannot be matched by the available aircraft in the existing fleet. For example the threat of terrorist attacks on business executives traveling internationally on commercial carriers has strengthened the niche for business jets with trans Atlantic range. Also, newer fan jet equipped aircraft cannot be substituted by older, underutilized turbo jet aircraft in the fleet.

HOW WE GOT HERE -- WHAT IT MEANS FOR THE FUTURE

In developing a market strategy for the future, an organization takes stock of the environment affecting the industry, its customers, and its competitors. From the GA industry's point of view, the environment -- those events essentially beyond the control of the industry such as economic conditions, demographics, airline yields, and discrete events such as airline deregulation and the PATCO strike -- led to the current state of the industry. In view of the factors affecting GA use by each segment, discussed earlier, the environment may be more supportive of GA use in the future:

As the demographic mix of the country moves toward the mix that occurred during the GA growth years of the 1960's and 1970's

If the long term economic growth of the country continues, increasing the need for GA and commercial air travel, and the need for pilots

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If airline yields continue their upturn as a result of:

- Continuing airline consolidation
- Further domination of hubs by the remaining airlines
- Improving yield management capabilities.

However, the opportunities or obstacles presented by the environment are just a base from which potential growth exists. The strategy of GA industry participants must be built based on how their customers (user segments) and competitors (alternatives to GA for each user segment) will act in the environment. The basic reasons why users would want to fly GA and their alternatives need to be reexamined for each segment. This includes not only understanding how to get people new to flying involved, but also what caused the 350,000 private pilots who flew in 1981 to fly less or, in the case of 40,000 of them, stop flying altogether.

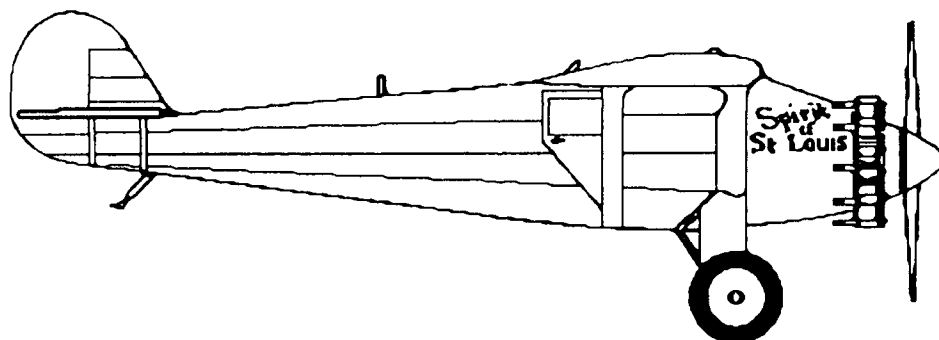
Attrition will not be a key driver of new purchases. The industry will have to stimulate use of GA or substantially improve technology beyond what is in the fleet today to stimulate sales. Annual flying hours will have to grow beyond the levels of the late 1970's -- the peak rates of flying at which the current fleet size was established -- to generate substantial demand for new aircraft.

Programs such as the General Aviation Market Expansion (GAME) Plan are important to integrating the efforts of the many industry stakeholders who, individually, could not have the same impact. The market research and promotion accomplished by such programs get people to try GA. However, it is not enough to get people to try GA if the product/service they get is not what they need.

The product/service itself -- the entire experience involved in using GA, from leaving home to returning home -- needs to be examined and redefined in view of user needs and alternatives. The ski industry has been faced with a similar problem as GA. The industry studied why skiers stopped skiing as well as how to get new people skiing. They found that Baby Boomer growth into family units, resulting in less discretionary time and money, was a key factor and the ski industry is responding by changing their product -- promoting family ski packages with a range of non-ski activities, providing day care at the slopes, and setting areas aside for snow boarding. Similarly, changes to the GA product need to be examined and tested in addition to the promotion efforts underway.

I read an article recently that theorized that GA flying would probably not rebound because the adult population now is different from that of the 1940's. The 1940's were a unique time when many had the exposure to free flight training during World War II. I agree that that time was unique, but today is unique too and needs to be addressed differently than in the past if the GA industry is to rebound. Whether a successful market strategy can be developed, I don't know. But I don't think the GA market will recover to reasonable levels without one.

**THE STATE OF GENERAL AVIATION
HOW WE GOT HERE -
WHAT IT MEANS FOR THE FUTURE**



March 7, 1991

by

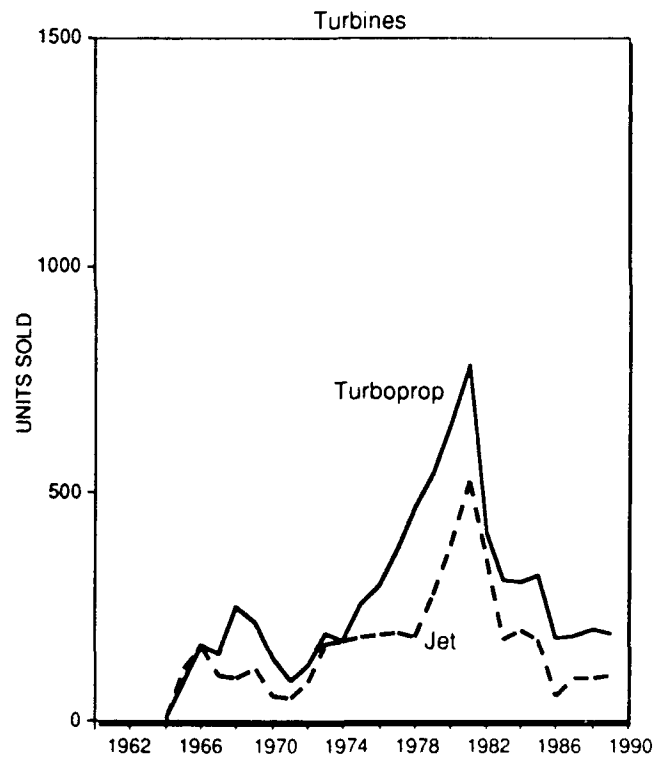
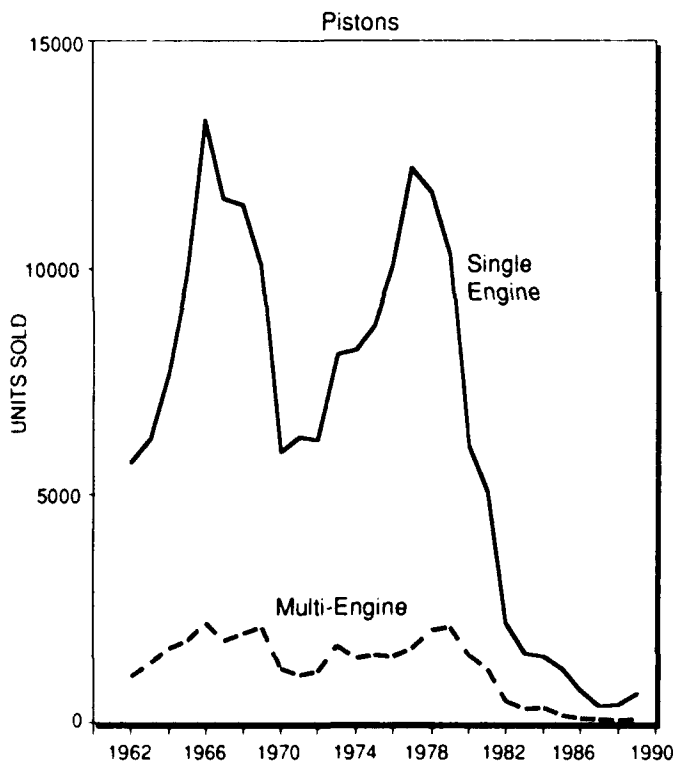
Andrew Chase

BOOZ-ALLEN & HAMILTON Inc.

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EXHIBIT 1

General Aviation Sales In U.S.



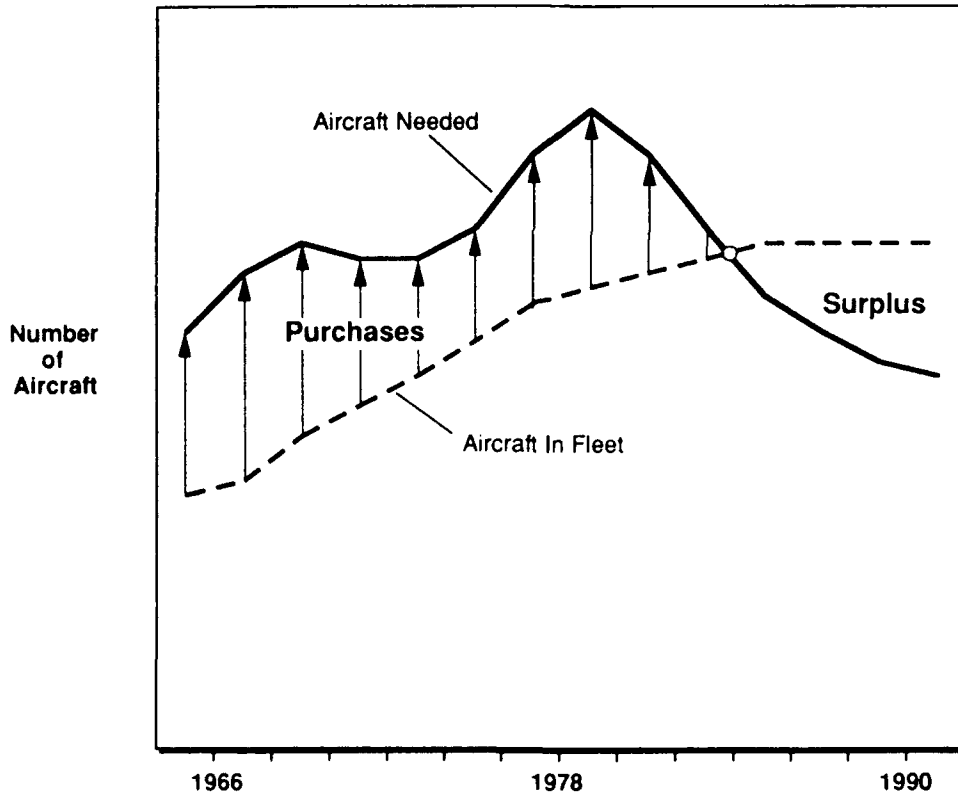
Note: Sales = Shipments - Exports + Imports
Source: GAMA, Department of Commerce, BA&H Analysis

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EXHIBIT 2

**Conceptual Relationship Among Aircraft Needed,
Available, & Purchased**

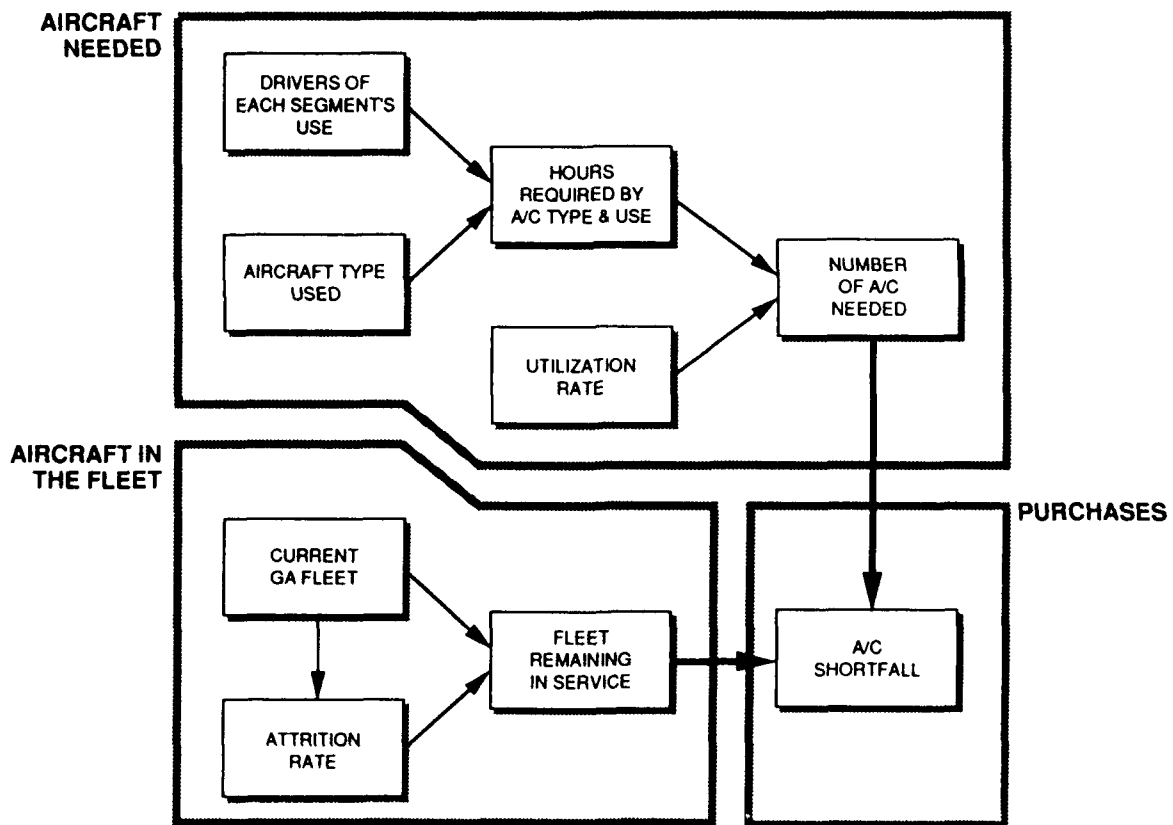


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EXHIBIT 3

DRIVERS OF GENERAL AVIATION AIRCRAFT PURCHASES



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EXHIBIT 4

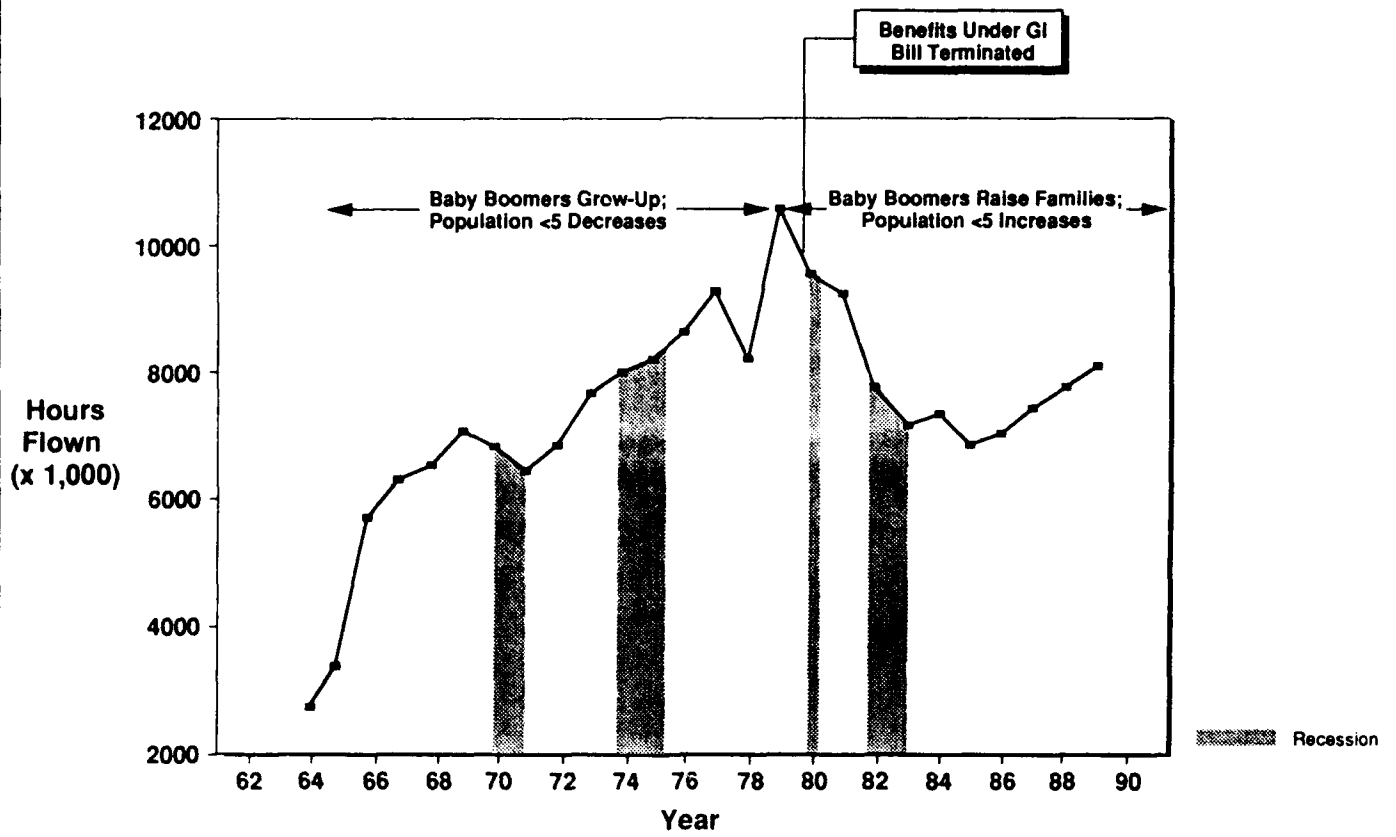
USERS OF EACH AIRCRAFT TYPE

		AIRCRAFT TYPE			
		PISTON		TURBINE	
		SINGLE ENGINE	MULTI-ENGINE	TURBOPROP	JET
USER SEGMENT	TRAINING/RENTAL	82%	91%		
	PERSONAL				
	BUSINESS				
	EXECUTIVE			82%	74%
	COMMERCIAL				
	UTILITY				
	OTHER				

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EXHIBIT 5

TRAINING & RENTAL USE OF GENERAL AVIATION

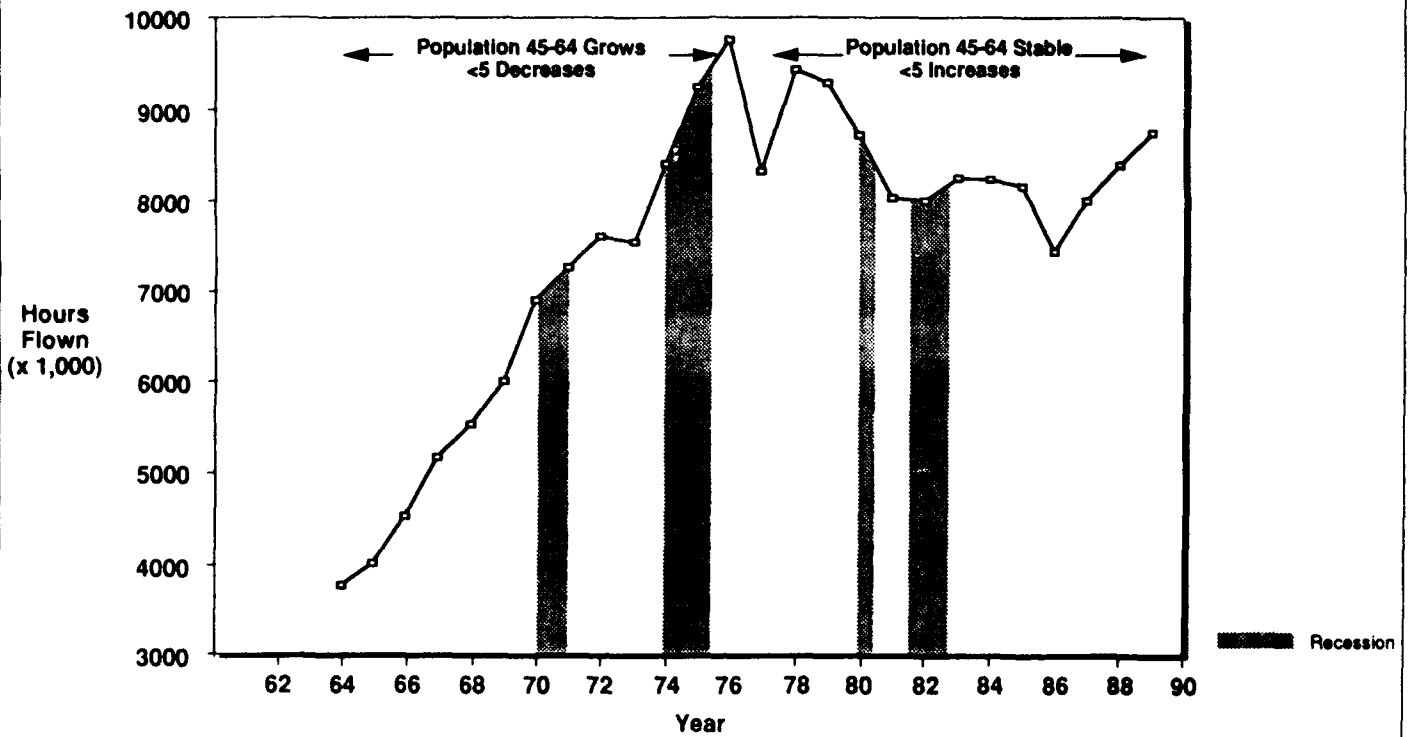


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EXHIBIT 6

PERSONAL USE OF GENERAL AVIATION

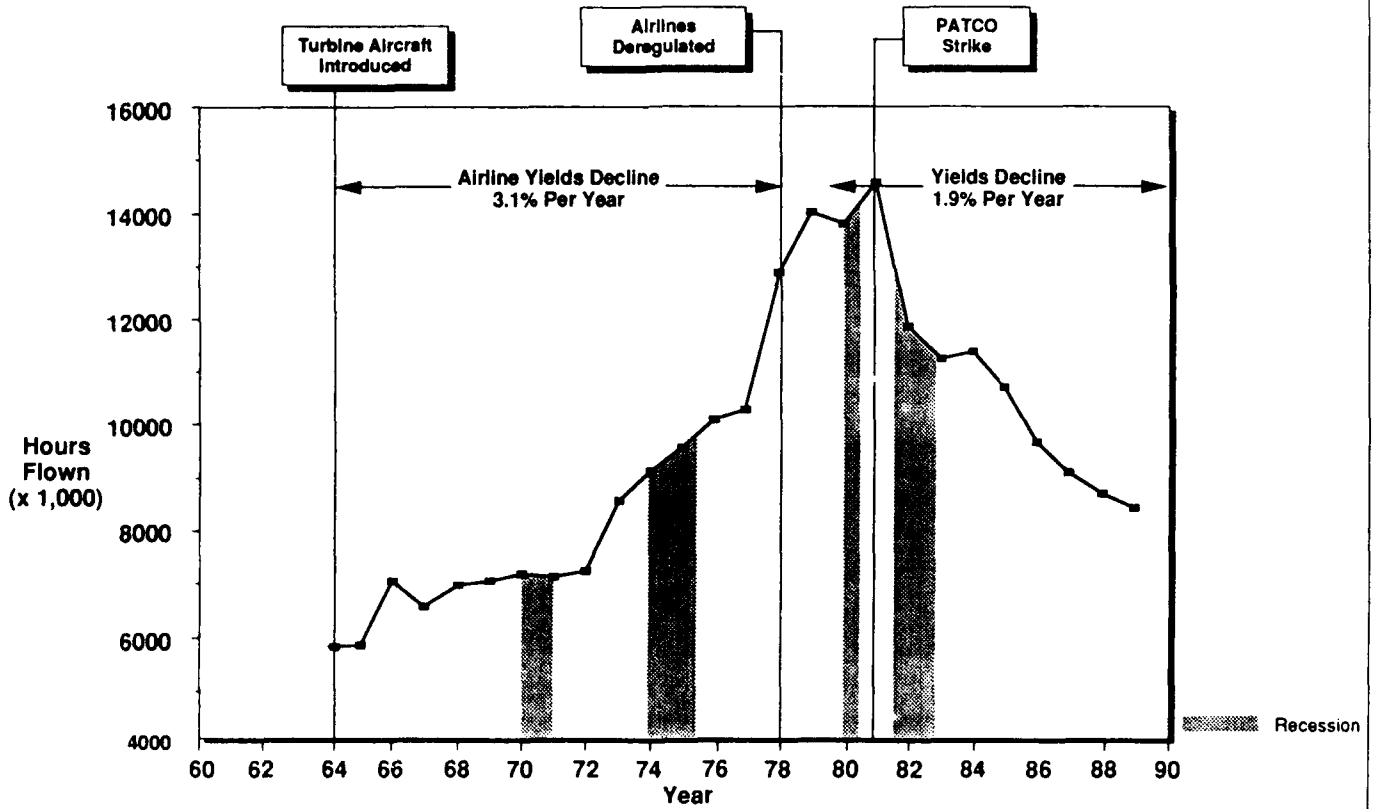


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EXHIBIT 7

BUSINESS/EXECUTIVE USE OF GENERAL AVIATION

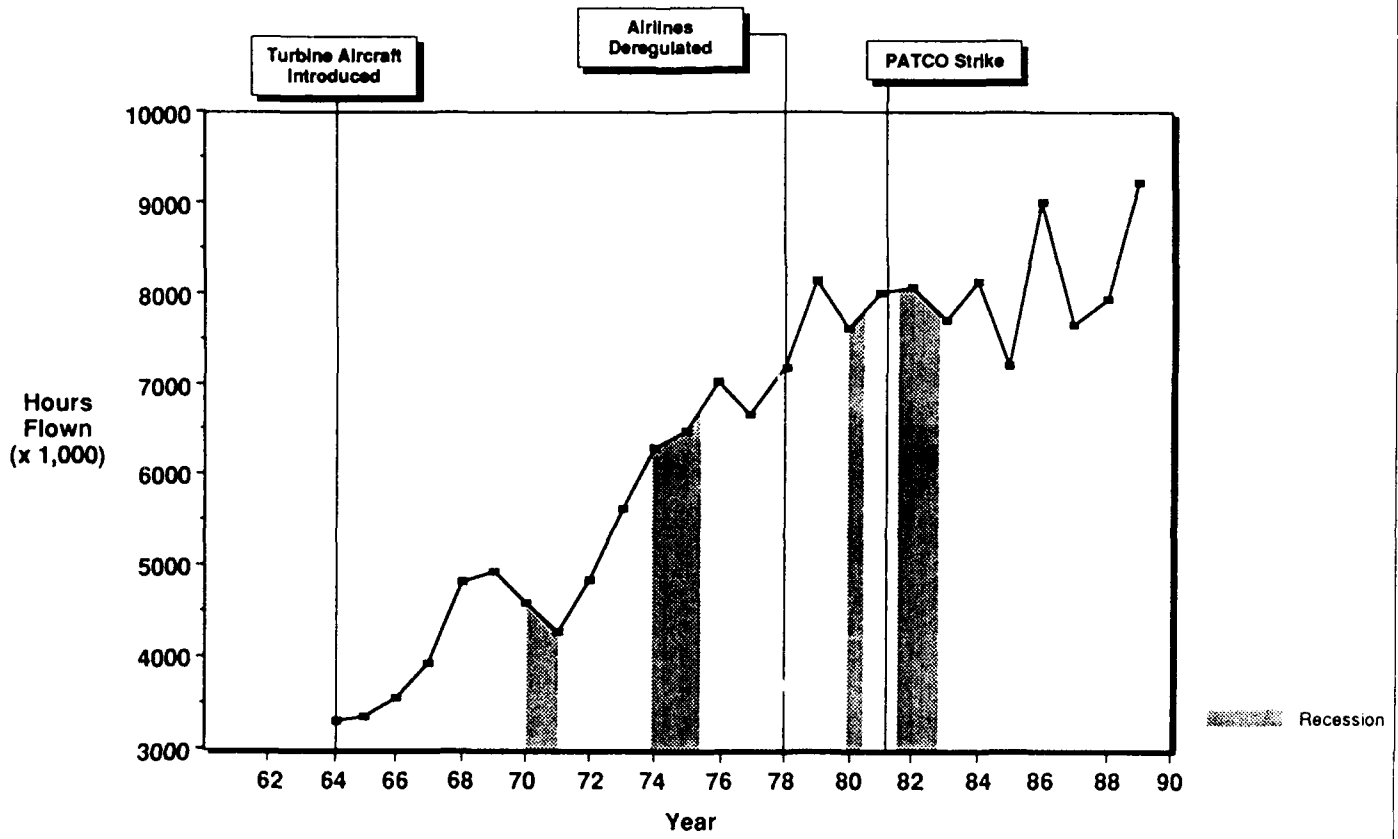


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EXHIBIT 8

COMMERCIAL USE OF GENERAL AVIATION

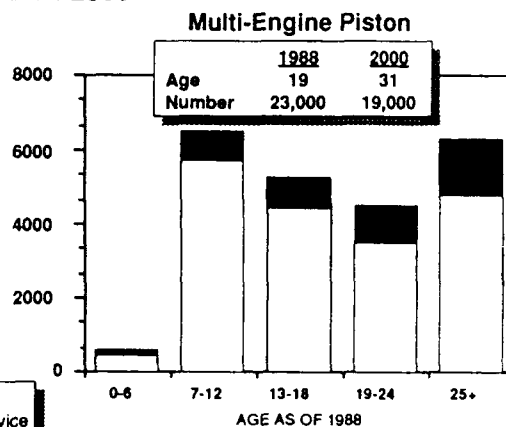
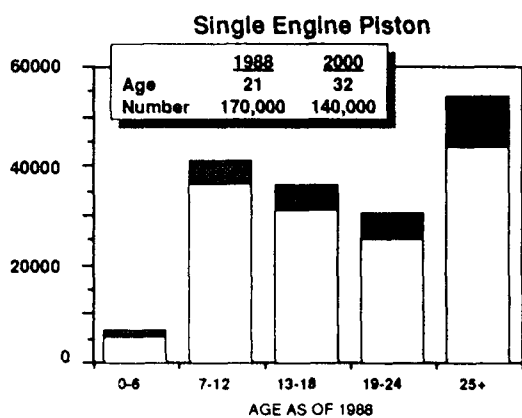


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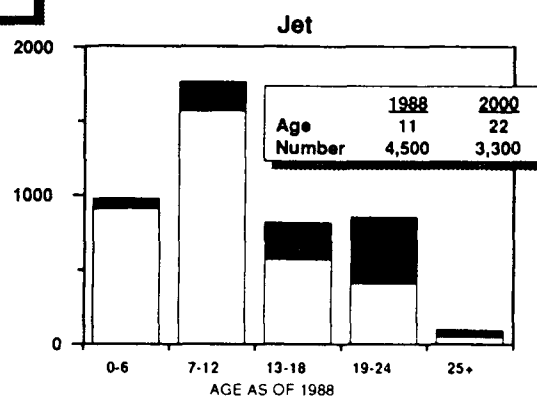
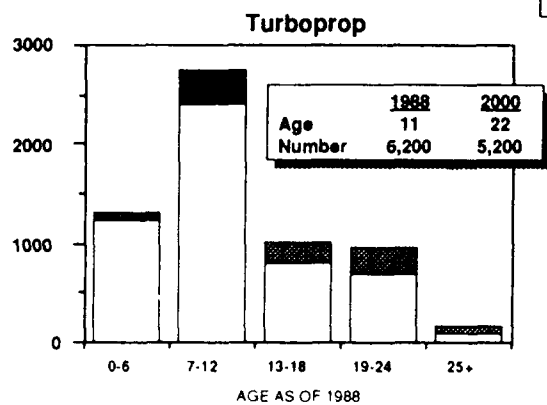
PANEL I

EXHIBIT 9

TODAY'S FLEET REMAINING IN 2000

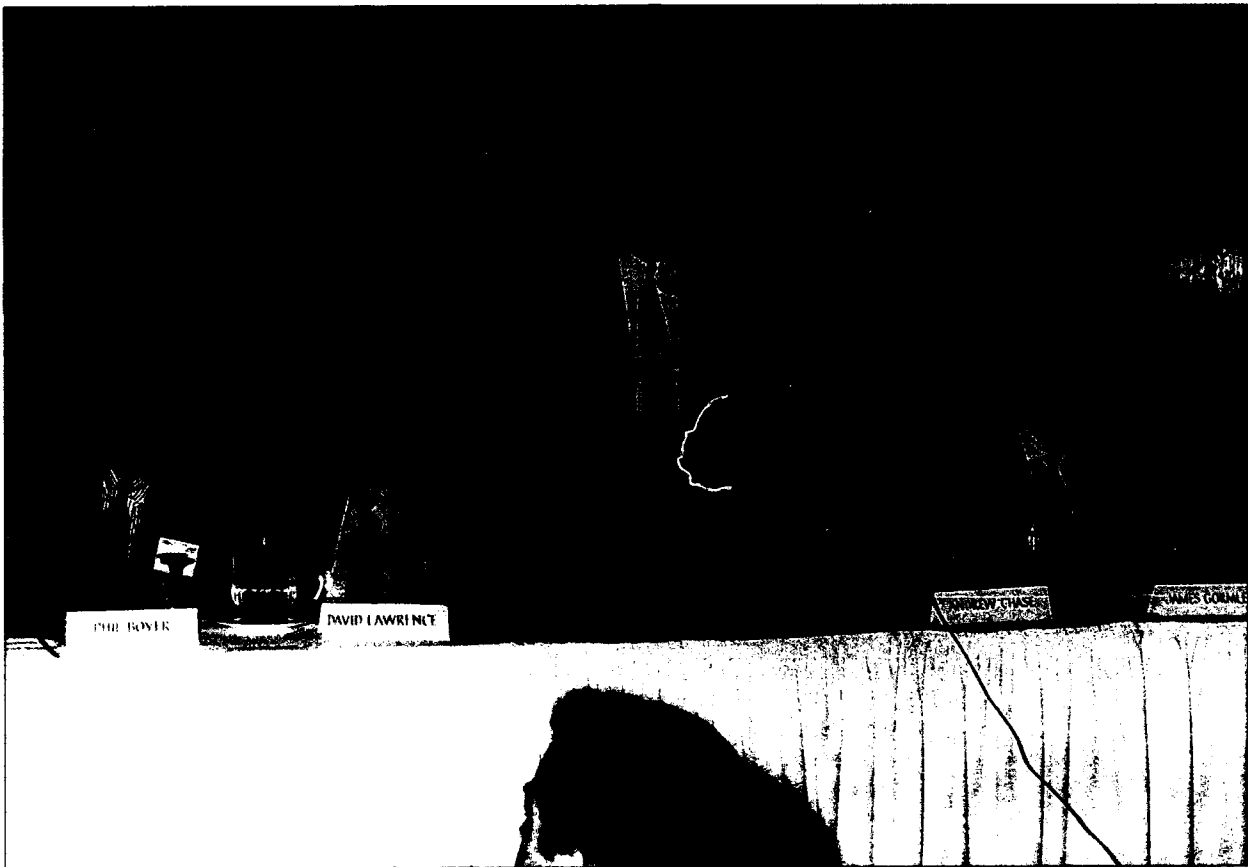


LEGEND
 ■ Aircraft Removed from Service
 □ Aircraft Remaining



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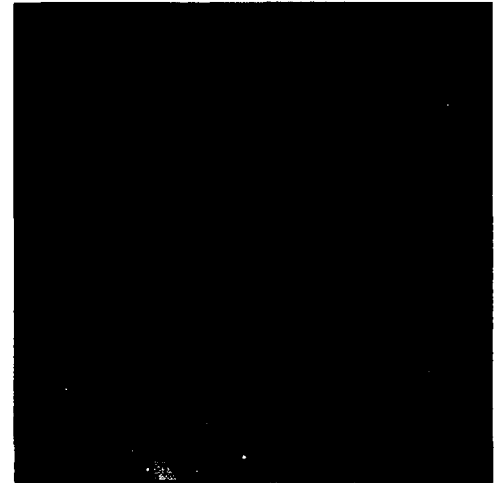
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David S. Lawrence

**Director
International Business
and Forecasting
Sikorsky Aircraft**



Biographical Highlights

David Lawrence is Director - Market Planning for Sikorsky Aircraft Division of United Technologies.

Joining Sikorsky after service in the U.S. Navy, Mr. Lawrence has held management positions in marketing, product support, and strategic planning. He holds a masters degree in regional economics and has written numerous papers and articles on the economics of the helicopter industry. Mr. Lawrence is an advisor to the Fairfield University School of Business and is active in the National Association of Business Economists and the Transportation Research Board, where he chaired the Committee on Helicopters.

Summary

The helicopter industry, historically defense-dependent, has been impacted significantly by lessening East-West tension during the past two years. It has reacted to present and planned reductions in military expenditures by downsizing, by intra-industry collaboration, and by reaching aggressively for a new significance in civil aviation.

In particular, with its eye on a role in mitigating the growing problems of congestion in the aviation system, the industry has sought to identify and address the technical, economic, and regulatory obstacles that could prevent it from reaching its potential. While the ultimate role of the helicopter cannot yet be defined, there seems little doubt that the unique and increasingly useful aircraft will be a significant player as general aviation continues to evolve.

The Fortunes of Peace: New Agendas and New Roles for Helicopters

Background

It's commonplace these days to say that the unpredictable geopolitical shifts of the last two years have forever changed the ground rules in this industry or that industry, but I think it's fair to say that few things have changed so traumatically as they have for those of us who manufacture helicopters. Unlike some other predominantly defense industries, like our neighbors in Connecticut who make atomic submarines, and who really live in a military monopsony, helicopters do have a significant civil business; but like the builders of submarines and rockets, we are extremely capital-intensive. So, we cannot do much in the way of "conversion," which is the current buzzword for beating swords into plowshares; but we can do something in the way of diversification within the helicopter universe itself, at least to the extent that the market will allow, and that is what I'd like to talk about this morning.

First, by way of background, let me flash through a few bits of basic data on the helicopter side of the aviation business we are all in, and let's see how military -- that is to say, how vulnerable -- it really is, and where we might find a few opportunities (Figure 1).

After the peak in 1986, we've seen a decline of about 2-1/2% per year: moderate so far, and mostly normal attrition. And we might note in passing that the Europeans are more stable than we are in consequence of the priority they put on social goals, which makes productivity less important to them than unemployment.

Behind the employment data are 10 years of shipments that reflect the same trends (Figure 2), and our belief is that these trends will continue.

It might seem from these data that the industry as a whole is not so much the captive of the U.S. military monopsony as we had thought, but when you add international government sales, the significant military dominance is apparent. Please note, by the way, that the unit data may tend to obscure that dominance in that civil aircraft are much smaller and less expensive than military. When we disaggregate the data by manufacturer, the dependency picture is far more serious (Figure 3).

There are only eight significant primary manufacturers of helicopters in the world, and some of them may well be at risk if military procurements are further stretched or cancelled. The risk to the four American companies may be exacerbated by a dramatic shift in the balance of defense trade across the Atlantic during the last decade (Figure 4). Perhaps more important, and not reflected in these charts, the

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R&D funds available to all these companies will certainly diminish across the board; and in this respect, the impact of shifting away from a war economy will be enormous.

Outlook

The dramatic rush of events in 1989 and 1990 notwithstanding, these developments should not have been total surprises, and in fact they were sort of acknowledged in almost everybody's pessimistic scenario somewhere. And, without meaning to impute more precognition to our business plans than we deserve, I must note that the industry had taken at least a few tentative steps down the appropriate path before both the Wall and Wall Street began to collapse. But the pace will now accelerate.

Of the many actions taken and being taken, three reflect trends that belong in any discussion of the helicopter industry as it affects general aviation, and two of them are likely to make a difference in the quantity and quality of the product we manufacture.

The first of these is downsizing.

Downsizing the helicopter industry's employment and assets is inevitable, and it was well overdue before the bottom fell out of military budgets last year. Our company's own core is down by about 10% from its peak in the mid-eighties, and I think that's about par for the course or even a little less severe than some. That trend in the industry will continue until we pare our respective sizes down to the levels that can be justified by projected work.

But perhaps more significant is the likelihood that one or more of today's eight major manufacturers will disappear as such during the next half-dozen years, because there just aren't enough critical masses to support that many independent companies.

That leads us to the second trend, because the result of smaller markets, smaller companies, and fewer companies has to be increased collaboration. Encouraged by military establishments on both sides of the Atlantic, there now are no new helicopter program starts that reside with one prime alone. Instead, the U.S. Army LH program competes a Boeing/Sikorsky team against a Bell/McDonnell team; the U.S. Marine Corps V-22 contractor is Bell/Boeing; the British/Italian EH-101 program features Agusta and Westland as E-H Industries; and the NATO NH-90 project equity is held by Agusta, Fokker, and Eurocopter -- which latter is itself a merger of Aerospatiale and MBB. Some of these programs may have civil market implications; in any case, I think it's safe to say that there will never again be a large civil helicopter that isn't a near-derivative of a military transport, or a multinational joint venture, or, probably, both. And, by the way, it will sport major content in design as well as fabrication from countries that do not now field a significant helicopter manufacturer.

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Now, with increased collaboration there is always the danger of decreased competition, but there's been little evidence of that as this scenario has developed over the last few years. There may well be a smaller offering of products, but the proliferation of clone helicopters in the seventies and early eighties produced little in the way of customer benefits, and a lot in the way of a weakened and top-heavy industry. The evidence does suggest that collaboration thus far has permitted substantial improvement in the quality of helicopters, and I doubt that the expansion of the technological envelope demanded by LH or V-22 or NH-90 could have been achieved without that collaboration.

So my projection of the downsized and collaborative industry sees a somewhat smaller selection of helicopters but a much higher level of quality. And, I would hope, somewhat lower real prices in consequence of better scale economies, although collaboration -- from the Concorde to the EH-101 -- does inevitably inflate administrative costs.

The third trend more directly impacts some of the issues the FAA has highlighted for this meeting -- particularly small airport development and the ATC system -- and that is that in our intensified search for a future, the helicopter industry has rediscovered the civil market. And here I should touch on what we're calling the Civil Rotorcraft Initiative.

The Civil Rotorcraft Initiative

The Initiative is an across-the-industry effort to understand the issues and take a proactive role in better integrating helicopters into the national transportation system. It began to take shape in the spring of 1989 at the urging of two helicopter industry executives, independently and coincidentally reacting to the world pressures and opportunities we've been speaking of. The two executives were Stanley Martin of the Bell-Boeing Joint Program Office and Eugene Buckley, President of Sikorsky.

They saw an apparent coming together of growing air-traffic congestion, new rotorcraft technology, and a willing government in Washington as a signal for a new industry agenda; they saw an opportunity for global cooperation to improve the product and its public perception, and to resolve the patchwork of international regulatory controls that constrain rotorcraft development, just as they often constrain development in other segments of general aviation.

A broad-based steering group included the major U.S. and European manufacturers, the FAA, NASA, the helicopter trade associations, and related aviation interests who are not directly involved with helicopters. Its objective is to show how helicopters or rotorcraft can help solve the short-haul transportation crisis; and specifically, to identify the obstacles to their more widespread use in passenger transport roles, and to develop an action plan to remove those obstacles. Working groups have been exploring those issues, or obstacles, and they will present their report to the industry in May, along with their recommendations for further government and industry action.

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This may not be the first attempt to define the role of the helicopter in transportation, or even the most comprehensive, but the focus is necessary now, and the level and extent of cooperation in the effort is indicative of the urgency.

Defining the Niche

Now, the impetus for this particular initiative was the notorious air system congestion problem, which already has not only impacted the way we travel -- or fail to travel -- but has also impacted the structure of the way we conduct our business everywhere in the industrial world. Clearly, for example, increasing experimentation with behavioral landing fees, whether at Boston Logan or London Heathrow, no matter how unfair or even unworkable it may be, does reflect understandable panic as we sink deeper into potentially disastrous airport saturation. And just as clear is the prospect that helicopter transports could make the short-haul commuter business less airport-intensive, and by the way, free up more space for GA aircraft. This was, in fact, a key assumption of the FAA's Rotorcraft Master Plan, published last November, which shares several assumptions and objectives with the industry's Civil Rotorcraft Initiative. And the idea of attacking the congestion problem by way of the short-haul commuter is attractive. In the New York hub, for example, short-haul commuters use 18% of the capacity to deliver only 3% of the scheduled traffic, and I'm sure that's representative. And a recent projection that 59% of the next fifteen years' growth will be accommodated by additional airplanes lends no comfort to that outlook.

But we should be mindful that this problem has emerged before, and it will again; and while it is very real, the solutions that each of us offer as "best" or even "unique" may not be either of those things. My own first experience with the congestion problem and its role as a gravy train for all kinds of strongly lobbied solutions was the Great Airport Saturation of 1968. That one, you may recall, was resolved by the twin miracles of a recession and the 747, which together managed to reduce both passenger and aircraft operations to a comfortable level for a long time. There are many potential solutions to the problem of aviation congestion -- some very costly, some "not yet fully invented," as Andy Rooney used to say about the helicopter -- and they range from more runways to high-speed trains.

At this point, the market may be signalling a preference to solve the problem through expansion of existing fixed-wing hubs. New utilization of Stewart Airport, the Chicago plan, and the major development that we'll visit tomorrow here in Denver are certainly strong signals in that direction; and it's undeniably attractive when you consider the importance of sunk costs and the cost of replicating the existing airport and airway system, the momentum of training and related infrastructure in the airline industry, the scarcity of capital that would be needed for a revolutionary as opposed to an evolutionary approach, and the emergence of phased-array radar and other technical prerequisites.

Clearly, airport expansion, to the extent feasible, will help solve the problem; all of these prospective solutions will help. But just as clearly, helicopters will have a major role to play.

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What might that role be?

It, too, will be evolutionary and not revolutionary. In the relatively near term, helicopters will increase their traditional if somewhat spotty role as shuttles in metropolitan areas, essentially between downtown centers and the airports that serve them. Ultimately, they will expand their commuter services from the shuttles within metropolitan areas to somewhat longer routes between nearby cities. And while I don't foresee intercity routes of more than 150 miles or so for today's helicopters or perhaps even for the more advanced vertical-lift equipment of the future, intercity helicopter service does exist today and undoubtedly will expand in the most heavily travelled corridors.

And this raises two questions.

First, will this be the mass transit that off-loads the airports?

That's doubtful. But, like the rest of general aviation, it will offer attractive alternatives to scheduled carrier service for those whose value of time and other needs are appropriate.

And then, why will this be viable, when it's never been viable before?

There are two reasons. One is the demand for such a service, which exists and is served to a small extent today, and which will grow in parallel with the growing difficulties of congested scheduled service. The other is the impressive improvement in helicopter technology since the days of the original helicopter airlines that many of you remember, and please remember also that the equipment they used all predated the Viet Nam war and the technical revolution that it spawned. Without going into the litany of advances in helicopter technology, from glass cockpits to HUMS, let me just note in passing that the dispatch reliability, operating costs, and comfort of today's helicopters are substantially improved; and they will substantially improve again before the end of the decade. Those of you who know this generation of helicopter, or who follow the trades on that subject, are fully aware of the speed with which recent military rotorcraft technology has been integrated into civil equipment.

The Future

Finally, it's important that we understand the interface between helicopters and conventional general aviation. And that is that we are essentially complementary, not competitive. After all, we are GA.

We interfere neither with your airspace nor your landside infrastructure. An excellent example of our ability to cohabitate is the experience of a growing, single-engine helicopter shuttle in the Boston area that is completely integrated with fixed-wing traffic, even in the face of the continuing problems the GA community has had in that hub.

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Just as important, we provide an interesting synergy -- an opportunity for business users and charter operators alike to offer a complete spectrum of general aviation utility, from international distances to none at all.

In summary, if you ask about the status of the helicopter industry, we would answer:

- o It's changing -- smaller, more collaborative; at the same time, more efficient, more capable.

- o By necessity as well as desire, it's increasingly more oriented to civil applications.

- o It has a role to play in the air system congestion problem -- the helicopter may not solve it, but it sure can make it more livable.

- o Perhaps most important, we complement the fixed-wing side of general aviation, but we don't compete for what's left of your shrinking terminal-area elbow room.

Thank you very much.

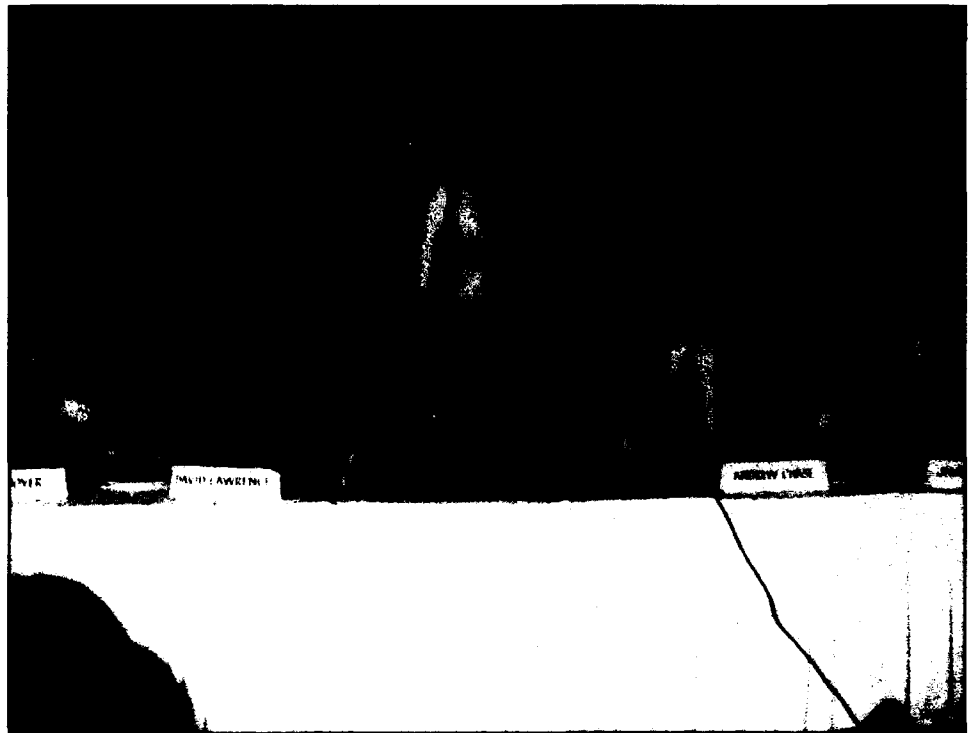


Figure 1.
MANUFACTURING EMPLOYMENT IN
THE HELICOPTER INDUSTRY (1980-1989)
(Thousands)

<u>Manufacturer</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>
Aerospatiale	7.4	8.7	8.7	8.5	8.5	8.5	8.0	7.2	7.4	7.4
Agusta	6.1	6.6	6.6	6.5	6.5	6.5	6.0	6.0	4.9	4.9
MBB	1.6	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.2
Westland	7.5	7.5	7.5	7.4	7.4	6.2	5.0	4.7	4.6	4.9
Total European	22.6	24.3	24.3	23.9	23.9	22.7	20.5	19.4	19.4	19.4
Bell	9.2	8.5	6.2	6.1	7.2	7.8	9.0	9.0	7.5	8.0
Boeing	5.5	4.8	4.6	3.8	5.3	6.0	6.5	6.5	6.3	6.3
McDonnell	4.5	4.4	4.2	5.8	6.3	7.0	8.0	8.0	7.5	6.7
Sikorsky	11.7	11.8	12.0	12.3	12.5	12.5	13.2	13.6	13.0	12.7
Total U.S.	30.9	29.5	27.0	28.0	31.3	33.3	36.7	37.1	34.3	33.7
Total Industry	<u>53.5</u>	<u>53.8</u>	<u>51.3</u>	<u>51.9</u>	<u>55.2</u>	<u>56.0</u>	<u>57.2</u>	<u>56.5</u>	<u>53.7</u>	<u>53.1</u>

Source: Published data and Sikorsky estimates

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**Figure 2.
HELICOPTER SHIPMENTS (1980-1989)**

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>
U.S. Military	147	156	164	229	225	306	304	323	291	232
International Military	611	564	472	450	485	534	603	433	376	432
Total Civil	<u>1200</u>	<u>1119</u>	<u>823</u>	<u>498</u>	<u>565</u>	<u>362</u>	<u>386</u>	<u>399</u>	<u>426</u>	<u>462</u>
Total	<u>1958</u>	<u>1839</u>	<u>1459</u>	<u>1177</u>	<u>1275</u>	<u>1202</u>	<u>1293</u>	<u>1155</u>	<u>1093</u>	<u>1126</u>

Source: Published data and Sikorsky estimates

Figure 3.
**MAJOR MANUFACTURERS' MARKET
DEPENDENCIES (1989)**

Manufacturer	Total Sales (\$M)	Distribution of Sales (%)		
		U.S. Military	International Military	Civil
Sikorsky	1700	75	15	10
Aerospatiale	1200	-	30	70
Bell	1075	-	35	65
McDonnell	900	60	10	30
Boeing	700	80	20	-
Westland	500	-	100	-
Agusta	325	-	70	30
MBB	250	-	25	75
Weighted Total	6650	40	30	30

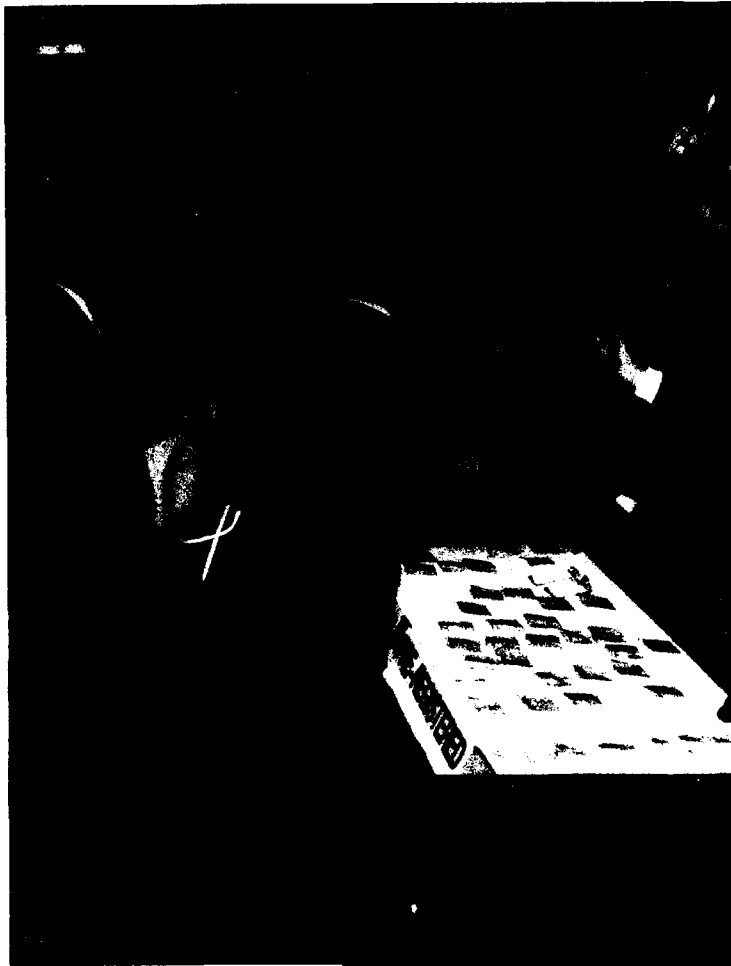
Source: Sikorsky analysis

**Figure 4.
U.S./EUROPE DEFENSE TRADE
1984-1987**

	<u>U.S. Exports to Europe</u>	<u>U.S. Imports from Europe</u>
1984	\$8.0B	\$1.0B
1987	3.2	2.0

Source: CSIS Staff Paper, November 10, 1990

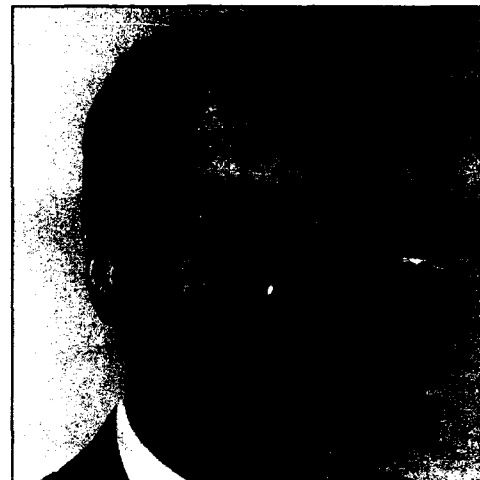
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Phil Boyer

**President
AOPA**



Biographical Highlights

Phil Boyer became President of the 300,000-member Aircraft Owners and Pilots Association on January 1, 1991.

A long-time broadcasting executive and general aviation advocate, Mr. Boyer is a 3,000 hour private pilot who has been flying for more than 23 years, 13 of those as an aircraft owner. He is instrument- and multiengine rated. He is the developer and publisher of ABC's Wide World of Flying, a quarterly subscription-based video magazine produced since 1987.

Prior to his selection as AOPA President, Mr. Boyer served as Senior Vice President, Development, for Capital Cities/ABC Video Enterprises, Inc., and has also held the top executive position as Vice President and General Manager at ABC's flagship station, WABC-TV in New York, and WLS-TV in Chicago. He earned a degree in communications from Sacramento State University, and later was an associate professor for communications there.

Mr. Boyer is a vice president of the Northeast Chapter of the American Bonanza Society and a member of the Cessna 310-340 Owners of America. He flies about 300 hours a year and last summer, he and his wife Lois completed a 12-country tour of Europe in a Cessna 340A.

Summary

General aviation is not dying but is healthy, growing modestly, and has been doing so for some time. Problems, however, include airport capacity and access, fuel taxes, product liability and until now, there has been no overall, consistent vision of the future for general aviation. This conference is a sign that one is beginning to take shape.

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A General Aviation Pilot's View: Don't Slow Us Down!

I come here today with a pilot's perspective. I have a 30-year background as an executive in communications, principally in television, but I am also an aircraft owner and have been a very active pilot for more than 23 years.

I've been asked to provide a general aviation pilot's view of the industry. Aside from the facts and figures I'll give you, my personal commitment just a few months ago to take on the job of AOPA president probably gives away the bottom line to my remarks. Obviously, I'm enthusiastic about general aviation, and I believe there's still life in this industry or I certainly wouldn't have made a major lifestyle change, moving out of Manhattan to Frederick, Maryland; and certainly wouldn't be mounting to a podium twice a week to talk about general aviation when I usually prefer sitting in the audience. Just like our 300,000 AOPA members, I am a general aviation pilot and I look at the industry from that perspective.

Let's start by looking at some of the negatives. There are pundits who say general aviation is slowing down or severely depressed. Some even suggest that general aviation is dying.

Yes, more than a thousand public-use landing facilities have disappeared over the past 10 years, due to a variety of reasons ranging from local development to noise concerns, to a lack of support from all levels of government. Currently, there are just a few more than 5,600 landing facilities open to the flying public in the United States. Ten years ago there were 6,600 and 20 years ago, 7,100. The pilot population has declined by more than 125,000 in the last 10 years. Today, there are less than 700,000 pilots in this country compared to well over 825,000 just 10 years ago. And total flight services provided by flight service stations have declined 32% over the past decade. U.S. aircraft shipments have declined by 94% since 1978. In that year, U.S. manufacturers shipped 17,800 new aircraft, but last year, according to GAMA, only 1,144 aircraft were shipped. Pretty discouraging figures, you'll agree.

Well, I think those numbers are obscuring the truth. They're not the key indicators of general aviation's health or growth. A recently released FAA projection to the year 2005 forecast an increase of 23% in general aviation hours flown and an increase of 38% in IFR operations. It predicts a 7% expansion in total flight services, an increase of 5% in number of general aviation aircraft, 15% more pilots, and 7% more instrument-rated pilots.

General aviation is not dying. Quite the contrary. General aviation is healthy, it is growing modestly, and it has been doing so for quite some time. The total general aviation hours flown in the national airspace system has been stable or slowly increasing since the early 1980's. In fact, the 35 million hours flown by general

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aviation in 1989 is the highest number of hours flown by the industry since 1984. And attendance at safety seminars, air shows, conventions, and fly-ins is holding strong. I was at nearly every air show and aviation convention that's been held this winter, and I can tell you the attendance was heartening. An example: Tacoma, Washington, the Northwest Aviation Conference, 12,500 pilots gathered on a weekend of horrible weather to look at trade show exhibits and to discuss general aviation. Enthusiastic? Absolutely!

Just this last weekend I was in Kalispell for the Montana Aviation Conference. It was right after a major snowstorm, but 650 pilots were there, enthusiastically discussing general aviation and looking forward to many years of flying.

Our own AOPA convention in Palm Springs last October drew a record turnout of 5,500 pilots, so many of whom arrived in their own aircraft that we had delays of an hour and a half for takeoffs. You couldn't tell that group that general aviation was dying. There were 250 exhibitors at our trade show -- more than we've ever had before -- all enthusiastic, all selling products for the aging but active fleet of 210,000 general aviation aircraft.

Yes, it's easy to believe that general aviation is alive and well when you look at the many events drawing such upbeat people. And they're flying: 22.3 million hours in piston-engine singles in 1989, the highest total hours in five years. More importantly, they're flying safely. The 1990 general aviation safety record is the best it's ever been. According to the NTSB and our own AOPA Air Safety Foundation, general aviation suffered only 7.01 accidents and 1.39 fatal accidents for every 100,000 hours flown last year.

Another sign of vitality in general aviation: there is strong interest in initial and upgrade flight training. You tell a new private pilot or a student who's just soloed that this is a dying industry and you're going to be preaching to deaf ears. In every year since 1985, personal flying accounted for more hours than the total flown by corporate and all other business flying together. This is something Admiral Busey has talked about -- the fun part of flying. Almost one out of every three hours flown is flown for personal reasons. Personal flying is what brought me into aviation -- running up my first Mastercard and Visa to their limits with flying lessons, grounding myself until they were paid down, and finally getting my first pilot license. When you're raising young kids and buying the washer and dryer, that's about the only way to do it.

In 1989, general aviation flew 10.3 million hours for personal reasons, corporate flying accounted for about 3.7 million hours, and other business flying for 4.7 million hours. General aviation instructional flying has been increasing. More hours of flying instruction were flown in 1989 than in any year since 1977, when the numbers were first collected. General aviation in 1989 conducted the highest number of operations since 1981. And the proportion of pilots with instrument ratings and the proportion of flight instructors is increasing substantially, despite a decline in the overall pilot population. Ten years ago, 30% of pilots were instrument rated; today approximately 40% are instrument rated. Ten years ago, 7% of

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all pilots were flight instructors; today that proportion is 9%.

As I noted before, there are just about 5,600 public landing facilities in the U.S. which accept general aviation aircraft, down a thousand from 10 years earlier. However, there are almost 12,000 more which are private strips which general aviation can use; many are private/public-use airports. Air carriers, on the other hand, have access to less than 400 airports on a scheduled basis and serve just 20 or so locations around the country for the majority of their flying.

General aviation's potential growth is being restrained by a number of factors, but they are not insurmountable obstacles. For instance, no new training aircraft are being built in the U.S., but on the other hand, Aerospatiale's interest in acquiring Piper aircraft is a positive sign. Then there is the hope of a primary aircraft certification rule, which AOPA has been working on for nine years. It was interesting to hear the FAA Administrator talk about this rule as a possible stimulus for new, low-priced, four-place, lower-horsepower, non-complex aircraft. We're working hard on that.

There's been no realistic and comprehensive aviation vision for the future as it related to general aviation. I think this conference, the first of its kind to deal exclusively with general aviation interests, is a positive sign pointing toward a vision for the future for general aviation. There have been various disconnected DOT and FAA annual plans, not always coherent and not addressing general aviation concerns in depth. In a move to encourage remedies for this problem, AOPA last year issued a major report called, "Aviation: The Future is Now." I commend it to your attention.

We continue to be concerned about the airport and airways trust fund, for which taxes are collected but not spent for the purposes Congress intended. Adding insult to injury, user fees are being increased, despite the seven or eight billion dollars that now lie uncommitted in the trust fund. AOPA is working very hard, last year on the federal level and this year on the state level as well, to get taxes on general aviation reduced. This year, 35 states have new governors, 26 of those states have fiscal crises, and the notion of aviation fuel taxes seems to be in a lot of minds as a way to help them offset some of those deficits.

Everyone in this audience is surely aware of the persistence of ATC inadequacies -- equipment malfunctions, procurement problems, NAS plan implementation problems. I was just recently in Albuquerque and visited a beautiful new automated flight service station, built two years ago in the architectural style of the New Mexico area. I asked why it isn't operational yet. Procurement problems. So here we are, at about our 50th AFSS, and they're having problems with the manufacturer. This wonderful facility with people trained to work there is not in operation because of equipment malfunctions.

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We still suffer airport congestion, access problems, like the Boston-Logan access restriction that we faced, or right here in Colorado, the Aspen issue. But AOPA is pursuing these problems with legal and administrative action, supported by our members, to try to convince the public, to convince congress, to convince the states, and to convince the airport authorities that general aviation deserves its fair share of available capacity.

In my first meeting with Sam Skinner, a principal topic of discussion was airport capacity problems. I took the occasion to remind him that not all of our 300,000 members want to fly into Denver's Stapleton Airport or Boston-Logan, but when it is the closest place to where they have to do their business, a few of them will need to do that. They fly airplanes equipped to enter a TCA like Boston, and they are skilled enough to use that kind of airport, so they should have that access.

Speaking of my relationship with Sam Skinner, I might mention that we think it's a very positive circumstance to have a Secretary of Transportation who is a general aviation pilot. We think that should make it easier for others in DOT to acquire an understanding of the general aviation environment. Sam will be flying a general aviation airplane into Frederick, Maryland, on March 18 for an historic afternoon visit to our headquarters to find out just what we're all about and what we're doing. We're looking forward to that visit with pleasure and pride.

There is a great lack of runways, and community support for reliever airports is hard to generate. As long as there are airplanes, we're going to need a strip of concrete or asphalt or dirt or grass to put those wheels down on. Seaplanes and helicopters will always be a minority among aircraft. AOPA is supporting initiatives to keep existing airports open, to seek new funding for reliever airports, and to construct needed new airports.

I just came here yesterday from San Jose, California, where we're into a real Catch-22 situation. San Jose International wants to reduce the number of GA aircraft using that airport, but at the same time nearby Reid-Hillview Airport, which could take some of that traffic, is under attack by a county government that wants to close it. And then right across the low mountains next to the coastline, there's Watsonville Airport. They want to put low-cost housing on that land, which is really the only aviation way to get to that county. It's really amazing, because all three of those airports were used for major medical and food supply and other emergency airlifts during the San Francisco earthquake two years ago, and those highly praised relief flights were all carried out by general aviation pilots.

Other general aviation problems are generated in various quarters. Heavy-handed drug enforcement actions and requirements, some imposed by Customs authorities and some by Congress, include the ludicrous example of the proposal in the Senate that general aviation aircraft should be shot down if they are suspected of drug smuggling. AOPA was successful in defeating a couple of those wild attempts, but they'll be back, and there'll be more.

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There are unreasonable aircraft maintenance requirements for the present aging fleet -- a proliferation of service bulletins, some oddball mandatory service bulletins, and then the ADs. On behalf of our pilot membership, we review every one of the ADs that affect general aviation aircraft to make sure that they're not onerous, that they are truly justified, and that they aren't a knee-jerk reaction to a problem that may have been significant only for a couple of airplanes in the fleet flown in specific ways.

Contemplated unreasonable equipment requirements have the potential to lay unwarranted burdens upon general aviation owners and pilots. Two examples: MLS and Mode S, and we hope we have heard the last of them. And yet AOPA, while opposing these, has been supporting advanced technology when the cost and complexity were justified by very real safety or navigational advantages. Loran C was first flown by our members, its use was spearheaded by our membership, and we look forward probably more than anyone else to the Loran approaches that the Administrator talked about earlier this morning.

Right now our members are flying second-generation Lorans, but they're not buying the next one until they know whether it's GPS-compatible. Again, I refer you to the AOPA document, "Aviation: The Future Is Now," which includes our proposal to the Congress for a space/earth, GPS/Loran C air traffic control system to replace, at less cost and complexity, the ILS system.

Another plague for general aviation is a lack of timely data to help analyze the problems. You may have noticed that many of the figures I cite are from 1989. They are the latest figures we have. We need data on a more timely basis, and when I say "we," I include government offices as well as private industry and user associations. We shouldn't have to wait two years to find out things that may have changed radically while the statisticians chewed their pencils. I am, of course, contrasting this with the business I came from -- television, which is gauged and governed by the TV rating business, which includes overnight ratings. We should at least be able to know the general aviation hours flown in the last quarter or in the last month. It's not too much to ask. At AOPA, with our limited staff, we survey 1,200 fuel vendors each month to produce a weekly average fuel price trend index. So we know these things can be done.

The costs of general aviation -- taxes, fuel, maintenance, equipment requirements, insurance -- continue to rise. But the pilot population, our membership, is putting up with this unavoidable evil. They're buying the equipment, they're paying for the insurance, they're taking the fuel increases. The one critical issue is the leaded avgas problem. To take a big first step toward solution of that problem, AOPA is holding a major seminar on March 13th in Washington. Many of you in this room are invited and will be attending. We want to pull together the EPA, other government organizations, pilots, the oil companies, other aviation membership organizations, to really understand this problem and see where it's going. We want to make sure it will not ground the 194,000 piston-powered aircraft in our 210,000-aircraft fleet.

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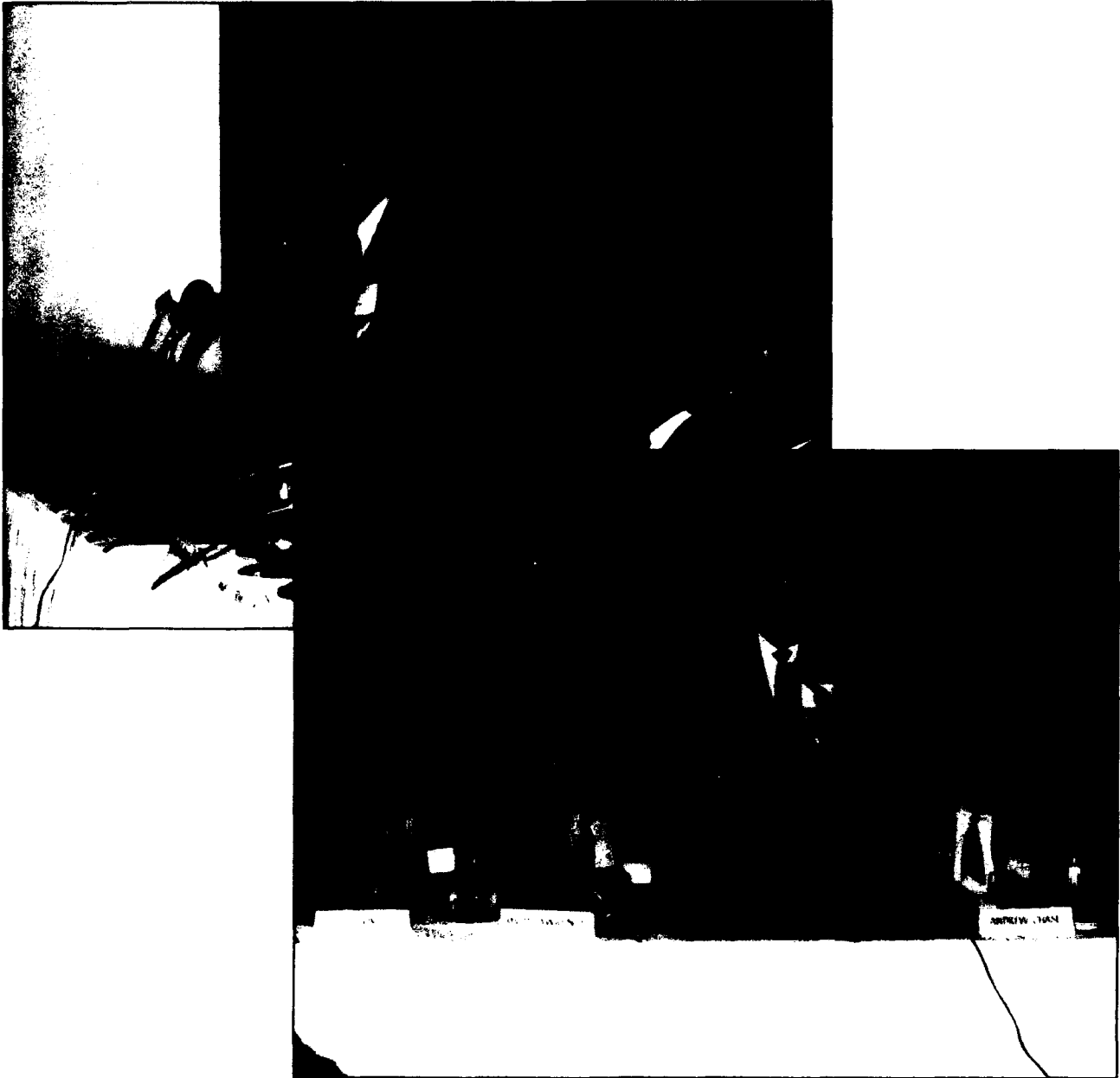
General aviation is an essential transportation resource and its future is important to the nation. You wouldn't be in this room if you didn't think so. It's not going to die. It's vital, it's dynamic, and it's an industry that produces an estimated economic benefit to this country of \$42 billion a year. General aviation plays a role in the national air transportation system for which it is uniquely qualified.

People like to fly, people want to learn to fly, and people want to be challenged. And people do need to travel. While general aviation will not grow as fast as it did in the late 70s, it's not going to decline, as some suggest, like the numbers of new aircraft shipments did in the 1980s. That's an abnormality caused by a variety of factors and not a leading indicator for the future of the industry.

General aviation is going to grow, but at a relatively slow and steady rate over the foreseeable future. Why? Because general aviation provides a substantial economic benefit to the public, and because general aviation pilots like myself and our 300,000 members will demand it. Be assured that AOPA will play a major role in preserving this great American resource of general aviation.

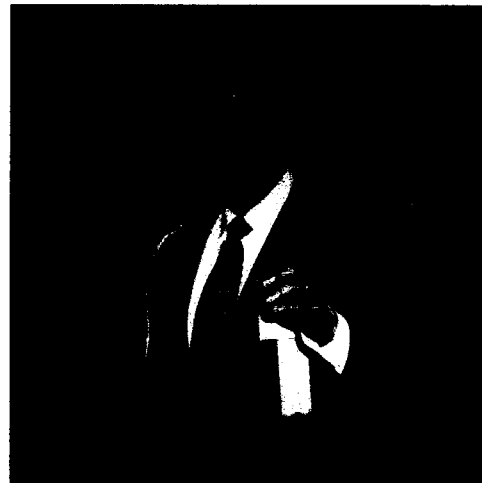


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Charles N. Coppi
Senior Vice President
Engineering and Technology
Gulfstream Aerospace Corp.



Biographical Highlights

Charles N. Coppi is Senior Vice President, engineering and Technology for Gulfstream Aerospace.

Mr. Coppi began his engineering career with the Grumman Company in 1952. In 1956, he was assigned to the Gulfstream I preliminary design team and, since then, has been a guiding principal for the development and evolution of the Gulfstream II, and Gulfstream III and Gulfstream IV.

Mr. Coppi is a native New Yorker and received his Bachelor's of Aeronautical Engineering degree from New York University in 1952.

Summary

We are today witnessing dramatic worldwide political , economic and cultural changes. As we move toward the turn of the new century, these changes will stimulate the inevitable expansion and repositioning of our global business communities.

Recognition of those enormously important events will influence the future course of business aviation. These influences will emerge as new customer requirements for the ultimate "time-machine" - the supersonic transport.

The challenges will be formidable but not insurmountable and the commitment to pursue the concept through recognition of the need will convert the challenges to opportunities. As always, the opportunities will lead to the realization of industry and customer expectations.

The Supersonic Business Jet: Recognizing the Need and Accepting the Challenge

Thank you.

Personally, and on behalf of Gulfstream Aerospace, it is indeed a pleasure to be with you today. In keeping with the theme of this forecast conference, Gulfstream is prepared to go out on the limb as far as you can go and speak to the coming of the Supersonic Business Jet. It is our purpose today to share with you our insights into defining the need and our perceptions regarding the challenges we face.

But before we address the supersonic business jet, I would like to offer a brief commentary on this First General Aviation Forecast Conference.

Clearly, it is both noteworthy and timely. Noteworthy in the sense that there exists a demonstrated awareness of General Aviation as a recognized contributor within our aviation industry and timely in the context of realizing that we are ready for some good old fashioned soul searching to prepare ourselves for the twenty first century.

Let me say at the outset, that I am a strong proponent and an avid supporter of forward planning. Our Federal Aviation Administration is to be applauded for bringing us together in the framework of team building to surface the issues and create the opportunities that will strengthen the future posture, health, and well-being of General Aviation.

In my view, that alone makes this forecast conference an exciting event. And, in the true spirit of all quality process initiatives, we are all here to help.

I believe we all share the common view that our General Aviation industry has arrived at a pivotal juncture. There is an urgency to move forward, but perhaps selecting the path to follow lacks sufficient definition. When you consider the many facets of our industry it becomes very clear, very quickly, that an integrated planning process is in fact a prerequisite for establishing our future expectations.

We are today witnessing extraordinary changes in our world. Each one of us here today, to some degree, will be touched by the restructuring taking place. We are all being caught up in the ever-changing "90's". The only thing we can count on is change and knowing how to manage change will be a key ingredient to our success as an industry.

Admittedly, we face some formidable challenges. Soaring product development costs; environmental issues; advanced technology readiness; budget constraints; market uncertainties; new regulatory issues; modernization of our airways and navigation systems and the development of skilled resources are just some of the things we worry about here at home.

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Internationally we see the coming of Europe '92 in an economic consolidation of nations; the growth of business consortia with government financial backing; growing competitive influences in our markets; and the emergence of nations striving to establish market based economies - all obvious external threats to our industry -- but they can also be targets of opportunity for alignment with our future business strategies.

Certainly, this is not the time for complacency. The message is clear. It is time for strategic thinking focused on making our industry flexible and able to compete as an industry team. The message is also telling us that it is time to change old habits.

It has often been said that history is a good teacher. Or, to put it another way, those who ignore history are destined to relive it. General Aviation has come a long way from a fledgling post World War II start. Years of growth and experience make it today a vital part of our National Air Transportation System including an impressive worldwide presence.

The lessons we have learned form a solid foundation upon which to declare our strengths and weaknesses. This foundation must be a cornerstone for the forecast process to be successful. Gulfstream is confident that the process will solidify our industry and enable it to prevail in future domestic and world markets.

Now, having said all that, let's talk about the Supersonic Business Jet. In order to place this concept in its proper perspective, we must go back to a fundamental principle of business aviation -- business aircraft are "time-machines." Time is the most critical resource of any enterprise and the most volatile since it cannot be replaced. Within our ability to gaze into the 21st century and knowing that social, economic and political advances will continue, the supersonic business jet will represent the ultimate time machine.

If you buy into this principle, then the process of market recognition and customer requirements definition becomes one of logic and reason -- plus a generous dose of "crystal ball gazing" and intuition.

One has only to appreciate what is happening in our world today in the way of change to begin formulating a logical and reasonable derivation of what to expect for the future of business aviation. The velocity of this change will be a prime factor in how our industry responds.

In many respects, what we anticipate happening at the turn of the century is much like what we experienced in launching the Gulfstream concept back in the mid - 1950's. The Gulfstream emerged as a vision for a unique transportation concept -- an all new transport aircraft designed, without compromise, for business aviation.

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The need was derived from a convincing rationalization that the global reconstruction taking place following World War II would produce unprecedented business growth, enormous market expansion for products and services, and dramatic increases in travel requirements. Every American enterprise would be involved in pursuing product developments, creating new markets, and rebuilding industries. Response time was a critical factor and the Gulfstream concept presented an opportunity for an aircraft that would become a productive tool responsive to the needs of any enterprise.

History has proven the vision to be correct. The concept has endured for more than three decades through a planned evolutionary process that exploited the concept. Each Gulfstream derivative along the way, culminating in today's Gulfstream IV, has blended experience with modern technology to produce ever increasing efficiencies that have kept pace with the progressive needs of the enterprises they serve.

I mention this history to make a point. We have been fortunate through the years to have developed a worldwide Gulfstream presence and an impressive list of clients that provide a marvelous intelligence network.

With history as our teacher and the present as our benchmark, what does our vision for the future begin to look like? We do know for sure that traditional methods of market analysis will not be effective simply because we will be dealing with a long term opportunity some ten years out.

Again, I will use the Gulfstream as an example. The evolution of the Gulfstream was, in large measure, predictable in terms of matching customer requirements with evolutionary technology advancements that satisfied customer needs. As with all marketing initiatives, timing was critical -- but having an accepted concept and an available technology base permitted a confident execution of the product development process.

Contrast this with the supersonic business jet potential. Traditional market analysis methods will not apply for several reasons; it is a revolutionary concept in many respects, customer requirements must be defined and product definition is lacking.

Therefore a "visionary survey" will have to be undertaken where the concept can be developed through informed business aircraft owners -- much like we did in launching the Gulfstream concept. The market will have to be created through education, communications, exchanges of views, and a lot of listening on our part. We will have to find out what the future CEO's think the aircraft can do for the enterprise and how it will fit. Ultimately we would like to continue developing the business aircraft mind set -- "Its not what it costs, but what it gets you."

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In Gulfstream's view, "What it gets you" is the ability to effectively deal with a different world going into the twenty first century -- a world that will move further toward economic, social and cultural integration. A world that will see major geographic relocation of business centers and the emergence of new markets. A world that will require spanning more distant city pairs. A world that will require exceedingly quick reaction time. In short, a world that will require a supersonic business jet.

We see it coming. The signposts are becoming visible. The changes are taking place. We can sense it in our Gulfstream fleet -- a desire to go where Gulfstream's haven't gone before and get there faster.

As events unfold with time, the process of recognizing the need will evolve into a market awareness of the concept.

We see several markets being served with a supersonic business jet. The primary market will be the national and international business sectors. A secondary market will be world's government agencies and heads of state. And a third market will develop for charter operations. (It would also make a great "escape machine" if you have need for one.)

In terms of concept development, Gulfstream has identified an initial product specification. As we move through the recognition process toward the customer requirements definition, these specifications will be refined and they will emerge as the design criteria for the SSBJ.

We currently envision a twin engined SSBJ with a 4,000 nautical mile IFR range cruising at Mach 2.0 or 1,326 miles per hour. The SSBJ would also be capable of supersonic flight over land -- say at Mach 1.5 or approximately 1,000 miles per hour. Cruising altitudes would be in the 50,000 to 60,000 foot levels and the aircraft would operate from general aviation airports. Passenger capacity would be eight to twelve with appropriate comfort and amenities.

Consider the possibilities. Productivity would be more than doubled. The speed factor will dramatically increase management value and response time. And, a Mach 2.0 SSBJ could reach virtually any world destination in a normal eight or nine hour travel day -- which is considered a limitation in terms of crew duty time and passenger comfort.

Operationally, the SSBJ would satisfy the prerequisites for a successful business transport with random "go-anywhere" flight planning, autonomous operation, and the ability to leverage time.

These will be powerful features and they will generate profound advantages in what is expected to be a different and more demanding world for business aviation.

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The achievement of this next true adventure in flight will require a new process, bold and creative, clearly different than what we have been used to in terms of design execution and program management. Acceptance of change and acceptance of the challenges we face will drive the process. New process models for thinking, cooperating, managing, leading and working are needed and are being formulated. Included will be new relationships between corporations and yes even countries.

As you all know, Gulfstream has been exploring the SSBJ concept with more than just a passing interest. Having announced our intentions to explore a supersonic business jet at the Paris Air Show in 1989, we were approached by the Soviet firm Sukhoi with an expressed desire to join with us in developing the SSBJ. Their reasoning went like this.

The restructuring, openness and de-emphasis of the military complex within the Soviet Union required a strategy focused on establishing a western world presence for consumer goods and services. Their situation was very clear -- economic survival demanded competing in the free world. And they fully understood that they couldn't be second best in competing. They knew they would have to produce products equal to or better than those available in the western world.

Sukhoi's proposition was very simple. They would undertake the development of the SSBJ to Gulfstream's specifications and requirements in exchange for Gulfstream's knowledge of product development, marketing and product support. We would be their conduit to the market and they would assume a respectable share of the development costs.

Obviously we considered this worth looking into and a Memorandum of Understanding was signed and plans organized for the first coordination meeting which took place in September 1989 at the Sukhoi Design Bureau. That meeting brought together a development team with impressive credentials. Gulfstream as program manager and as the responsible party to ensure appropriate application of design technology. Additionally, Gulfstream would ensure aircraft systems, functions and operational suitability of the aircraft to western market standards. Sukhoi would be the central design office and provide the manufacturing capability. Rolls-Royce and Lyulka, the Soviet Engine Design Bureau, would collaborate on the design and production of a new engine for the SSBJ.

Following the first meeting, we fully appreciated the meaning of the word challenge.

Fortunately our common objective of conceiving an SSBJ overshadowed the distinctly different approach to product development. The Soviets employ intensive manpower for design and manufacture with a strong inclination toward experimentation and prototype testing. Methods and procedures are hampered by bureaucratic obstacles. Market competition, risk management and profit margins are not part of their business routine simply because they have never had to deal with those issues.

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Therefore, the first challenge faced was one of education in the fundamentals of a free market society and how we cope with product application, market identification, competition, financial planning and return on investments.

Be advised that the Soviets are very capable and resourceful people. They picked up on what we were saying very quickly and began to understand the total process of bringing a product to market. The Soviets like to work. They are skilled in their professions, produce quality work and are backed up by extensive facilities and laboratories. As engineers, gathered together, working the problems, the language and cultural differences melted into the background. Thrust and drag form a common bond proving that mother nature and the laws of physics are universal.

Education does not imply that "we" will be the sole teacher but rather that, for all involved, we have an opportunity through education to learn new ideas and concepts.

The challenge is building that knowledge base and transferring it to the new process and its objectives. One, among many, that comes to mind concerns the issue of program funding. We are looking at a billion dollar development program -- certainly prohibitive for a single enterprise to undertake. This implies a joint venture with risk sharing partners and that raises the issues of program management, patent and copyright protection. Program control and communication must be defined up front if the process is going to work -- particularly if other countries are involved.

If the program goes forward with international partners, and in this case the Soviet Union, bilateral agreements must be established in the form of agreed to airworthiness rules, certification requirements, and standardized quality control procedures to ensure product safety and integrity.

Furthermore, international development groups will have to face the national limitations that exist for technology transfer. This will be a limiting factor unless the respective governments involved provide access to appropriate design advancements. Technology transfer will be a critical issue since national security is involved.

And, speaking of technology, it is imperative that we reach out to define affordable technologies appropriate for the turn of the century. Concorde was a masterful triumph in design and engineering; but we must look ahead at emerging new developments in aerodynamics, propulsion, systems and structural methods.

The ability to evolve an SSBJ capable of meeting the design requirements for minimum size and weight, performance and environmental suitability at an acceptable market price demands advanced technology. We will have only one shot at developing an efficient SSBJ with positive cost/benefit characteristics -- its got to be our best shot.

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Sensitivity to the environment is another key matter for this will require close cooperation between many segments of the governments involved and the entire industry team. Quiet airport operations, the sonic boom problem, emissions control, and ozone depletion will tax the ingenuity of scientists, engineers, administrators, and lawmakers. But we will have to come to grips with each element and strive for meaningful solutions. An efficient and environmentally clean supersonic transport capable of supersonic flight over land is the objective. Technology can provide the aerodynamic tailoring and power, but the absence of acceptable operating standards will render the SSBJ ineffective.

With the SSBJ in service will come the other important events needed for the entire system to become truly operational. Advanced product support methods, training, flight department management plus airways, navigation and air traffic control systems compatible with supersonic flight operations.

Now this may all sound like a litany of doom but the perspective is a positive outlook based on accepting the challenge and developing the plans, organization, people and resources that will bring the vision to reality.

There is an old Chinese saying, "May you live in interesting times." They are coming and so will many new opportunities.

So there you have it -- a sharing of Gulfstream's excitement for the next breakthrough in general aviation -- supersonic flight. The appearance of the SSBJ will launch a new era for business aviation and will require the skills of our entire industry team to bring it all together.

How it will all play out at the end of the day is not yet clear. We know there will be many issues to reconcile and questions to answer. But the answers will come with time through perseverance and commitment. And when it happens, Gulfstream will be a part of it.

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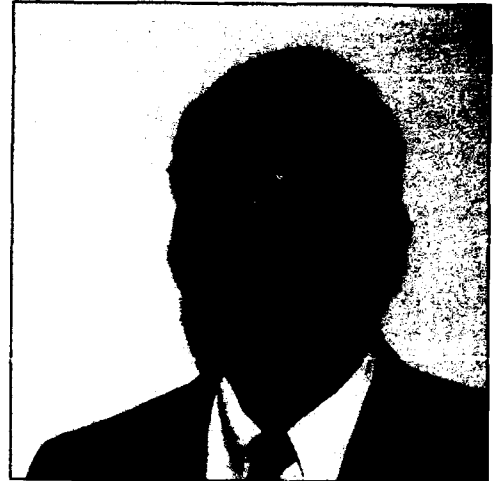
The Many Faces of Doing Business on an Airport



Robert H. Showalter

CEO

Showalter Flying Services, Inc.



Biographical Highlights

Robert H. (Bob) Showalter is a second generation fixed base operator and owner of Showalter Flying Service, Inc., a business operating on the Orlando Executive Airport since 1945.

Mr. Showalter has worked in the business since 1973. He was a top ten Piper salesman for 5 years in a row, served as chairman of the board of the NATA, and served twice as president of the Florida Aviation Trades Association. He spent two years as the vice-president, operations of Butler Aviation, responsible for 26 FBO's throughout the country. A commercial pilot, his flight experience exceeds 12,000 hours.

Mr. Showalter serves on the board of trustees of Rollins College in Winter Park, Florida, is a founding member of the "FBO Twenty Group," a structured group that strives to improve business by sharing ideas between the members, and is a member of the general aviation market expansion (game plan) board of directors.

Summary

The FAA, state regulators, airport authorities and our customers must be made to realize that fixed base operators cannot absorb the extra burdens imposed upon them with ease. The EFA regulations, security costs, firefighting and drug testing procedures are all well-intentioned, but in most cases, are economically devastating non-performing costs to this industry. Should the pressure on us cause the demise of FBO's at all but the busiest airports, we will be missed by these above-mentioned parties.

FBOs Today-Transition or Turmoil?

Good afternoon ladies and gentlemen. I would first like to commend our friends at the FAA for convening this conference at last. While the mandate for the FAA to "foster the growth of aviation" was given in 1958, perhaps some of what we accomplish today may provide a transfusion that will give the industry some more time for its own natural healing abilities to function.

Sometimes, I compare FBO's to politicians, since you must be a little bit crazy to want to be one in the first place. I believe, for instance, that a good FBO operator could make greater compensation in any number of other businesses, "job security" is not a strong suit of this industry nor are the retirement benefits particularly good for most of us. It is, however, possible to enjoy working at an airport -- at least I keep telling myself it is!

Turmoil or Transition..

How about turmoil and transition! Turmoil: if any of you happen to have a ten year old copy of the AOPA airport directory, I invite you to browse through and check the name of the FBO's on the airports. Fewer in number now, lots of new ones now, half of the old ones gone. Remember, I said ten years. At twenty years, my spot check indicates there are less than 10% of the airports in the country that have the same FBO listed.

I doubt that any of these missing companies left on purpose!

It is a sad fact that the latest industry statistics show that an average FBO's state sales tax collections are over twice as high as his before tax profit!

Turmoil:

Once, an FBO could count on a number of revenue generating departments that could all be undertaken with modest capital and managerial investment. Once upon a time, an FBO could raise his hand and obtain a dealership for new aircraft sales, hire a mechanic and be in aircraft maintenance, buy an airplane and be in the flight training and charter business, have an oil company come in, build a fuel farm for him, give him a truck, perhaps pave some ramp for him, give him a lighted sign and put him in the fueling business for the cost of the first load of fuel--perhaps \$1,200 to 1,800 per load. The owner had a commercial license and an instructor certificate, so he flew the plane for charter and instruction, the mechanic or the lineman would pump the fuel and answer the phone.

In the early 50's, my Dad put the lineman to work building little sailboats, called sailfish, which the "boat dealers" of that day had to build out of kits before selling

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them to the public. When a plane came in, sailboat production was impacted.

That was then. Today I say that an FBO manager's job should lead to a federal pension, since the time spent in understanding and complying with the various federal, state and local regulations and procedures occupies some two and a half man-years at my small business. The only possible efficiencies and bottom line performance that all of this effort generates is the avoidance of some fines and penalties!

Today, few FBO's can claim that each of their departments contribute positively to the bottom line. Even some of the famous names in our business, with the best reputations, will have at least one department chronically in the red.

The fact is that there are no longer any departments of an FBO that remain "automatic" cash and profit generators. Certainly some locations can have one or two be automatic, but seldom all.

Why?

Fueling:

Once the main "automatic" department, fueling, is now included among the endangered species list as a profitable department. Corporate self fueling, "uplift" agreements with brokers, fuel efficient turbine aircraft, decreasing numbers of aircraft in the U.S. Fleet -- all have contributed to very flat demand for aviation fuels used each year by corporate and general aviation aircraft.

Let's add a few more deterrents. As an example, under construction at my FBO now is a new fuel farm to replace the one once built by my fuel supplier at no cost to me. This farm, complying with the toughest environmental regulations in the country, Florida's, will cost more than the total sales of Showalter Flying Service in 1973, the year I bought into the business. Certainly it is important and worthwhile to protect our natural resources. This fuel farm will not, however, save my company any money through efficiency or for any other reason. It is not faster, easier to operate, easier to reach. It is, in fact the opposite case in every respect.

On an annual basis, the payments on this farm will equal about \$.07 /gallon sold. Will my based and transient customer understand this when my retail price goes up to cover this cost? To quote our little friend in the movie Home Alone "I don't think so." Financial responsibility, inventory monitoring, equipment cost escalation due to the suddenly increased demand for fuel farm equipment and product liability have made this fuel farm incredibly expensive. It will yield absolutely nothing good to my FBO's bottom line.

These non-performing investments would be easier to swallow if our market was

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expanding. It isn't.

My fuel supplier furnishes product to two businesses on my airport, my FBO and a corporate operator with his own tanks. For every one gallon of fuel he buys, I buy over 200 gallons. Yet -- he buys his fuel for less than I do. The logic is that since I sell "branded fuel" to the public, the oil company has a greater exposure to a liability suit. The oil company anti-trust lawyers say, therefore, that the oil company must charge me more than the unbranded corporate self fueler, even though the quality control procedures at my shop are many times more thorough than this fellow. Some volume discount scheme, don't you think?

Maintenance:

Liability, paperwork, intertwining service bulletins, ad's, miniscule parts markups, high cost -- low volume parts, conflicting, confusing and confounding interpretations by different FAA inspectors, different FAA regions, or by the same guy on different days of the week. Expensive training, test equipment, stocking requirements, more paperwork, customers negatively astounded at the prices, the wait for the parts, the undiagnosed and expensive problem discovered in the inspection and, your responsibility to check that everyone who ever worked on the aircraft previously did the work correctly, all have increased the chance of litigation and decreased the chance the work will be done at a profit.

Mistakes, whether typographical or actual, can now land a mechanic in jail. The pursuit of perfection of both the work and the paperwork, has forced most maintenance facilities to specialize in particular types or brands of equipment -- not bad as long as you're flying the right kind of airplane when you break down away from home. I believe that the rarest kind of maintenance department today is the "full service" department with one exception, our friend out on the tailgate under the shade tree, he's still there.

Unfortunately, "enforcement" efforts for both maintenance and charter by the FAA are chronically focused on the operations that have permanent and findable places of business. Whether it is the shade tree mechanic or the "part 91 charter" operation, the bona fide folks catch all of the attention -- and spend the monies necessary to comply with the regulations, which just means that the fly-by-nights gain an even greater competitive cost advantage.

The rest of the charter department has been more than ably covered by Ms. Mayo in her presentation.

Aircraft sales:

Today, there is not one U.S. light plane "manufacturer" that justifies the definition. More airplanes were rendered unflyable by acts of god and obsolescence last year than new aircraft were built to replace them! I'm not including here the ones

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that crashed. Additionally, the trainer fleet is being worn away while we watch.

Congress continues to ignore the product liability issue. Ironically, it is because of an aircraft's longevity that most of these liability problems besiege our industry. The problem touches every corner, through its impact on parts costs, insurance premiums, etc., etc.

To compound the loss of new aircraft sales as a profit center, the remaining "good used" aircraft, in most cases, are in such demand that the owner will -- more often than not -- sell the aircraft himself.

If a man was standing on your doorstep, demanding to buy your house, name your price, would you hire a realtor to answer for you? Again -- I don't think so.

The whole issue of this litigious society and "safety" to the sixth decimal place has, in my opinion, not only all but killed this industry, but is killing the ability of this country to compete internationally at anything! Most FBO's, including myself, have seen some hayseed disembark from his "corporate aircraft," that was bought with part of some obscene insurance settlement.

Sadly, the sponsors of this conference, to my knowledge, have done little to support our small industry's cry for relief from this situation. Lawmakers and bureaucrats alike both face far more secure retirement futures than the members of this critically ill aviation industry.

Transition.

It is my opinion that our industry is entering its second transition in the past 12-15 years. Starting in the middle of the seventies, chains began to appear and grow. The theory was that large and professionally managed systems of FBO's could be more efficient and profitable than their smaller competitors.

"Love money," defined as people not formerly in the FBO business, continued to flow in. For some reason, folks on the outside see our business as an obvious gold mine that the current proprietors are too ignorant to realize. So, whether selling to a chain or the local heart surgeon, the feeding frenzy was on. Unheard of prices were paid for mediocre locations and operations. Although the laws have changed, I used to marvel at the folks who made fortunes in other businesses, justifying their forays into the FBO businesses as a tax write off! To me, the day that the tax rates exceed 100%, I'll "look forward" to losing money on purpose.

I believe that almost all of the heart surgeons and the larger chains now know why the prices were unheard of. They were unsupportable. I worked at such a chain, owned at the time by young investment bankers who knew the magic route to riches that we were too stupid to see. They don't have the company or most of their money anymore.

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The transition currently underway, is one in which the chains will dramatically slow growth, with many being broken up once again and becoming Independent businesses. The most successful chain in the country today, who happens to also be based in Orlando, will readily admit that one facet of their business is the backbone of their profitability, some of their other ventures being far less successful.

I believe the "full service" FBO will become a rarer occurrence. FBO's will become "niche" businesses, focusing and excelling at one or two specialties, doing them well and making a profit at what they do.

Once, Showalter Flying Service did every traditional FBO service except avionics -- and we had a coin car wash at the airport fence to boot! We have subsequently sold the flight training, charter, maintenance and parts departments. We closed the car wash, when the environmental requirements made the cost of continuing illogical. The primary force behind the sale of these departments was a desire to limit myself to the parts of this business, namely that of fueling and being a landlord, that have the smallest exposure to the chance some widow will own my business!

In conclusion, I would like to say that the FAA, the state regulators, the airport authorities and our customers must be made to realize that your FBO doesn't operate a cash cow that allows him a soft cushion to absorb extra burdens with ease. The EPA regulations, security costs, fire fighting and drug testing procedures are all well intentioned, but in most cases, are economically devastating non-performing costs to this industry. The return on effort and investment is so poor now that the enjoyment of being in this business must be the driver for the successful FBO manager. The profit in this business has always been thin. With all of the pressures facing us today, we may well not make it as a viable industry in the future. Should the pressure on us cause the demise of FBO's at all but the busiest airports, then I believe we will be missed by these above mentioned parties. The FBO industry provides a valuable and irreplaceable link in this country's transportation system. Without the entrepreneurial spirit to provide corporate and general aviation with a well-run place to base or visit with their aircraft, that aircraft will cease to be a useful business or pleasure tool: -- AND THEY WILL THEN ALSO, BE MISSED.

Thank you.



John Schalliol

**Airport Director
St. Joseph's Co. Airport Authority
South Bend, Indiana**



Biographical Highlights

John Schalliol has been the Director at the Michiana Regional Airport since 1981.

Born in Mishawaka, Indiana in 1941, Mr. Schalliol graduated from Purdue University in Civil Engineering and served for four years in the Civil Engineer Corps of the U. S. Navy.

Prior to joining the St. Joseph County Airport Authority, Mr. Schalliol spent nine years as an airport engineering consultant.

Summary

The relationship between the airport owner/operator and the Fixed Base Operator has historically been a rocky one. FAA compliance issues are the root cause for conflict. Communications and cooperation between the FBO and the airport are imperative, thereby allowing both to realize their goals.

Airport Management is not the Enemy!

Although you might not believe me, airport managers are not the enemy! It only seems that way. We are, in fact, caught in the middle between the Federal Aviation Administration and their rules and regulations, and the fixed base operator and his fight for survival in the ever-increasing economically difficult times we face today.

What I am really referring to are the contents of Federal Aviation Administration Order 5190.6A entitled Airport Compliance Requirements. This document is without doubt one of the most difficult documents to understand and to apply that I have ever encountered.

The compliance program requires the airport to take a position in determining the cost you charge your customers for fuel. It can determine the number of square feet that you must have before you can open up a propeller shop. It determines the hours that you operate at your airport. It determines whether or not your employees wear uniforms. The list goes on and on.

You may have seen some of these requirements in your leases with your airport, but the odds are that even the airport operators with whom you deal on a day-to-day basis are not totally familiar with the compliance issues as they exist and as they are interpreted today. In fact, I would venture to say that there is only one person in the country that is totally comfortable in discussing airport compliance and that is Mr. Richard Rodine of the Federal Aviation Administration.

I attended a seminar held in Washington last year where Dick spoke on this topic and I was astonished at the scope of these rules and regulations. As a result of that conference, I came home and we totally revised our Minimum Standards for operations at our airport. These Minimum Standards had only been adopted the year before. In addition, changes were necessary in our Rules and Regulations and in the developmental standards that were in the process of finalization, and that have been put on hold for the time being.

When a compliance issue arises, the airport operator is viewed as the "bad" guy. He is the one that comes to the FBO and says "do this, and you must do that, and you can't do this." Even when the reasons are given, they are not totally understood because of the lack of familiarity with the compliance documents and the compliance program.

For years, airports such as ours have operated on what I like to call the "bluff and bluster" approach. If we bluster long enough and hard enough that you must do something, or that you cannot do something, the odds are that you will believe that we have law on our side and will ultimately drop the issue. It is only in those cases where the FBO or some other operator pushes the matter that the issue is finally resolved.

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This compliance issue is not a situation that has developed overnight. This process, and this body of rules and regulations, dates back to the very start of the federal grant program. Back in the 50's, when the initial federal aid to airports program was established, certain rules and conditions were built into each of those grants. Those rules have been continued and, in fact, have been expanded until we arrive at the Grant Assurances as they exist today.

Assurances embody the terms and conditions of the compliance program. This is the only way that the Federal Aviation Administration can insure that the funds for the development of airports are spent as the FAA wants them to be spent.

Let's take a look at exactly what I am talking about. In order to do that, I will give you special circumstances as they exist at the Michiana Regional Airport. Michiana Regional, established in 1932 by Vincent Bendix, the founder of the Bendix Corporation, well known in the avionics industry and the aviation industry over the years, is a commercial service airport categorized by the FAA as a small hub airport. We have nine (9) carriers that operate at the airport serving nine (9) different hub cities with an annual commercial traffic count of 791,600 for the year 1990. The Michiana Regional Airport, owned and operated by the St. Joseph County Airport Authority District, also has a long history of general aviation activity.

For years the airport was home to the Stockert Flying Service, started by Homer Stockert, one of the regional aviation pioneers. Since 1962 the airport has also been the home of Post & King Aviation, owned and operated by Charlie Post and Bob King. General aviation bumped along for a number of years with approximately eighty (80) based aircraft and a decent mix of corporate activity, air taxi service, freight, and instruction. Both operators also sold fuel in a farm owned and operated by the two fixed base operators.

In the late 70's and early 80's, things started to change. The fuel farm was relocated by the Airport Authority to make way for a new terminal building. At that time, the underground farm was totally removed and a farm from Northwest Orient in Milwaukee was purchased and relocated to the airport. After thorough cleaning and coating of the tanks, the entire farm was put underground. This, of course, was prior to the current E.P.A. regulations. With hindsight being 20/20, it was one of our larger mistakes, although at the time it seemed to make sense. We now own the farm and lease it to Corporate Wings. We just completed a new above-ground farm this last month.

Also about that time, the Stockert Flying Service went through Chapter 11 Bankruptcy, and ultimately ended up being owned and operated by a group of former employees and known as SBN Aviation, Inc. One of the conditions placed upon the new operators by the Airport Authority was that this fixed base operation start to relocate to the north side of the airport, the opposite side from the air carrier activity into an area designated as the General Aviation Development Area. The agreement was that upon the expiration of the lease for Post & King, they too

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would either not renew their operating lease or relocate to the north side of the field. This would insure adequate development area for both general aviation operators and would also provide expansion capabilities for the air carrier activities well into the 21st century.

This program was implemented with the Authority assisting in the relocation efforts. The Airport Authority constructed fifty four (54) new T-Hangars and allowed each operator to lease them with a cap placed on the amount of rent being charged. The old T-Hangars on the south side of the field were torn down. SBN Aviation, Inc. constructed a new operations headquarters on the north side of the field with their own funds. It is one of the outstanding FBO headquarters east of the Mississippi. In 1988, SBN Aviation, Inc. was purchased by Corporate Wings, Inc. of Cleveland and made a part of their rapidly-increasing network of facilities at airports in the east. In 1990, Post & King was acquired by Corporate Wings, resulting in one fixed base operator on the airfield.

Just last week the Airport Authority agreed to build a \$700,000.00 aircraft storage facility on the north side of the field, thereby allowing Corporate Wings to abandon the Authority-owned buildings in the southwest corner of the airport that are slated for either relocation or demolition due to new construction in that area. All of this activity is a culmination of at least four (4) years of negotiations and planning, and I feel it will be extremely beneficial to both the FBO and the airport operator.

But it has not been easy! Many different issues have been examined and accommodations have been made on both sides. Fortunately, due to the attendance at the conference I mentioned earlier, the new agreement has been structured with the compliance issues in mind. Unprofitable F.B.O. activities are no longer required, but have been made optional. Only maintenance and line services are required in order to sell fuel, and thereby be a full-service FBO. That seems enough to protect our existing FBO, yet allow him to make a modest profit.

However, on the horizon looms another potential fixed base operator! This operator wants to come in and start operating in areas that would carve out what few profit centers are available to our existing fixed base operator. The potential second FBO is presently operating a Part 135 operation from a neighboring field, and is using our existing FBO's headquarters facility as a pick-up point for customers. His intent is to become a full-service FBO on our field.

Understandably, the present operator feels that the business there at the airport has been developed and nurtured by him, and should be protected for him by the airport. On the face of it, it makes sense that the airport would want to do that in order to provide the strongest possible fixed base operator. The downside of that picture is that any nurturing done by the Airport Authority would smack of discrimination against new entrants and could possibly tend to foster monopolistic tendencies on the part of the existing operator. Under the compliance rules and regulations, this is not possible.

These are the questions that now exist because of interest by a second operator:

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1. Does the airport have to bid out the existing T-Hangars which are filled with Operator #1's customers?
2. Can Operator #1 prevent Operator #2 (presently a Part 135 Operator) from using #1's lounge and pilot amenities?
3. Can Operator #1 refuse to sell fuel to Operator #2's Part 135 Operation?
4. Can Operator #1 charge a higher price for fuel to Operator #2?
5. Can Operator #1 refuse to rent hangers to Operator #2?
6. Can the Authority tell either FBO what to charge for fuel?

Do you have ready answers for these? The answers that this audience would tend to give would probably be slanted towards keeping the new operator out since the majority of you represent established fixed base operators, and I could see you thinking about how this situation would play at your own home airport. This particular petitioner not put off by negative answers. He continued to pursue the matter, forcing the Authority to seek the assistance of the Federal Aviation Administration. A letter was drafted and sent off to our contact person in the district office, who then consulted with his regional office counterparts and ultimately received direction from the national headquarters before responding. The essence of that response is as follows:

1. So long as FBO #1 can demonstrate a need for their present leased facilities, the Authority does not have to put them up for bid at the end of the lease period. However, the Authority may if they so desire.
2. The second operator can be barred from using the facilities of the first to conduct his Part 135 business.
3. FBO # 1 must sell fuel to him if he requests fuel.
4. Discounts could be given, but charging higher prices than anyone else would be very hard to justify.
5. Operator #1 does not have to lease space to a competitor.
6. The language in the Compliance Handbook is not to be interpreted as giving the airport owner the right to dictate the actual rate for which the fuel be sold. Rather, the Authority must retain

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sufficient control over the FBO, through language in the operating lease, to review the rates to determine if they are "fair, reasonable, and not unjustly discriminatory."

7. Should any of the above issues remain unresolved, the FAA is then brought into the picture through the FAA's contact person in the Airports District Office.



As you can see from the above, certain issues have been resolved and others are still not crystal clear. It appears to me that the new entrant has the right to become a full-service FBO so long as he stays within the framework of our Minimum Standards and so long as he obeys all of the rules and regulations that have legally been established by the Airport Authority. However, certain of his operations as a Part 135 operator will be curtailed.

So long as the Airport Authority has the room to provide to the operator, the operator has the inalienable right to start up a business and to fail at that business. The Airport Authority, no matter how firmly it believes that the airport cannot support additional activities, does not have the right to say "no" on that basis.

This is an extremely difficult situation for the incumbent operator to understand and to appreciate. It is extremely difficult for that incumbent to put himself in the position of the new entrant, especially when he sees his customer base being eroded by the new entrant's presence. He must try to understand that the airport operator does not have an option in this matter except to insure that all the rules that the incumbent followed when he was setting up his business are now followed by the new entrant.

There are close parallels here between the FBO industry and the airline industry. Both are now operating in what amounts to a deregulated atmosphere, with the idea that what is best for the consumer is best for everyone. As you all know, that is not necessarily the case, but that is in fact the federal philosophy. What we all need to do is to understand the situation, get our hands on the compliance issues and review them thoroughly, and look for the best possible ways to work within the framework of these rules and regulations so that both the fixed base operator and the airport, and the community at large, can continue to prosper. That, after all, is the reason why we are located where we are.

The community needs the services of the general aviation industry. The marketing of the general aviation services and the awareness of general aviation as a whole is another issue but one that is closely tied to the issue of making money at an airport where everyone is working within the compliance framework. Cooperation, communications, and coordination inspire confidence in each party, and that is absolutely necessary in order to exist in the marketplace today.

Gwendolyn O. Mayo

**President
Mayo Aviation, Inc.**



Biographical Highlights

Gwendolyn O. Mayo is president and sole stockholder of Mayo Aviation, Inc., an on-demand part 135 operation located at Denver's Stapleton International Airport. With a fleet of 10 aircraft about half of Mayo's operations are corporate charters, the rest air ambulance flights. Mayo is also a provider of temporary aviation professionals to the industry.

Dr. Mayo has 13 years of experience in the management of business aircraft. Her business experience also includes several years as the chief financial officer of a successful family retail gasoline chain.

Dr. Mayo is a Phi Beta Kappa graduate of Vassar College and earned a Ph.D. in organic chemistry at the University of Minnesota. She additionally spent four years as a post doctoral fellow at the University of Colorado.

Summary

Although we foresee increasing demand for the essential and unique services provided by aircraft charter, the industry is threatened by the ever increasing demands of hyper-regulation. The FAA has not recognized the need for the flexibility demanded by diverse operations. It does not regulate with fairness, with competence, or in a timely fashion. The small business type of operation is threatened by the increasing costs of operation and compliance and by the competitive advantages of airline affiliated charter businesses, which have access to international computerized reservation systems.

Air Charter: A Threatened Industry

As the president and owner of an on-demand Part 135 charter organization, I have faced the challenges of general aviation every single day for the last 13 years.

Let me begin with a brief description of Mayo Aviation, which is located here at Denver's Stapleton International Airport.

Mayo Aviation employs about 50 people in its charter operations and related businesses, which include aircraft management and temporary aviation professional employment services. Our flight operations are staffed 24 hours a day, seven days a week including on-site mechanics and flight coordinators. My family owns 8 of the 10 aircraft we operate. The fleet consists of 3 Learjets, 5 King Airs, a Cheyenne II, and a Bell Longranger. About half of our business involves air ambulance service - we have been under contract to Denver's renowned Children's Hospital for over 10 years - and the other half is corporate charter.

Mayo Aviation has a diverse customer base which includes the telephone company, oil and gas producers, international mining operations, the news media, and the occasional jet setter. Over the years we have carried show dogs, airline mechanics, burn victims, a baby gorilla, geologists, brewers, mangled Harley drivers, Australian cattle breeders, and a very rich cat named Marmalade. Our pilots encounter a large variety of clients and destinations, such as Leadville (elevation 9927 feet), Toronto, and Midland. Much of the flying is tough: single pilot work in the middle of the night in the mountains - in a snow storm - bringing life saving care to a baby in mortal danger.

General aviation is exceedingly important to the small towns of America, perhaps as important as over-the-road trucking, especially in the west where distances between metropolitan centers are so vast.

I foresee an increasing demand for the following essential services.

1. Emergency medical services. Charter operations include organ procurement and air ambulance services as well as the transportation of big city doctors to small town clinics, a service which is even more important during wartime, when many rural communities are sharing their docs with our men on the battlefield.
2. Transportation of other professionals. Aircraft charter moves lawyers, geologists, bankers, computer experts, and fire fighters to and from remote areas.
3. Disaster relief. The San Francisco earthquake isolated the area around Santa Cruz from ground access and last summer a tornado caused the virtual isolation of Limon, Colorado. Both communities received emergency assistance by air when it was

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sorely needed. More recently, the city fathers of Watsonville, California have threatened to bulldoze their airport, which serves Santa Cruz, and build low income housing in its place. Some folks have short memories.

4. Carriage of cargo. Both large and small towns depend on general aviation aircraft to move newspapers, small packages, and cancelled checks. The movement of checks by air is a service upon which the Federal Reserve system relies for the efficient clearing of checks.
5. Maintenance of essential services. Mayo once moved an entire replacement telephone system to a small town, and today our Longranger jumps from peak to peak in the high country, carrying technicians who maintain the microwave system which provides communications to mountain communities.

Let me digress for a moment and highlight the extreme conditions of temperature and altitude under which Mayo operates. One winter our L-3 was based in Fraser, Colorado where nighttime temperatures frequently dropped to -50°F. It was an interesting problem to get spooled up in the morning. The chin bubble cracked in the cold. A few months later the operation moved to Scottsdale where it was so hot that two sets of plastic door panels deformed in the heat and had to be replaced. We fly our helicopter under conditions which approach the limits of the working environment.

As an industry we have a real marketing challenge, since charter operations provide services whose importance is unrecognized by the general public and its elected representatives.

Recently we've had some good news in that for the first time in my memory, the per seat cost of a fully loaded charter aircraft approaches that of a scheduled carrier.

But the bad news is that the FAA treats us like an orphan child. The Congress and the FAA seem not to recognize the unique needs of the clients we serve and the diversity of operating conditions we face. Our operations are indeed totally different from scheduled operations. And yet the FAA would like to force us into the Part 121 mold.

Air taxi operators recognize the necessity of working together to develop a power base for survival in this era of hyper-regulation. Within NATA we are making more pro-active responses to aviation issues as the membership places stronger pressures on its staff to take action. Just as commercial air carriers have been partners with the FAA in the writing of Part 121 regulations, so too should charter operators be consulted at the beginning of the evaluations of regulatory issues. The lack of fair and reasonable judgement by the FAA has caused our industry to be inflicted with unreasonable demands such as the over-zealous interpretation of oxygen requirements for passengers. We intend to make our voices heard on

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issues such as aging aircraft, noise restrictions, and air ambulance standards.

As support for NATA grows within the charter community, I envision greater cooperation between our trade organization and the FAA in the area of regulation.

Let's move now to a discussion of some trends and threats to the air charter industry.

1. **Fuel.** We've been on a wild ride this year, but in contrast to the airlines the charter operator has found it easier to cope with the changing situation, because we've written contracts and rate sheets which have allowed us to collect fuel surcharges. The Bush administration assures us that no shortage of fuel exists, but many of us worry about its future cost and availability and hope that the government will disclose its contingency plans soon as a part of its national energy policy.
2. **Insurance.** Aviation insurance underwriters remain at the bottom of a long soft cycle which ought to persist at least throughout the recession. General aviation will rejoice in this market while it lasts. Many more of us are buying war risk insurance because of increased exposure in the foreign ports we visit.
3. **Small business concerns.** Most aircraft charter firms are small businesses and are struggling with the increasing costs of benefits and compliance with federal and state regulations. Health insurance costs are becoming a burden and worker's compensation rates have made a quantum leap in Colorado in 1991.
4. **Other economic threats.** After a slow November and an even slower December, the American businessman is starting to move again. My colleagues who do a lot of transoceanic flying tell me that their flying has increased, because many of America's largest corporations have prohibited or discouraged their executives from traveling on the airlines. At Mayo we have seen an up tick, but flight hours are not back to the 1990 pace.
5. **Pilot availability and training.** In our charter business we take pilot recruitment very seriously. We have to choose people who not only have excellent cockpit skills but also have the kind of personality that builds the confidence of the customer.

It is extremely difficult to do background checks on applicants. Former employers and even FAA inspectors are afraid to speak with candor for fear of legal liability. The records kept in Oklahoma City are sometimes inaccurate. Once our chief pilot tested the system by asking for the record of a pilot who had been involved in two incidents. The report came back clean.

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Now that security has become a greater concern to all, it would be helpful to get more cooperation from federal agencies. I'd like to recommend that the FAA find a means of assisting us in obtaining better background information.

An interesting trend we've noticed in the last couple of years is that many job applicants have piloting skills inferior to those predicted by their resumes. Mayo protects itself by giving each applicant a flight test in a simulator as a part of pre-employment testing and interviews.

We're also seeing increased cooperation between general aviation and the educational institutions which are training professional pilots and aviation managers. Here in Denver corporate flight departments and Mayo Aviation are giving interns from Metropolitan State College valuable experience in the real world of professional aviation.

In the future its going to be even tougher to find and keep qualified pilots. Charter operators have become a training ground for the airlines and training of charter pilots has become very expensive. It is true that improvement in the training of pilots has been a major factor in the decreasing numbers of unfavorable statistics. However, the costs of training by outside professional organizations is staggering, not only for the subscription cost but also for the pilot's airfare and out-of-town expenses and the unavailability of that pilot for work while he is at school. Nevertheless, it is an investment in safety that the industry willingly makes.

6. Access and noise. These two issues are providing threats to general aviation. When national transportation policy is deliberated I pray that the public and the congress will be convinced that general aviation is vitally important to every community and that a sense of fairness will prevail.

We have recently observed some communities looking into protective licensing arrangements for air ambulance operators in order to set minimum standards and to limit competition from outside providers. We should encourage the development of nationally accepted standards to avoid a patchwork of new restrictions.

7. Consolidations and attrition. Denver is an aviation hub which has seen a very large increase in the size of its charter fleet in the last few years. We've counted about 25 jets alone in a metropolitan area which has been economically stressed since the decline in the oil industry in the mid eighties. The most recent economic pressures should result in some attrition of marginal operators.

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I fully expect that by attrition and consolidation the numbers of charter operators will one day shrink in the same proportion that the number of airlines has contracted in the recent past. Who will the successors be?

The survivors will be the charter organizations affiliated with the airlines themselves. Two major airlines are in the charter business and one has been especially aggressive in growth in the last two years.

Growth has been achieved by purchasing smaller charter organizations and by consolidations whereby whole charter organizations have given up their individual operating certificates and have been incorporated into a larger certificate holding entity, an example being AMR Combs' Alliance program. Why are airline affiliated charter companies such a threat? Because the airlines alone have the ability to tap a huge potential market from international and domestic travel agents through the airline reservation computer network. (In some communities the airlines also own the FBO's which provide fuel and parts to their charter subsidiaries at a cost lower than that paid by independent operators.)

Fred Gevalt who publishes the Air Charter Guide told me that the number of charter companies has decreased by approximately one third since publication began five years ago. Gevalt believes that most of the attrition was due to the phasing out of simple piston powered aircraft. He sees a relatively static fleet size, meaning that the big operators are getting bigger.

Extrapolation of these trends leads to the conclusion that small business charter operators are facing an enormous challenge in a rapidly changing environment.

8. The FAA. About a year ago Admiral Busey announced a policy change, in which he committed the FAA to reduce its emphasis on enforcement and instead work with certificate holders to achieve compliance. As a result the air taxi operator has witnessed a kinder and gentler FAA, and he is grateful for this constructive change. The great majority of operators has a compliant attitude and is willing to cooperate with its regulators in the maintenance of high standards for safe flight operations.

But when we report an illegal or unsafe practice, as I have, we are told that no action can be taken for fear of entrapping the accused. This is a serious flaw in the system, one which has a negative economic impact upon the compliant certificate holder.

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And the cost of compliance is becoming a serious threat to air charter operators. Our jets will have to fly hundreds of revenue hours to pay for the CVR modification, although I feel that Mayo would realize greater enhancement of safety by spending \$60,000 on additional simulator training rather than on three CVR installations.

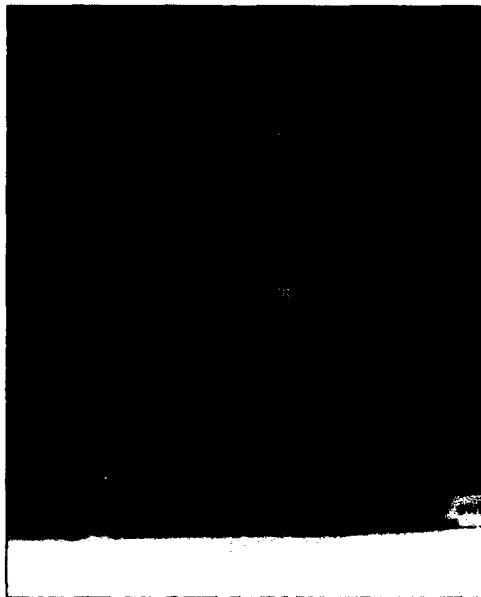
Finally, the air charter operator is stunned by the lack of standardization in the application of the regulations. The FAR's are administered differently from region to region, from FSDO to FSDO, and from inspector to inspector. Fairness does not appear to be a word in the FAA lexicon.

The problems are partially due to ambiguously written regulations and direct conflicts between different parts of the regulations. Another factor is the invocation of unwritten "national policy" by some inspectors.

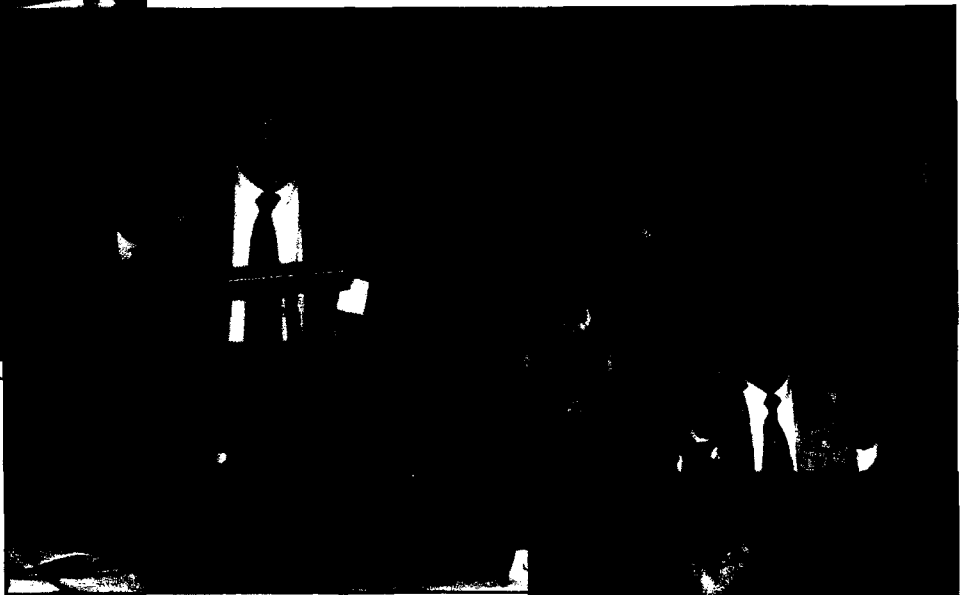
Fairness can only be achieved by enactment of unambiguous national standards which are reasonable and appropriate and administered with an even hand.

My peers joke about having to train their POI's and PMI's in the ways of Part 135, and when one of us must deal with an inspector who is incompetent or who has no sensitivity to the passage of time, an expensive paralysis results.

I for one advocate a bill of rights for certificate holders - a document analogous to the bill of rights published by the IRS for taxpayers. An alternative would be the establishment of an effective overseer for the FAA, because at the present time there is little or no recourse for the unfairly treated certificate holder and insufficient accountability from its regulatory agency.



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Air Traffic-Living With Commercial Aviation



William L. Polhemus

**President
Polhemus Associates, Inc.**



Biographical Highlights

William L. Polhemus is Senior Partner of Polhemus Associates of Vermont. Since its incorporation in 1964, he and his organization have been involved in research related to the science and technology of navigation.

Mr. Polhemus has been active in aviation since May of 1941. His civil flying experience includes a brief stint with a major carrier operating over the North Atlantic and Caribbean, twenty years of flight test and evaluation of avionics equipment and operational procedures related to navigation, and a re-creation of Amelia Earhart's 1937 'round-the-world' flight.

Over the years, Polhemus Associates has been actively involved with the National Association of State Aviation Officials and the AOPA in the program to advance the use of Loran-C RNAV for Enroute, Terminal and Approach Navigation.

Summary

General Aviation, utilizing state of the art avionics, is fully capable of meeting the operational challenges of the Year 2001 and given the opportunity to utilize Loran/GPS RNAV plus the expanded form of ADS discussed in this brief, will clearly be a major contributor to successful use of the National Airspace System.

General Aviation: A Major Contributor to Successful Use of the National Airspace System

Good afternoon, ladies and gentlemen, and thank you for giving me the opportunity to present these remarks.

INTRODUCTION

My remarks, today, derive from ideas expressed by members of an ad hoc group representing the FAA, the National Association of State Aviation Officials (NASAO), the AOPA, the Avionics Industry and private individuals who have an interest in speeding the acceptance of Loran-C RNAV. It is identified within our team as the FAA/NASAO Loran Working Group.

Most of the concepts underlying the use of RNAV or Area Navigation procedures have been around for more than 25 years, as many of you in this audience are well aware.

And in a sense RNAV procedures are in fact already in use by INS-equipped operators like United Airlines. However full acceptance of the concept by the majority of airspace users has been delayed by lack of appropriate, low-cost radio navigation equipment.

An aggressive Loran-C manufacturing community and a receptive and knowledgeable aircraft owner/pilot community have overcome the inertia. FAA estimates that there are more than 100,000 installations of Loran RNAV equipment in use within aviation today.

With commissioning of nationwide Loran-C coverage this Spring, and availability of an increasing number of GPS satellites, instantaneous navigation fixes of better than 1/4 qtr nm accuracy become available to any suitably equipped vehicle operating anywhere within the United States.... from airport surface thru any Flight Level. With the addition of calibration and differential update procedures at locations such as airports, accuracies of less than 300 ft. will be achievable.

Key to success of this new navigation capability is the implementation of low-cost digital receiver/computers which speed the processing and enhancement of signals, and take much of the labor out of the navigation process while making everyone a 'qualified Magellan'.

The digital navigation computer also sets the stage for addition of a 'flight-following' data link capability similar to that being used by helicopter operators in the Gulf of Mexico thus setting the scene for a dependent surveillance interface with the air traffic service.

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The helicopter flight following systems, which include the Loran receiver, digital navigation computer, and data link, are used to relay aircraft position, ident, altitude, heading, speed and other relevant navigation information to their parent Company Dispatchers and to Houston Center Air Traffic Control personnel. An array of data considerably more informative than a Mode-S transponder output.

It is this combination of avionics, used in conjunction with RNAV procedures, which will assure General Aviations' continuing successful integration into the NAS.

ABOUT RNAV PROCEDURES, NEEDS AND CAPABILITIES

The demand for access to IFR airspace and instrument approach qualified runways will continue to grow at 2 to 3 percent per year, according to FAA's Forecast Branch, so we can expect increasing pressure to restrict movement and to live with delays and cancellations particularly at busy Hubs.

Automated air traffic management is touted as the solution to the airspace problem while construction of new airports is usually presented as the principle solution to the congestion and runway shortage problems. The potential benefit to be derived from improved navigation capability, new (RNAV) procedures, and greatly increased number of non-precision approaches is ignored.

Landing Surfaces and Airport Access

This paper suggests that at least some of the need could be fulfilled through aggressive utilization of outlying or reliever airports.

While it would seem at first that utilization of Loran RNAV avionics could do little to affect shortage of runways, the fact is that the performance of Loran system makes possible implementation of a nearly Cat-I quality instrument approach to virtually every runway in the nation. This presents us with a relatively low-cost means of bringing many under-utilized runways into the IFR system.

Two applications come immediately to mind:

- 1) providing approaches to runways at outlying or reliever airports in the busy hubs (in the Washington, D.C. area this could add 7 to 10 runways with out laying any more concrete).
- 2) providing at least two directions of land at every instrument runway.

Figure 5 indicates the nature of penalties experienced in the form of 'penalty miles' resulting from the requirement to utilize a single nav aid or arrival route.

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With some hard work applied to the problem of rapid ground transport between Reliever and City Center or Major Hub, and/or provision of meeting rooms, hotel facilities, secretarial services, etc., many of the outlying airports within a hub complex could become attractive and even become attractive and even superior destination airports

Away from the major Hubs the nation has hundreds of Public Use airports and runways which are not equipped with any instrument approaches at all or offer only a single ILS instrumented runway... a circumstance which can impose an economic penalty.

Loran signals are available at every airport and for every desired direction of approach throughout the U S, it is possible to imagine creation of a NPA to every TERPSqualified runway, waterway and helipad in the country.

What a fantastic potential that would represent!

Terminal Area Operations

RNAV Procedures permit implementation of more efficient departure and arrival routes, particularly at facilities where a single station-referenced nav aid is today the only Fix for control of all arrivals, departures, missed approaches and holding patterns.

Mandatory Procedure Turn maneuvers can be replaced through through judicious siting of Waypoints so that in many cases a 'straight-in, straight-out' configuration of SIDs and STARs is achieved.

The penalties and potential benefits associated with the Terminal Procedures are summarized in Figure 2.

Individual aircraft often differ significantly in performance capabilities during the Climb/Descent phases of flight. In the present Airspace system faster/higher climb rate aircraft are often penalized by being required to remain in trail behind the slower vehicle.

Utilization of the 'parallel track' navigation capability of the RNAV system to create 'by-pass' corridors can be accomplished almost on an ad hoc basis to the advantage of all parties involved.

RNAV-Direct and Parallel Track Enroute Operations

Utilization of the 1/8 - 1/4 nm navigation accuracy of the Loran system offers the opportunity to space airways at closer intervals...or to establish a family of tracks parallel to or conformal with heavily traveled airways.

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Such an arrangement allows more aircraft the opportunity to operate at or nearer their respective optimum altitudes and and cruise speeds as compared with the use of a single track airway system.

The savings in fuel and operating costs should be sizeable, capacity of a given airway segment would be increased, and there should be a reduction in Controller workload realized as well.

Considerable interest has been expressed by both General Aviation and Air Carrier operators in utilizing RNAV system capabilities to file and fly random routes. A goal expressed by the representative of a major carrier who has been participating in the FAA/NASAO Loran Workshop activities is to combine the 'random routing' capability of the RNAV system with Minimum Time Path (wind/TAS) optimization procedures used in long-range, Over-Ocean operations.

Dependent Surveillance Employing RNAV Technology

During the years that Loran has been 'finding its way' within the fixed-wing General Aviation community, it has also been earning its 'keep' in the Gulf of Mexico as the principle aid to navigation employed by the oil industry's helicopter operators.

The Gulf off-shore operation is conducted almost entirely beneath the floor of FAA's radar coverage of that area. For reasons of safety and efficiency an electronic, automated 'dependent surveillance' or Flight Following system was devised. It has been serving the Operators and ATC since 1984.

As an aside it is noted that this system is also in use in the North Sea and in an oil exploration area off the South Coast of Australia.

Implementation of this capability in conjunction with the Loran/GPS RNAV technology would provide a supplement to or substitute for ATC's ground based radar. The information which is available on the navigation system Data Bus is capable of indicating pilot intentions and progress with respect to intentions as well as the more conventional lat/ long, range/bearing, altitude, ident, etc.

The navigation data available on the RNAV system data bus, can be made available from an aircraft to a designated Controller via VHF radio, via relay, or thru a Remote Operating Comm line.

The data rate of the Flight Following system used in the Gulf of Mexico can be set at an output comparable to that of an airport Surface Detection Radar.

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This suggests that ATC could monitor operations at untowered airports, prior to takeoff, during the approach and land phase, and even after landing during return to ramp. The end result would be a reduction in delays, improvement in safety and reduction in Controller uncertainty about operations in his area of concern.

Utilization of this form of ADS could, we believe, reduce communications workload for both ARTCC Controller and Pilot by as much as 25%. (the Forecast is for as many as SOM required radio (message traffic) operations by year-2000).

Economic Considerations

If full use were to be made of the capabilities of RNAV, that is provision of at least two directions of landing at every airport, straight-in/straight-out terminal procedures, elimination of mandatory Procedure-Turn maneuvers, implementation of parallel tracks for Climb and Descent and along prime airways, etc, it is estimated that aircraft operators would realize reductions in DOC as shown below.

Potential Reduction in Operating Costs
From Use of Area Navigation

PHASE OF OPERATION	MAJORS & NATIONAL	REGIONAL COMMUTER	CHARTER AIR TAXI	EXECUTIVE & BUSINESS USE, GA
Enroute Direct	0.5 - 1.0%	1 - 3%	3 - 6%	3 - 6%
Terminal SID, STAR Hold, CL/DS	1.0 - 2.0%	1 - 12%	2 - 6%	2 - 10%
Non-Precision Approach	0.5 - 1.0%	2 - 5%	2 - 6%	2 - 6%
Range of Benefits	2.0 - 4.0%	4 - 20%	7 - 22%	7 - 22%

With respect to creating a nation wide RNAV environment, I feel confident that most of you in this room are aware that the 'final four' Loran-C transmitter facilities needed to complete 'quarter-nautical-mile-accuracy coverage' of the Continental United States, are now 'on the air'.

The USCG schedule calls for the two new chains to be operational in April. A formal DOT commissioning ceremony will be celebrated at the El Paso, TX International Airport.

Admiral Busey, the FAA Administrator, the Secretary of Transportation and the Commandant of the U.S. Coast Guard are to officiate at the formal ribbon cutting ceremony. Following this ceremony, and continuing into day-2, there is to be a full-day of activities involving workshops and panel discussions for the benefit of aircraft owners, pilots and anyone who may have an interest in the Loran system

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and the FAA's long range plans for Loran.

The World Map, Figure 8, illustrates the growing acceptance of Loran-C within the Northern Hemisphere. Note that the Russians have two operational chains (cross-hatched areas), one of which is to be interfaced with the U.S. system in Alaska and the chain in Japan, so as to provide continuous radionavigation capability across the Northern Pacific route from the U.S. to Asia.

The second Russian chain will interface with Western European coverage in the Baltic and western Russia. Nine new transmitters are planned for Europe; three have been proposed for Venezuela; the chains in Saudi Arabia and the Suez area of Egypt have been in use by U.S. Forces during the Iraqi war; and chains in Japan, Korea and Eastern China are operational.

It is evident that GA now may operate anywhere within the 'lower 48' with an accuracy and reliability of navigation that fully meets the FAA's most stringent requirements.

ADDING SIGNAL REDUNDANCY

In addition to facilitating the introduction of the Loran system into the National Airspace it is also a stated goal of the FAA/NASAO Working Group to add GPS to the 'technical suite' when that system is judged to have reached an appropriate level of maturity.

To this end the NASAO/FAA team, with the U.S. Coast Guard a major contributor as well, was instrumental in two beneficial study actions, one addressing improvements in transmitter knowledge of time (the target is to synchronize to not worse than 100 nanoseconds) ; and the second to bring about a capability for the aircraft avionics RNAV system to treat Loran and GPS signals as coming from a single source, that is to make them 'interoperable'.

The results of these efforts will ultimately produce a system of sufficient integrity and accuracy to allow its designation as a 'sole-means capable' navigation system.. a necessity if we are to use it to access airports and runways which are not equipped with other approach aids.

In conclusion then, let me suggest that 'General Aviation' utilizing state of the art avionics, is fully capable of meeting the operational challenges of Year-2001; and that given the opportunity to utilize Loran/GPS RNAV plus the expanded form of ADS discussed in this brief, will clearly be a major contributor to successful use of the National Airspace System.

Thank You.

FEDERAL AVIATION ADMINISTRATION

**ACCELERATED IMPLEMENTATION OF
LORAN-C RNAV ENROUTE, TERMINAL
AND APPROACH PROCEDURES**

FIGURE 1

TMA - ENROUTE AIRSPACE INTERFACE

- INTERIM RNAV GRID CONCEPT
- ALIGN GRID WITH SELECTED EXISTING AIRWAYS
- ACCOMMODATE LORAN-C, GPS AND VOR/DME NAVIGATION SYSTEM
- PROVIDE MULTIPLE PARALLEL TRACKS
- ULTIMATELY INDEPENDENT OF TRADITIONAL STATION-REFERENCE NAVAIDS

FIGURE 2

EXPLOITATION OF RNAV CAPABILITIES

TERMINAL AREA SAFETY AND CAPACITY IMPROVEMENTS

- o LORAN/ILS (MLS) INTEGRATED INITIAL APPROACH AND MISSED APPROACH PROCEDURES
- o NON-CONFLICTING DEPARTURE AND ARRIVAL ROUTES
- o CLIMB/DESCENT CORRIDORS
- o PARALLEL ROUTE FEASIBILITIES DEMONSTRATION
- o INDEPENDENCE FROM STATION-REFERENCE AIDS

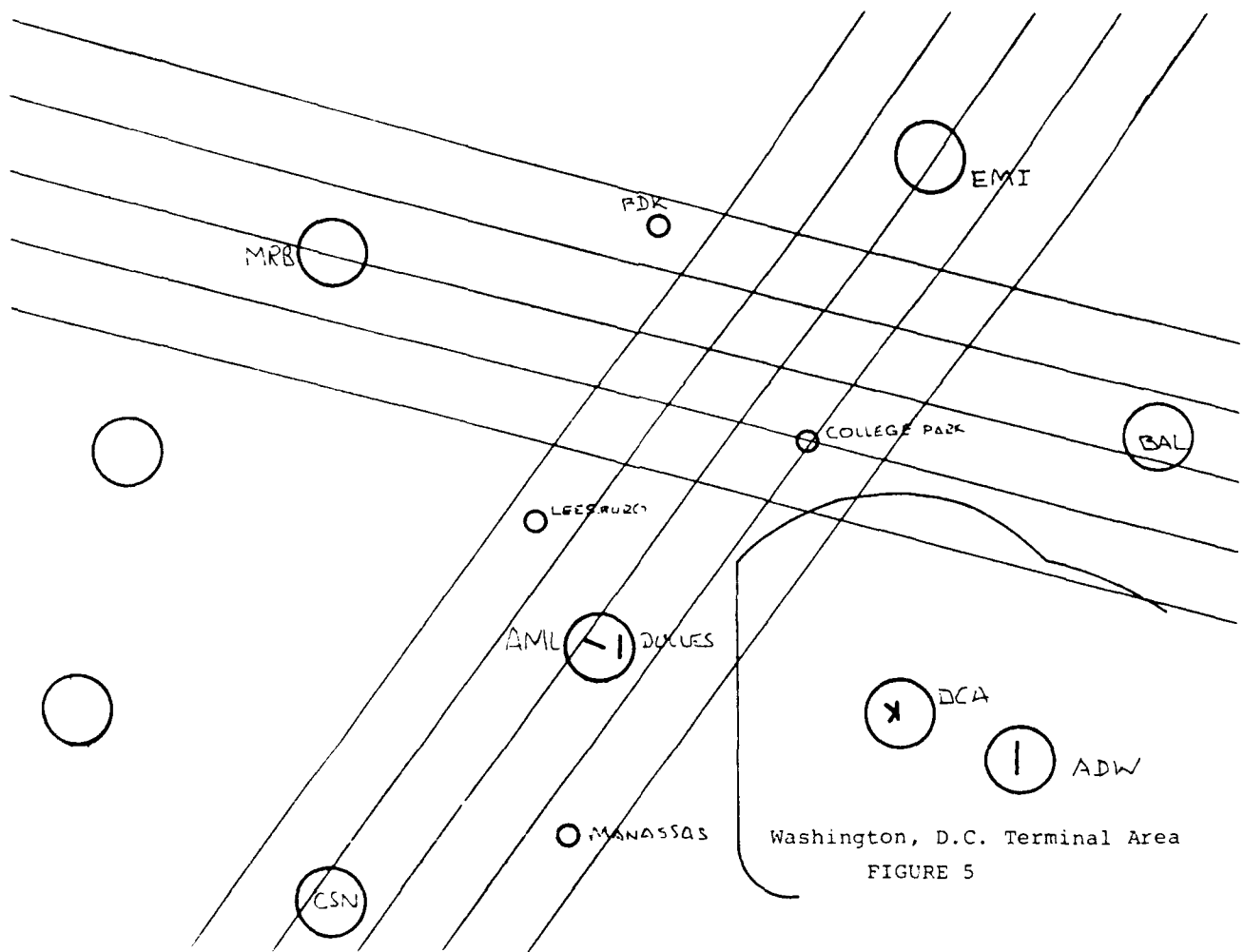
FIGURE 3

CONTROLLER AND AIRCREW WORKLOAD REDUCTION

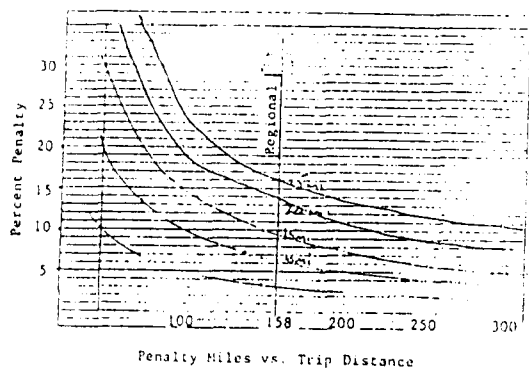
- DEMONSTRATION OF AN ADVANCED, AUTOMATED
AIRCRAFT POSITION REPORTING SYSTEM (ADS)
 - FLIGHT PLAN AS REFERENCE
 - PILOT INTENTIONS
 - AIRCRAFT POSITION CONFORMANCE AND
NAVIGATION STATUS

FIGURE 4

PANEL III

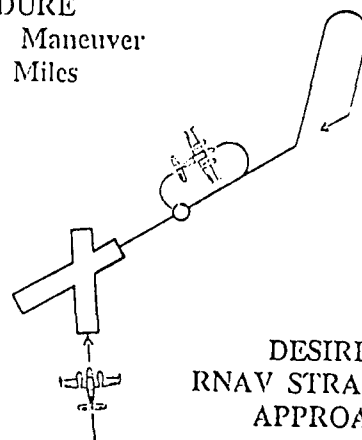


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TYPICAL TMA & APPROACH SITUATION

PROCEDURE
TURN Maneuver
Adds 17 Miles



DESIRED:
RNAV STRAIGHT-IN
APPROACH

	Trip distance	Reverse Direction		Procedure Turns
		Departure 8 - 10 mi	Arrival 15 - 20 mi	IFR-Required 17 - 25 mi
International	2,595	0.3 - 0.38%	0.5 - 0.8 %	0.6 - 1.0 %
Domestic, Majors	770	1.0 - 1.3 %	1.9 - 2.6 %	2.2 - 3.2 %
Regionals	156	5.1 - 6.4 %	9.6 - 12.8%	10.9 - 16.0 %
Commuters	100	8.0 - 10.0%	15.0 - 20.0%	17.0 - 25.0 %

FIGURE 6

MID-CONTINENT LORAN-C GAP

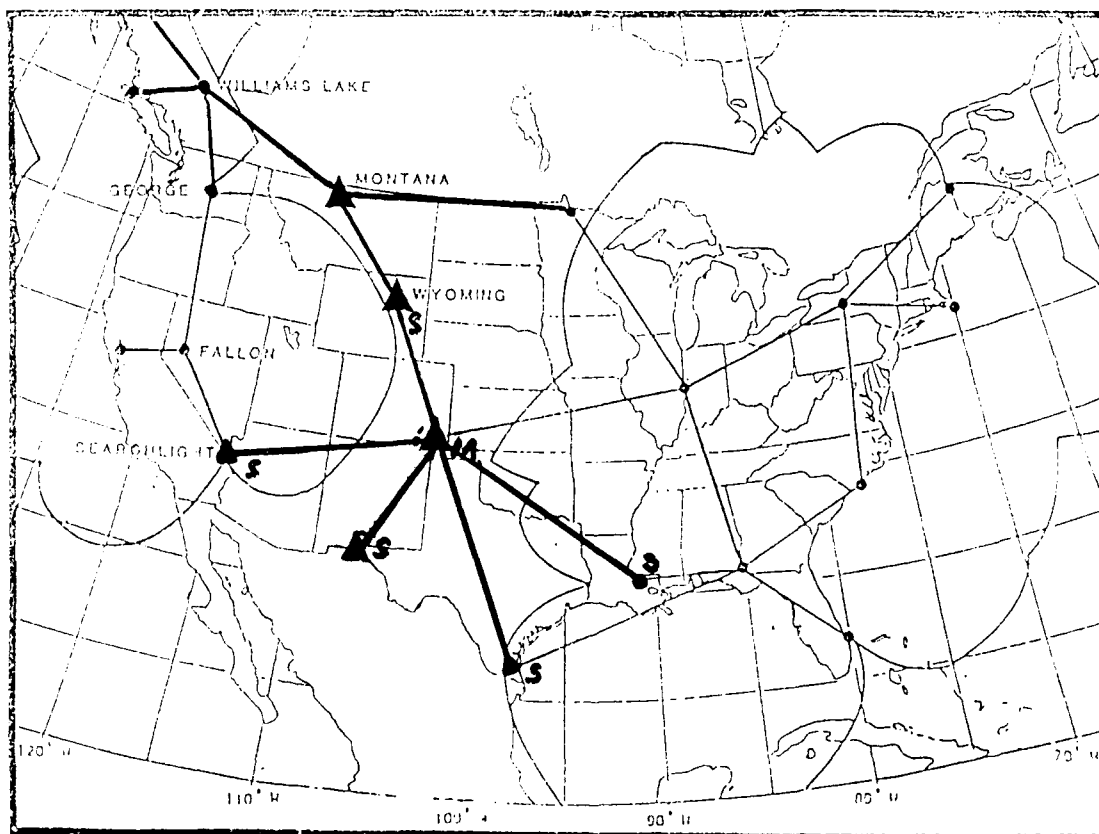


FIGURE 7

LORAN-C COVERAGE DIAGRAM
NEAR FUTURE

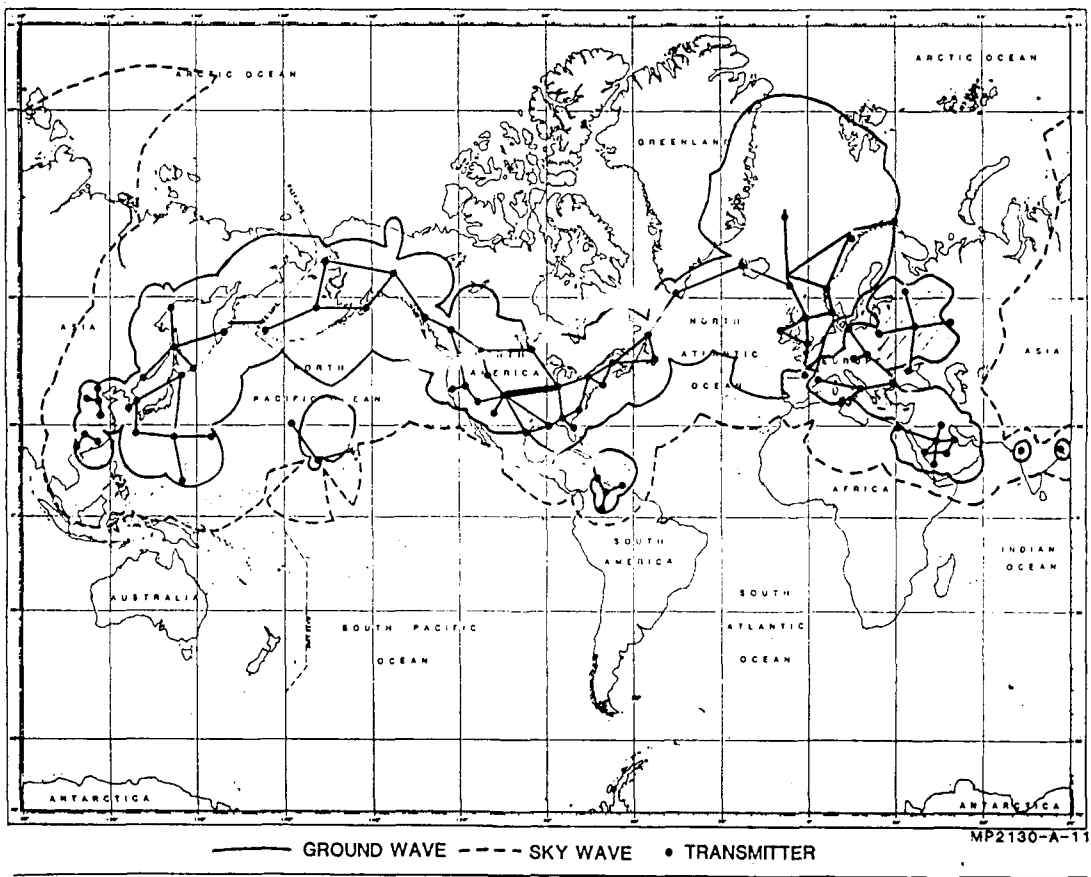


FIGURE 8

PANEL III

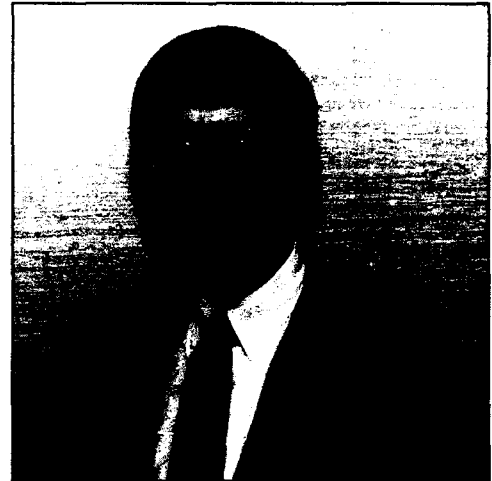
CLASSES	ESTIMATED COST FLIGHT OPERATIONS	POTENTIAL REDUCTIONS			TOTALS \$ SAVED	
		TMA	ENROUTE	APPROACH	MAX	MIN
Air Carrier						
Major	12,634,000,000	252,680,000	126,340,000	126,340,000	505,360,000 (4%)	252,680,000 (2%)
National	18,957,000,000	379,020,000	189,510,000	189,510,000	758,282,000 (2%)	379,140,000 (2%)
Regional/Commuter	1,171,697,358	140,603,683	35,150,920	58,584,868	234,339,472 (20%)	46,867,894 (4%)
Regional/Cargo	Not Available					
General Aviation						
Air Taxi/Charter	831,275,420	74,814,788	49,876,525	58,189,279	182,880,592 (0%)	58,189,279 (7%)
Corporate/Executive	1,510,379,387	151,037,938	90,522,762	90,622,762	332,283,465 (0%)	150,726,557 (7%)
Business Use	509,379,215	50,937,922	30,562,753	30,562,753	112,063,427 (0%)	35,656,545 (7%)
TOTALS	35,613,731,380	1,049,094,331	522,062,960	553,809,662	2,125,208,956 Avg 6%	878,260,275 Avg 2.5%

Summation of Potential Savings

Table 1

Dennis Roberts

**Director of Aviation
State of Colorado**



Biographical Highlights

Dennis Roberts is the Director of the Colorado Division of Aviation, having served in this position since the Division's creation in 1989.

From 1983 to 1989, Mr. Roberts was the Manager of Aviation Planning for the Denver Regional Council of Governments responsible for the development and maintenance of the region's Continuous Aviation System Planning program, Metropolitan Aviation System Plan, Regional Heliport Plan and airport land use compatibility guidelines.

Prior to joining the public sector in 1983, Mr. Roberts worked as an aviation planning consultant preparing airport master plans, site selections, FAR Part 150 noise studies and environmental assessments. Mr. Roberts holds a B.S. in Aviation Management and a M.S. in Aviation Safety from Central Missouri State University as well as FAA Commercial Pilot-Instrument ratings.

Summary

Development of the Denver International Airport (DVX), in addition to expanding commercial aviation capacity nationwide, will significantly increase the demand for airspace control in the Denver metropolitan area. With aircraft operations expected to rise from 500,000 currently at Stapleton International Airport to over 1.2 million at DVX, extensive airspace planning is necessary to accommodate this level of activity.

The Colorado Division of Aviation, in conjunction with the FAA and numerous aviation user groups, coordinated a process whereby the needs of all aviation users were considered and incorporated into the design of the new DVX Terminal Control Area (TCA). The FAA's acceptance of the Ad Hoc committee's final TCA configuration recommendations is proof that aviation users and the FAA can work together in developing a "user friendly" environment that operates both safely and efficiently.

New Denver International Airport Terminal Control Area: A New Spirit of Cooperation

Quoting from the FAA's notice provided to speakers at this conference, "The U.S. general aviation industry has entered a stage of growth that should be examined by the industry and FAA. There are likely to be both opportunities as well as alternatives to be examined and - perhaps - avoided. Increased concentration in the air carrier industry and congestion at hub airports have resulted in a favorable climate growth of business aviation." I would like to expand that to say "for general aviation as a whole". These statements could not be more appropriated than to my topic today. Contrary to what some people in the general aviation community believe, "TCA" does not stand for "Terribly Confused Aggravation".

In reality, what we as pilots know as Terminal Control Areas are defined by the Federal Aviation Administration as "Parcels of controlled airspace extending upward from the surface or higher to specified altitudes within which all aircraft are subject to the operating rules and pilot/equipment requirements specified in FAR Part 91.131."

While many of us do consider TCAs, ARSAs, TRSAs, MOAs, MTRs, VR and IR Routes as well as Restricted and Prohibited Airspace to be sources of confusing aggravation, we must realize that with the growing complexity of today's aircraft and airspace structure, each of these airspace designations have a purpose -- which is to make the nation's air traffic control system as safe and efficient as possible.

Background

As all of you are aware, the City and County of Denver is undertaking the development of a new international airport that when completed, will encompass nearly 50,000 acres of land with an airport influence zone covering nearly 100 square miles.

In 1993 when Phase I of the facility opens, the airport will consist of four-five-six runways capable of accommodating TRIPLE, SIMULTANEOUS ILS ARRIVALS. To date, this has not been accomplished anywhere in the United States however the FAA is testing similar procedures at its Technical Center in Atlantic City.

Ultimate plans for the airport call for twelve runways capable of accommodating 1.2 million annual operations and up to 55 million enplanements. These figures compare to today's activity of 500,000 annual operations and 15 million enplanements.

Obviously, to handle this level of activity requires a considerable amount of planning, study and coordination. The FAA, through its New Denver Airport Project

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Office in Seattle, Washington, along with specialist at the Denver Tower and Denver Air Route Traffic Control Center, have been working nonstop for the past 3-4 years developing ATC procedures, procuring navigational equipment, awarding contracts and preparing environmental assessments in anticipation of the airport's opening in 1993.

To give an example of the preplanning that is necessary for a project such as this, the federal regulations require that no new NAVAID can be named using an existing name unless that name has not been used for at least one year. In the case of Denver, it will be necessary to change the name of the existing Denver VORTAC for at least one year before assigning that name to the new VOR-DME planned at DVX.

Additionally, the new air traffic control tower at DVX, which will reach a height of 320 feet AGL, is incorporated into the terminal design complex and the automated guideway structure and must have its ground support structures constructed in conjunction with the terminal facility.

Historic TCA Design Procedures

Historically, the FAA has designed airspace around the specific needs of the ATC system and those of the airlines. Rarely has the general aviation and/or military had the opportunity to become involved with the evaluation of alternatives and actual layout of the TCA. In most instances, user groups did not know the final TCA configuration until it was published in the Federal Register as part of a Notice to Proposed Rulemaking. As you all know, once an idea has reached the NPRM stage, it can be very difficult and frustrating to implement change.

In many instances, the FAA and the airlines prepared approach and departure procedures based on the theory of "The most good for the most people". This generally meant that a fully-loaded B-747 would have considerably more priority than would a corporate business jet with ten passengers aboard.

This approach often led to vast amounts of mail being sent to FAA criticizing any new airspace action, especially relating to the implementation of TCAs or other types of special-use airspace. Aviation user groups often attended public hearings hosted by the FAA only to have the FAA present its "official findings" then open the floor up for public comments. At no time during the hearing would the FAA respond to questions from the audience. Their only response would be that "All public comments, either verbal or written, will be considered prior to issuing the Final Rule.

Obviously, this process did not go a long way to promoting trust between the FAA and the aviation community, particularly the general aviation users. In actuality, it only served to further divide users of the air transportation system and generate vast amounts of negative publicity for all of aviation. However, times are changing.

TCA Standardization

Several years ago following the Ceritos, California midair collision between a general aviation aircraft and a Mexicana airliner, the FAA released a study calling for the standardization of all Terminal Control Areas in the U.S. These TCAs would consist of 10 - 20 - 30 nautical mile concentric circles with consistent floors above the surface. In essence, the TCAs would all look like a standard inverted wedding cake, regardless of airport activity, terrain, unique operating procedures, just to mention a few.

Unfortunately, when ATC planners began studying this approach, they quickly learned that every TCA could not be the same. In Denver, this standardized TCA would result in aircraft attempting to remain clear of the western boundaries of the TCA encountering frequent bouts with "cumulo-granite". In other words, the TCA would exist below the ground. What the field personnel learned and carefully passed back to headquarters was that "If it ain't broken - Don't fix it".

After much ado about nothing, the FAA let this idea quietly slip off the table.

Strawman TCA - Point of Beginning

Following this exercise and the huge amount of turmoil associated with the release of NPRM 90-2 (The Veil Rule), the FAA realized there had to be a better way of designing and implementing rules related to airspace matters. Thus was born the Ad Hoc Airspace Committee process.

Following successful efforts used in the Washington, D.C. and Phoenix terminal areas, the FAA began a process they refer to as Pre-Rulemaking Actions. In the case of the Denver DVX TCA, this consisted of distributing a Letter-to-Airmen from the FAA Regional Air Traffic Division (ANM-500) in Seattle to all active airmen in Colorado inviting them to one of three public information meetings to discuss factors which should be considered in the design of the TCA.

This notice, in addition to describing the rulemaking process, presented a "Strawman TCA" on which the public could comment. The intent was to provide to the public with a generic design which met all of the federal criteria for a TCA.

Based on what you see on this figure, it was obvious to the general aviation community that improvements could be made. Recognizing that only three weeks existed prior to the FAA's first public meeting, immediate action was necessary.

Development of TCA Ad Hoc Committee

The Colorado Division of Aviation, responding to a request from the Aircraft Owners and Pilots Association, agreed to coordinate and establish an Ad Hoc committee comprised of various aviation user groups, the FAA and the Colorado Aeronautical Board. From an initial group of 25, the final committee grew to 52 members.

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It should be noted that assistance from both AOPA and the Colorado Pilots Association was extraordinary. Modelling this effort after a similar approach used in the Washington, D.C. area, AOPA worked with CPA prior to the first Ad Hoc Committee meeting to develop and alternative TCA configuration. Comments from the FAA Air Traffic (A/T) personnel were that this first draft was so well prepared that the FAA wished they could hire the group as airspace specialists.

Goals and Objectives

At the outset of the Committee's activities, a number of goals, objectives and design parameters were established. These included:

- * Keeping the TCA design simple - taking only the minimum amount of air space necessary needed for safe and efficient operations.
- * Utilizing visual landmarks to the greatest extent possible.
- * Establishing radials and VOR-DME arcs off one centrally-located NAVAID. The current Denver TCA is centered on the Stapleton Runway 08 localizer-DME transmitter, not the VORTAC.
- * Maintaining a VFR corridor on the western portion of the TCA to allow uncontrolled north-south passage along the foothills at safe altitudes.
- * Guaranteeing that all air carrier approaches and departures would enter and exit the top of the TCA - not the sides or bottom of the TCA.
- * Designing the TCA for six runways (versus the ultimate of 12) with triple ILS arrivals to the north-south runway complex.
- * Limiting the inner core of the TCA to the minimum possible radius, allowing for the exclusion of as many nonparticipating airports as possible.
- * Presenting a united front, with one majority recommendation, to the FAA yet allowing individuals the opportunity to express minority opinions if desired.

Special Consideration

- * Preservation of Existing Airports - Initially, over 20 airports were included in the core of the TCA (based on 13.5nm radius). Included were two public-use facilities including a major reliever for DVX and one military, air national guard base. The final result was that only three facilities are in the core -- all of which are private, unimproved landing areas where the owners plan to abandon the facilities in the future.

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At one of the public-use sites, this called for squaring off the arc of the inner core and elevating the floor to permit operations under the TCA. In a second case, the FAA permitted a cutout for a public-use airport which is planned for closure in the future. To facilitate this site, plans are for language to be included within the NPRM which states that if, and when, this facility closes, the cutout will be eliminated and the airspace for DVX in this area will return to the surface.

- * **Maintain VFR Corridor** - Due to terrain clearance and severe turbulence along the foothills on the western side of the TCA, users stressed the need for a N-S VFR flyway. The FAA agreed and terminate the TCA on the western side. In addition, the FAA has planned to install a VORTAC on the Jefferson County Airport and establish a Victor Airway from Colorado Springs to Cheyenne, WY using this NAVAID so transient traffic can be assigned the airway as a way of avoiding the TCA while having positive course guidance.
- * **Glider/Skydiving Activities** - Because of the high volumes of glider and skydiving activities in the region, the FAA agreed to establish Letters-of-Agreement with the organized operators of these activities so as to create the least amount of impact on their operations.
- * **Military, Special-Use Airspace** - During the coming 18 months, the Colorado Air National Guard is transitioning from the A-7 aircraft to F-16 fighter aircraft. Due to the changes in their future mission, special considerations had to be planned for at Buckley ANG Base. The military stressed the need for certain traffic pattern altitudes, availability of two-way operations at Buckley, and emergency contingency plans for arrivals with "Hot Guns" and/or "Hung Bombs".

Additionally, the Colorado Army National Guard requested airspace to access their firing ranges for their Huey Cobra gunships without requiring TCA clearances.

In both instances, the FAA agreed.

- * **Triple ILS Approaches** - Because of anticipated traffic volumes, the FAA and the DVX sponsor have planned for independent, simultaneous ILS approaches at DVX. These, along with existing/planned ILS approaches to Centennial, Front Range and Buckley ANG airports, will result in up to 6 final approach courses exist from the south to the north. To meet this need, the FAA will be required to turn aircraft onto the final DVX approach course approximately 22 miles from touchdown. To keep these aircraft within the confines of the TCA, relatively low floors were required on the south side of the TCA. In some instances, these floors will allow for only 1000 feet of terrain clearance, greatly decreasing the possibility for nonparticipating aircraft to tunnel under the TCA in these areas.

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While this is a concern to the general aviation users, the FAA has stated that the TRACON will increase its staffing for the general aviation, satellite airport position from one controller to an ultimate level of three. This change will increase to opportunity to obtain TCA clearances and reduce the dreaded controller response "Unable to issue a clearance due to current workload -- SQUAWK 1200 --Remain clear of the TCA".

FAA - User Participation

As noted, the original committee of 25 members quickly grew to over 50 as word of this exercise spread. In the end, user input to the FAA proved invaluable. At the early meetings, a considerable amount of mistrust existed from the users toward the FAA. Individuals stated the FAA was only concerned with the ATA and airlines and had no interest in general aviation.

The FAA did everything possible to dispel this attitude, even to the point of refusing a number of the ATA/Airline requests. Throughout the meetings, of which there were six in addition to the three public hearings which followed, FAA ATC personnel spent numerous hours evaluating recommendations of the committee then explained in great detail why an item would or would not work.

From all of this, both the FAA and members of the committee grew to respect and appreciate the needs of the other. By the end of the process, the ATC personnel were viewed as proponents of the users, even to the point of fighting for the committee's position with other divisions (FSDO) of the FAA.

Of special note is the fact the FAA could not "officially" endorse or approve any of the committee's recommendations due to legal limitations and the threat of jading the rulemaking process. The ATC staffers did however indicate which of the recommendations "looked like they might work if certain modifications were considered".

Public Hearings - The Process Worked

Following many hours of study and hard work, the time came for the committee to formally present its recommendations to the FAA. Three public meetings, as noted earlier, were scheduled throughout the metropolitan area to solicit input from any user on the FAA's strawman proposal. Due to the strict rulemaking process, the FAA was only allowed to take testimony on alternatives and not officially respond to questions at the hearings.

Prior to the hearings, the committee organized speakers to present specific portions of the recommendations. This included an aviation attorney to summarize to history and general findings of the committee, the Colorado Division of Aviation on the regional and statewide impact of the TCA, private airport operators saved by the amended TCA core, skydiving and glider operators and aviation users groups either supportive or opposed to certain portions of the committee's plan.

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To aid in the visual presentation of the committee's TCA, a private architect designed and developed an actual model of the TCA as well as digitized the TCA on a CADD system in order to expedite changes as they occurred throughout the process.

Additionally, Jeppesen Sanderson prepared 3-D computer models of the TCA which allowed viewing of the recommended design from any angle or perspective.

Despite their earlier support of the FAA's generic Strawman TCA proposal, the ATA and Denver International Airport planning staff, gave conditional support of the Ad Hoc committee's plan.

Based on comments of the FAA senior ATC staff, the hearings could not have been more of a success. Words such as "Love Fest, Outpouring of Support, and Greatest Thing to Happen to Aviation" were quite common.

Current Events

Following the hearings, the FAA took all hearing comments and input from the committee and began an intensive staff evaluation of the proposal. After the closure of the public comment period, the FAA asked for an addition meeting with the committee to present their preliminary findings and guarantee they hadn't omitted anything. This meeting resulted in several very important revisions which both the FAA and users agreed were beneficial.

Again, after more staff study, the FAA invited all attendees of the TCA hearings to a final meeting to present their recommendation. Again, the meeting turned into a testimonial as to the success of the process.

As of this date, the Region's final recommendations are being prepared for submission to FAA headquarters where the NPRM is planned for publication on October 25, 1991. According to headquarter's staff, it is not their practice to amend a region's technical recommendations unless some element of the rule-making process was omitted or violated. In the case of the DVX TCA, it appears to be "squeaky clean".

Summary

As you can tell, this has been a unique, and hectic process yet one which will result in a TCA that is efficient, safe and friendly to the nonparticipating users. We went from a condition where airports were planning legal action against the FAA for the "taking" of their airspace to one where these same operators were embracing the FAA for their cooperation.

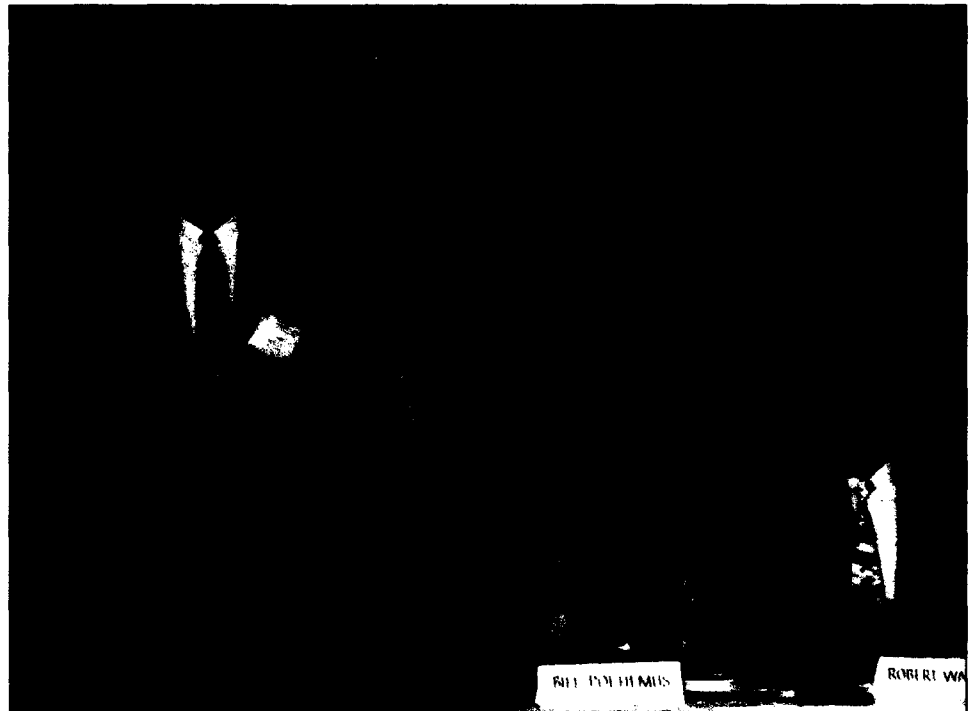
PANEL III

The military users were stating that the TCA would hinder their mission and endanger the nation's defense if changes were not made. In the end, their attitude was they received even more than they had hoped for.

Various aviation user groups came to the table questioning the FAA's need for more airspace (some even questioned the need for TCAs at all) and stated that this was yet another effort to eliminate general aviation entirely. However, by the end, these same people and groups were some of the strongest supporters of the plan. They even responded to those who continued to oppose the plan by saying the FAA did not have to solicit input from the users on this matter and that it was only out of courtesy they listened and altered their plan to reflect the needs of all users.

In closing, I can only speak for this particular instance but designing a TCA by committee can and does work. But without the tremendous help and patience of the FAA's Northwest Mountain Region ATC staff and personnel at the Denver ARTCC and Denver ARTCC, this would not have been accomplished. So - the bottom line is that before you view the design or alteration of a TCA (or any type of controlled airspace) as being a "done deal", consider how you as a user can contribute, rather than detract, from the process for the good of us all.

Thank You.



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"TCA"

TERRIBLY CONFUSED AGGRAVATION

TERMINAL CONTROL AREA

DEFINITION:

Parcels of controlled airspace extending upward from the surface or higher to specified altitudes within which all aircraft are subject to the operating rules and pilot/equipment requirements specified in FAR Part 91.131.

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RECEIVED AUG 06 1990

NM38-AT

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
NORTHWEST MOUNTAIN REGION
17900 PACIFIC HIGHWAY SOUTH
SEATTLE, WASHINGTON

ISSUED: July 9, 1990

EFFECTIVE: July 13, 1990

AIR TRAFFIC DIVISION, ANM-500, LETTER TO AIRMEN NO. 90-2

SUBJECT: Terminal Control Area - TCA; Denver, Colorado

CANCELLATION: October 1, 1990

The Federal Aviation Administration (FAA) is considering the establishment of a Terminal Control Area (TCA) in conjunction with the opening of the new Denver International Airport (DVX), Denver, Colorado. The proposed TCA could consist of airspace from the surface, or higher, within a maximum 30-mile radius of DVX, up to a maximum ceiling of 12,500 feet above mean sea level; wherein all flights would be subject to air traffic control authorization and criteria as set forth under the applicable Federal Aviation Regulations (FAR's).

PRE-RULEMAKING ACTIONS

Prior to initiating rulemaking actions to establish the new Denver TCA, the Air Traffic Division of the Federal Aviation Administration's Northwest Mountain Regional Office is seeking public input to assist in the development of a viable TCA airspace design. In addition to this request, the FAA will hold informal airspace meetings in order to receive additional input with respect to the proposal.

FOR FURTHER INFORMATION CONTACT:

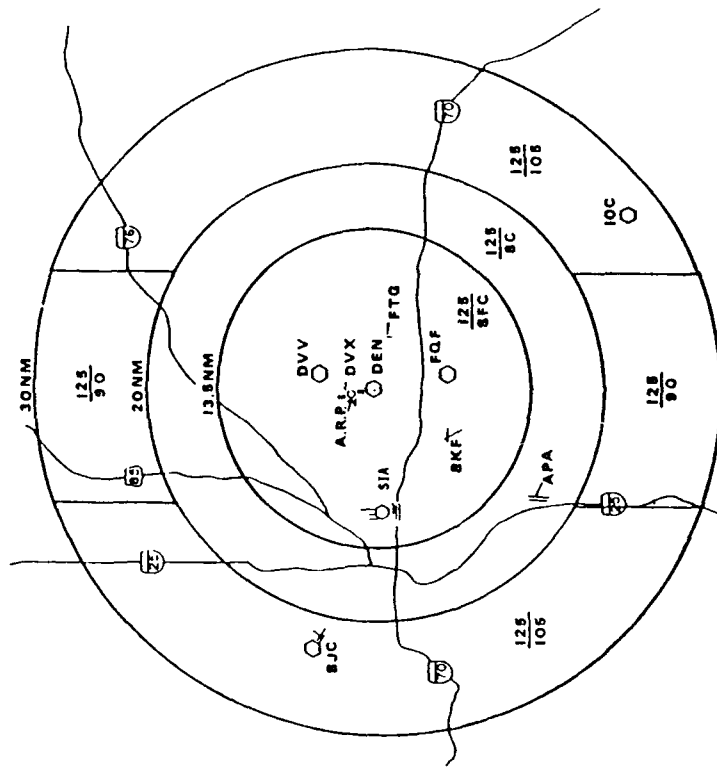
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Federal Aviation Administration
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Seattle, Washington 98168; Telephone (206) 431-2531

LOCATION QUALIFICATION

To qualify as a TCA site, an airport must serve at least 3.5 million enplaned passengers annually or have a total annual airport operations count of 300,000 (of which at least 50 percent must be air carrier).

Denver Stapleton International Airport (DEN) qualified for, and was designated as a TCA site during initial TCA establishment efforts in the early 1970's. Traffic volumes and passenger loads have continued to increase since that time. In fiscal year 1989, DEN served 13.7 million enplaned passengers and recorded nearly 464,000 airport operations.

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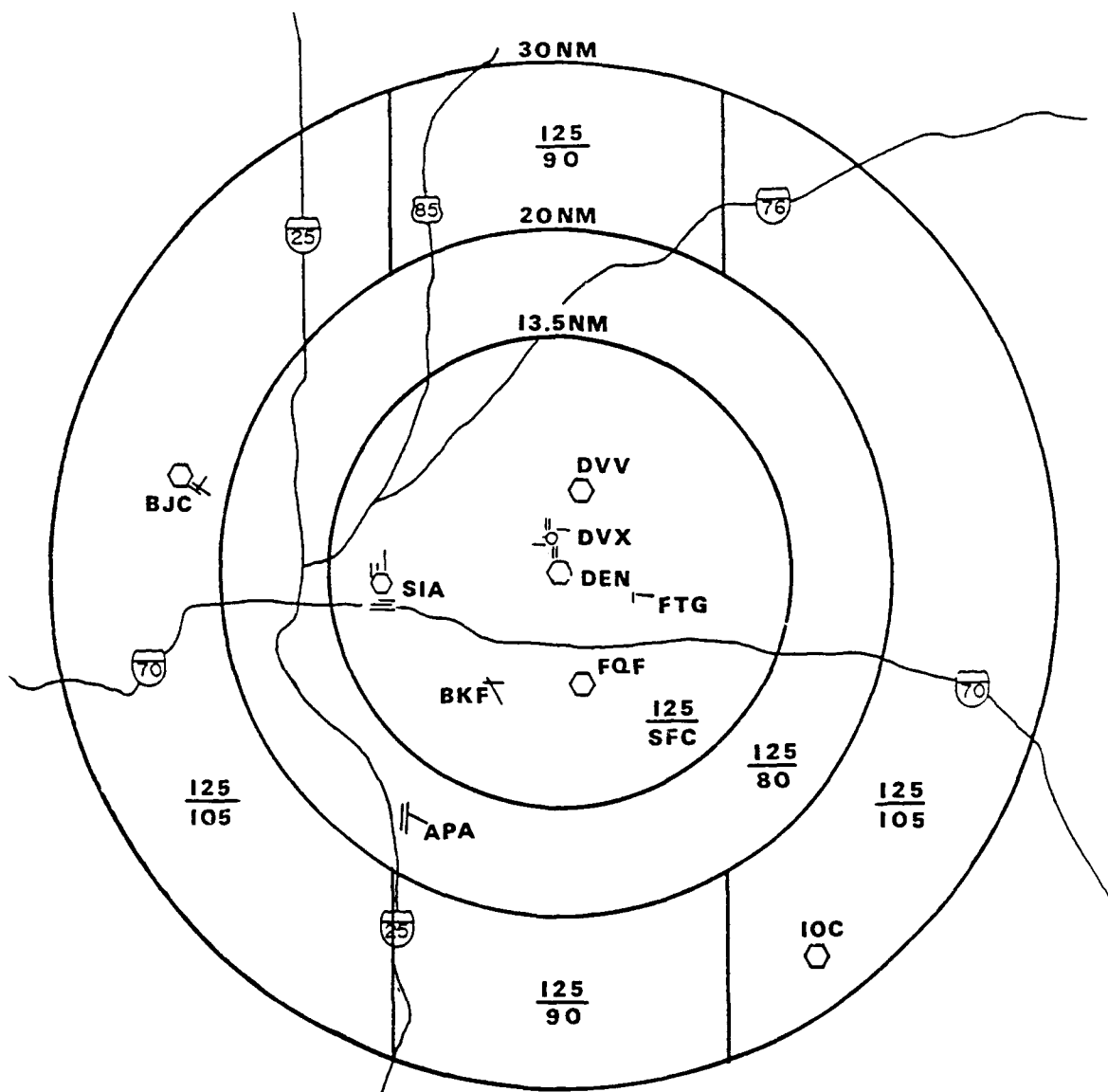


NEW DVV VOR - 3 NM NORTH OF NEW DENVER AIRPORT (DVX). AIRPORT REFERENCE POINT (ARP)
 NEW DEN VOR - 2 NM SOUTH OF DVX. - A.R.P.
 NEW FOF VOR - 10 NM SOUTH OF DVX. - A.R.P.
 SIA - STAPLETON INT'L AIRPORT
 DVX - NEW DENVER INT'L AIRPORT
 BJC - NEW VOR
 ("STRAWMAN" TERMINAL CONTROL AREA (TCA) FOR NEW DENVER AIRPORT) 3/90
 NOT TO SCALE

U.S. Department
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 Aviation Standards National Field Office
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 Oklahoma City, OK 73125

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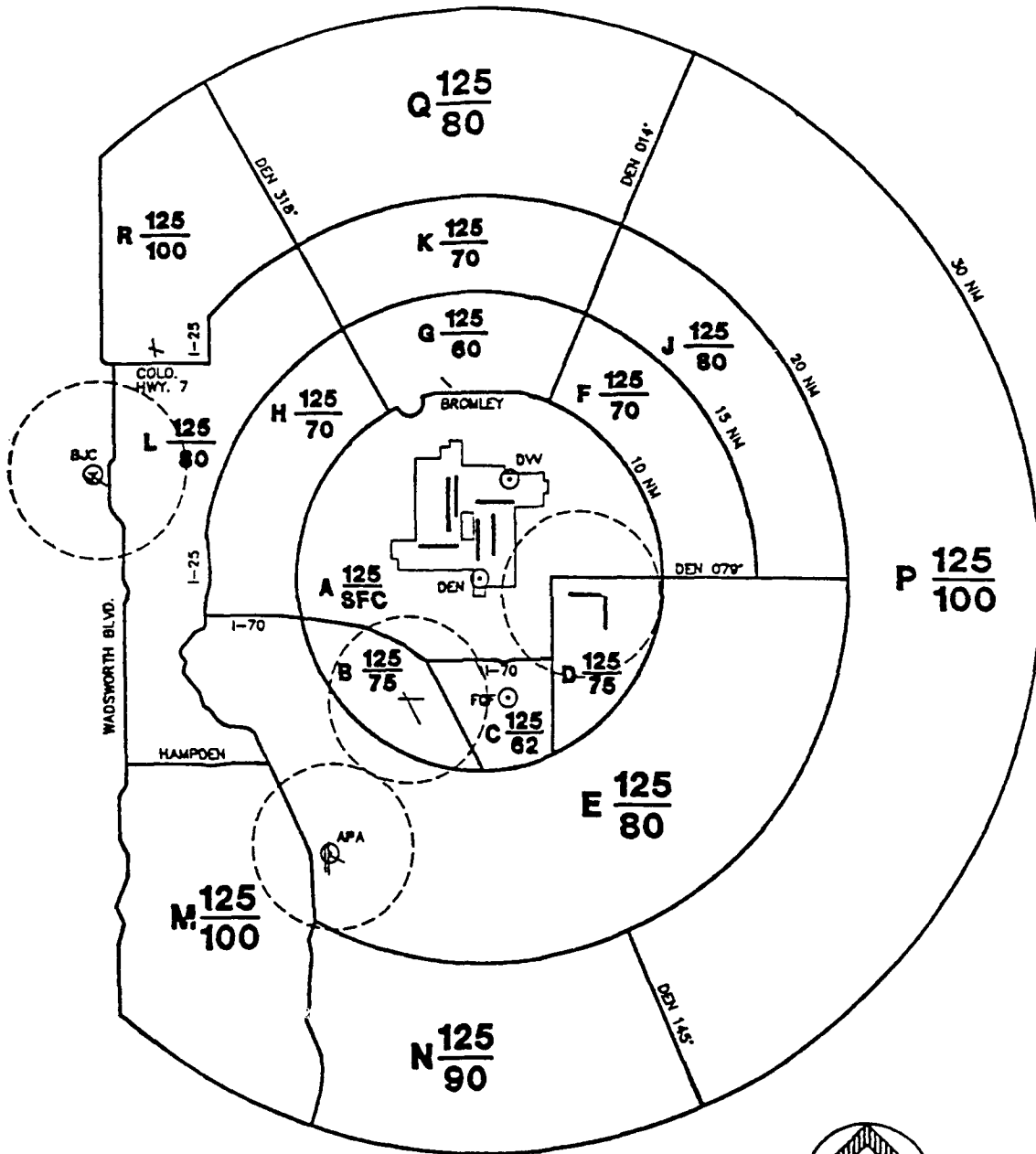


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 BJC - NEW VOR

("STRAWMAN" TERMINAL CONTROL AREA (TCA) FOR NEW DENVER AIRPORT) 3/90

NOT TO SCALE

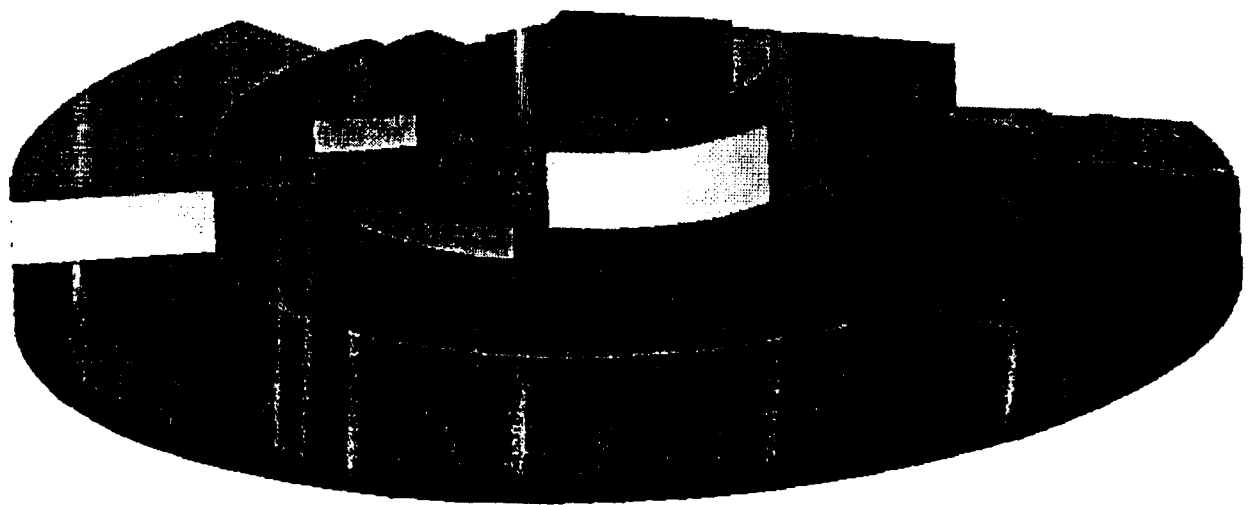
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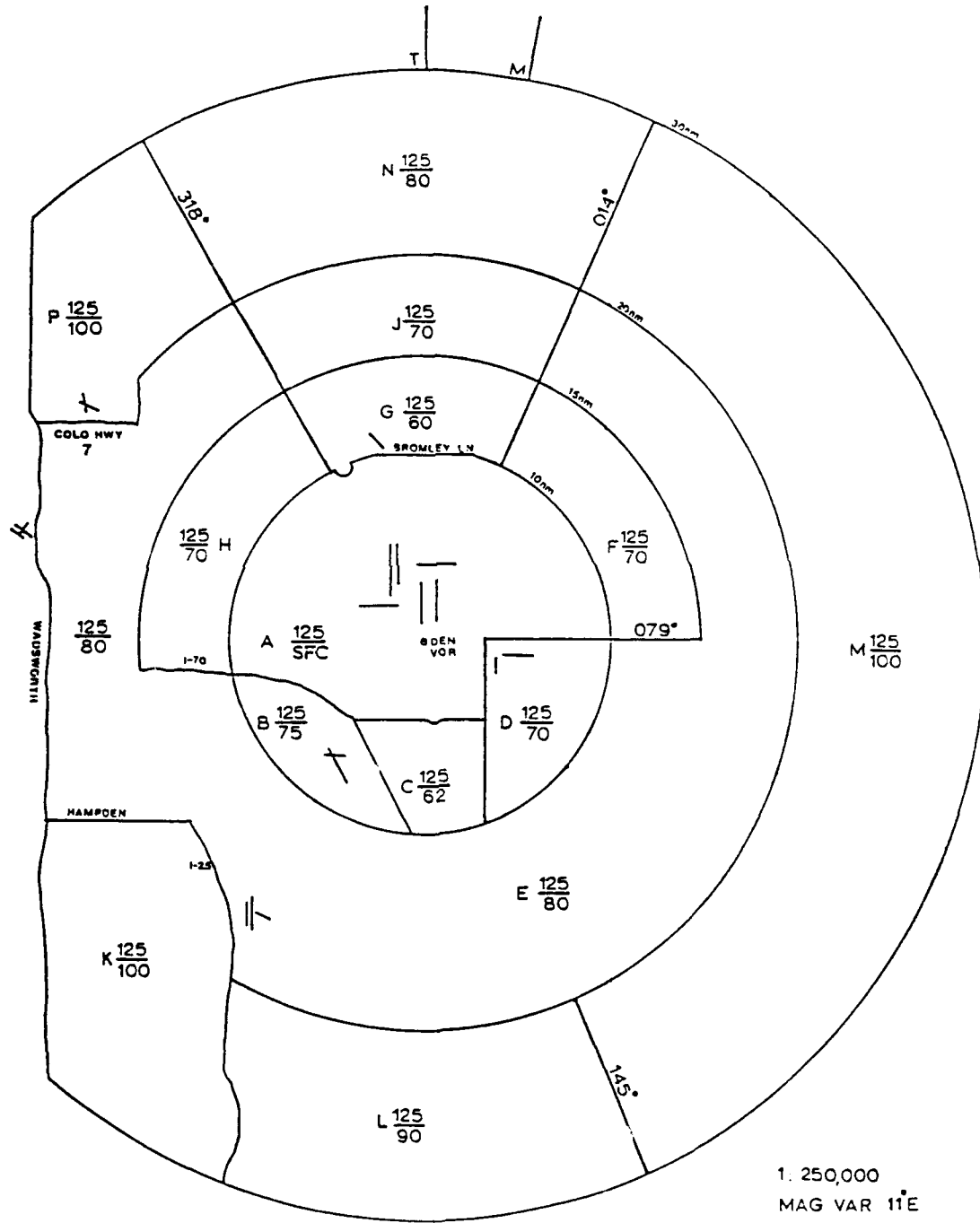
1 = 500,000

NEW DENVER AIRPORT TCA PROPOSAL
 DVX TCA AD HOC ADVISORY COMMITTEE
 31 AUGUST 1990

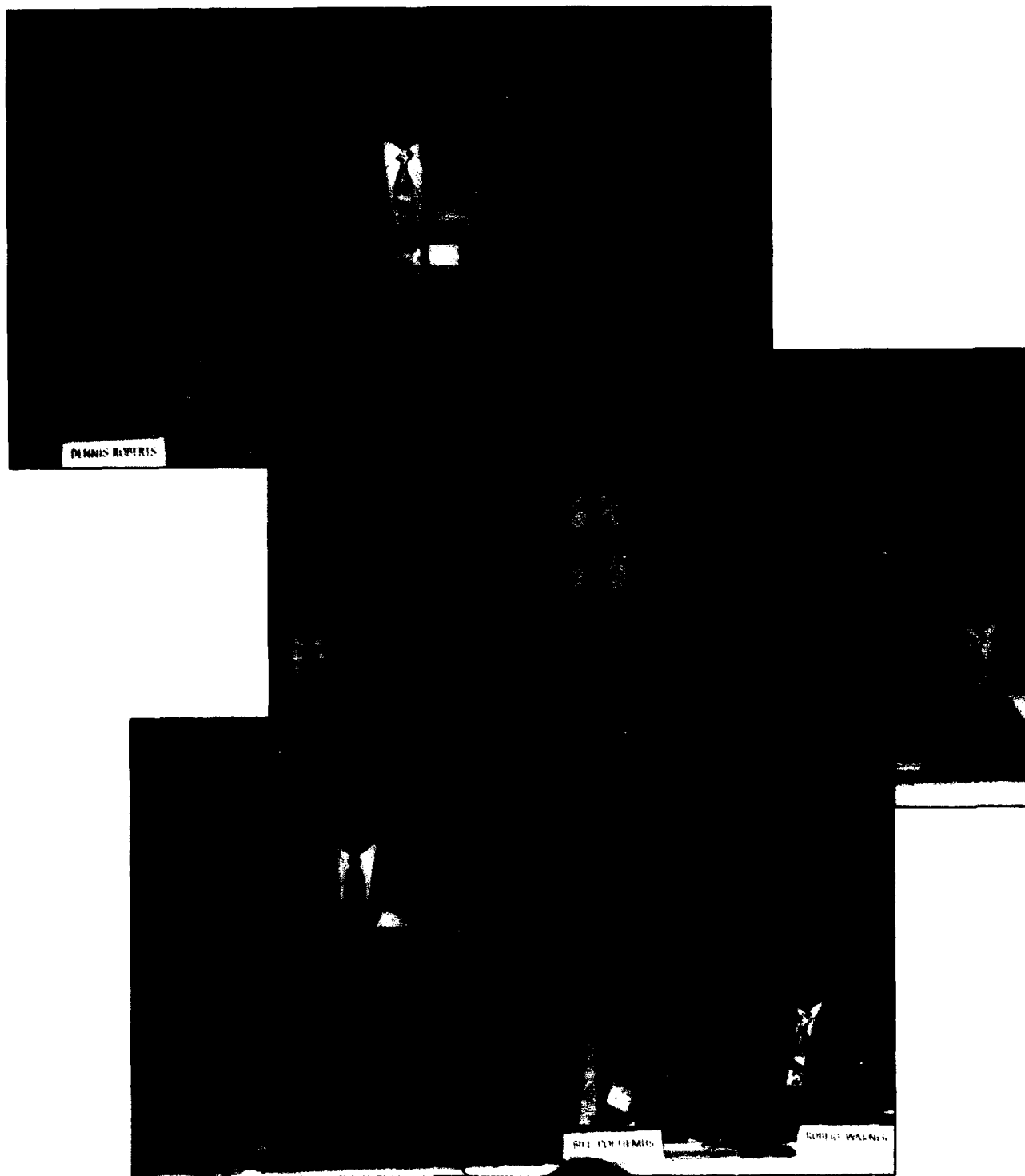
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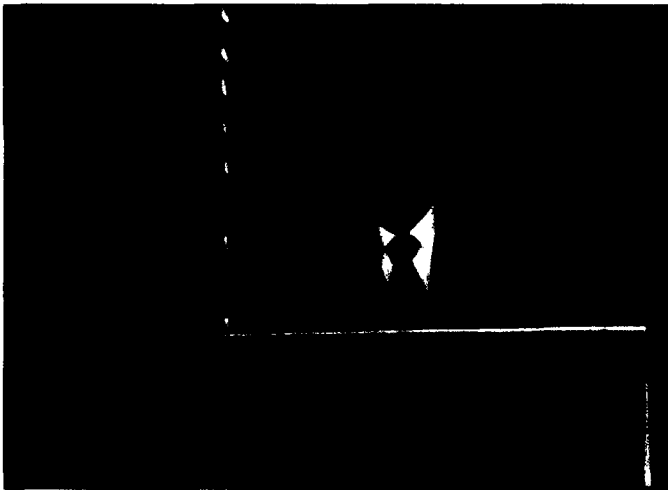
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