FAA
AEROSPACE FORECASTS

U.S. Department of Transportation
Federal Aviation Administration
Office of Aviation Policy & Plans
FAA-APO-00-1
March 2000

FISCAL YEARS 2000 - 2011

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle FAA AEROSPACE FORECAST--FISCAL YEARS 2000-2011		5. Report Date MARCH 2000
		6. Performing Organization Code FAA, APO-110
7. Author(s)		8. Performing Organization Report No. FAA APO-00-1
9. Performing Organization Name and Address DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION OFFICE OF AVIATION POLICY AND PLANS STATISTICS AND FORECAST BRANCH WASHINGTON, DC 20591		10. Work Unit No. (TRAIS)
		11. Contract or Grant No.
12. Sponsoring Agency Name and Address DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION OFFICE OF AVIATION POLICY AND PLANS STATISTICS AND FORECAST BRANCH WASHINGTON, DC 20591		13. Type of Report and Period Covered NATIONAL AEROSPACE FORECAST TRAFFIC AND ACTIVITY FORECASTS FISCAL YEARS 2000-2011
		14. Sponsoring Agency Code
15. Supplementary Notes		

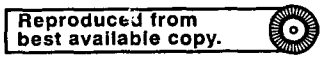
16. Abstract

This report contains the Fiscal Years 2000-2011 Federal Aviation Administration (FAA) forecasts of aviation activity at FAA facilities. These include airports with FAA and contract control towers, air route traffic control centers, and flight service stations. Detailed forecasts were developed for the major users of the National Aviation System--air carriers, air taxi/commuters, general aviation, and military. The forecasts have been prepared to meet the budget and planning needs of the constituent units of the FAA and to provide information that can be used by State and local authorities, the aviation industry, and the general public.

The outlook for the 12-year forecast period is for moderate economic growth and inflation and, after a projected one-year spike in oil prices in 2000, declining real fuel prices. Based on these assumptions, aviation activity is forecast to increase by 27.4 percent at the combined FAA and contract towered airports (454 in 1999) and 32.9 percent at air route traffic control centers. U.S. scheduled domestic passenger enplanements are forecast to increase 54.6 percent--air carriers increasing 52.8 percent and regional/commuters growing by 90.1 percent. Total international passenger traffic between the United States and the rest of the world is projected to increase 81.4 percent. International passenger traffic carried on U.S. flag carriers is forecast to increase 90.8 percent. The general aviation active fleet is forecast to increase by 11.8 percent while general aviation hours flown grow by 30.5 percent.

17. Key Words	18. Distribution Statement		
Commercial Air Carrier, Aviation Statistics, Regionals/ Commuters, Aviation Activity Forecasts, Federal Aviation Administration, General Aviation, Military, Commercial Space Transportation	Document is available to public through the National Technical Information Service Springfield, Virginia 22151		
19. Security Classif.(of this report) Unclassified	20. Security Classif.(of this page) Unclassified	21. No. of Pages 276	22. Price

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized



PREFACE

I am pleased to submit to the aviation community *FAA Aerospace Forecasts, Fiscal Years 2000-2011*. These forecasts are developed annually by Robert L. Bowles and his staff in the Statistics and Forecast Branch for use by the agency in its planning and decision-making processes. In addition, these forecasts are used extensively throughout the aviation and transportation communities as the industry plans for the future.

This year's report contains ten chapters which discuss four major areas: (1) the U.S. and world economic environment, assumptions, and predictions used in developing the forecasts; (2) historical data and forecasts of future aviation demand and aircraft activity for three major non-military user groups--large commercial air carriers, regional/commuter airlines, and general aviation/helicopters; (3) workload measures for FAA and contracted towers, en route centers, and flight service stations; and (4) the outlook for commercial space transportation. The report concludes with a discussion of our forecast accuracy and year-by-year historical data and forecasts for selected aviation demand and activity series.

Briefly, the forecasts predict continued expansion of both the U.S. economy and U.S. aviation demand and aircraft activity. Internationally, economic activity and aviation demand are anticipated to grow more rapidly than in the United States, especially in the Pacific/Far East and Latin America. However, the continuing sluggishness in the economies of Japan and Brazil adds an element of risk to the current forecasts, in particular, those related to economic growth and air travel in Asia and Latin America. Clearly, future growth in both U.S. and world air travel will be affected by the economies of Southeast Asia and South American. If these countries continue to recover as expected, aviation activity should be strong throughout the forecast period. However, if the economic problems in Japan and Brazil are not mitigated and spread throughout the regions, causing these nations economies to slowdown or fall into recession, traffic could fall below projections.

There are several new additions to this year's forecast publication: (1) a breakdown of U.S. air carrier air cargo revenue ton miles by all-cargo and passenger carriers; and (2) a breakout of U.S. air carrier large jet fleets by passenger and cargo aircraft.

In addition, we are including for a second year a chapter on the outlook for Commercial Space Transportation. This chapter is prepared in conjunction with the staff of FAA's Commercial Space Transportation Office and includes an assessment of the state of commercial space transportation, identifies future domestic and international space markets, and provides a forecast of expected commercial launches

We are also including a one-time special report entitled "Aviation Scenarios of the Future." This work summarizes the findings from an FAA/industry workshop which assessed the

outlook of aviation against four futuristic scenarios. These scenarios are based on work completed by the Department of Transportation, and range from a world of global prosperity to one limited by deterioration of environment, from hemispheric regionalism created by trade sanctions to an aging population of baby boomers, and the resulting economic impacts. While the likelihood of these scenarios occurring is very low, they bound the range of plausible future events.

In reading and using the information contained in this document, it is important to recognize that forecasting is not an exact science. Forecast accuracy is largely dependent on underlying economic and political assumptions. While this always introduces some degree of uncertainty in the short-term, the long-run average trends tend to be stable and accurate.

Although there are slight differences between both the Administration's short- and long-term economic projections and those prepared by other economic forecasting services, the differences are in degree, not direction. In addition, future federal policy and programs may change. Such shifts could produce changes in either the short- and/or long-term economic outlook or both, and could significantly alter the demand for aviation services.

If in using this document you see opportunities for improvement, I would appreciate hearing from you. We welcome information and suggestions to improve the usefulness and accuracy of our forecasts and this document.

Additional copies of the executive summary and forecast tables can be downloaded from our website at http://api.hq.faa.gov/apo_pubs.htm/.

You are also encouraged to send your comments to me at the Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591.

David Traynham
Assistant Administrator for Policy,
Planning, and International Aviation

ACKNOWLEDGMENTS

This document was prepared by the Statistics and Forecast Branch (APO-110), Office of Aviation Policy and Plans, under the direction of Mr. Robert L. Bowles. The following individuals were responsible for individual subject areas:

Economic Environment:	Daniel E. Taylor (202) 267-3302 Cheryl L. Miner (202) 493-4236
Commercial Air Carriers:	
Passengers:	Arnold N. Schwartz (202) 267-3306
Cargo:	J. Peter LeBoff (202) 267-3361
Regionals/Commuters:	Charles H. Moles (202) 267-3308
General Aviation:	
Forecasts:	Cheryl L. Miner (202) 493-4236
Survey Data:	Robert L. Bowles (202) 267-3355
Helicopters:	J. Peter LeBoff
FAA Workload Measures:	
Forecasts:	Arnold N. Schwartz Charles H. Moles
Data:	Nancy M. Trembley (APO-130)
Statistical Assistance:	Diane M. Green (202) 267-3352
Text and Table Preparation:	Statistics and Forecast Branch Staff
Forecast Conference Planner:	Helen A. Kish (202) 267-9943
APO Websites:	
Forecasts/Statistical Publications	http://api.hq.faa.gov/apo_pubs.htm
APO Data System	http://www.apo.data.faa.gov

TABLE OF CONTENTS

Table of Contents (Continued)

Table of Contents (Continued)

Table of Contents (Continued)

Table of Contents (Continued)

Table of Contents (Continued)

Table of Contents (Continued)

LIST OF FIGURES

LIST OF FIGURES (Continued)

LIST OF FIGURES (Continued)

LIST OF FIGURES (Continued)

LIST OF FIGURES (Continued)

LIST OF TABLES

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

EXECUTIVE SUMMARY

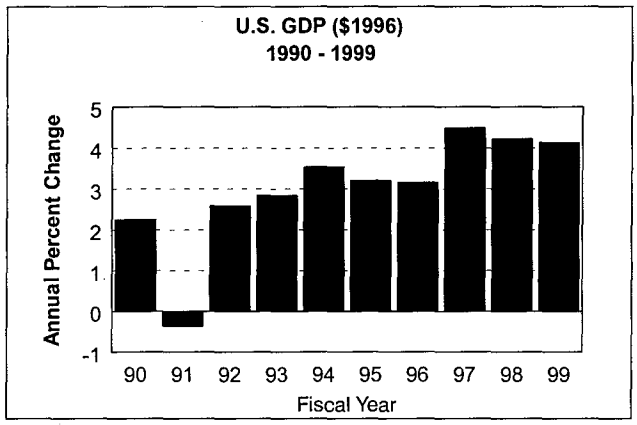
CHAPTER I

EXECUTIVE SUMMARY

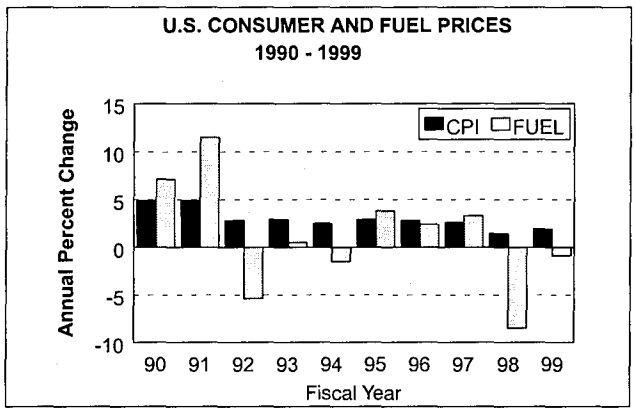
THE 1990s: A VERY GOOD DECADE FOR AVIATION!

Amid the soon to be longest post-war U.S. economic expansion, aviation enjoyed one of its best, if not the best, decade ever. The U.S. commercial aviation industry ended the 1990s by recording its sixth consecutive year of traffic growth, while the general aviation industry continued its turnaround by recording yet another record year in terms of aircraft billings.

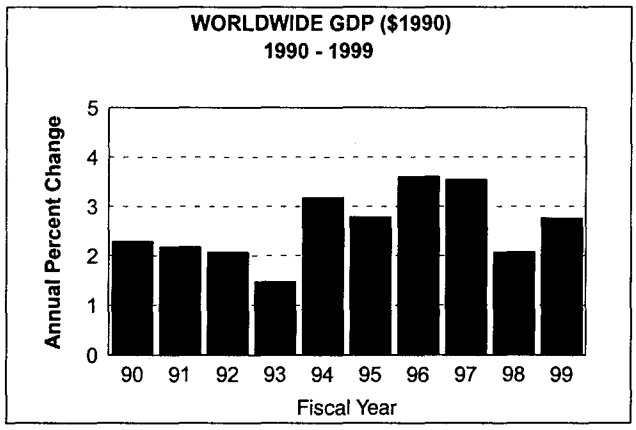
To a large extent, growth in both domestic and international aviation was driven by the continued economic expansion in the U.S and most world economies, as well as by declining fares. The current U.S. economic expansion is well into its ninth year (34 quarters, dating from 1991:3), and, baring any unforeseen event, will become the longest expansion in post-war history early next year. The longest post-war expansion dates from 1961:1 to 1969:3 (35 quarters). Real GDP growth has averaged 3.5 percent over the current expansion and 3.0 percent during the decade of the 1990s.



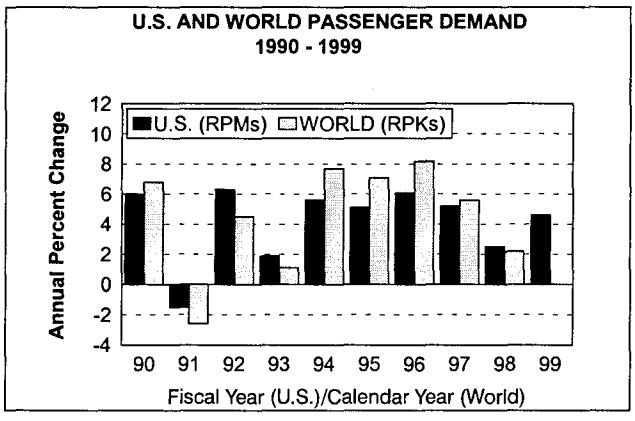
In addition, U.S. inflation (as measured by the consumer price index) averaged less than 3.0 percent during the decade. The low rate is due, in large part, to only a 1.1 percent annual increase in fuel prices during the period. However, a 8.5 percent decline in fuel prices in 1998 was largely responsible for the relatively slow growth in fuel prices over the decade.



Globally, economic gains have averaged about a half percent less (GDP up 2.6percent) than those of the United States during the decade of the 1990s. However, the slower rate of world economic growth reflects, to some extent, the impact of the Southeast Asian financial crisis in 1998, when GDP expanded by just over 2.0 percent.



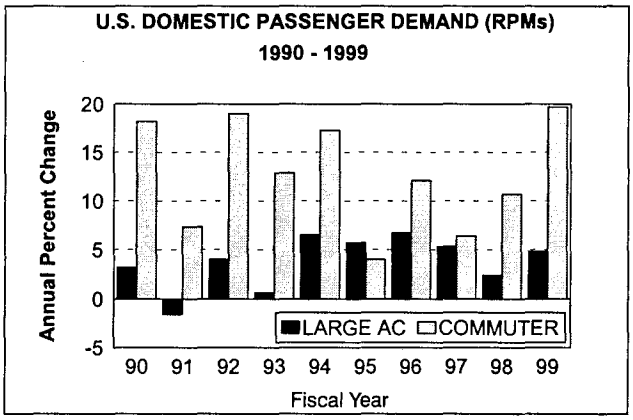
The relatively strong growth in both U.S. and world GDP is largely responsible for the strong demand for aviation services over the past decade. However, three events--the 1991 Iraqi War, worldwide passenger air carrier financial restructuring in 1993, and the 1998 Southeast Asia financial crisis--negatively impacted both worldwide and U.S. air carrier passenger demand during these years, thus reducing overall growth for the 10-year period.



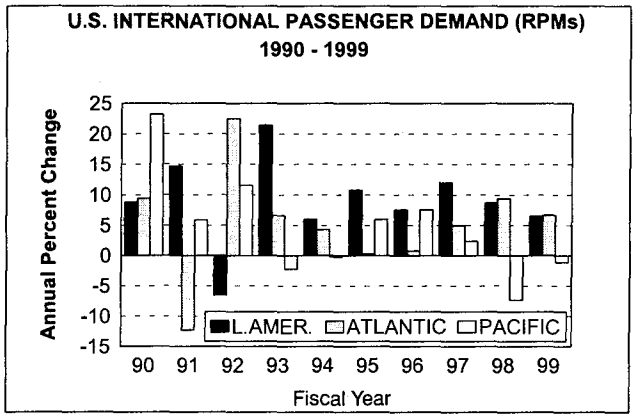
Worldwide passenger demand, as measured by revenue passenger kilometers, expanded by an average of 4.5 percent over the 1990-1998 time period. Discounting the negative or slow traffic growth in 1991, 1993, and 1998, worldwide traffic growth averaged 6.7 percent a year during the period. Although traffic figures are not available for worldwide traffic in 1999, it appears that growth should be in the 5.0 to 6.0 percent range.

U.S. air carrier (large air carriers and regionals/ commuters) traffic, as measured by revenue passenger miles (RPMs), averaged 4.3 percent during the 1990s, 5.7 percent if the three negative/slow growth years are removed from the results. While traffic during the decades of the 1970s and the 1980s grew at faster annual rates, 7.5 and 5.3 percent, respectively, than it did during the 1990s, the highest absolute gains in traffic were achieved during the decade of the 1990s. The actual increase in RPMs during the 1990s totaled 223 billion, compared to an increase of 174 billion during the 1980s, and 132 billion during the 1970s.

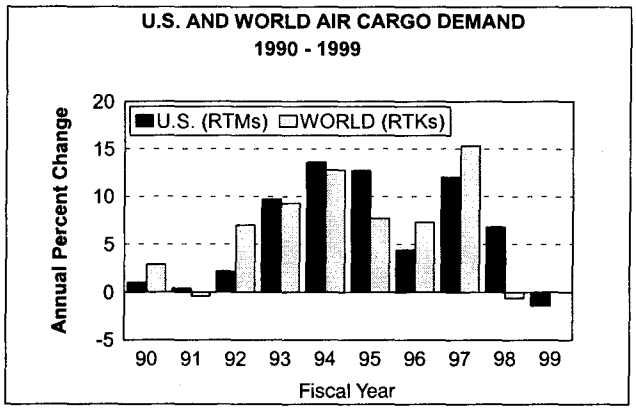
U.S. air carrier domestic traffic expanded at an annual rate of 3.9 percent during the 1990s. A large part of this growth is attributed to the smaller regional/commuter carriers, who grew at an average annual rate of 12.5 compared to 3.7 percent for the larger air carriers.



Internationally, traffic growth averaged 5.3 percent annually, the higher growth fueled, in large part, by the 8.8 percent annual increase in Latin American markets. Traffic in the Atlantic (impacted by the Iraqi War in 1991) and Pacific (impacted by the Asia financial crisis in 1998 and 1999) markets grew at annual rates of 4.9 and 4.3 percent, respectively, over the same period.

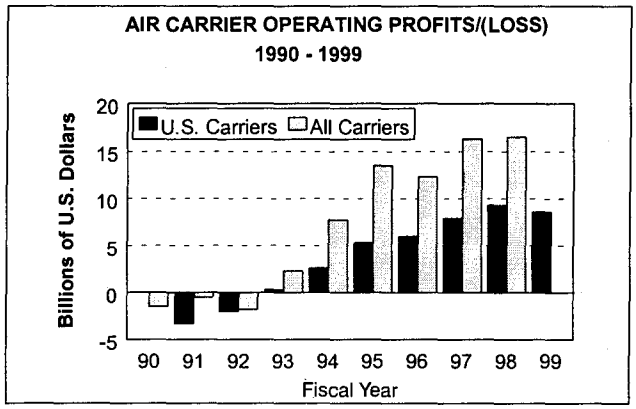


Air cargo demand grew at a somewhat faster pace than passenger demand during the 1990s, with worldwide freight ton-kilometers increasing at an annual rate of 6.7 percent over the 1990-1998 period. U.S. air carrier freight revenue ton-miles (RTMs) grew by 5.7 percent annually over the 10-year period, 4.6 percent in domestic markets and 6.9 percent in international markets.



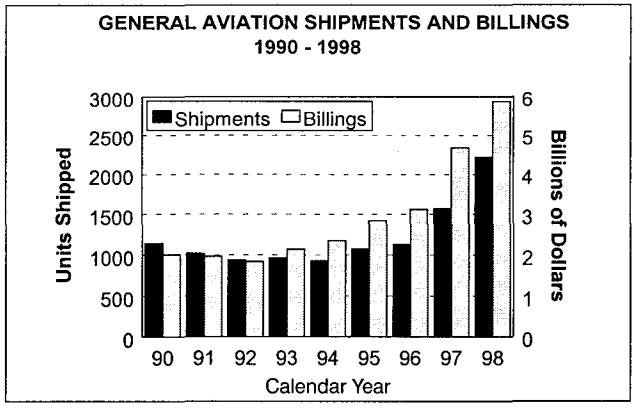
The Iraqi War and the Southeast Asian financial crisis also negatively impacted air cargo demand in 1991, 1998, and 1999. Discounting these slow or negative growth periods, worldwide air cargo demand grew at an average annual rate of 8.9 percent while U.S. air cargo demand increased at an annual rate of 7.7 percent. U.S air carrier RTMs growth averaged 6.3 percent annually in domestic markets and 9.3 percent in international markets over the 7-year period.

Expanding U.S. and world economic growth, combined with the strong demand for both passenger and air cargo services, led to record profits for both world and U.S. air carriers. Based on data compiled by the International Civil Aviation Organization (ICAO), world air carriers (including U.S. airlines) reported cumulative operating profits totaling $64.8 billion and cumulative net profits totaling $6.9 billion during the 9-year period ending in 1998. U.S. air carriers' cumulative operating and net profits totaled $34.6 and $8.6 billion, respectively, during the 10-year period ending in 1999. For U.S. carriers, this is nearly double the combined reported profits of both the decade of the 1970s ($5.8 billion operating and $3.4 billion net profits) and the decade of 1980s ($11.6 billion operating and $2.6 billion net profits).

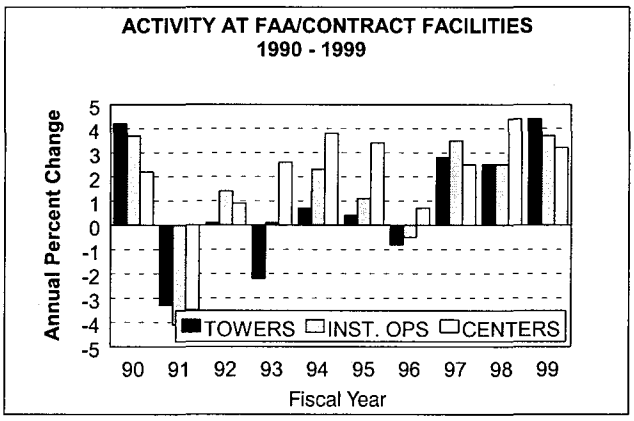


The turnaround in the general aviation industry can be attributed to a combination of two events--the current U.S. economic expansion that began in 1993 and the passage of the General Aviation Revitalization Act in 1994. General aviation aircraft shipments are expected to record a fifth consecutive year of increase in 1999 while industry billings are almost certain to surpass the all-time high record billings of $5.8 billion in 1998. General aviation shipments and billing have both more than doubled since 1994.

The FAA's General Aviation and Air Taxi Activity Survey also reports increases in both the general aviation active fleet and hours flown for a fourth consecutive year. In addition, general aviation activity at FAA air traffic facilities, both itinerant and local operations, continues to grow at above expected levels.



Despite the strong growth by both the commercial and general aviation industries during the 1990s, the increase in activity at FAA air traffic facilities has been relatively small. During the decade of the 1990s, activity growth at combined FAA and contract tower airports averaged 0.9 percent (IFR up 1.3 percent) annually, while activity at en route centers grew at an annual rate of 2.0 percent. However, most of this growth has occurred in just the last 3 years. Since 1997, activity at towered airports has increased at an annual rate of 3.2 percent (IFR up 3.1 percent), while activity at en route centers grew by 3.4 percent annually. It is the growth over the past 3 years that may portend serious problems for the future.



Certainly, the 1990s have indeed been a very good decade for both the commercial and general aviation industries. The extremely positive results of the latter half of the decade have assuredly positioned the aviation industry to enter the new millennium with high expectations for continued growth and prosperity.

REVIEW OF 1999

UNITED STATES AND WORLD ECONOMIC ACTIVITY

The U.S. economy expanded by 4.1 percent in 1999, the third consecutive increase of 4.0 percent or better. Inflation remained at relatively low historical levels (up 1.9 percent), the second consecutive year below 2.0 percent. The last time that this occurred was in 1964-65. The relatively low inflation over the past 2 years is due, in large part, to a 9.4 percent decline in fuel prices during this period—down 8.5 percent in 1998 and 0.9 percent in 1999.

Worldwide economic growth averaged only 2.7 percent in 1999, the lower growth due largely to negative growth in Latin American economies (down 0.4 percent) and relatively slow growth in European/Middle Eastern countries (up 2.0 percent). The economies of Asian/Far East countries are expected to expand by 3.2 percent in 1999, showing that the recovery from the 1997-98 financial crisis is well underway. The Canadian economy grew by 3.5 percent in 1999.

COMMERCIAL AVIATION

In 1999, the large U.S. air carriers' system capacity (ASMs or available seat miles) increased by 4.6 percent, the largest annual increase since 1990. Passenger demand (RPMs and enplanements) grew by 4.6 and 3.5 percent, respectively. As a result of slightly faster capacity growth relative to growth in traffic, the system-wide load factor (including domestic and international services) declined marginally to 70.8 percent, the first recorded decline in load factors since 1993. However, it should be noted that the 1999 load factor is still the second

highest ever recorded, second only to the 70.9 percent load factor achieved in 1998.

Domestic capacity (50 states, Puerto Rico, and the U.S. Virgin Islands) increased by 5.2 percent in 1999, also the largest capacity increase since 1990. RPMs and passenger enplanements grew by 4.8 and 3.8 percent, respectively, the result being a 0.3 point decline in load factor to 69.8 percent. This is also the first decline in domestic load factors since 1993, a period during which domestic load factors increased by 8.5 percentage points.

Regional/commuter airline traffic continued to grow at rates significantly higher than traffic of the larger air carriers, with RPMs and passengers up 19.7 and 12.0 percent, respectively. Regionals/commuters capacity increased by 17.5 percent in 1999, the result being a 1.1 point increase in load factor to 57.6 percent—a new all-time high.

In 1999, it is estimated that U.S. and foreign flag carriers combined transported a total of 132 million passengers between the United States and the rest of the world, an increase of 4.2 percent over 1998. This traffic volume is distributed among the four world travel markets as follows: 48.9 million (up 5.0 percent) in Atlantic markets; 39.2 million (up 4.2 percent) in Latin American markets; 24.1 million (up 3.0 percent) in Pacific/Far East markets; and 19.8 million (up 3.7 percent) between the United States and Canada.

On the other hand, international enplanements on U.S. flag carriers alone grew by only 0.3 percent in 1999, significantly less than the estimated growth in total international traffic to and from the United States. U.S. carrier passenger enplanements were up 6.0 percent in Atlantic markets and 4.2 percent in Latin American markets. However, the number of passenger enplanements in Pacific/Far East markets declined 12.8 percent in 1999, the second consecutive double-digit decline in these markets. The declines during 1998 and 1999 (22.1 percent) reflect the impact of the financial crisis in Southeast Asia, the Northwest Airlines pilot strike (August 28 to September 15, 1998), as well as individual carrier marketing, scheduling, and fleet strategies on the affected routes. U.S. carrier capacity on the Pacific/Far East routes was reduced by 8.6 percent over the past 2 years, with much of the capacity shifted to other international and domestic markets.

U.S. air carriers' air cargo traffic declined 1.4 percent in 1999; the first recorded decline since 1985. Domestic RTMs were up 0.3 percent while international RTMs declined 3.0 percent, the latter change largely due to declining freight movements between the U.S. and Latin American and Asian markets. Domestic freight/express RTMs (11.5 billion) declined by 0.6 percent while domestic mail RTMs (2.4 billion) were up 4.8 percent over 1998 levels. International freight/express (13.6 billion) and mail (508.9 million) RTMs were down 3.0 and 3.9 percent respectively, in 1999.

Although U.S. air carriers achieved higher growth in overall traffic levels in 1999 (4.6 versus 2.5 percent in 1998), a 2.0 percent decline in system passenger yields resulted in a $702 million decline in industry profits. Industry profits in 1999 totaled $8.5 billion, second only to the $9.3 billion earned in 1998—an all-time record high. Net profits totaled $5.3 billion in 1999, down slightly from the 1998 reported figure. It should be noted that the industry was the beneficiary of a 15.7 percent decline in the cost of jet fuel in 1998, the net result being a $1.9 billion reduction in operating expenses. Although the *average cost of jet fuel* was again lower in 1999 (49.7 versus 54.7 cents per gallon), fuel prices were up 30.0 percent over the last 6 months of fiscal 1999, rising from 44.58 cents per gallon in March to 57.8 cents a gallon in September. These higher fuel prices are one of the contributing factors to higher operating expenses and lower operating profits in 1999.

Despite the relatively large gains reported in both industry traffic and profits over the last several

years, considerable disparity continues to exist among the individual U.S. carriers. In 1999, all but one of the 13 majors reported positive earnings, with operating and net profits for the group totaling $7.6 and $4.9 billion, respectively. Operating results for the majors ranged from a high of $1.6 billion (Delta) to a low of a $143.8 million loss (Trans World). Three carriers (American, Delta, and United) accounted for over half (52.4 percent) of the group's total earnings.

The financial results of many of the smaller nationals (carriers with operating revenues between $100 million and $1 billion) and regionals (carriers with operating revenue less than $100 million) improved considerably in 1999, with only 11 of the 54 reporting carriers reporting operating losses. The combined operating profits of the reporting nationals and regionals totaled just under $1.2 billion in 1999, with earnings ranging from an operating profit of $219 million (Alaska Airlines) to an operating loss of nearly $14 million (Challenge Air Cargo). The record for the low cost, low-fare, new entrant carriers was mixed in 1999, with several of the carriers continuing to post large operating losses.

The regional/commuter airline industry posted an operating profit of $696 million in 1999, 15.5 percent higher than the $603 million recorded in 1998. The eight Form 41 carriers (operating at least one aircraft with more than 60 seats) reported operating profits of $369 million while 85 Form 298-C carriers (operating only aircraft with 60 seats or less) posted profits of $327 million.

Orders for commercial jet aircraft totaled 981 during the first 3 quarters of 1999, a 21.1 decline from the same period in 1998. The decline in 1999 is due, in large part, to the large number of orders in the two prior years, 1,369 in 1998 and 1,346 in 1997—the two all-time record highs for the industry. The smaller regional jets (30 to 75 seats) accounted for almost half of the orders (481 aircraft) during 1999, a 44.4 percent increase over orders in 1998. While the number of regional jets in the U.S. regional/commuter fleet totaled only 203 in 1999, the 920 orders over the past 7 quarters show that this will continue to be the fastest growing segment of the industry over the next several years.

A total of 815 commercial jet aircraft were delivered during the first 3 quarters of 1999, a 30.8 percent increase over the same 1998 period. The relatively large increase in new aircraft deliveries in 1999 and the previous 2 years (678 in 1997 and 951 in 1998) reflects the large numbers of orders during the 1996 to 1998 period. A total of 133 regional jets were delivered during the first 9 months of 1999, a 66.3 percent increase over deliveries during the same 1998 period.

GENERAL AVIATION

By any measure, 1999 was a very good year for general aviation. Unit shipments of general aviation aircraft are well on their way to recording a fifth consecutive year of increase. General aviation manufacturers' shipments increased from 928 aircraft in 1994 to 2,220 aircraft in 1998 (up 139.2 percent) and were up an additional 13.4 percent (1,692 units) during the first 3 quarters of 1999. Of particular importance is the renewed interest in piston powered aircraft. Shipments of piston powered aircraft have more than tripled between 1994 and 1998 (from 499 to 1,534) and were up an additional 10.8 percent (1,164 units) during the first 9 months of 1999.

Shipments of jet aircraft have increased in each of the past 6 years (from 171 in 1992 to 415 in 1998) and are headed toward a seventh consecutive year of increase (352 units, up 26.2 percent) through the first 3 quarters of 1999. The increased sales of jet aircraft reflects, to a large extent, the relative importance of the rapidly growing fractional ownership programs to the industry's current turnaround and its future growth. While shipments of turboprop aircraft

have not fared as well as the other two aircraft categories, shipments totaled 176 (up 8.6 percent) during the first 9 months of 1999.

Billings for general aviation aircraft totaled almost $5.9 billion in 1998, an all-time record high. During the first 9 months of 1999, the industry reported billings of almost $5.5 billion, up 41.0 percent over the same time period in 1998. The large increase in billings relative to shipments reflects increased shipments of the higher unit-priced turbojet aircraft. Export billings and aircraft shipments also increased in 1999, up 73.5 and 12.1 percent, respectively, during the first 3 quarters of the year.

Based on the results of the 1998 General Aviation and Air Taxi Activity Survey, the active general aviation aircraft fleet and hours flown both increased for a fourth consecutive year, up 6.4 and 1.4 percent, respectively. According to the 1998 survey, the active general aviation fleet totaled 204,711 and flew an estimated 28.1 million hours.

General aviation activity counts were up at both FAA and contract towers as well as at en route centers in 1999. Operations at combined FAA and contract towers were up 5.2 percent, with itinerant and local operations up 4.3 and 6.5 percent, respectively. This marks the third consecutive increase in general aviation activity at FAA and contract towered airports and represents a 13.4 percent increase in activity over this 3-year period. Instrument operations at the combined towered airports also increased for a third consecutive year, up 4.9 percent in 1999 and 15.5 percent over the last 3 years.

General aviation activity at FAA en route centers increased for a eighth consecutive year--up 1.9 percent in 1999 and 12.1 percent over the past 3 years. Sustained positive trends in instrument operations and center activity probably reflect continuing growth in business and corporate flying. Additionally, the increase in local operations (generally touch-and-go activity) at FAA and contract towered airports over the past 3 years (up 17.4 percent) shows that the long awaited turnaround in recreational and instructional flying is also well underway.

Following 7 consecutive years of decline, the total number of active pilots increased for a second consecutive year in 1999, totaling 640,113. All four of the major pilot categories showed increases--student, private commercial, and airline transport--in 1999. The number of instrument rated pilots was up nearly 9,000 to 308,951, the second consecutive year of increased numbers.

Of major importance to the general aviation community are the positive statistics regarding student pilots. The number of active student pilots increased for a third consecutive year in 1999 (up 4.4 percent), totaling an estimated 102,000. In addition, preliminary estimates show that the FAA processed a total of 47,091 student pilot certificates (both new and renewals) during the first 8 months of 1999, a 12.6 percent increase over 1998. Preliminary estimates also show that the FAA issued 39,963 original student pilot certificates during the first 8 months of 1999, an increase of 16.9 percent over the same 1998 time period.

Although all of the statistics relating to general aviation activity are encouraging, it is the estimated increase in student pilots, one of the key factors impacting the future of the general aviation industry, that should be good news for the general aviation industry. The industry has, over the past several years, instituted a number of industry-wide programs, including "BE A PILOT," which are designed to attract new pilots to general aviation. The positive statistics for student pilot certificates processed or issued by the FAA in both 1998 and 1999 shows that these programs are having an impact.

FAA WORKLOAD

At the end of fiscal year 1999, there were a total of 454 towered airports--288 FAA towers and 166 FAA contract towers. This compares to 402 FAA towers and 33 contract towers in 1994, the point at which the FAA began extensive conversions of Level 1 towers. A lawsuit filed against the FAA by the National Air Traffic Controllers Association placed additional conversions under the FAA Contract Program on hold for most of 1998 and 1999.

In 1999, FAA contract towers accounted for 19.2 percent of total combined activity at the 454 towers, up from only 3.0 percent in 1994. As in 1994, the majority of traffic activity at the contract towers is being performed by general aviation, 83.3 percent in 1999 compared to 82.8 percent in 1984.

FAA and Contract Towers

The combined activity counts at FAA and contract towers totaled 68.2 million in 1999, an increase of 4.4 percent over 1998. The increase in the tower counts was, in large part, due to the growth in both general aviation and military activity. General aviation operations were up 5.2 percent while military expanded by 6.1 percent. Commercial operations (the sum of air carrier and commuter/air taxi) totaled 25.2 million, an increase of 3.0 percent. Air carrier operations grew by 2.3 percent while commuter/air taxi operations increased by 4.0 percent. Operations at FAA air traffic control towers totaled 55.1 million in 1999, up 3.9 percent over 1998 activity levels. Operations at contract towers totaled 13.1 million, an increase of 6.6 percent.

Instrument operations at the combined FAA and contract towers totaled 51.8 million in 1999, an increase of 3.7 percent. General aviation activity was up 4.9 percent, while military activity grew by 2.6 percent. Commercial activity expanded by 3.0 percent in 1999. Instrument operations at FAA towered airports (98.6 percent of total combined operations) were also up 3.7 percent in 1999, while instrument operations at contract towers increased 1.7 percent.

FAA En Route Centers

The number of Instrument Flight Rule (IFR) aircraft handled at FAA's en route air traffic control centers totaled 44.7 million in 1999, an increase of 3.4 percent over 1998. The number of commercial and general aviation aircraft handled were up 4.7 and 1.9 percent, respectively. Military activity declined 2.9 percent in 1999.

FAA Flight Service Stations

The number of traditional (non-automated) services provided at FAA Flight Service Stations (FSS) totaled 32.4 million in 1999, a 4.4 percent decline from 1998 levels. All categories of flight services declined in 1999: pilot briefings, down 5.0 percent; aircraft contacted, down 4.3 percent; and flight plans originated, down 3.7 percent.

The number of flight plans originated is generally thought to be an indicator of general aviation activity. The turnaround in the number of flight plans originated in 1997 (up 1.5 percent) did presage the turnaround in general aviation activity at FAA facilities (up 4.3 percent). However, while general aviation activity at FAA facilities continued its turnaround in 1998 and 1999 (up 8.7 percent), the number of flight plans originated failed to follow suit, declining 7.0 percent over the 2-year period.

The Direct User Access Terminal System (DUATS) provides an automated alternative to the FSS for obtaining pilot briefing information

and filing flight plans. The number of weighted DUATS services totaled 13.4 million (up 4.0 percent) in 1999. Combined FSS and DUATS services totaled 45.8 million in 1999, a decline of 2.1 percent from the number of combined transactions recorded in 1998.

FAA AEROSPACE FORECASTS FISCAL YEARS 2000 - 2011

This year's FAA aviation forecast document contains several additions and format changes which were not included in last year's publication. The FAA/Transportation Research Board's (TRB) 11th International Workshop on Future Aviation Activities, held on September 15-17, 1999, recommended that the FAA expand on the air cargo forecasts developed and published in the 1999 forecast document.[1] In response, the FAA has expanded its forecasts of domestic and international air cargo demand (freight/express and mail revenue ton miles) to include a breakout of air cargo demand carried by all-cargo carriers utilizing dedicated cargo aircraft (freighters) as well as cargo demand moved in the belly of passenger aircraft. These forecasts are discussed in Chapter III and are contained in Tables 16-18 in Chapter X.

A number of changes have also been made in our handing and reporting of the U.S. commercial air carriers and regional/commuter airline fleets. For the first time, this document contains separate forecasts and tables of passenger and cargo jet aircraft. In addition, the regional/commuter aircraft seat-size categories have been changed to include aircraft with seating capacity greater than 60 seats. This was done to more accurately reflect the changing nature of this fast growing industry. A discussion of the air carrier passenger and cargo fleets can be found in Chapter III, the fleet data in Chapter X, Tables 19 and 20. A discussion of the new regional/ commuter seat-size categories can be found in Chapter IV, the fleet forecast in Chapter X, Table 25.

The format of Chapter III, *Commercial Air Carriers*, has been reformatted to facilitate and enhance the flow and presentation of the information discussed. The new format now includes four distinct sections: (1) a review of 1999 traffic and financial results; (2) domestic passenger assumptions and forecasts; (3) international passenger assumptions and forecasts, and (4) air cargo assumptions and forecasts.

For a second year, the document contains a chapter on commercial space transportation prepared in conjunction with the staff of the FAA's Commercial Space Transportation Office. This chapter is intended to provide an overview of the state of the space transportation and includes forecasts of expected commercial launches over the next several years. The forecasts and discussion can be found in Chapter IX.

The document also contains a special one-time report on "Aviation Scenarios of the Future." This report summarizes the findings from a FAA/industry workshop that assessed the outlook of aviation against four futuristic scenarios—Global Prosperity, Western Hemisphere, Aging America, and Global Climate Change. The report can be found immediately following the 48 forecast tables contained in Chapter X.

ECONOMIC FORECASTS

The economic forecasts used by the FAA to project domestic aviation demand are provided by the Executive Office of the President, Office of Management and Budget (OMB). In addition to the OMB forecasts, the FAA also uses the U.S. macro economic projections of two commercial

[1] The cargo forecasts prepared in 1999, the first since 1983, were in response to recommendations made at the 1997 FAA/TRB Workshop.

forecasting services--DRI/McGraw Hill (DRI) and WEFA, Inc. (WEFA). These alternative forecasts provide the FAA with a range of economic forecasts with which to gauge the risk associated with variations from the OMB projections. The FAA uses the world and individual country economic projections provided by WEFA to forecast the demand for international aviation services.

Readers of this document should be aware that effective October 28, 1999, the Bureau of Economic Analysis, U.S. Department of Commerce, changed the reference year for calculating price indexes and chained dollar estimates of GDP from 1992 to 1996. In addition, a number of definitional and classification improvements have been made which results in an upward revision to the historical growth rate of real GDP—from 2.8 percent on average since 1984 to 3.2 percent. The changes also result in an upward revision in the historical growth rate of world GDP—approximately 0.1 percent annually. A more detailed discussion of these changes is presented in Chapter II.

In any given year there are likely to be variations around the long-term trend. None of the current economic models used by the FAA are sufficiently precise to predict interim business cycles. In addition, unanticipated developments, such as the recent Southeast Asia financial crisis or the 1998 Northwest Airlines' strike cannot be predicted.

In addition to the economic forecasts prepared by OMB and the economic forecasting services, the FAA incorporates many of the relevant assumptions developed at the FAA/TRB 11th Annual International Workshop. Although the FAA makes use of the recommendations and assumptions developed by all nine industry panels, it relies heavily on the assumptions and forecasts prepared by the three industry panels on general aviation--Light General Aviation, Business Aviation, and Vertical Flight--in preparing its general aviation and helicopter forecasts.

The projected growth of aviation demand discussed in this and subsequent chapters is consistent with the national short- and long-term economic growth forecasts discussed in greater detail in Chapter II. Table I-1 summarizes the key U.S. and world economic assumptions used in developing the domestic and international aviation demand forecasts. Annual historical data and economic forecasts are presented in tabular form in Chapter X, Tables 1 through 5.

United States Economy

While there is agreement among most economic forecasters as to the general direction of the U.S. economy--sustained growth--there are differences among the economic projections supplied by OMB, DRI, and WEFA as to the expected growth in individual years of the forecast period. The two forecasting services bracket OMB's projected growth in 2000, with expected U.S. economic growth ranging from 3.4 to 3.8 percent. However, OMB is generally more pessimistic than either forecasting service over the remainder of the forecast period. While both OMB and the two forecasting services expect the U.S. economy to slow during the 2001 to 2004 period, the OMB slowdown is more pronounced than that of either WEFA or DRI.

The OMB economic forecasts anticipate moderate growth throughout the forecast period. In the short-term, U.S. real GDP is projected to increase by 3.5 percent in 2000, slowing to average growth of 2.6 percent over the next 4 years. GDP is forecast to increase at an average annual growth rate of 2.8 percent over the entire 12-year forecast period. The consumer price index is projected to remain in the moderate range throughout the 12-year forecast period, increasing at an average annual rate of 2.6 percent.

TABLE I-1

FAA FORECAST ECONOMIC ASSUMPTIONS

FISCAL YEARS 2000-2011

ECONOMIC VARIABLE	HISTORICAL			FORECAST			PERCENT AVERAGE ANNUAL GROWTH				
	1990	1998	1999	2000	2001	2011	90-99	98-99	99-00	00-01	99-11
UNITED STATES											
Gross Domestic Product--Chain Weighted (BIL 1996$)	6,674.7	8,420.8	8,768.4	9,077.2	9,334.3	12,190.4	3.1	4.1	3.5	2.8	2.8
Consumer Price Index (1982-84 = 100)	127.1	159.1	162.2	166.6	170.6	220.3	2.7	1.9	2.7	2.4	2.6
Oil & Gas Deflator (1996 = 100)	87.8	92.1	91.2	113.0	95.2	116.7	0.4	(1.0)	23.9	(15.8)	2.1
INTERNATIONAL											
Gross Domestic Product (In Billions of U.S. 1990$)											
World	21,527.9	26,443.2	27,169.4	28,024.4	28,990.5	40,328.2	2.6	2.7	3.1	3.4	3.3
Canada	581.2	690.7	715.1	733.9	754.4	962.4	2.3	3.5	2.6	2.8	2.5
Europe*	8,609.8	10,276.1	10,484.0	10,803.0	11,127.8	14,637.9	2.2	2.0	3.0	3.0	2.8
Latin America/Mexico	1,039.0	1,370.5	1,365.6	1,412.3	1,473.5	2,299.9	3.1	(0.4)	3.4	4.3	4.4
Pacific**	4,857.6	6,341.9	6,545.4	6,769.1	7,049.0	10,871.5	3.4	3.2	3.4	4.1	4.3
EXCHANGE RATES											
(U.S.$/Local Currency)											
Canada	0.857	0.674	0.672	0.688	0.701	0.764	(2.7)	(0.3)	2.4	1.9	1.1
United Kingdom	1.785	1.657	1.610	1.594	1.608	1.651	(1.1)	(2.8)	(1.0)	0.9	0.2
Germany	0.619	0.568	0.560	0.597	0.616	0.635	(1.1)	(1.4)	6.6	3.2	1.1
Japan***	6.906	7.639	8.568	8.738	9.029	10.268	2.4	12.2	2.0	3.3	1.5

Source: United States: FY 1990-2010; Executive Office of the President, Office of Management and Budget
FY 2011; Consensus growth rate of DRI/McGraw-Hill and WEFA, Inc.
International: CY-1990-2011, WEFA, Inc.

* Sum of GDP for Europe, Africa, and Middle East
** Sum of GDP for Japan, Pacific Basin, China, Other Asia, Australia, and New Zealand
*** U.S.$ per 1,000 Yen

The oil and gas deflator is expected to increase by 23.8 percent in 2000, then decline by 15.7 percent in 2001. The relatively large increase in fuel prices in 2000 reflects two factors: the increased worldwide demand for oil resulting from the recovery of Southeast Asia economies; and the ability of OPEC members to maintain production quotas. Fuel prices are forecast to increase at an average annual growth rate of 2.1 percent over the entire 12-year forecast period, the result being a 0.5 percent annual decline in real fuel prices. An increase in real fuel prices occurs only in the year 2000. Real fuel prices decline throughout the remaining 11 years of the forecast period.

No major disruptions in the price or availability of oil have been assumed during the 12 year forecast period.

World Economy

Worldwide economic growth is expected to exceed that of the United States by approximately 0.5 percent annually over the 12-year forecast period, increasing at an average annual rate of 3.3 percent. Economic growth is forecast to be greatest in Latin America and the Far East/ Pacific, expanding at annual rates of 4.4 and 4.3 percent, respectively. These high rates of growth assume that the two regions will experience slower growth in 2000 as their respective economies continue to recover from the impacts of Southeast Asian and Brazilian financial crises, then resume strong growth over the remainder of the forecast period. Economic growth in Europe/Africa/Middle East countries and Canada is expected to average 2.8 and 2.5 percent, respectively, over the forecast period.

AVIATION TRAFFIC AND ACTIVITY FORECASTS

The large commercial air carrier traffic and activity forecasts are summarized in Table I-2. A detailed discussion of the forecasts and underlying assumptions can be found in Chapter III. Year-to-year historical data and forecasts can be found in Chapter X, Tables 6 through 22.

The regional/commuter and general aviation forecasts are summarized in Table I-3. Detailed discussions of the forecasts and underlying assumptions for the regionals/commuters and general aviation can be found in Chapter's IV and V, respectively. Year-to-year historical data and forecasts can be found in Chapter X--Tables 23 through 25 for regionals/commuters and Tables 26 through 30 for general aviation.

Commercial Aviation

Domestic Air Carrier Passenger Traffic

Domestic air carrier RPMs and passenger enplanements are forecast to increase at annual rates of 4.1 and 3.6 percent, respectively, over the 12-year forecast period. The forecast assumes that domestic RPMs and enplanements will grow by 4.0 and 3.2 percent, respectively, in 2000, then slow during the 2001 to 2003 period in response to a slowing of U.S. economic activity. During this 3-year period, RPMs and enplanements are expected to average only 3.5 and 2.9 percent growth, respectively. However, a quickening in U.S. economic activity beginning in 2004, results in relatively strong demand throughout the remainder of the forecast period. Domestic RPMs and enplanements increase at average

annual rates of 4.4 and 3.9 percent, respectively, over the last 8 years of the forecast period.

Declining real yields also impact domestic traffic demand in the short-term. Real yields are expected to decline by 3.2 percent annually during the 2000 to 2003 time period. This relatively large decline in real yields over the early years of the forecast is based on the assumption that air carriers will hold the line on fare increases to counteract the slowing of demand that results from the slowing of the U.S. economy. Thereafter, real yields are expected to decline by an average of 0.3 percent annually over the remainder of the forecast period. Real yields decline by an average of 1.3 percent annually over the entire 12-year forecast period.

The decline in real yields reflects the expected continuation of strong competitive forces (both domestically and internationally) throughout the forecast period. Competition in domestic markets will come from second-tier carriers such as Delta Express, United Express, and MetroJet (USAirways); established low-fare carriers such as Southwest; as well as from new low-fare start-ups such as JetBlue Airways. Internationally, increased competition will come from expanded open skies agreements and new and existing global alliances.

Air carrier aircraft operations are forecast to increase at an annual rate of 2.8 percent during the 12-year forecast period. The slower growth in activity at FAA air traffic facilities relative to expected traffic increases (3.6 percent growth in domestic enplanements) reflects the efficiencies which result from the assumed increases in both domestic average aircraft size (up 0.6 seats annually) and the passenger trip length (up 4.2 miles annually). However, no gains are expected to be achieved from increased domestic passenger load factors. The current forecast assumes that load factors will reach 70.0 percent in 2006 (up from 69.8 percent in 1999) and remain at this level through 2011.

International Air Carrier Passenger Traffic

Forecasts of total passenger traffic (U.S. and foreign flag carriers) are provided between the United States and three world travel areas--Atlantic, Latin America (including Mexico and the Caribbean), and the Pacific/Far East--as well as for U.S./Canadian transborder traffic. These forecasts are based on historical passenger statistics obtained from the United States Immigration and Naturalization Services and Transport Canada and on regional world historical data and economic projections obtained from WEFA.

Total passenger traffic between the United States and the rest of the world is expected to grow from 132.0 million in 1999 to 239.4 million in 2011, an average annual growth rate of 5.1 percent. Passenger traffic is expected to be strongest in Latin American and Pacific markets, growing at annual rates of 6.1 and 6.0 percent, respectively, over the forecast period. Passenger traffic is projected to grow 4.3 percent annually in Atlantic markets and 3.6 percent a year in Canadian markets.

U.S. air carrier international RPMs and passenger enplanements are forecast to increase at average annual rates of 5.8 and 5.5 percent respectively, over the 12-year forecast period. The stronger growth in international travel relative to domestic markets is being driven by the strong passenger demand projected in the Latin America and Pacific/Far East markets—both up 6.1 percent. Passenger enplanements in the Pacific/Far East markets are forecast to increase by only 3.6 and 4.7 percent during the first two years of the forecast as the region continues to recover from its current financial crisis. However, passenger demand in the Pacific/Far East is expected to increase at an average annual rate of 6.5 percent over the remaining 10 years of the forecast period. Passenger enplanements in the Atlantic

TABLE I-2

AVIATION DEMAND FORECASTS
LARGE AIR CARRIERS

FISCAL YEARS 2000-2011

AVIATION ACTIVITY	HISTORICAL			FORECAST			PERCENT AVERAGE ANNUAL GROWTH				
	1990	1998	1999	2000	2001	2011	90-99	98-99	99-00	00-01	99-11
U. S./Foreign Flag Carriers											
Total Passengers to/from											
United States (Millions)	84.2	126.6	132.0	137.6	143.4	239.4	5.1	4.2	4.2	4.3	5.1
Atlantic	29.0	46.6	48.9	51.0	53.1	81.3	6.0	5.0	4.3	4.2	4.3
Latin America	26.3	37.6	39.2	40.9	42.7	79.4	4.5	4.2	4.5	4.3	6.1
Pacific	15.1	23.4	24.1	25.2	26.4	48.4	5.3	3.0	4.5	5.0	6.0
Canadian Transborder	13.7	19.1	19.8	20.5	21.2	30.3	4.1	3.7	3.4	3.4	3.6
U.S. Air Carriers											
Enplanements (Millions)											
Domestic	424.1	555.0	576.1	594.8	612.5	880.1	3.5	3.8	3.2	3.0	3.6
International	41.3	53.1	53.3	55.6	58.1	101.7	2.9	0.3	4.4	4.5	5.5
Atlantic	16.1	18.0	19.1	20.0	20.9	32.2	1.9	6.0	4.8	4.5	4.4
Latin America	13.0	21.0	21.9	22.9	23.9	44.4	5.9	4.2	4.5	4.3	6.1
Pacific	12.2	14.1	12.3	12.7	13.3	25.1	0.1	(12.8)	3.6	4.7	6.1
System	465.4	608.1	629.4	650.4	670.6	981.8	3.4	3.5	3.3	3.1	3.8
RPMs (Billions)											
Domestic	339.1	451.5	473.1	492.0	509.7	767.6	3.8	4.8	4.0	3.6	4.1
International	115.1	163.3	169.7	178.7	188.3	334.3	4.4	4.0	5.3	5.4	5.8
Atlantic	53.7	74.6	79.6	83.8	87.9	139.2	4.5	6.7	5.3	4.9	4.8
Latin America	16.0	32.0	34.1	36.1	38.0	73.5	8.8	6.5	5.8	5.3	6.6
Pacific	45.4	56.7	56.1	58.8	62.4	121.6	2.4	(1.1)	4.9	6.1	6.7
System	454.2	614.8	642.8	670.7	698.0	1,101.9	3.9	4.6	4.3	4.1	4.6
Cargo RTMs (Billions)											
Domestic	9.0	13.8	13.9	14.6	15.3	25.4	5.5	0.3	5.1	5.0	5.2
International	7.3	14.5	14.1	15.1	16.3	30.2	8.6	(3.0)	7.2	7.8	6.6
System	16.3	28.4	28.0	29.7	31.6	55.6	7.0	(1.4)	6.2	6.4	5.9
Fleet (Large Jets Only)	4,244	5,132	5,325	5,401	5,582	8,031	2.9	3.8	1.4	3.4	3.5
Passenger	3,714	4,165	4,312	4,355	4,484	6,400	1.9	3.5	1.0	3.0	3.3
Cargo	530	967	1,013	1,046	1,098	1,631	8.4	4.8	3.3	5.0	4.0
Hours Flown (Millions)*	10.5	13.1	13.6	13.9	14.4	21.8	3.2	3.2	2.9	3.5	4.0

Source:1990-99; U.S. Air Carriers, Form 41, U. S. Department of Transportation; Total Passengers, INS Form I-92, U.S. Department of Commerce
2000-2011; FAA Forecasts

* Includes both passenger (excluding regional jets) and cargo aircraft.

markets are projected to grow by 4.4 percent annually over the 12-year forecast period.

The air carrier forecasts assume that commercial air carriers will continue to benefit from the moderate to strong economic growth expected to take place both within the United States and worldwide. It is also assumed that electronic technology improvements, along with a continuation of cost containment efforts, will benefit the overall financial performance of both U.S. and foreign flag carriers. In addition, the operation of a fleet consisting entirely of more fuel-efficient stage-3 aircraft (or retrofitted/ reengined aircraft) should result in further cost savings and increased industry productivity. These productivity improvements should strengthen the industry's overall financial performance.

Regionals/Commuters Passenger Traffic

The regional/commuter industry consists of carriers that report on DOT Form 298-C (85 carriers in 1999) and DOT Form-41 (8 carriers in 1999). For reporting purposes, the designation is based on aircraft size--carriers operating aircraft with more than 60 seats report all traffic, whether transported on larger or smaller aircraft, on DOT Form 41. All other carriers report on DOT Form 298-C.

In 1999, the regional/commuter airlines enplaned 72.4 million passengers, 11.8 percent of all passenger traffic in scheduled domestic air service. By the year 2011, these carriers are expected to carry 137.5 million passengers (5.5 percent annual growth) and to account for 14.6 percent of all domestic passenger enplanements.

Regional/commuter airlines RPMs are expected to increase by 7.4 percent annually over the forecast period, growing from 18.8 billion in 1999 to 44.6 billion in 2011. Most of the growth in regional/commuter traffic is expected to occur among the Form 41 carriers (RPMs and enplanements up 7.9 and 5.7 percent, respectively) or the larger Form 298-C carriers who operate the new regional jets.

The significantly higher growth in RPMs relative to enplanements is the result of expected large increases in the average passenger trip length for regional/commuter carriers, increasing from 260.2 miles in 1999 to 324.1 miles in 2011. This increase in trip length is due to the continued integration of large numbers of regional jets (1,203 over the 12-year forecast period) and high-speed turboprops into the regional/commuter fleets. These aircraft, with ranges of up to 1,000 miles, are expected to open up new opportunities for growth in nontraditional regional/commuter markets. The increased use of regional jets is also expected to lead to further route rationalization by the larger commercial air carriers, including markets in the 400 to 500 mile range and beyond. This phenomenon is expected to be one of the drivers of growth for the regional/commuter carriers during the first half of the forecast period.

The move to greater use of regional jets and larger propeller-driven aircraft results in the average seating capacity of the regional fleet increasing from 36.0 seats in 1999 to 44.3 seats in 2011. Most of the growth in aircraft seat size occurs among the larger Form 41 carriers whose average aircraft seat size increases to 50.5 seats in 2011, up from 42.8 seats in 1999. Form 298-C carriers' average aircraft seat size increases from 31.3 seats in 1999 to 39.2 seats in 2011. The number of regional jets in U.S. regional/ commuter service is projected to grow from 343 in 1999 to 1,546 in 2011.

Air Cargo

Air cargo demand by U.S. commercial air carriers is expected to grow at annual rates that are about

1.0 percent higher than those forecast for passenger demand. System RTMs are forecast to grow at an annual rate of 5.9 percent (compared to 4.6 percent for system RPMs) over the 12-year forecast period, with domestic and international RTMs increasing 5.2 and 6.6 percent, respectively.

Cargo freight/express RTMs are forecast to more than double over the forecast period as a strong global economy stimulates the demand for the rapid movement of goods and products by air, both domestically and internationally. Domestic freight/express RTMs are forecast to increase from 11.5 billion tons in 1999 to 21.6 billion tons in 2011, an increase of 5.4 percent annually. International freight/express RTMs, owing to stronger worldwide economic growth, are projected to increase at an average annual rate of 6.7 percent over the forecast period, from 13.6 to 29.5 billion.

Most of the growth in freight/express RTMs is expected to come from the all-cargo carriers operating dedicated cargo aircraft. All-cargo domestic and international freight/express RTMs increase at annual rates of 6.4 and 8.3 percent, respectively, over the 12-year forecast period. The percent of domestic freight moved by all-cargo carriers increases from 78.2 percent in 1999 to 87.7 percent in 2011, international freight/express from 53.6 to 64.4 percent.

Significantly slower growth is forecast for mail RTMs as electronic alternatives (fax, email, direct bill payment, etc.) cut into the volume of mail moved by air. Domestic and international mail RTMs are projected to increase at annual rates of 3.8 and 3.1 percent over the forecast period, with domestic mail increasing from 2.4 to 3.8 billion RTMs and international mail from 509 to 736 million RTMs in 2011.

All-cargo carriers account for 29.7 percent of mail RTMs in 2011, up from 25.0 percent in 1999. The disparity in all-cargo carrier's share of mail RTMs relative to its share of freight/express traffic (74.2 percent in 2011) reflects the fact that passenger carriers operate flights throughout the day while the majority of all-cargo carrier operations occur at night. Despite this scheduling disadvantage, all-cargo carrier mail RTMs increase by 5.2 percent annually over the forecast period compared to annual growth of only 3.1 percent for the passenger carriers.

GENERAL AVIATION

The general aviation active fleet is projected to total 230,995 in 2011, an increase of just over 24,000 aircraft or 0.9 percent annual growth over the 12-year forecast period. In 2011, piston powered fixed-wing aircraft are expected to account for the majority of the fleet, 76.7 percent compared to 79.4 percent in 1999. However, the turbine powered fixed wing fleet is expected to make the biggest inroads in the general aviation active fleet, increasing its share from 6.1 percent in 1999 to 8.0 percent in 2011. In 2011, experimental aircraft account for 8.6 percent (up from 8.1 percent in 1999) of the fleet while rotorcraft comprise 3.9 percent of the fleet (up from 3.7 percent in 1999).

The current forecast assumes that the business use of general aviation aircraft will expand at a more rapid pace than personal use. This is due, in large part, to the continued rapid growth in fractional ownership and is reflected in the changing composition of the general aviation fleet mix. The more expensive and sophisticated turbine-powered fleet (including rotorcraft) is projected to grow at four-times the rate forecast for the piston aircraft categories—2.8 compared to 0.7 percent. Turbine-powered fixed wing aircraft are projected to increase at an average annual rate of 3.2 percent, totaling 18,535 in 2011—7,240 turboprops and 11,295 turbojets. The turbine rotorcraft fleet is expected to increase at an annual rate of 1.6 percent over the forecast period, totaling 6,010 in 2011.

The general aviation piston fleet is projected to increase by just under 14,000 aircraft over the

TABLE I-3

AVIATION DEMAND FORECASTS
REGIONALS/COMMUTERS AND GENERAL AVIATION

FISCAL YEARS 2000-2011

AVIATION ACTIVITY	HISTORICAL			FORECAST			PERCENT AVERAGE ANNUAL GROWTH				
	1990	1998	1999	2000	2001	2011	90-99	98-99	99-00	00-01	99-11
REGIONAL/COMMUTERS											
Enplanements (Millions)	37.7	64.6	72.4	78.2	83.1	137.5	8.5	12.0	8.1	6.3	5.5
298-C Carriers	33.1	34.3	35.0	37.7	39.9	64.6	0.7	2.2	7.6	5.9	5.2
Form 41 Carriers	4.7	30.3	37.3	40.5	43.2	72.9	29.7	23.1	8.6	6.6	5.7
RPMs (Billions)	6.8	15.7	18.8	21.1	23.1	44.6	13.6	19.7	12.2	9.1	7.4
298-C Carriers	5.8	8.5	9.3	10.4	11.3	20.9	6.1	9.1	11.4	8.6	7.0
Form 41 Carriers	1.0	7.2	9.5	10.8	11.8	23.7	32.8	32.2	13.0	9.6	7.9
Fleet (As of December 31)	1,896	2,117	2,237	2,342	2,457	3,186	2.1	5.7	4.7	4.9	3.0
Turboprops	1,896	1,914	1,894	1,873	1,847	1,640	(0.0)	(1.0)	(1.1)	(1.4)	(1.2)
Jets	0	203	343	469	610	1,546	NA	69.0	36.7	30.1	13.4
Hours Flown (000)	3,004	3,590	3,718	3,861	3,944	5,302	2.7	3.6	3.8	2.1	3.0
GENERAL AVIATION											
Active Fleet (000)	196.9	204.7	206.5	208.7	210.8	231.0	0.6	0.9	1.0	1.0	0.9
Pistons	175.2	163.0	164.0	165.2	166.4	177.2	(0.8)	0.6	0.7	0.7	0.6
Turboprops/Turbojets	9.4	12.2	12.7	13.2	13.7	18.5	3.8	3.3	4.0	3.9	3.2
Rotorcraft	6.9	7.4	7.6	7.7	7.9	9.0	1.2	2.2	2.0	1.9	1.5
Hours Flown (Millions)	30.8	28.1	29.8	30.4	31.1	38.8	(0.4)	5.9	2.2	2.3	2.2
Pistons	25.8	20.4	21.7	22.0	22.3	26.0	(2.1)	6.4	1.2	1.5	1.5
Turboprops/Turbojets	3.7	4.0	4.3	4.6	4.8	7.9	1.7	6.6	6.9	6.2	5.3
Rotorcraft	2.2	2.3	2.4	2.5	2.5	3.2	1.1	2.8	2.7	2.6	2.5
Total Active Pilots (000)	700.0	618.3	640.1	650.4	668.4	824.5	(1.1)	3.5	1.6	2.8	2.1
Instrument Rated Pilots (000)	282.8	300.2	309.0	315.1	321.4	378.4	1.1	2.9	2.0	2.0	1.7

Source: 1990-99; Forms 298-C and 41, U.S. Department of Transportation
2000-2011; FAA Forecasts

forecast period, totaling 180,180 aircraft in 2011. The single engine fixed wing piston aircraft category increases at an average annual rate of 0.7 percent--from 145,250 aircraft in 1999 to 158,400 in 2011. The number of piston powered rotorcraft increase by just over 400 aircraft, totaling 3,030 in 2011. Multi-engine fixed wing piston aircraft are expected to remain constant at 18,750 aircraft throughout the forecast period.

Experimental aircraft are projected to increase by 1.5 percent annually, reaching 19,910 aircraft in 2011. Aircraft in the "other" category (gliders, lighter-than-air, etc) are expected to total 6,360 in 2011, up from 5,640 in 1999.

General aviation hours flown is projected to increase at an average annual rate of 2.2 percent over the 12-year forecast period, to 38.8 million hours in 2011. The larger increase in hours relative to aircraft reflects expected increases in the utilization of the general aviation fleet. In 2011, piston powered aircraft are projected to fly 26.6 million hours (up 1.5 percent annually) while turbine-powered aircraft fly 10.5 million hours (up 4.5 percent annually). Most of the increase in utilization occurs in turbojet aircraft, the fastest growing category of general aviation aircraft—active fleet and hours up 4.8 and 7.3 percent annually, respectively. These large increases are due to the expected increases in both the fractional ownership fleet and its activity levels. Utilization of fractional ownership aircraft average approximately 900 hours annually compared to only 325 hours for all business jets.

The number of active pilots are forecast to total 824,490 in 2011, an increase of over 184,000 (2.1 percent annually) over the 12-year forecast period. Most of the expected growth is projected to occur in the student and airline transport categories. The number of student pilots are projected to increase by over 50,000 (3.4 percent annually), totaling 152,500 in 2010. Airline transport pilots are forecast to increase from 137,642 in 1999 to 198,100 in 2011, an average annual increase of 3.1 percent. Projected growth among other types of pilot certifications include: private pilot certificates, 1.4 percent annually to 306,600; commercial pilot certificates, 1.4 percent annually to 147,300; and helicopter only pilots, 2.0 percent annually to 9,745.

FAA WORKLOAD FORECASTS

There were a total of 454 towered airports at the end of September, 288 FAA towers and 166 contract towers. The number of FAA contract towered airports is expected to increase by a total of 22 during 2000. This includes the conversion of 22 FAA towered airports, the addition of one new contract tower, and the closing of one contract tower. Most of the conversions are scheduled to take place during the first quarter of the year.

Since 1993, a total of 114 FAA towers have assumed contract tower status. To overcome any reporting inconsistencies caused by the tower conversion program, the FAA has, since 1996, developed separate activity forecasts for both FAA and contract towered airports. Activity at FAA Air Route Traffic Control Centers and Flight Service Stations are not affected by the contract tower conversions.

Summary forecasts of aircraft activity at combined FAA and contract tower facilities can be found in Table I-4. Summary forecasts of activity at FAA facilities only, including FAA towers, en route centers, and flight service stations, can be found in Table I-5. More detailed forecasts and discussion of aircraft activity at FAA and contract facilities can be found in Chapter VII and in Tables 31 through 48 in Chapter X.

FAA and Contract Towers

Activity at the combined FAA and contract towers is projected to grow from 68.2 million in 1999 to 86.9 million in 2011, an annual increase of just over 2.0 percent. The majority of this growth is expected to result from increased commercial aircraft activity. Between 1999 and 2011, air carrier activity is forecast to increase 2.8 percent annually, while commuter/air taxi activity is projected to increase 2.6 percent a year.

General aviation activity is projected to increase from 40.0 million operations in 1999 to 49.2 million operations in 2011, an annual increase of 1.7 percent. The FAA does not forecast military activity, and so it is held constant at its 1999 activity level (3.0 million) throughout the 12-year forecast period.

The projected large increase in the numbers of regional jets and general aviation turbine aircraft is expected to result in instrument operations increasing at faster rates than total tower operations. Combined instrument operations counts at FAA and contract towered airports increase from 51.8 million in 1999 to 67.6 million in 2011, an annual increase of 2.2 percent.

Commercial aircraft instrument operations are forecast to increase at a significantly faster rate than are general aviation instrument operations, up 2.7 and 1.9 percent, respectively. Military activity is expected to remain at 3.5 million operations through 2011.

En Route Centers

The workload at FAA en route traffic control centers is forecast to increase at an average annual rate of 2.4 percent during the 12-year forecast period. In 2011, FAA en route centers are expected to handle 59.4 million IFR aircraft, up from the 44.7 million in 1999

The number of commercial aircraft handled is projected to increase at an annual rate of 2.7 percent while the number of general aviation aircraft handled increases at an average annual rate of 2.0 percent. Military activity at en route centers is held constant at its 1999 activity level of 4.1 million.

The higher growth rate at FAA en route centers, relative to activity at combined towered airports, reflects the fact that commercial activity accounts for a significantly larger percentage of center activity—71.2 versus 37.0 percent at towered airports in 1999. Therefore, the projected larger increases in commercial aircraft activity have a much greater impact on total center traffic during the forecast period.

Flight Service Stations

Total flight services originating at FAA flight service stations are forecast to decline from 32.4 million in 1999 to 31.4 million in 2011, an average annual rate of decline of 0.3 percent. Of the services provided by the FAA, only flight plans originated is projected to increase over the forecast period, growing from 6.3 million in 1999 to 6.8 million in 2011. Both pilot briefings and the number of aircraft contacted are forecast to decline over the next 12 years, down 0.7 and 1.7 percent annually.

The number of DUATS services are projected to grow at an average annual rate of 2.8 percent over the forecast period, from 13.4 million in 1999 to 18.6 million in 2011. Combined FSS and DUATS services are expected to total 50.0 million in 2011, an annual increase of 0.7 percent.

TABLE I-4

AVIATION ACTIVITY FORECASTS
COMBINED FAA AND CONTRACT TOWERS

FISCAL YEARS 2000-2011

ACTIVITY MEASURES (In Millions)	HISTORICAL			FORECAST			PERCENT AVERAGE ANNUAL GROWTH				
	1990	1998	1999	2000	2001	2011	90-99	98-99	99-00	00-01	99-11
NUMBER OF TOWERS											
FAA Towers	402	287	288	266	266	266					
FAA Contract Towers	25	161	166	188	188	188					
TOTAL	427	448	454	454	454	454					
AIRCRAFT OPERATIONS											
Air Carrier	12.9	14.3	14.6	15.0	15.4	20.4	1.6	2.3	2.6	3.1	2.8
Commuter/Air Taxi	9.0	10.2	10.6	10.9	11.1	14.4	2.1	4.0	2.7	2.0	2.6
General Aviation	38.1	38.0	40.0	40.7	41.4	49.2	0.6	5.2	1.6	1.8	1.7
Itinerant GA	20.8	22.1	23.0	23.4	23.9	28.4	1.3	4.3	1.6	1.8	1.8
Local GA	17.2	16.0	17.0	17.3	17.6	20.8	(0.2)	6.5	1.6	1.8	1.7
Military	2.9	2.7	3.0	3.0	3.0	3.0	0.5	12.9	(2.3)	0.0	(0.2)
Itinerant MIL	1.5	1.4	1.5	1.4	1.4	1.4	0.4	5.7	(4.5)	0.0	(0.4)
Local MIL	1.4	1.2	1.5	1.5	1.5	1.5	0.7	21.0	0.0	0.0	0.0
TOTAL	62.8	65.2	68.2	69.5	70.9	86.9	1.0	4.7	1.8	2.0	2.0
INSTRUMENT OPERATIONS											
Air Carrier	14.0	15.4	15.8	16.2	16.7	22.2	1.5	2.8	2.6	3.1	2.8
Commuter/Air Taxi	9.5	11.2	11.6	11.9	12.1	15.7	2.6	3.3	2.7	2.0	2.6
General Aviation	19.2	19.9	20.9	21.3	21.7	26.2	1.0	4.9	1.8	2.0	1.9
Military	4.4	3.4	3.5	3.5	3.5	3.5	(2.8)	2.6	(0.0)	0.0	(0.0)
TOTAL	47.1	50.0	51.8	52.9	54.1	67.6	1.2	3.7	2.1	2.2	2.2

Source: FY 1990-2011, FAA Data and Forecasts

TABLE I-5

AVIATION ACTIVITY FORECASTS
FAA FACILITIES

FISCAL YEARS 2000-2011

ACTIVITY FORECASTS (In Millions)	HISTORICAL			FORECAST			PERCENT AVERAGE ANNUAL GROWTH				
	1990	1998	1999	2000	2001	2011	90-99	98-99	99-00	00-01	99-11
AIRCRAFT OPERATIONS											
Air Carrier	12.9	14.1	14.4	14.7	15.2	20.1	1.3	2.3	2.1	3.1	2.8
Commuter/Air Taxi	8.8	8.9	9.3	9.4	9.6	12.4	0.6	4.4	0.9	2.0	2.4
General Aviation	39.2	27.9	29.1	28.1	28.7	34.0	(3.2)	4.4	(3.5)	1.8	1.3
Itinerant GA	22.5	16.8	17.4	16.9	17.3	20.7	(2.8)	3.5	(2.9)	1.9	1.4
Local GA	16.7	11.1	11.7	11.2	11.4	13.4	(3.9)	5.6	(4.3)	1.7	1.1
Military	2.8	2.0	2.2	2.2	2.2	2.2	(2.7)	7.6	0.0	0.0	0.0
Itinerant MIL	1.4	1.1	1.1	1.1	1.1	1.1	(2.7)	6.4	0.0	0.0	0.0
Local MIL	1.4	1.0	1.1	1.1	1.1	1.1	(2.8)	8.9	0.0	0.0	0.0
TOTAL	63.7	53.0	55.1	54.5	55.6	68.8	(1.6)	3.9	(1.1)	2.1	1.9
INSTRUMENT OPERATIONS											
Air Carrier	14.0	15.3	15.7	16.1	16.6	22.0	1.3	2.8	2.4	3.1	2.8
Commuter/Air Taxi	9.4	10.9	11.3	11.5	11.8	15.2	2.1	3.2	2.3	2.0	2.5
General Aviation	19.1	19.7	20.6	21.0	21.4	25.9	0.9	4.9	1.7	2.0	1.9
Military	4.4	3.4	3.5	3.5	3.5	3.5	(2.7)	2.6	0.0	0.0	0.0
TOTAL	46.9	49.3	51.1	52.1	53.2	66.6	1.0	3.7	1.9	2.2	2.2
IFR AIRCRAFT HANDLED											
Air Carrier	18.5	23.2	24.0	24.7	25.4	33.7	3.0	3.5	2.6	3.1	2.8
Commuter/Air Taxi	5.7	7.1	7.7	7.9	8.1	10.5	3.5	8.4	2.7	2.0	2.6
General Aviation	7.8	8.6	8.8	9.0	9.2	11.2	1.3	1.9	1.9	2.1	2.0
Military	5.5	4.2	4.1	4.1	4.1	4.1	(3.3)	(2.9)	0.0	0.0	0.0
TOTAL	37.5	43.2	44.7	45.7	46.8	59.4	2.0	3.4	2.2	2.4	2.4
FLIGHT SERVICES											
Pilot Briefs	11.8	8.7	8.3	8.2	8.1	7.6	(3.8)	(5.0)	(1.2)	(1.0)	(0.7)
Flight Plans Originated	7.3	6.5	6.3	6.3	6.4	6.8	(1.7)	(3.7)	1.3	0.8	0.6
Aircraft Contacted	6.3	3.5	3.3	3.3	3.2	2.7	(6.9)	(4.3)	(1.7)	(1.7)	(1.7)
TOTAL	44.5	33.9	32.4	32.3	32.2	31.4	(3.5)	(4.4)	(0.3)	(0.4)	(0.3)
DUATS	2.9	12.9	13.4	13.7	14.2	18.6	18.5	4.0	2.6	3.8	2.8
TOTAL (w/DUATS)	47.4	46.8	45.8	46.0	46.5	50.0	(0.4)	(2.1)	0.6	0.9	0.7

Source: FY 1990-2011, FAA Data and Forecasts

FORECAST RISKS

There are a number of positive signs that point toward a continuation of moderate to strong growth in both the commercial and general aviation industries, not the least of which is the projected strong growth in both the U.S. and worldwide economies. However, there are also a number of uncertainties that could cause the growth of the U.S. and world economies to be less than that projected. Slower economic growth would, ultimately, slow the demand for aviation services.

Much has been said about the strong economic recovery now taking place in Southeast Asia—the scene of the devastating financial crisis in 1997 and 1998. The latest WEFA forecast (November 1999) for the region includes real GDP growth of 3.2 percent in 1999 and 3.4 percent in 2000. This strong recovery is predicated on the up-graded outlook for the economies of South Korea, Singapore, Thailand, Malaysia, and Japan. However, on December 6, the Japanese government reported that third quarter GPD declined by one percent, after posting positive gains during the two previous quarters. This raises uncertainty as to whether Japan has finally shaken off its 8-year economic malaise. WEFA projected that Japan's GDP will increase by 1.3 percent in 1999 and 1.4 percent in 2000. Failure of the Japanese economy to respond to government stimulus could slow the expected recovery in air travel on routes to Japan and the Far East.

WEFA also projects that Latin American real GDP will increase by 3.4 percent in 2000 and 4.1 percent in 2001. However, the region experienced a 0.4 percent decline in economic activity in 1999 and only two major countries—Peru and Mexico--experienced growth over the past year. The outlook for Latin America continues to depend on political actions rather than economic fundamentals. The greatest risk to the expected recovery comes from a failure of the Brazilian government to implement necessary financial reforms. Additionally, the 2000 presidential elections in Mexico could create uncertainty for investors, resulting in a flight of investment capital and the collapse of the peso. If either Brazil or Mexico fails to grow as predicted, growth of traffic on Latin America routes could slow.

Although there appears to be unanimity among the economic forecasting services and OMB regarding continued strong growth in U.S economic activity, there are a number of factors that could slow or reverse this optimistic outlook.

Over the past several years, the U.S. economy has benefited considerably from the "wealth effect" created by the large increase in market equity values. This has resulted in unprecedented increases in both consumer spending and consumer sentiment--the Conference Board's index of consumer confidence for December was at its highest level in more than 3 decades. Any large sustained correction in the stock market equity values, considered inevitable by many economists, could be followed by a sharp decline in consumer spending for goods and services, including air travel.

Additionally, the rising cost of fuel could present a major risk for all segments of the economy, in particular aviation. The current OMB forecast assumes a 23.8 percent increase in fuel prices in 2000, followed by a 15.7 percent reduction in 2001. Sharply higher fuel prices appear to be inevitable in the near-term and these higher costs will almost certainly have an impact on the consumer's discretionary income and spending patterns. If the projected scale back in fuel prices in 2001 doesn't materialize, the potential impact on U.S. and world economic growth and air travel could be considerable.

Any slowing of U.S. economic growth will impact the earnings of corporations and ultimately, travel budgets. In addition, much of corporate America continues to be at odds with the U.S. commercial airline industry over what it

perceives as unreasonable and rapidly increasing fares for business travelers. Business could implement a number of measures to contain rising travel costs, including a cutback in commercial air travel and/or a shift to travel by corporate jets or fractional ownership companies.

The general aviation industry is also vulnerable to an economic slowdown or recession, although not to the same extent it would have been several years ago. The turnaround in the demand for general aviation products and services since the passage of the General Aviation Revitalization Act in 1994 has occurred during a period of unprecedented economic growth. No one actually knows how the industry or its customers would react to a protracted slowing of demand or an economic recession.

Increased flight delays are becoming a growing problem to the airlines, the traveling public, and the FAA. Delays are not a recent phenomena, but a fact of life for air transportation, be they weather, schedule, or air traffic control related. However, delays are closely linked to demand and increased delays are a potential risk to achieving the aviation demand forecasts presented in this document.

Given the strong growth in aviation demand during the 1990s, the real question is why delays did not become an issue until just recently. Prior to 1997, a number of unrelated factors combined to constrain the growth of activity at FAA air traffic facilities. As such, activity at combined FAA/contract towers actually declined by 0.3 percent annually during the 1990-96 time period. En route center activity increased at an annual rate of 1.4 percent during the same 7-year period, the higher growth due to its larger percentage of commercial activity as compared to tower activity—71.2 versus 36.9 percent.

Air carrier passenger traffic grew by 4.1 percent annually during the 1990-96 time period. However, much of the growth was absorbed through increased load factors (up 5.8 percentage points). During this same period, regional/commuter traffic increased at annual rate of 12.8 percent. Again, a large part of this growth was absorbed through increased load factors (up 4.3 percentage points) and increased aircraft size (up 5.3 seats). Additionally, both general aviation and military activity at FAA facilities remained below pre-1990 levels, the latter the result of declining military budgets.

However, it is the growth over the last 3 years that has given rise to increased delays. During this period, activity at combined FAA and contract towers and en route centers grew at average annual rates of 3.3 percent. The reasons behind these relatively large increases are as follows:

- Large air carrier load factors appear to be approaching their maximum levels. Also, based on known future aircraft orders and options, there will be little or no efficiency gains to be achieved through increased aircraft size. The industry has essentially decided to compete on schedule frequency. As such, future activity growth will closely mirror the rate of increase in traffic.

- A total of 243 new regional jet aircraft were delivered to U.S. regional/commuter air carriers over the past 2 years. Despite continued increases in load factors and aircraft seat size, regional/commuter ASMs grew by 23.3 percent during these 2 years while commuter/air taxi activity at FAA/contract towers increased 5.4 percent. Regional/commuter activity at en route centers was up 13.2 percent during the same 2-year period. A total of almost 700 regional jets are scheduled to be delivered to the regional/commuter fleets over the next 5 years and more than 1,200 will be delivered over the entire forecast period.

- General aviation appears to be growing as demonstrated by the increased activity at FAA air traffic facilities over the past 3 years. General aviation activity at FAA/contract towers was up 13.5 percent, a large part of it

business and corporate activity at the 29 large hub airports (up 8.5 percent). Activity at en route centers was up 12.1 percent. The large numbers of jet aircraft on order by fractional ownership companies point toward a continuation of strong business/corporate travel while the success of the industry's "learn to fly" programs assure continued growth in both instructional and personal flying.

- Military budgets appear to be on the increase and this has resulted in an increase in military flying. As such, military activity at FAA/contract towers was up 17.2 percent over the past 2 years; center traffic increased 4.4 percent. If future military budgets continue to increase or remain stable, we can expect military flying to continue to increase in future years.

A projected high level of growth among all four-user groups is a phenomenon that has not been witnessed by the FAA since the late 1970s. What these increased activity levels presage in terms of future air traffic delays or constraints on future demand is something that should be of concern to the FAA, aviation officials, and the flying public.

If the economic scenarios presented in this document--sustained moderate growth for both the U.S. and world economies--are achieved, there is every reason to believe that the demand for commercial and general aviation products and services will continue to expand throughout the forecast period. The real question is whether there will be enough capacity (airside and landside) to accommodate the projected growth.

FORECAST SUMMARY

Highlights of the current FAA aviation forecasts for the 2000 to 2011 time period include:

- The U.S. economy is expected to grow at a rate about one-half percent less than that of worldwide economic activity (2.8 versus 3.3 percent annually), with most of world economic growth taking place in the Latin American (4.4 percent annually) and the Pacific/Far East (4.3 percent annually).

- International passenger traffic is forecast to grow significantly faster than U.S. domestic traffic (5.5 versus 3.6 percent annually), with most of the international growth occurring in Latin American and Pacific/Far East markets, both up 6.1 percent annually.

- Regional/commuter passenger traffic will continue to grow at a faster rate than their larger domestic counterparts (5.5 versus 3.6 percent annually). Growth in the industry is derived from the establishment of new markets utilizing the new regional jets and from further route rationalization by the larger commercial carriers.

- Air cargo traffic is expected to grow at rates about one and a half percent higher than those predicted for passenger traffic, with domestic and international RTMs increasing at annual rates of 5.2 and 6.6 percent, respectively.

- The growth being exhibited throughout the general aviation community, combined with industry-wide promotional programs, is expected to result in moderate sustained increases in the active fleet (0.9 percent annually), hours flown (2.2 percent annually), and student pilots (3.4 percent annually).

- Total aviation activity at FAA and contract facilities is expected to grow at annual rates of 2.0 to 2.4 percent annually, with commercial activity (up 2.7 percent annually) increasing at significant higher rates than those predicted for general aviation (1.7 to 2.0 percent annually).

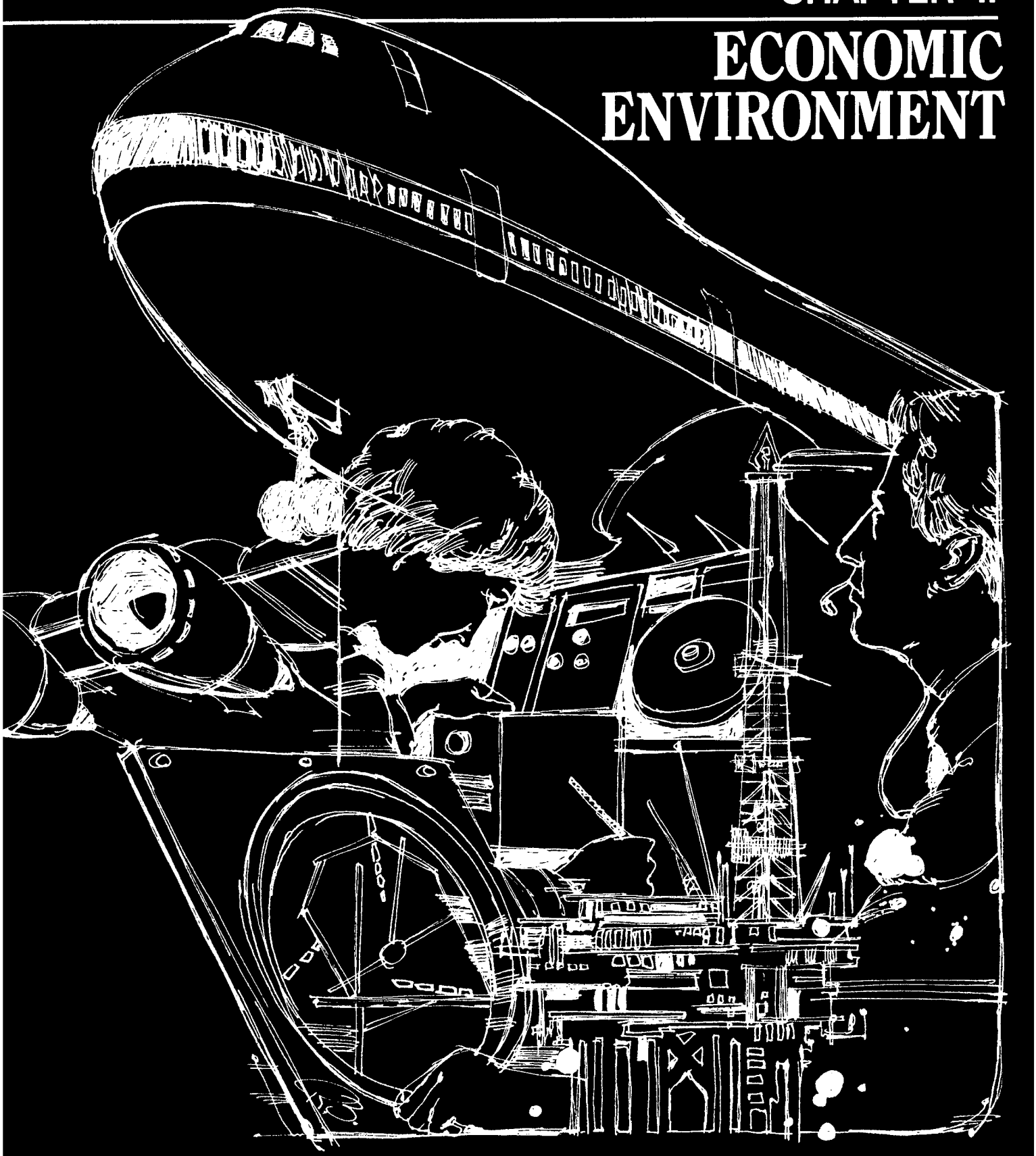
Uncertainties which have the potential to limit the growth in the demand for U.S. and international aviation services include:

- The economic problems in Japan and Brazil pose significant risks to the economies of other countries in Asia and South America. If current internal economic problems are not resolved, there is potential for significant economic slowdowns or recessions in Asia and South America.
- The large fare increases experienced by business travelers could result in reduced future business travel and corporate travel budgets, and/or speed the introduction and/or acceptance of alternatives to air travel, i.e., teleconferencing.

Nevertheless, air transportation is expected to continue to dominate all other transportation modes in both long distance domestic inter-city travel and in international passenger markets throughout the foreseeable future.

CHAPTER II

ECONOMIC ENVIRONMENT



CHAPTER II

ECONOMIC ENVIRONMENT

This chapter discusses the historical and forecast economic data used to project aviation demand. The data are derived from a number of sources. United States economic data is derived from annual and quarterly data supplied by the Office of Management and Budget (OMB), the Council of Economic Advisors, and two economic forecasting services—WEFA, Inc (WEFA) and DRI McGraw-Hill (DRI). Quarterly data for the three series used to develop the aviation demand forecasts--Gross Domestic Product (GDP), the Consumer Price Index (CPI), and the Oil and Gas Deflator--are presented as annualized rates. The Bureau of Economic Analysis has revised its method of calculating GDP. This change created a significant increase in the GDP estimates and will be discussed later in this Chapter.

Fiscal year (FY) estimates are calculated by averaging the four quarters for the period October through September. The WEFA international economic estimates provide the basis for developing the international aviation forecasts. The specified years for the economic data discussed in this chapter are as follows: United States economic data is on a FY basis and international economic data is on a calendar year (CY) basis, unless indicated otherwise.

REVIEW OF 1999

UNITED STATES

The current U.S. economic expansion is now into its 9th year, making this growth period the 2nd longest expansion of the post-World War II era. This expansion, which began in the second quarter of 1991 just after the Gulf War downturn, has lasted for 34 quarters. The current longest economic expansion lasted from the first quarter 1961 to the third quarter 1969 (35 quarters).

The U.S. economy expanded at a blistering pace during the first two quarters of fiscal 1999 (October 1998 through March 1999) rising 5.9 and 3.7 percent on a seasonally adjusted annual rate. The pace eased to 1.9 percent during the third quarter, but jumped again to 5.5 percent during the fourth quarter. For the year as a whole, U.S. GDP expanded by 4.1 percent in 1999, just slightly less than the 4.5 and 4.2 percent growth recorded in 1997 and 1998. An expanding stock market, combined with relatively low interest rates, has boasted the confidence of consumers and lead to a sustained period of strong consumer spending. During CY 1999, WEFA estimates inflation adjusted consumer expenditures will rise 5.1 percent, just above the 4.9 percent rate of a year earlier.

Overall price inflation, as measured by the consumer price index (CPI), rose slightly to a 1.9 percent rate in 1999, up from a 1.4 percent rate in 1998. Energy prices declined by 0.9 percent during 1999. However, the annual average hides a steep increase in fuel prices, as demonstrated by a 17.6 percent increase in the oil and gas price index in the fourth quarter of CY 1999.

The annual average unemployment rate fell from 4.5 to 4.3 percent in 1999 a rate not witnessed in a generation. Employment rose 2.2 percent to an average level of 127.9 million workers during 1999.

The rapidly expanding U.S. economy, combined with the veiled threat of price inflation, led the Federal Reserve Board[1] (FED) to raise interest rates three times between July and November. The first rate increase, voted by the Federal Reserve Open Market Committee on July 1, raised the federal funds rate on overnight loans among banks by 25 basis points from 4.75 to 5.00 percent. The FED lifted rates for the second time this year on August 24 when it raised its federal funds rate by 25 basis points bringing it up to 5.25 percent. It also raised the discount rate on loans to banks from the Federal Reserve System from 4.50 to 4.75 percent. In a further effort to overcome the perceived threats of inflation, the FED, on November 16th, again increased its federal funds rate a quarter percent to 5.5 percent.

WORLD

Worldwide GDP expanded by 2.7 percent in 1999, up considerably from the 1.9 percent growth recorded a year earlier. The relative increase in the rate of growth reflects a partial recovery from the deep economic recession in Asia. The recovery in Asia is reflected in the 1.3 percent projected growth rate in 1999 Japanese GDP compared to a 2.9 percent decline in GDP in 1998. With the exception of South America, all major countries and regions in the world experienced economic growth in 1999. The economic woes in South America arose from the deep recession in Argentina (down 4.4 percent) and to a lesser extent the decline in Brazil (down 0.4 percent).

European Union (EU) nations reported combined GDP growth of 2.0 percent in 1999, down from the 2.8 percent rate a year earlier. GDP growth rates among EU countries ranged from a high in Ireland, 7.6 percent to a low of 1.5 percent in Germany. Eurasia, including the countries of the former Soviet Union and Eastern Europe, grew by a modest 1.4 percent in 1999. This follows a decline of 0.8 percent in 1998.

The upturn in oil prices during 1999 helped to spur growth in the Middle East countries which grew at a 2.3 percent rate compared to a rate of 0.4 percent the previous year. Economic growth in the developing-world nations of Africa was up a solid 4.1 percent in 1999, while separately the Union of South Africa grew by a more modest 1.2 percent.

China once again led the world in economic growth, with real GDP expanding by 7.1 percent in 1999, down slightly from the 7.8 percent pace in 1998. The large gain by China stands in contrast to the 4.4 percent increase in economic growth by the Pacific Basin countries--Hong Kong (governed by China), Indonesia, Malaysia, the Philippines, Singapore, South Korea, Taiwan, and Thailand. However, this modest growth represents a substantial improvement over last year's 4.7 percent decline in GDP. Australia increased its GDP by a substantial 3.8 percent in 1999, while New Zealand reported growth of only 2.8 percent.

Latin American countries suffered a 1.6 percent decline in economic activity in 1999, due primarily from the economic slowdowns in

[1] Official title is "Board of Governors, Federal Reserve System."

Argentina and Brazil the region's largest economies. The economies of Canada and Mexico each grew 3.5 percent in 1999.

Among the G-7 nations—U.S., Canada, United Kingdom (U.K.), Germany, Italy, France, and Japan--CY growth rates ranged from a high 3.9 percent in the U.S. to a negative 1.2 percent recorded in Italy.

Price inflation remained at very low levels among the group of G-7 Seven countries in CY 1999. The U.S. had the highest inflation among the G-7 countries, while Japan realized a small price decrease (down 0.8 percent). The remaining countries displayed price increases ranging from 1.7 percent in Canada and Italy to 0.6 percent in France and Germany.

Among the G-7 nations, short-term interest rates ran from a high of 5.2 percent in the U.S. to a low of 0.2 percent in Japan. Interest rates dropped in six of the Summit Seven countries, remaining unchanged in Canada. The largest interest rate declines occurred in Italy and the U.K. with a 2.3 and 2.2 percent decline, respectively.

Only the Japanese yen appreciated substantially against the U.S. dollar during 1999, with the cost of $1.00 declining from 130.9 to 116.7 yen, reflecting the relative strengthening of the Japanese economy. The remaining five countries of the G-7 group found their currency lower relative to the dollar in 1999. The Italian lira fell by a full 3.9 percent to 1803.1 lira per U.S. dollar and the British pound fell by 3 percent mirroring a relative weakness in these economies. The French franc, German mark, and Canadian dollar fell by 2.0, 1.4, and 0.3 percent, respectively. The Euro, the common currency among European Union countries, stood at an estimate 0.91 euro to the dollar in 1999 compared to 0.90 euro a year earlier a decline of approximately 0.9 percent.

U.S. ECONOMIC OUTLOOK

The economic assumptions used in developing the FAA baseline aviation forecasts are derived from estimates provided by the Executive Office of the President, Office of Management and Budget (OMB). OMB provides estimates for the period 1900 through 2010. The final forecast year, 2011, is derived by extrapolating the last year's annual growth rate. The GDP projections are Bureau of Economic Analysis (BEA) chain-weighted estimates with a base year of 1996. The BEA also modified the method it uses to measure GDP. This change is discussed in detail on page II-14.

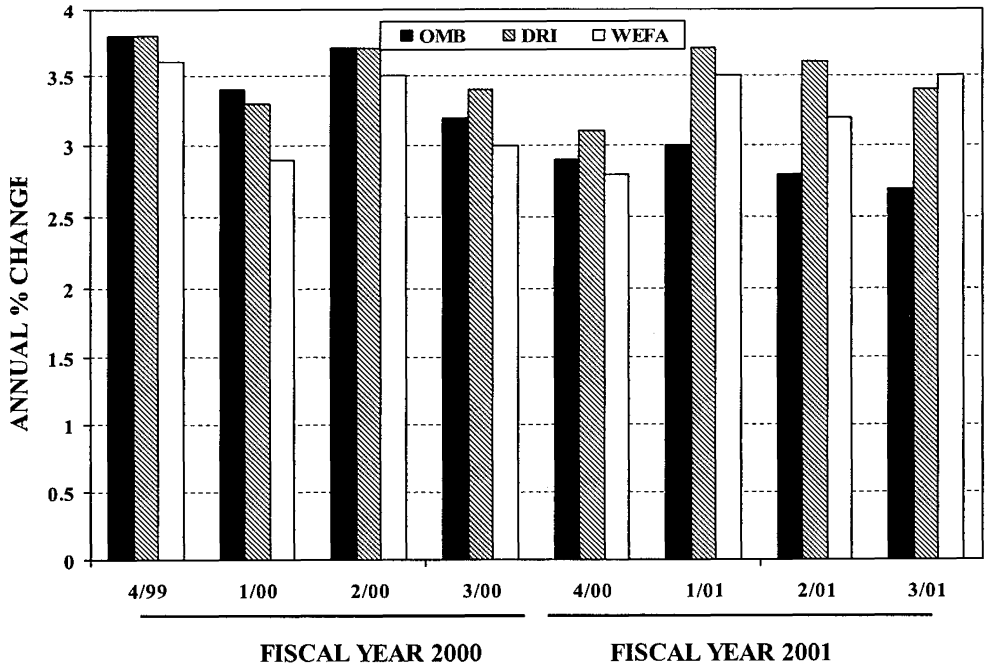
SHORT-TERM ECONOMIC OUTLOOK

Graphics presented on the following page show modest economic growth accompanied by restrained price increases over the next two years. OMB estimates indicate that real GDP growth will reach 3.5 percent in 2000 and then slow to 2.8 percent in 2001. These growth rates, although moderate, present a somewhat rosier picture than last year. Some of the increase in the near-term forecast is due to the changes made by the BEA.

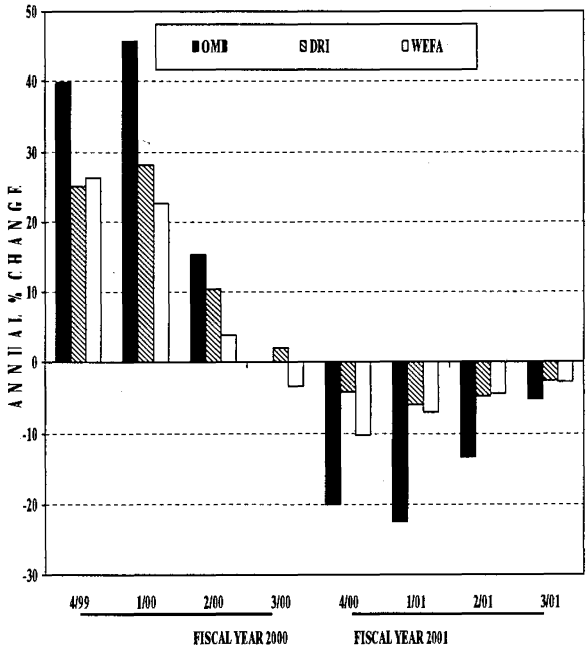
Price increases, as measured by the CPI for urban wage earners, are projected to rise at a moderate 2.7 percent pace in 2000 and 2.4 percent in 2001. After falling 0.9 percent in 1999, fuel prices, as measured by the oil and gas price index, are expected to continue the rise started in late 1999. OMB projects an increase of 23.8 percent (the consensus increase for the fiscal year is 13.5 percent) in 1999. The cartel of oil producing and exporting countries (OPEC) have succeeded in limiting oil supplies and its success has led to substantially higher

U.S SHORT-TERM ECONOMIC FORECASTS

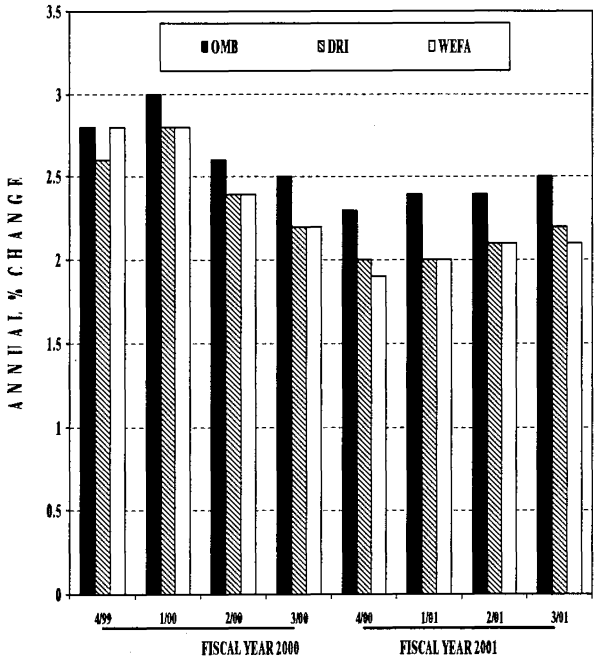
REAL GROSS DOMESTIC PRODUCT



OIL AND GAS PRICE INDEX



CONSUMER PRICE INDEX



gasoline prices. Price rises are expected to moderate during the latter half of 2000 and to decline by 15.7 percent in 2001.

LONG-TERM ECONOMIC OUTLOOK

The long-term economic outlook for the U.S. economy shows real GDP growth averaging 2.8 percent over the 12-year forecast period. Long-term growth in GDP is based on growth in population, labor force participation rates, average weekly hours worked, national saving and capital stock accumulation, physical and human capital, and technology. In general, growth relies on changes in the factors of production and increases in the productivity of those factors.

While the U.S. labor supply is expected to expand at a moderate rate over the forecast period, economic factors--including low interest rates, increasing capital investment, and continued technological growth from the cyber revolution--provide a base for U.S. economic expansion at a rate of 2.8 percent over the forecast period.

The labor force, or supply of labor, grows in proportion to the increase in population and the labor force participation rate. U.S. working age population (16 years old plus) is projected to grow at approximately 1.1 percent annually over the first 4 years of the forecast period, decreasing to an annual rate of 1.0 percent for the remainder of the period. Labor force participation rates have risen rapidly during the past two decades, climbing from 60 percent in 1970 to 67 percent in 1999. The labor force is expected to grow slightly faster than population growth over the forecast period, increasing the labor force participation rate to 68 percent by 2011.

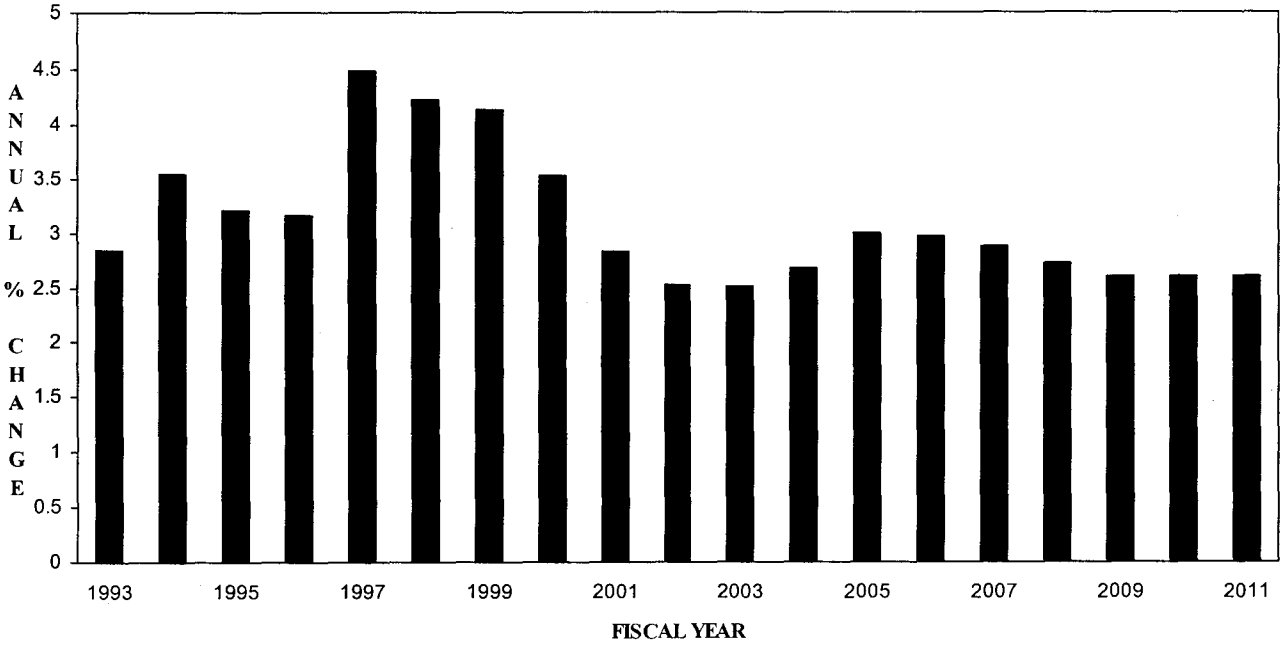
The labor force participation rate projected for those 65 years old and over show significant changes and merits additional discussion. Retirement-age Americans are projected to remain active in the labor force at higher proportions than at present. The number of men 65 years and over in the labor force is projected to grow at a rate of 2.8 percent annually over the forecast period, while women in this age group are expected to increase their participation at a rate of 2.9 percent annually. The labor force participation rate for older men is expected to rise from 17.2 to 19.8 percent in 2011. Among senior women, the labor force participation rate is forecast to grow from 9.0 percent to 11.4 percent over the period. The increase in work force participation among older workers results from a number of factors. These include better health of older workers, increased demand for experienced employees, and a growing need for income among the elderly. This increased labor force participation of older employees will help to cushion any possible reduction in income growth due the retirement of the generation born after World War II.

Between 1999 and 2011, the participation rate for the total U.S. labor force is expected to rise from 67.2 to 67.9 percent. The growth in population, combined with a small increase in labor force participation, results in 18.7 million more persons in the labor force in 2011, an increase of 13.4 percent and an annual growth of 1.1 percent during the forecast period.

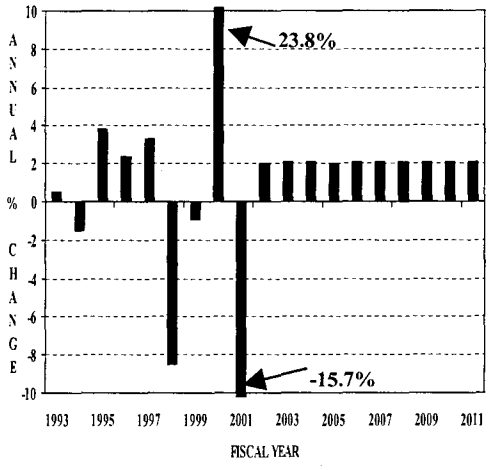
Significant factors influencing labor productivity include educational achievement, training and skill attainment, investment in productivity-increasing capital goods and technology. WEFA projects continued strong growth in capital stock investment. Capital stock is projected to rise, in real terms, by 5.5 percent over the next 4 years and by 4.3 percent annually thereafter. The capital-to-labor ratio is forecast to rise 3.4 percent annually over the next 12 years. The increased capital is expected bring about a 1.4 percent annual increase in output per hour.

U.S LONG-TERM ECONOMIC FORECASTS

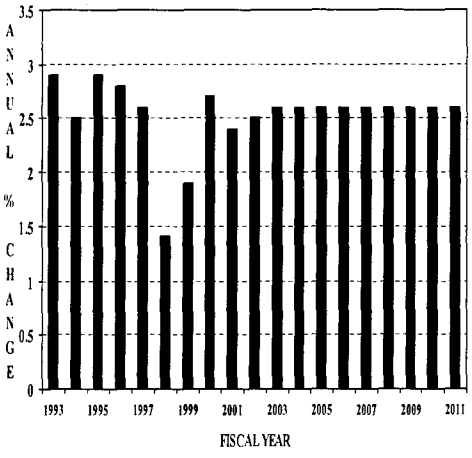
GROSS DOMESTIC PRODUCT
(1996 DOLLARS, CHAIN-WEIGHTED)



OIL AND GAS PRICE INDEX
(1992=100)



CONSUMER PRICE INDEX
(1982-84=100)



Inflation is expected to remain at a modest rate during the forecast period. The consumer price index is projected to increase at an annual rate of 2.6 percent through 2011. Although gyrating wildly in the first couple years of the forecast period, the more volatile oil and gas prices are projected to settle down and increase at a average annual rate of 2.1 percent over the entire forecast period, a half percent less than the annual rate of inflation. In other words, real fuel prices are expected to drop by 0.5 percent annually over the 12-year forecast period.

Alternative Forecasts

The alternative U.S. economic forecasts presented in Chapter X, Table 3, show a supplemental view to that presented by OMB. DRI and WEFA forecasts have been averaged to attain a consensus forecast. In the short term, the consensus forecast (converted to a FY basis) shows GDP rising 3.6 percent in 2000 and falling to 3.2 percent in 2001. OMB projects 3.5 percent growth in 2000, but growth decreases to 2.8 percent in 2001. The consensus forecast shows projected increases in the consumer price index of 2.5 and 2.0 percent in 2000 and 2001, respectively. The more volatile gas and oil price index is forecast to rise 13.3 percent in 2000 and then drop 5.8 percent the following year.

Over the entire forecast period (1999-2011), the consensus estimate of economic growth is 3.1 percent annually, slightly higher than OMB's 2.8 percent growth rate. In a like manner, the private forecast groups project overall price increases of 2.5 percent compared to 2.6 percent forecast by OMB. The consensus forecast projects oil and gasoline price inflation at 1.9 percent compared to the OMB fuel price increase of 2.1 percent annually.

WORLD ECONOMIC OUTLOOK

The principal series used in developing FAA's international traffic forecasts are discussed in the following paragraphs. These data are presented in tabular form in Chapter X, Tables 4 and 5. International GDP data are presented on a calendar year basis and are expressed in 1990 U.S. dollars. GDP and exchange rates for individual countries, as well as groups of countries, are obtained from WEFA's *World Economic Outlook* (Fourth Quarter 1999).

WORLD GDP

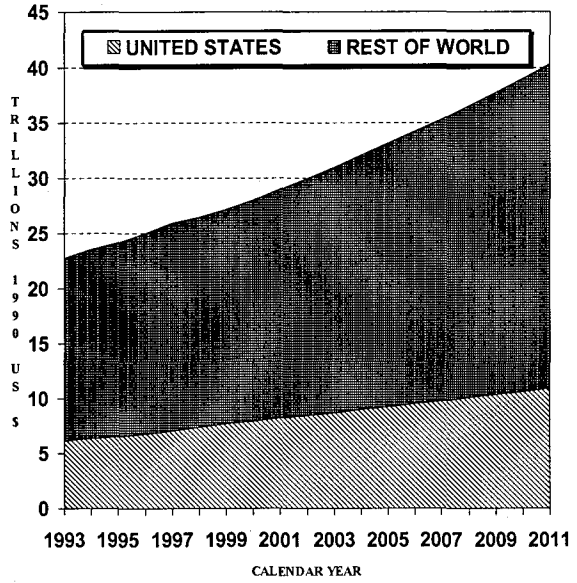
The graphics on the following page depict both the historical trend and projected GDP growth for major economic regions of the world. Worldwide GDP is projected to increase by nearly $892 billion to a level of $28.1 trillion in 2000, an annual increase of 2.9 percent. Over the 12-year forecast period, world output is projected to rise to $40.3 trillion, an annual growth rate of 3.3 percent.

Canada

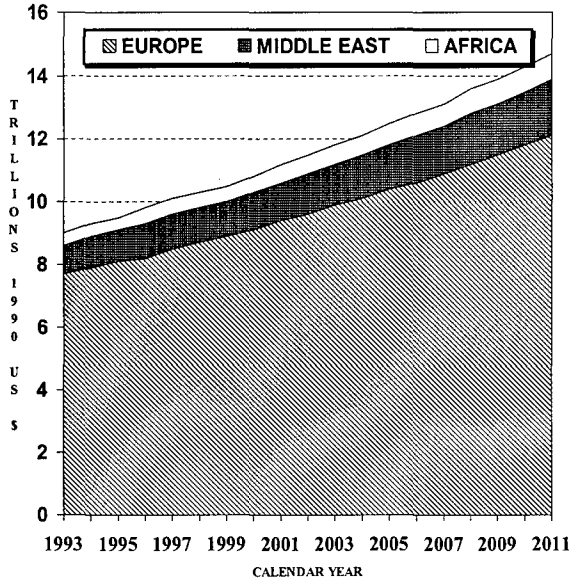
Although a close ally and reliable trading partner, Canada has a unique character. The Canadian economy showed substantial strength in 1999 as GDP grew by an estimated annual 3.5 percent, up from 3.1 percent a year earlier. The economy is expected to slow in 2000 and 2001, averaging 2.6 and 2.8 percent, respectively. Over the forecast period, the Canadian economy is projected to increase at an average annual rate 2.5 percent. The Canadian economy is characterized by excess production capacity and relatively high unemployment that

GROSS DOMESTIC PRODUCT BY WORLD REGION

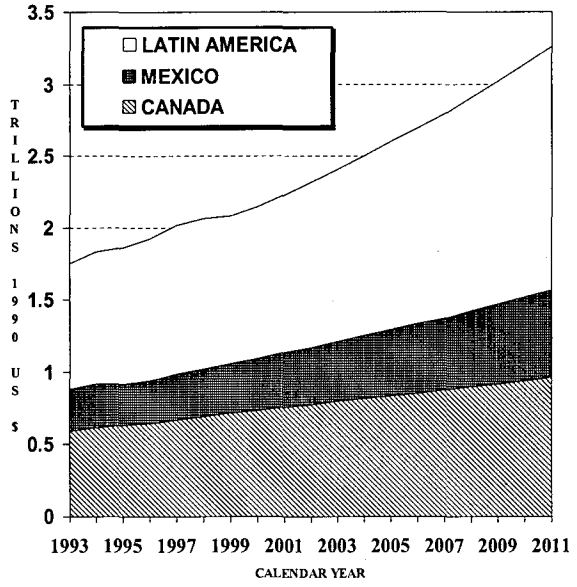
WORLD



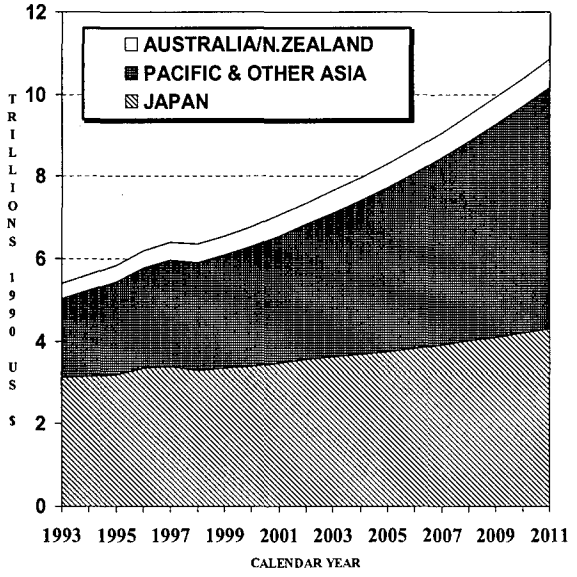
EUROPE/MIDDLE EAST/AFRICA



CANADA/MEXICO/LATIN AMERICA



JAPAN/PACIFIC & OTHER ASIA/AUSTRALIA & NEW ZEALAND



leaves substantial room for growth without inflationary pressures.

A major risk to the Canadian economy is the continued downward pressure on the Canadian dollar caused by the U.S. Federal Reserve increases in interest rates. The continued erosion of the Canadian dollar could force the Bank of Canada to raise interest rates at a time when excess capacity in the economy indicates a lowering of rates is necessary. The Canadian economy suffers an unemployment rate near 8.0 percent. A rise in the interest rate would further exacerbate the unemployment situation.

The Canadian economy needs tax relief to sustain long-term growth without creating additional unused capacity and unemployment. With the Federal and provincial government running fiscal surpluses, the political debate centers on how much to increase spending and how much to cut taxes. The timing and magnitude of tax relief places uncertainty in the forecast. Substantial near-term tax cuts would increase both the near-term and long-term outlook for the Canadian economy.

Pacific/Far East

Asian countries (Japan, developing nations of the Asia Pacific, China, India, and Pakistan), along with Australia and New Zealand, are projected to grow at rates of 3.4 and 4.1 percent over the next two years. The 3.2 percent growth recorded in 1999 marks an end to the severe economic downturn suffered by the region in late 1997 and 1998. In 1999, economic activity in Japan grew by 1.3 percent while the combined economies of those in developing Asia rose by 5.6 percent. Although the Asian forecast continues to carry with it substantial risks, the worst of the downturn appears over.

Japan's economy, which accounted for about 55 percent of Asia's output in 1999, grew by 1.3-percent compared to a 2.9 percent decline a year earlier. The world's second largest economy is projected to continue in its recovery phase over the next two years, with GDP expanding by 1.4 percent in 2000 and 2.3 percent in 2001. Over the 12-year forecast period, Japan's economy is projected to increase by 2.2 percent annually.

After a prolonged economic slump, Japan appears headed for sustained economic growth. Even with two quarters of declining government spending, the economy has grown. Private sector activity appears strong enough to sustain Japan's economic growth. However, a strengthening of the yen and government's failure to alleviate the bad-loan situation continue to place the Japanese economy at risk. The yen has risen to a high of 104 yen/ U.S dollar in 1999. A sustained rise in the yen would hit export profits, reducing business investments and possibly ending the recovery. Until loan write offs are achieved and the financial sector is on a firm footing, it continues to pose a substantial risk to the Japanese economic outlook.

The economies of Pacific and developing Asia (including the Pacific Basin countries), China, India, and Pakistan, have shown resilience, with aggregate GDP increasing by 5.6 percent in 1999. For these Asian countries, the financial crises of 1997 and 1998 have receded. Developing Asian economies are expected to grow by 6.4 percent in 2000. The combined GDP of these countries is projected to more than double during the forecast period, increasing from $2.7 to $5.8 trillion, an annual growth rate of 6.6 percent.

While its neighbors suffered severe economic slowdowns, China continued to expand. This expansion has gone unchecked in 1999 with GDP growing a healthy 7.1 percent. Economic expansion in China is forecast to slow slightly in 2000 to 6.8 percent. Over the 12-year forecast period, China's output is expected to grow from

$924 billion to $2.2 trillion, a growth rate of 7.5 percent annually.

As in most developing areas of the world, the Asian forecast contains substantial risk. WEFA warns that mounting tensions between Mainland China and Taiwan pose a serious threat to the region's stability and economic growth. These tensions flared in July when Taiwan's President declared the Taiwan-China relationship to be a "nation-to-nation" relationship, angering China who thinks of Taiwan as a renegade province, not a separate nation. Further, the U.S. State Department warned, on September 14, that China faces potential disruptions in many of its basic industries such as banking, utilities, and telecommunications. In addition, Indonesia continues to experience considerable political uncertainty that could spread to other nations in the region.

Latin America

Economic recession hit South America in 1999 as the area's GDP fell by 1.6 percent, this following anemic growth of 1.1 percent in 1998. The Brazilian economy, producing about 56 percent of South American GDP, declined at a rate of 0.4 percent in 1999, contributing to the region's recession. Argentina, South America's second largest economy, suffered a more substantial decline with GDP decreasing by 4.4 percent in 1999. Although Mexico's economy slowed its pace somewhat during 1999, the country is in its fourth year of economic expansion following a deep economic downturn of in 1995. Mexico's GDP grew by 3.5 percent in 1999, down from 4.6 percent a year earlier.

South America is expected to pull out its recession in 2000, with GDP growing 2.9 percent. Brazil's GDP is forecast to increase GDP by 2.8 percent, while Argentina is projected to grow at a 2.3 percent rate. Over the forecast period, South American GDP is forecast to increase at an annual rate of 4.3 percent. Mexico's GDP is expected to grow by 4.8 percent next year and by that same pace over the remainder of the forecast period.

Substantial risks could slow the potential growth of the South American economy. The devaluation of the Brazilian *Real* (increase the cost of one dollar from 1.21 to 1.95 *Real*) has not brought about the expected trade surplus. Additionally, the failed policies of the existing Brazilian administration have shaken both international and domestic confidence. The Argentine economy faces several challenges. Its export sector remains subdued because of the slow recovery of commodity prices and trade disputes between members of the Mercosur trade block. Also, Argentina's fiscal stability remains in question as the recession jeopardizes government revenues and fiscal targets agreed on with the International Monetary Fund.

A major risk to the Mexican economy is the increases in interest rates by the U.S. Federal Reserve. Increases in U.S. interest rates may threaten the stability of the peso and lead to higher Mexican interest rates. The stability of the peso is particularly important since the export sector provides the engine for the current economic expansion.

Europe/Middle East/Africa

The combined economies of Europe (Eastern and Western), the Middle East, and Africa are projected to grow by 3.0 percent next year and at a rate of 2.8 percent over the forecast period. Western Europe, responsible for 79 percent of the region's GDP, is expected to grow by 2.8 percent next year and to average a 2.5 percent annual growth rate over the 12-year period.

The European Union (EU), consisting of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the U.K, appears to be on a course of long-term stable growth. The European Monetary Union (EMU) now has its own currency—the Euro—that, although remaining weak, has recently risen against the dollar. Establishment of the EMU and a single European currency has provided monetary and fiscal discipline needed for stable long-term economic growth. The gradual narrowing of interest rates within the EMU and reduced price inflation has provided a solid basis for the Euro. The EMU is also expected to reduce or eliminate foreign exchange fluctuations, increase labor mobility, improve product-market competition, and reduce transaction costs within the EU.

Although the EU forecast appears stable, it has several downside risks. A sustained weakness in the Euro against the dollar could lead to higher import prices and increase price inflation within the EU. The European Central Bank (ECB) may soon increase interest rates posing an obstacle for EU growth.

The developing economies of the Middle East countries grew by 4.1 percent in 1999 and are projected to raise its growth rate to 4.5 percent in 2000. This growth follows a substantial economic slowdown that was related to slumping oil prices. The long-term outlook for these economies shows a projected 3.9 percent growth in GDP.

Reduced oil production by OPEC and some non-OPEC countries, along with increasing demand for oil by economically recovering Asian economies, have sustained an increase in oil prices. Although political stability of the Middle East remains a problem, the on-going peace efforts between Israel and its neighbors, combined with the relative stability in the remainder of the region, suggest that tensions in this volatile area may remain subdued for the near future.

The combined economies of Africa, including South Africa, are forecast to expand at an average annual rate of 4.3 percent over the forecast period. Next year's GDP growth in Africa is forecast at 4.6 percent. Political stability and commodity prices play a central role in African growth. The maintenance of relative political stability and generally rising commodity prices (including oil) suggests a positive growth scenario for African nations in the near-term.

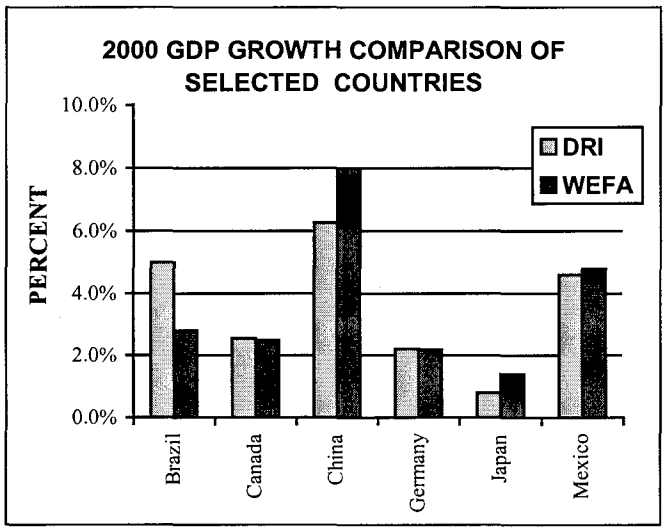
The economies of Eastern Europe also continued to expand in 1999, growing at a 1.7 percent clip. Economic growth in the former Soviet Union resumed at a pace of 1.2 percent after a steep decline last year. The economies of the two major countries of Eastern Europe--Poland and Hungary--expanded by 3.3 and 3.9 percent, respectively. The third largest country in this block, the Czech Republic, endured another year of economic downturn as GDP declined by 2.0 percent. Over the next 12 years, Eastern Europe is forecast to grow at an annual rate of 4.5 percent.

Potential Risks to the Forecast

The risk of worldwide recession is down from last year. WEFA estimates the probability of a global recession at a mere 15 percent. Concerns over the spread of the Asian financial crises have waned. The economies of developing Asia, including South Korea, Thailand, and Malaysia have made a substantial turnaround and appear headed for continued growth. However, Indonesia continues to struggle with political and economic turmoil. Although not out of the woods yet, Russia appears headed for economic growth and it's incipient democracy appears to be working.

The two potential trouble spots in the forecast are Japan and Brazil. Although the Japanese recovery appears on firm ground, the forecast

has two major risk factors: the continued rise in the value of the yen and its unsettled bad loans. These factors separately, or in combination, could derail the present recovery and send Asia into another round of recession. In Brazil, the Government needs to reform the pension system and other institutions to put the country's fiscal situation order. Because Brazil dominates the Latin American economies, its fiscal and economic health weighs heavily on the world scene.



DRI is projecting economic growth comparable to that forecast by WEFA for most key economies, implying that the predominant view of leading forecasters is one of relative stability and improved economic conditions for 2000. However, the risks to the forecast remain substantial and threaten to undermine the prevailing notion.

DOLLAR EXCHANGE RATE

The graphic on the following page shows historical and forecast values for the U.S. trade-weighted nominal exchange rate index with other developed countries. The trade-weighted exchange rate measures the relative purchasing power of the U.S. dollar against economically developed countries after accounting for trade differences. The graph also displays the historical and projected dollar exchange rates against the Japanese yen and the German mark.[2] Table V in Chapter X displays the historical and forecast exchange rates from 1993 to 2011 for the Canadian dollar, the British pound, the German mark, and the Japanese yen.

In trade-weighted terms, the dollar rose against its major trading partners in 1999. However, the purchasing power of the U.S. dollar is projected to fall throughout the 12-year forecast period, declining at an average annual rate of 0.9 percent. The U.S. dollar appreciated slightly against the Canadian dollar in 1999, to $0.672 U.S. The downward trend in the Canadian dollar is expected to reverse in 2000 (to $0.688 U.S) and continue throughout the forecast period, rising to $0.764 U.S. by 2011.

The German and British currency also depreciated against the U.S. dollar in 1999. The German mark fell slightly from $0.568 to $0.560, while the pound tumbled from $1.66 to $1.61. The mark is expected to rise throughout the forecast period increasing to a level of $0.64; the British pound sterling is projected to rise to a level of $1.65 during the period. The Japanese yen rose to a level $8.568 per 1,000 yen (116 yen to $U.S.) from a level $7.639 (131 yen to $U.S.) a year earlier. The yen is expected to rise to $10.268 (97 yen to $U.S.) by 2011.

OTHER ISSUES

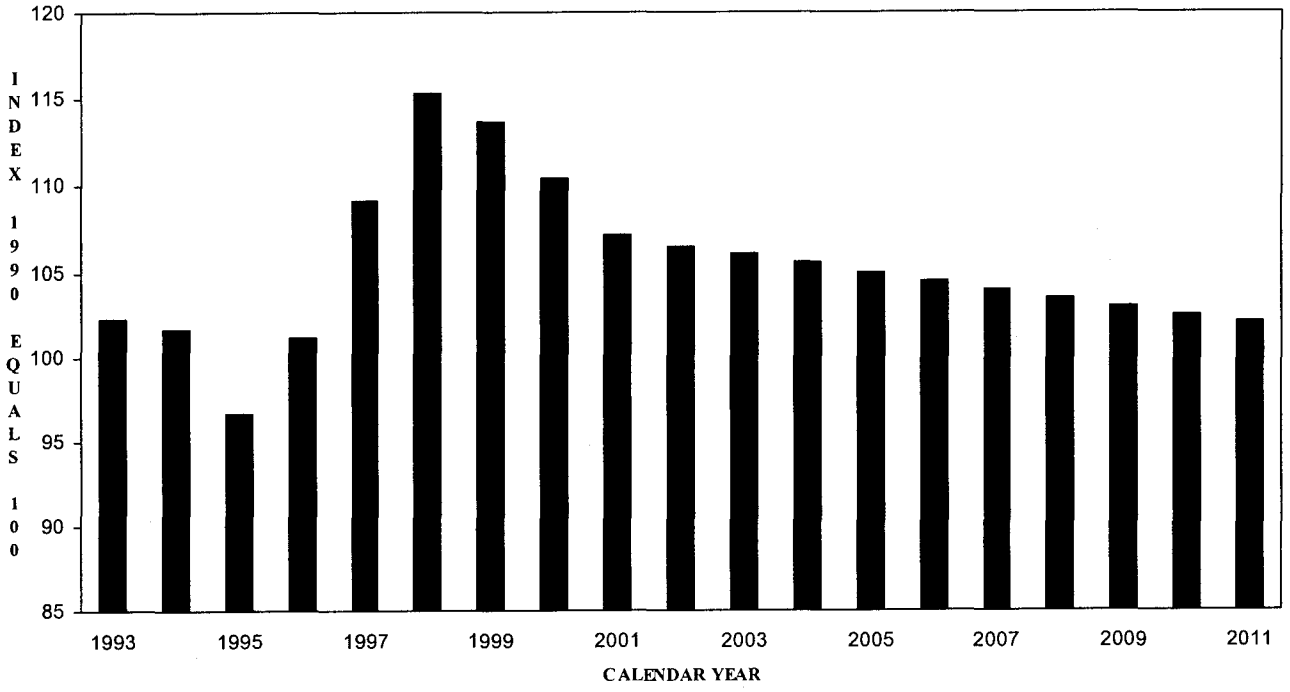
GDP DATA SERIES REVISED

The U.S. Commerce Department has again revised the GDP data series. In the recent past, the GDP series was converted to a chain-weighted basis that linked changes in consumer behavior to price changes and the level of the

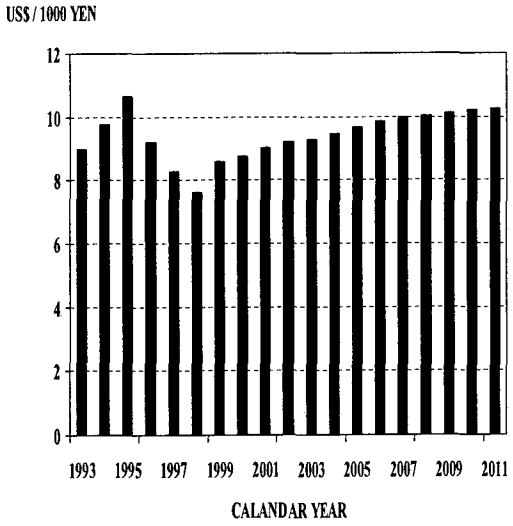
[2] Note: A rise in the index implies an appreciation of the dollar against other currencies; a decline in the DM, yen, or pound also implies an appreciation of the dollar against these currencies.

EXCHANGE RATE TRENDS AND FORECASTS

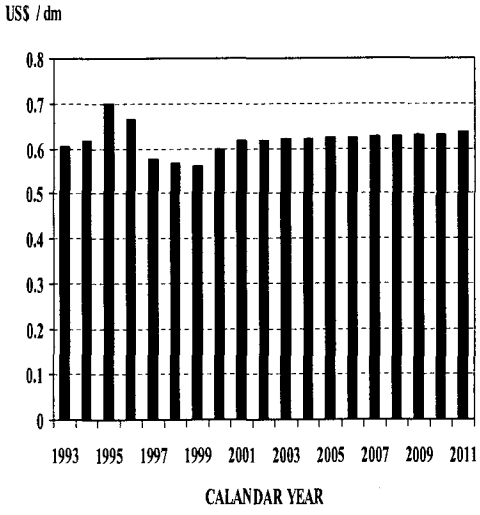
U.S. TRADE-WEIGHTED EXCHANGE RATE
(NOMINAL RATE WITH OECD COUNTRIES)



JAPANESE YEN



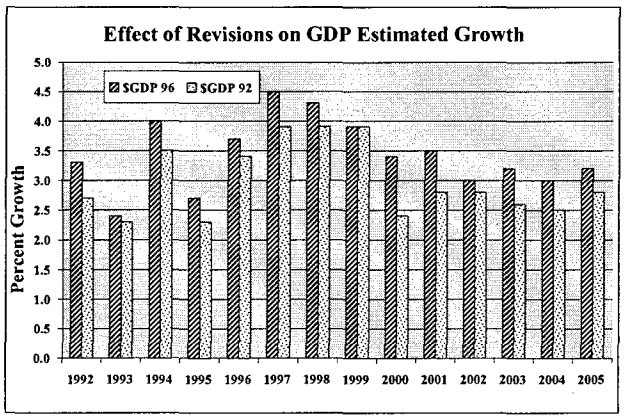
GERMAN MARK



GDP. The most recent change involved conceptual changes in the national income accounting as well as a rebasing of GDP data to 1996 dollars (previous was 1992).

Most important among the conceptual changes in national income accounting was the move of business and government spending on software to the investment category. Previously, national income accounting by the Department of Commerce had treated corporate spending on software as an intermediate good used to produce a final good. With the recent changes, software is treated as the purchase of a final good and thus added to GDP. Other changes included classifying consumer spending on software as a purchase of durable goods rather than as a service and the treatment of government pension funds in the same manner as private pension funds. These latter conceptual changes had little or no effect on GDP. DRI estimates that these adjustments to national income accounting adds about $140 billion to GDP.

The net effect of the change in GDP accounting is to raise estimated economic growth. The following table shows WEFA historical and forecast GDP growth rates for the old series (GDP in 1992 dollars, October forecast) and the new series (GDP in 1996 dollars, November forecast). WEFA estimates that U.S. GDP is up 0.3 percent (worldwide GDP up 0.1 percent). This upward revision of the historical growth in GDP inspired an increase in the forecast growth.



THE EFFECT OF THE INTERNET

The advent of the worldwide web and the use of the Internet for business, personal finances, information, and entertainment profoundly affect the economic scene. Older established companies and new ones alike know that their presence on the Internet is essential. Those companies most able to grab the new Web business have a considerable advantage. WEFA estimates that e-commerce totaled $80 billion in 1998 and will grow to $1 trillion by 2003.

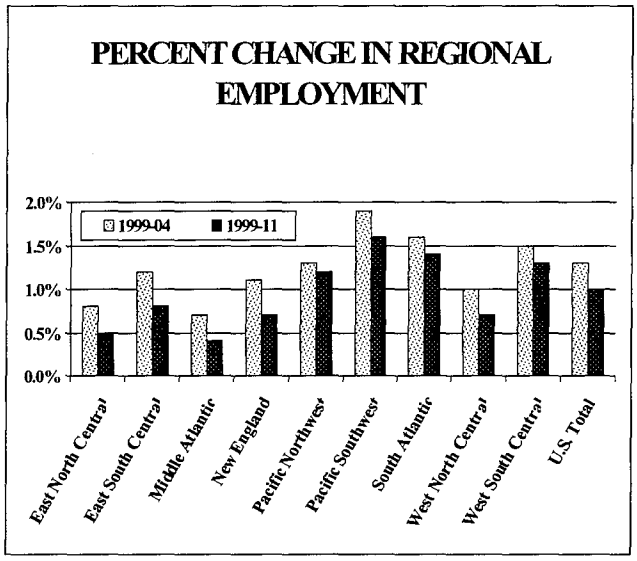
As the role of the Internet expands, it suppresses inflation and raises productivity. Internet penetration gives consumers an easy means to compare prices and quality thereby reducing retailer's pricing power. Consumer ignorance is diminishing. Additionally, consumers can order directly from producers, cutting costs. This shift could eventually cause major cuts in wholesale, retail, and company marketing.

As an example, airline travelers can bid widely on the Internet for airline tickets--a trend that may profoundly effect commercial aviation. Also, as e-ticketing expands, travel agents already hurt by declining commissions will begin to feel the pinch.

The growth in the Internet will mean a rise in a new set of industries. For instance, online retailers who provide home delivery must use companies such as UPS, Federal Express, and others to provide delivery services. And more directly, companies such as Cisco, Nortel, and Lucent Technologies that supply the Internet hardware will expand. The losers in this industry shake up will be the traditional retailers and service distributors as well as many advertising and marketing firms.

REGIONAL DISPERSION OF GROWTH

While U.S. economic growth is projected to continue at a steady, moderate pace, the future economic strength of U.S. regions will vary to a large extent. A region's employment growth provides a good indicator of its economic fortunes and potential for aviation growth. The following graph shows employment growth by region for the period 1999 to 2004 and for the entire forecast period. DRI, the source of this data, expects the overall employment in the U.S. to increase by 1.0 percent over the forecast period.



In the new millennium, states in the Pacific Southwest--including Arizona, California, Colorado, Nevada, Hawaii, Nevada, New Mexico and Utah--are expected to lead the nation in employment growth with an average increase of 1.9 percent between 1999 and 2004 and 1.6 percent over the forecast period. The states of the Middle Atlantic and East North Central--which include New Jersey, New York, Pennsylvania, Illinois, Indiana, Michigan, Ohio, and Wisconsin (the country's aging industrial states)--are forecast to experience sluggish employment growth over the next half decade.

The following table shows the top 10 metropolitan areas ranked by annual employment growth from 1999 to 2011. Two of America's premier tourist resorts, Las Vegas and Orlando are among the top four metropolitan areas in employment gains over the next decade. With the exception of Denver, all of these rapidly growing urban centers lie within the Sunbelt.

TOP 10 METROPOLITAN AREAS IN EMPLOYMENT GROWTH

METROPOLITAN AREA	EMPLOYMENT (000)	ANNUAL GROWTH (PERCENT)
Las Vegas NV	703	3.8%
Phoenix AZ	1,511	2.7%
Austin TX	622	2.5%
Orlando FL	877	2.5%
Raleigh-Durham NC	683	2.3%
Dallas TX	1,899	2.1%
Riverside-San Bernardino CA	910	2.0%
Fort Lauderdale FL	665	2.0%
Sacramento CA	669	2.0%
Denver CO	1,129	1.8%

Source: DRI, Inc.

SUMMARY AND IMPACT ON AVIATION

The outlook for the U.S. economy is for moderate economic growth in the short-term and continued healthy gains during the remainder of the forecast period. Fuel price increases are expected to subside during the latter half of 2000 and to remain modest for the rest of the forecast period. The rate of inflation remains at modest levels throughout the 12-year forecast period.

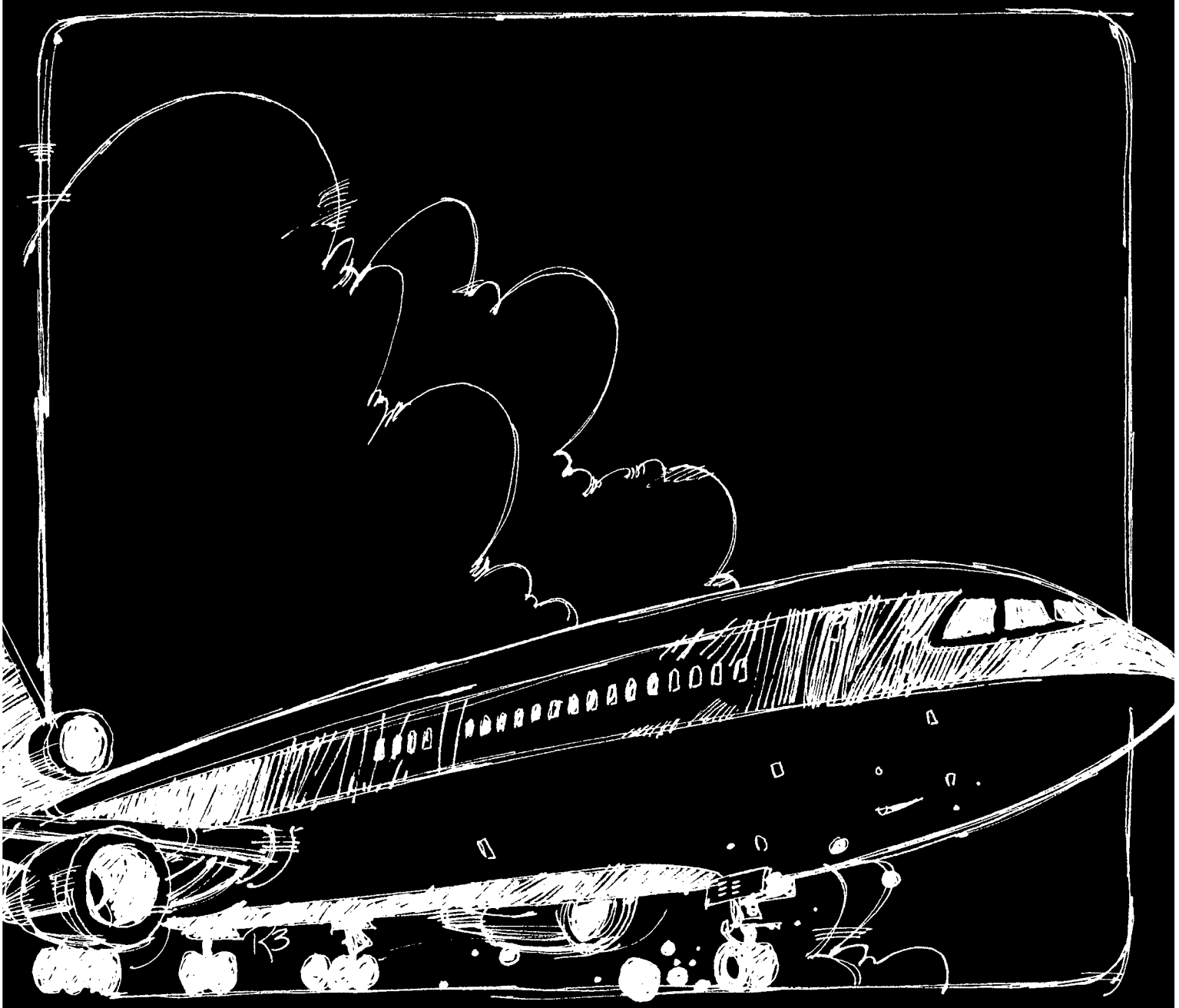
Worldwide economic activity is expected to expand at somewhat slower rates during the early years of the forecast period as Asian economies continue to recovery from the 1997-98 recession and continued economic turmoil in South America slows worldwide GDP gains. Thereafter, world economic activity is expected to return to the growth levels achieved prior to

the start of the financial crisis in Southeast Asia. However, important risks to the world economic forecast are posed by both the Japanese and Brazilian economies. A relapse into recession by Japan could send all of Asia into an economic tailspin. Brazil must get its fiscal house in order or risk deepening its recession and taking all of Latin America into a prolonged recession.

The domestic aviation forecast presented by FAA anticipates continued stable economic growth accompanied by moderate inflation. Under these conditions, the U.S. domestic aviation market should continue to thrive. The short-term international forecasts reflect a recovering world economy.

CHAPTER III

COMMERCIAL AIR CARRIERS



CHAPTER III

COMMERCIAL AIR CARRIERS

In fiscal year 1999 there were 90 U.S. commercial airlines (both scheduled and nonscheduled) reporting traffic and financial data to the Bureau of Transportation Statistics (BTS), U.S. Department of Transportation (DOT), on Form 41. There were 65 passenger airlines (operating aircraft with over 60 seats) and 25 all-cargo carriers. There are more carriers this year than last, and additions are primarily in the scheduled segment of the industry.

Forty-one of the airlines provided scheduled passenger service and constitute the focus of the air carrier forecasts (both domestic and international) discussed in this chapter. Forty of the carriers provided scheduled domestic service (within the 50 States, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands), while 19 of the carriers provided scheduled international service. Of the carriers providing scheduled international service, nine served Atlantic routes, ten served Latin American routes, and seven served Pacific routes.

Air carrier traffic forecasts and assumptions discussed here are presented in Chapter X (Tables 6 through 22). FAA air carrier workload forecasts are discussed in Chapter VII and presented in Chapter X (Tables 31 through 44).

It should be noted that all specified years in the remainder of this chapter are fiscal years (October 1 through September 30), and specified quarters are fiscal year quarters, unless designated otherwise.

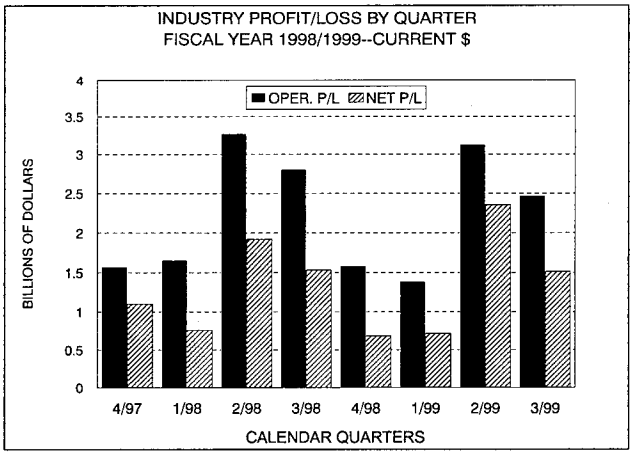
REVIEW OF 1999

FINANCIAL RESULTS

1999 was the seventh consecutive year that operating revenues for the U.S. commercial airline industry grew faster than operating expenses. Since 1993, cumulative operating profits have approached $40 billion. The financial success of the industry in 1999 was based on strong growth in traffic and lower fuel prices. The relatively large growth in capacity during the year pushed the system load factor down 0.1 percentage points--the first decline since 1993.

Although operating profits were down $702 million in 1999, it was the second highest year for operating profits since deregulation of the industry in 1978. The industry operating

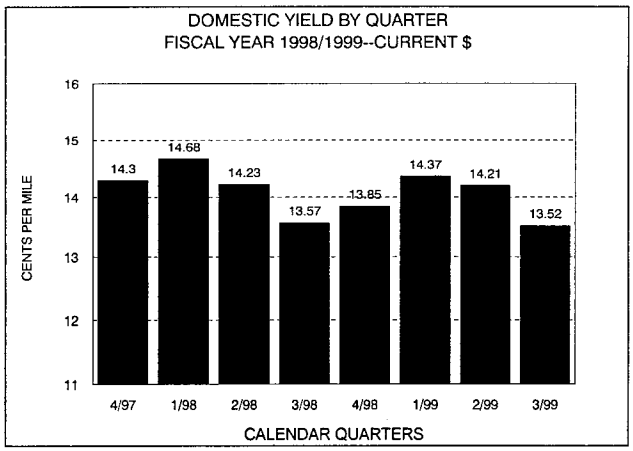
profit in 1998 was $9.3 billion. In 1999 the operating profit was $8.6 billion.



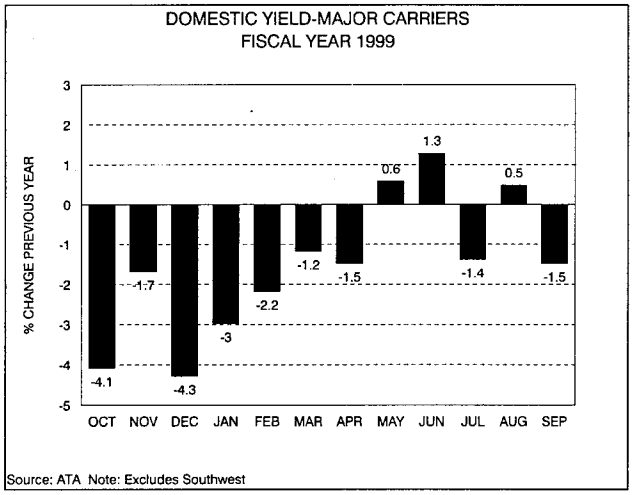
The industry had operating profits in all four quarters. For the year, operating revenues increased 3.2 percent, while operating expenses increased 4.2 percent. By comparison operating expenses were up 3.7 percent in 1998, 5.7 percent in 1997, and 7.9 percent in 1996.

The significant decline in the growth rate of operating expenses in 1998 and 1999 was largely due to a drop in fuel costs. In 1998 nominal fuel prices declined 18.6 percent; in 1999, they fell 9.0 percent. However, fuel prices began to increase during the last quarter of the fiscal year, and are expected to increase significantly during 2000.

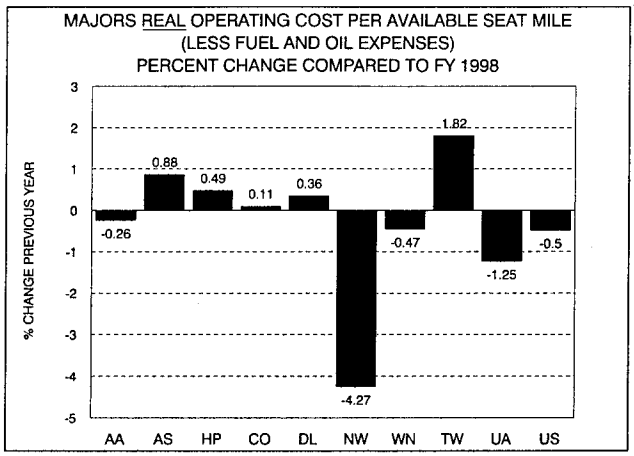
Industry domestic nominal yields declined 2.0 percent, while yields, adjusted for inflation fell 3.9 percent. During the first quarter of 2000, some carriers attempted to raise leisure fares because of increasing fuel prices. However, the increases did not hold since many would not go along with the proposal. While airlines have raised posted fares during the year, they continue to discount deeply from those prices to stay competitive and boost demand. Competition in the industry is intense, and is expected to continue in both the domestic and international markets throughout the forecast period.



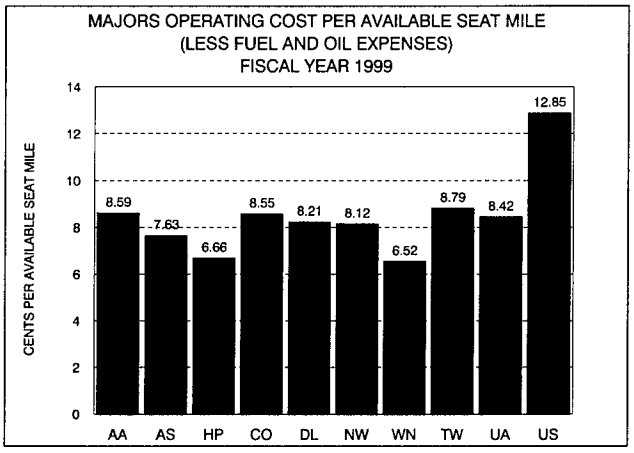
Nominal international yields also fell during the year. In the Atlantic, Pacific, and Latin American markets, real yields declined 6.9, 4.6, and 8.8 percent, respectively. The falling yields in the Latin American and Atlantic markets can be attributed to supply side effects of increased competition and growth in capacity. In the Pacific region, yields declined because of a precipitous drop in demand.



During 1999, five major passenger carriers reduced their real unit costs (estimated without fuel and oil expenses). Northwest had the largest decline--down 4.27 percent, followed by United with unit costs declining 1.25 percent. TWA showed the largest increase, with unit costs up 1.82 percent.

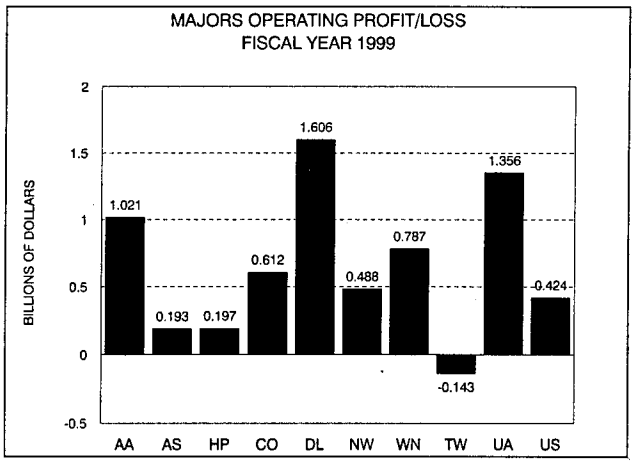


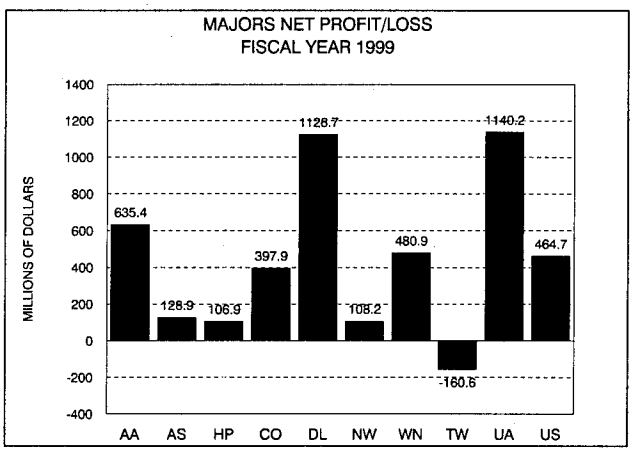
System average real operating cost per available seat mile (excluding fuel and oil) was 8.61 cents in 1999, down 0.8 percent from 1998. System real unit costs (including fuel and oil) decreased 1.8 percent. In 1999, Southwest had the lowest operating cost per available seat mile (6.52 cents). The highest unit cost among the major carriers was US Airways with 12.85 cents.



In 1999, U.S. airlines posted a net profit of $5.3 billion--the same level as 1998. In 1997 the industry had a net profit of $4.3 billion. And in 1996, 1995, and 1994 net profits were $2.7 billion, $1.2 billion, and $1.2 billion, respectively. Total net profit for the six-year period was $20.0 billion.

The following two graphs show operating and net profit and loss for the 10 passenger air carriers classified as majors. Nine had operating and net profits in 1999 while only one, TWA, had an operating loss of $143.8 million and a net loss $160.6 million. United and Delta recorded the highest operating and net profits of the major passenger carriers.

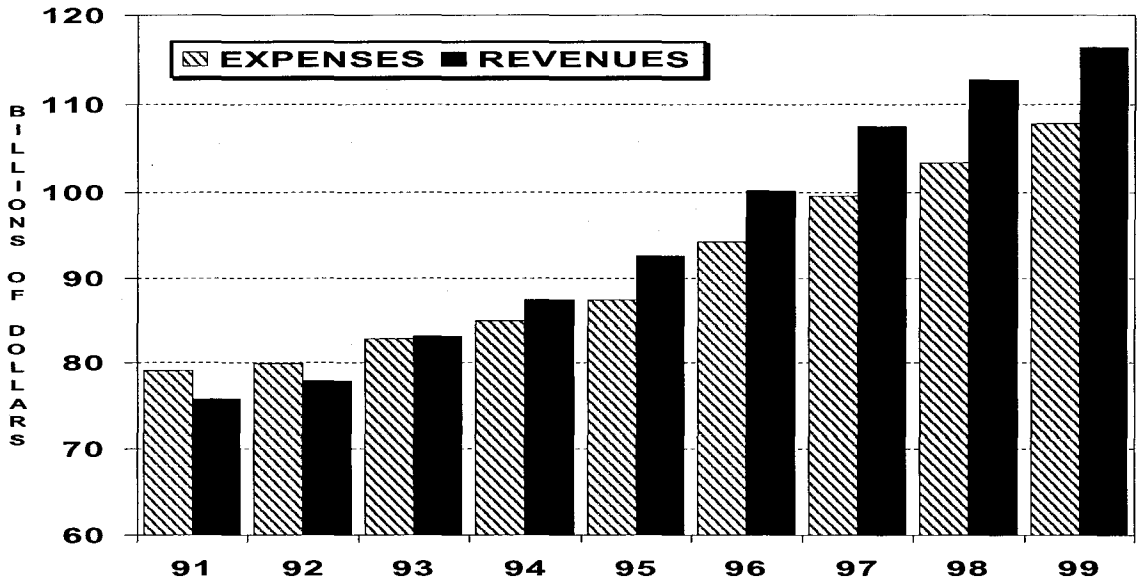




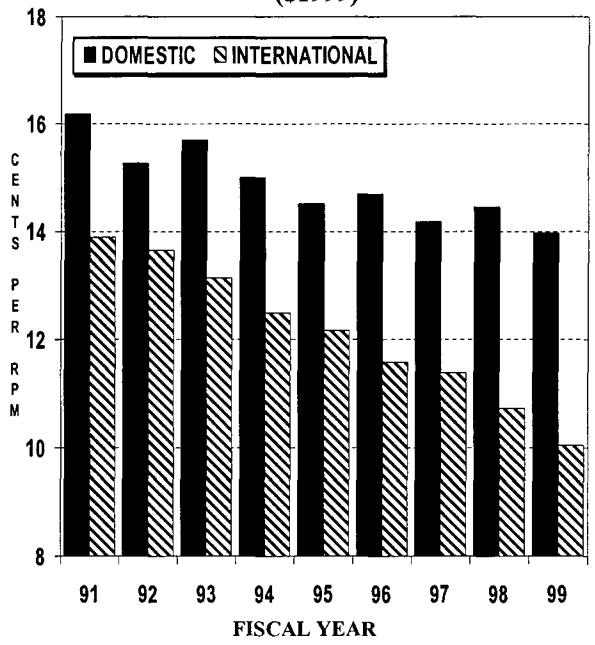
During the next several years, competition, capacity expansion and increased productivity within the industry are expected to push real yields downward. Falling yields along with sustained growth in the economy will continue to expand aviation activity and increase passenger revenues. If the industry is successful in controlling and reducing costs, profits should remain at relatively high levels throughout the forecast period.

U.S. COMMERCIAL AIR CARRIERS: REVENUE AND COST TRENDS

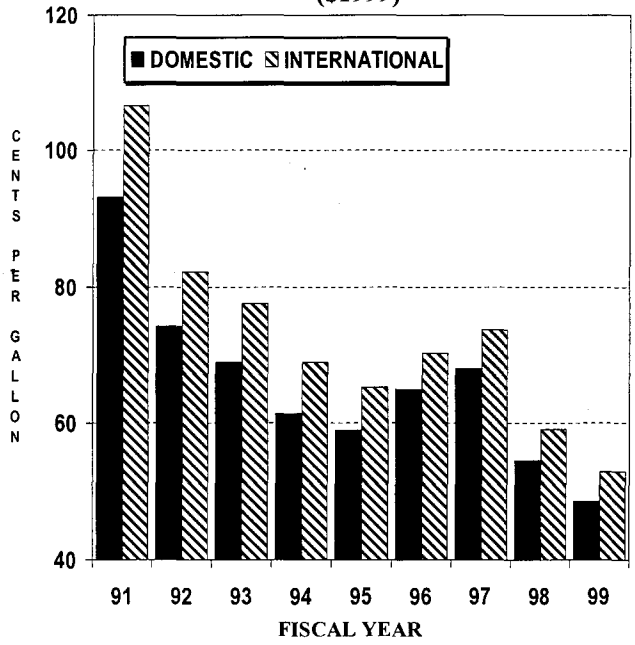
OPERATING REVENUES AND EXPENSES
(CURRENT DOLLARS)



PASSENGER YIELDS
($1999)

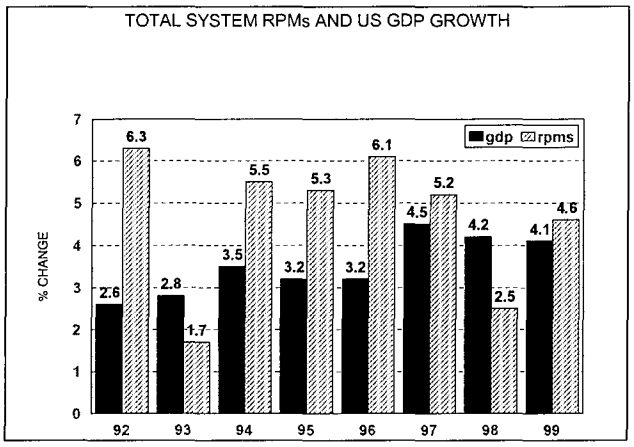


JET FUEL PRICES
($1999)



SCHEDULED PASSENGER TRAFFIC AND CAPACITY

In 1999, total scheduled U.S. commercial air carrier activity (domestic plus international) continued to grow at rates above those of the U.S. and world economies. In 1999, system revenue passenger miles (RPMs) increased 4.6 percent, while enplanements increased 3.5 percent. Since 1991, system RPMs have increased 4.6 percent a year--roughly 32.0 percent higher than the rate of growth of U.S. Gross Domestic Product (GDP) and 70.0 percent higher than world GDP growth, adjusted for inflation.

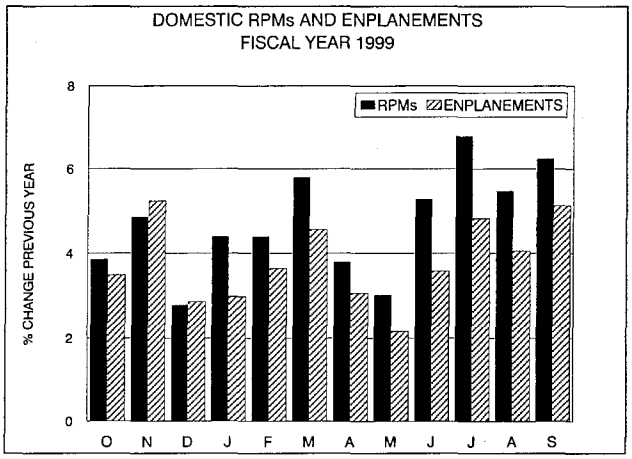


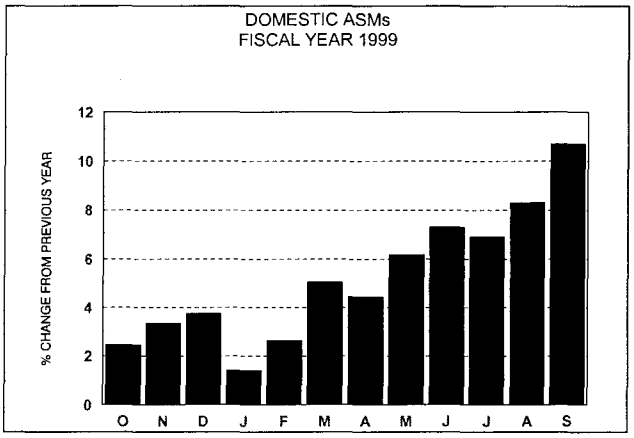
System available seat miles (ASMs) increased 4.6 percent in 1999, which reduced the load factor 0.1 percentage points to 70.8 percent--the first decline since 1993. Since 1991, the system load factor has increased 8.5 percentage points.

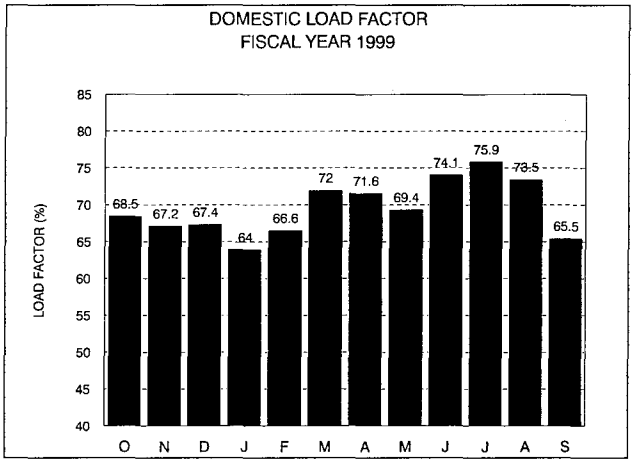
Domestic Passenger Traffic and Capacity

In 1999 a strong economy and declining real yields pushed RPMs up 4.8 percent and enplanements up 3.8 percent. Growth was consistently strong throughout the year, with both RPMs and enplanements increasing in every month.

The relatively large increase in capacity--5.2 percent--reduced the load factor 0.3 percentage points to 69.8 percent. In 1998, ASMs increased only 0.7 percent, which pushed the load factor to an all-time domestic high of 70.1 percent. Between 1991 and 1999, the domestic load factor increased 9.0 percentage points.

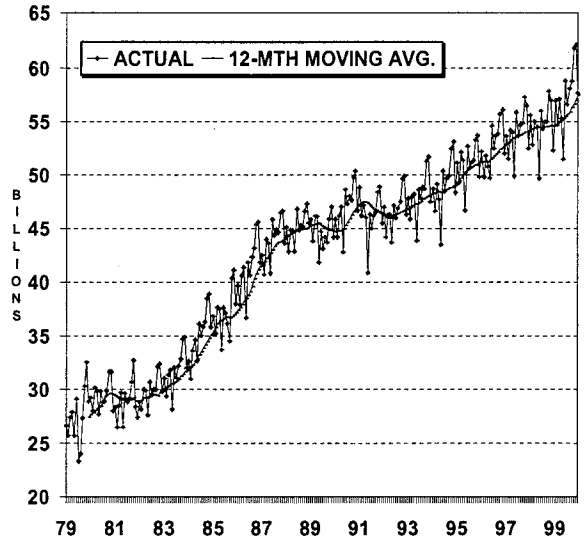






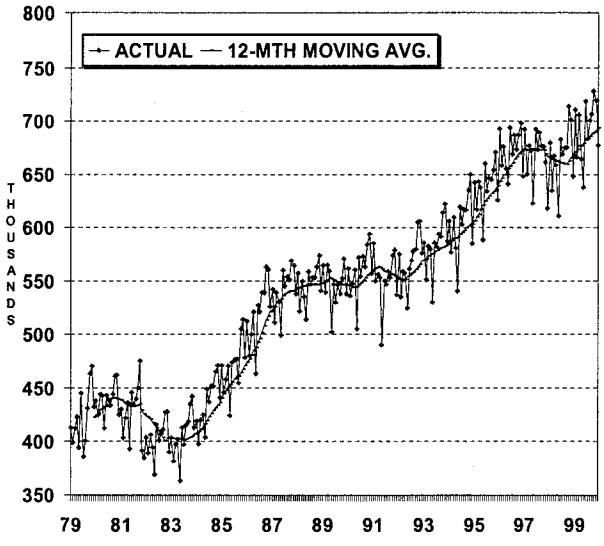
U.S. AIR CARRIER DOMESTIC TRAFFIC TRENDS

AVAILABLE SEAT MILES



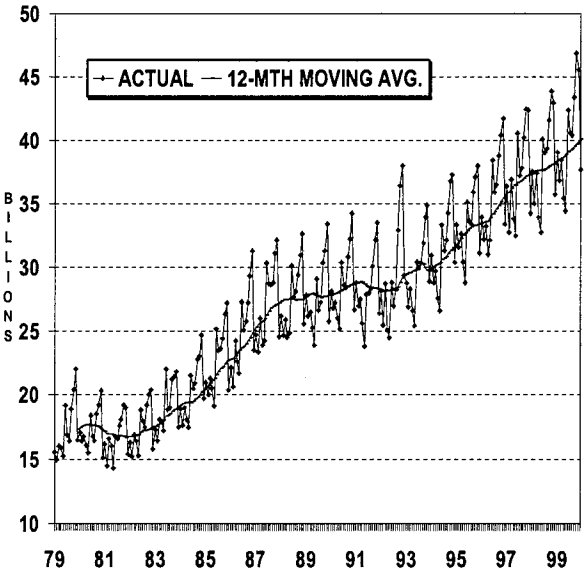
FISCAL YEAR BY MONTH

AIRCRAFT DEPARTURES



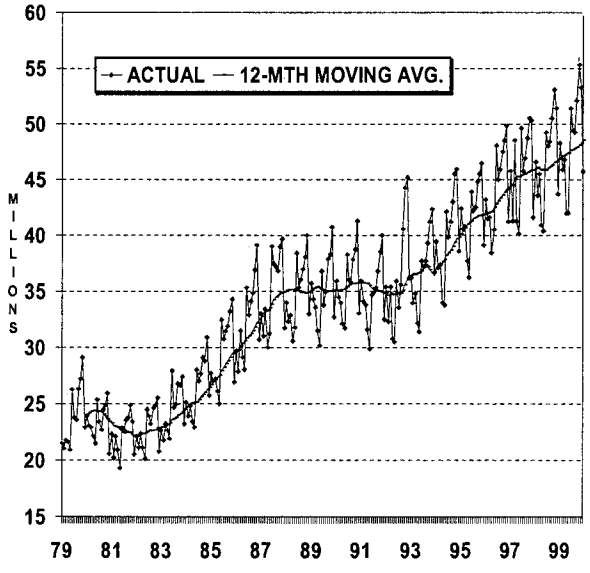
FISCAL YEAR BY MONTH

REVENUE PASSENGER MILES



FISCAL YEAR BY MONTH

ENPLANEMENTS



FISCAL YEAR BY MONTH

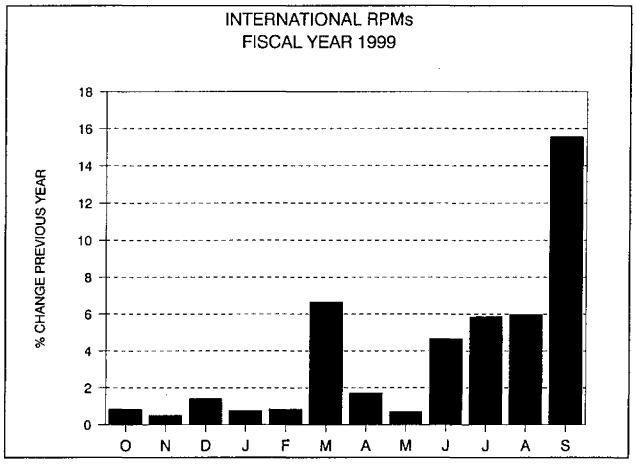
U.S. Air Carriers' International Passenger Traffic and Capacity

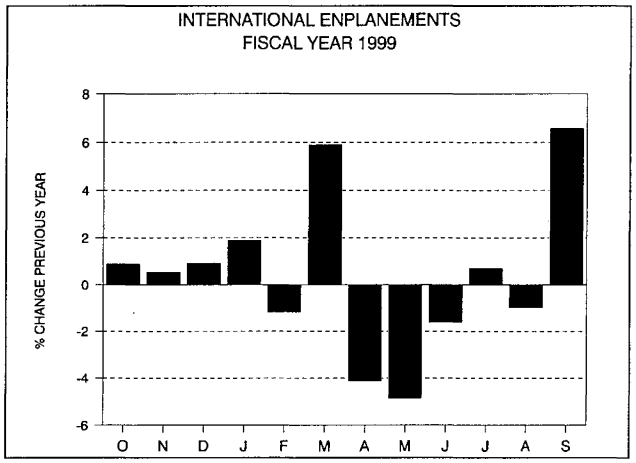
World and U.S. economic growth in 1999 along with declining real fares in the Atlantic and Latin American markets pushed total U.S. air carrier international traffic to record levels. Although the economies of the Asia/Pacific region showed signs of recovery in 1999, traffic growth for the region continued to decline.

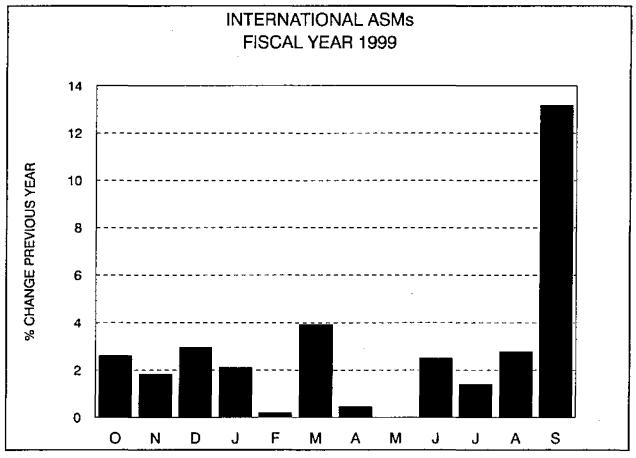
In 1999, total international RPMs increased 4.0 percent to 169.7 million--more than three times the level reached in 1979, the first full year of deregulation. Enplanements also expanded in 1999, although growth measured just 0.3 percent. The slow growth was largely due to a decline in the Pacific market.

Since the U.S. economic expansion began in 1991, international RPMs increased 49.5 percent, while enplanements increased 34.1 percent. During the same period, domestic RPMs and enplanements increased 41.8 and 39.5 percent, respectively.

Relatively slow growth in ASMs of 2.8 percent increased the load factor 0.8 percentage points to 73.9 percent. Total international ASMs showed a small gain in 1999 due to the shrinking of capacity in the Asia/Pacific market and a slowing of capacity growth in the Latin American market. During this period, U.S. carriers continued to shift capacity to the more robust domestic and international markets. In the Atlantic region ASMs increased 8.5 percent.

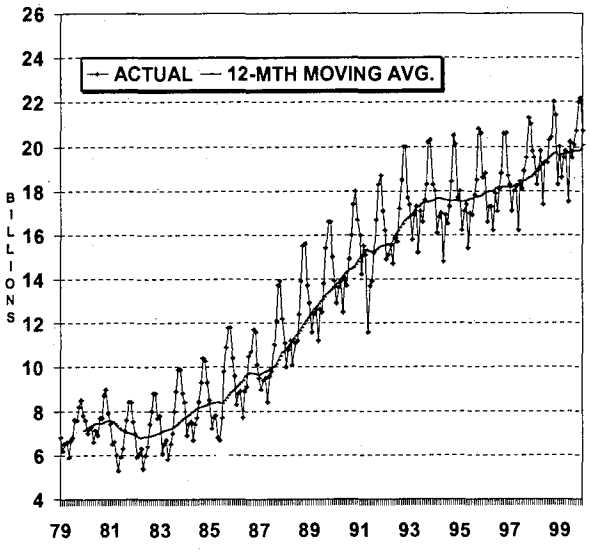






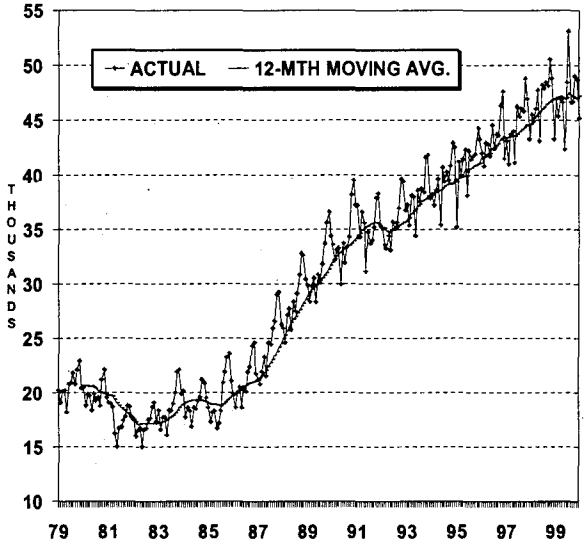
U.S. AIR CARRIER INTERNATIONAL TRAFFIC TRENDS

AVAILABLE SEAT MILES



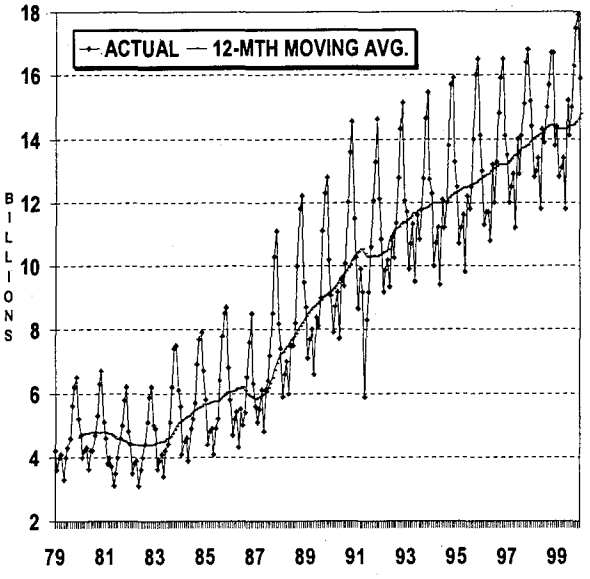
FISCAL YEAR BY MONTH

AIRCRAFT DEPARTURES



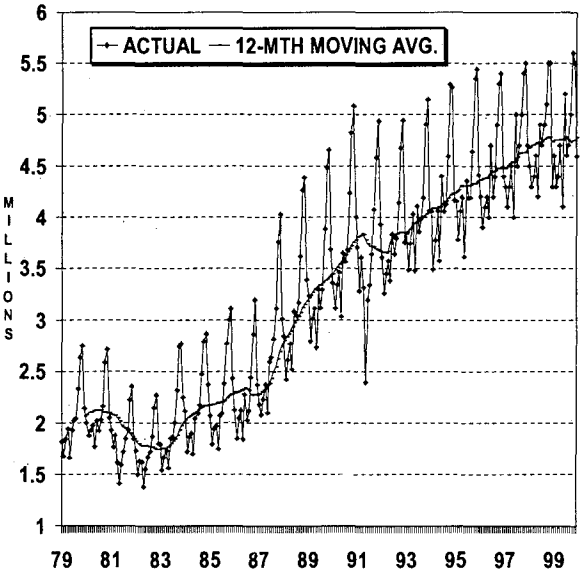
FISCAL YEAR BY MONTH

REVENUE PASSENGER MILES



FISCAL YEAR BY MONTH

ENPLANEMENTS



FISCAL YEAR BY MONTH

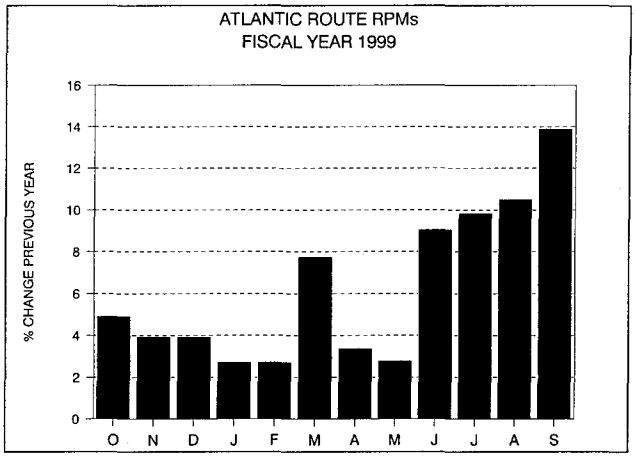
Atlantic Routes

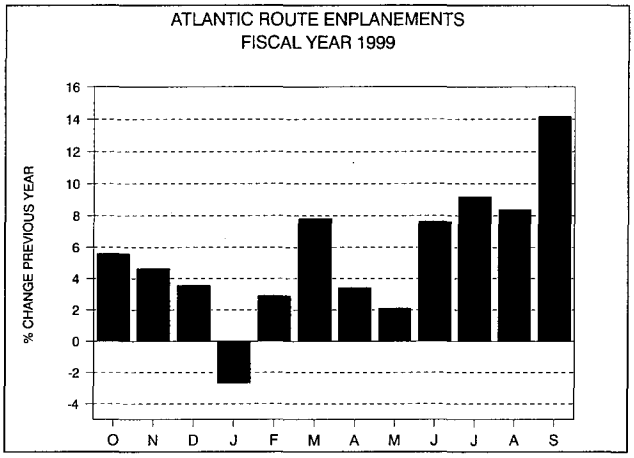
In 1999 transatlantic RPMs were up for the eighth consecutive year, increasing 6.7 percent from 74.6 million to 79.6 million. Enplanements also showed large gains, expanding 6.0 percent. Continued strong growth can be attributed to the shifting of capacity into the region from the sagging Asia/Pacific market, intense competition, lower fares, and strong economies both in the U.S. and Europe.

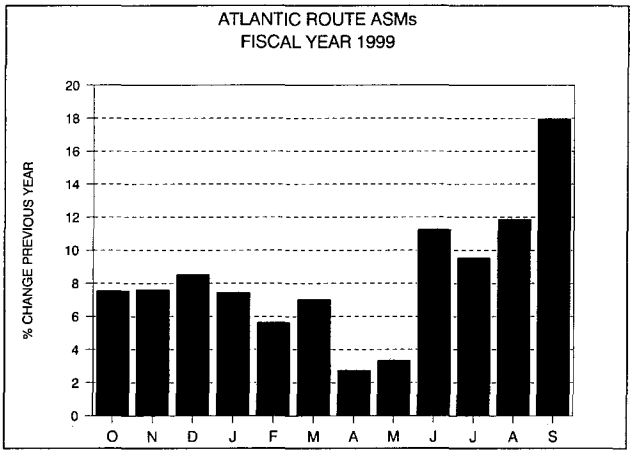
Following an average decline in capacity between 1994 and 1997 of about 1.0 percent a year, ASMs increased 9.1 percent in 1998 and 8.5 percent in 1999. Slower growth in RPMs relative to capacity reduced the Atlantic load factor 1.3 percentage points to 77.5 percent. Since 1991, however, the load factor has increased 8.0 percentage points.

Immigration and Naturalization Service (INS) data, which is compiled by the U.S. Department of Commerce, showed that in CY 1998 U.S. flag carriers' market share in the region dropped 0.2 percentage points to 39.6 percent. U.S. flag carriers' market share peaked in 1988 at 48.5 percent.

The U.S. passenger carriers serving the market had an operating profit of $630.2 million, making the Atlantic market the most profitable of the international regions. In 1998 the Atlantic market had an operating profit of $1.0 billion.

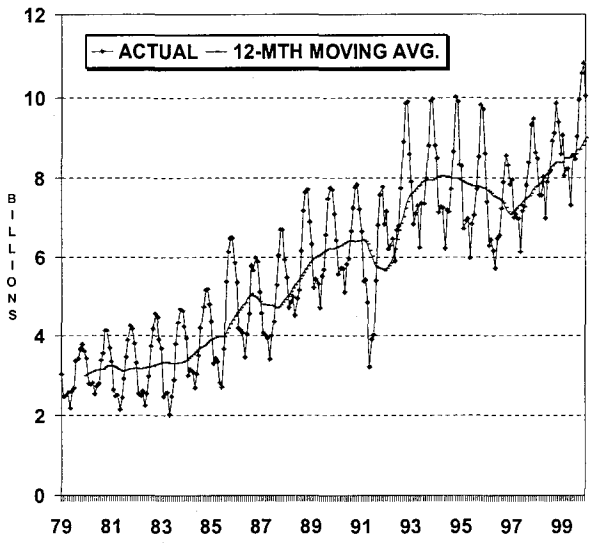




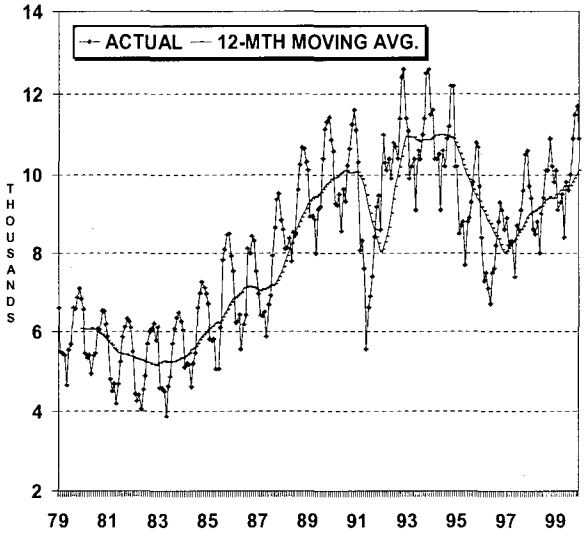


U.S. AIR CARRIER TRAFFIC TRENDS: ATLANTIC ROUTES

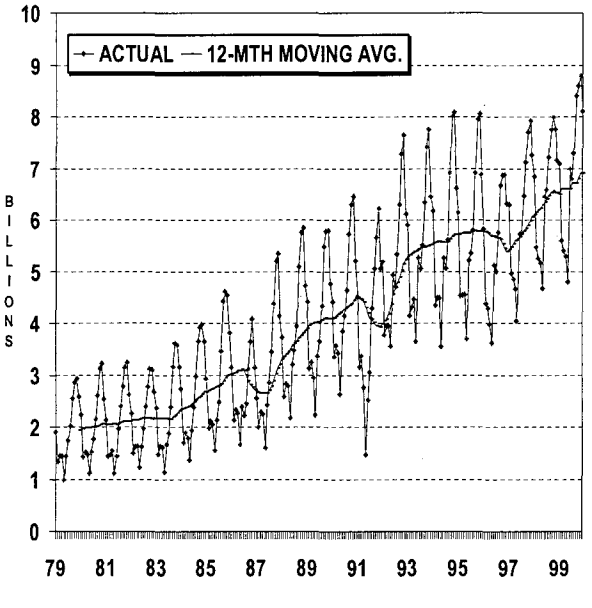
AVAILABLE SEAT MILLES



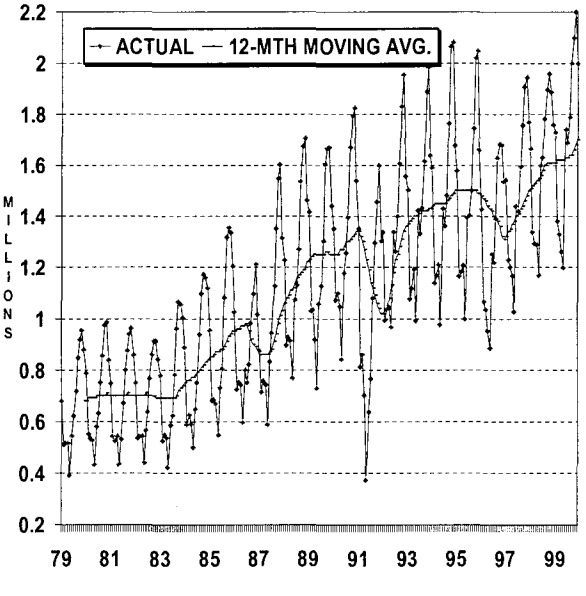
AIRCRAFT DEPARTURES



REVENUE PASSENGER MILES



ENPLANEMENTS



Latin American Routes

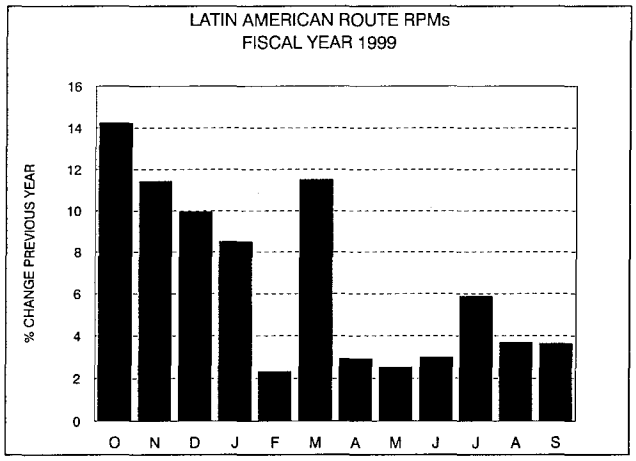
Traffic demand to Latin America (destinations in South America, Central America, Mexico, and the Caribbean) continued to show strong growth. In 1999, RPMs and passenger enplanements were up 6.5 and 4.2 percent, respectively. For the period 1991 through 1999 RPMs increased at an annual rate of 8.1 percent, while enplanements increased 5.1 percent a year.

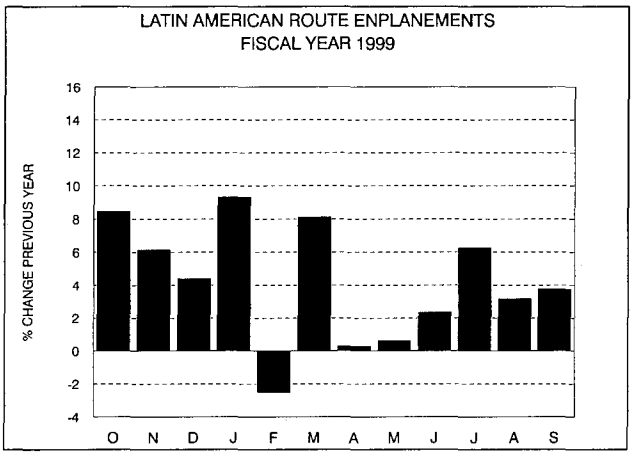
Expansion in traffic was the result of a strong U.S. economy, mixed growth in Latin America, expanding capacity, and declining real fares. In 1999 yield, adjusted for inflation, fell 8.8 percent, while capacity increased 1.6 percent. Slower growth in capacity relative to traffic increased the load factor 3.0 percentage points to 65.9 percent--a record high for the region.

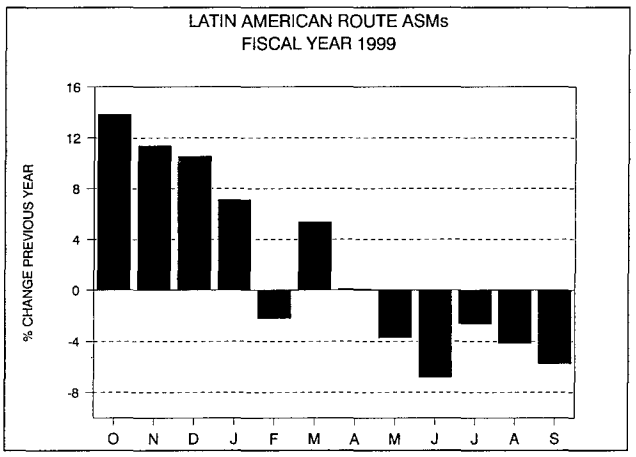
The continued expansion of U.S. carriers into deep South America--Argentina, Brazil and Chile--increased the average trip length 2.2 percent (34.1 miles) in 1999. Since 1990 the average trip length has expanded over 331.8 miles, increasing from 1,227.3 miles to 1,559.1 miles.

The U.S. passenger carriers serving the Latin American market had an operating profit of $325.9 million, down 5.8 percent over 1998.

The embracing of free markets in Latin America has resulted in the privatization and restructuring of Latin American carriers. Clearly, these industry changes along with the move towards open-skies agreements, will pose additional challenges for the U.S. carriers over the next several years. In October, the United States signed an open-skies agreement with Chile, the eighth Latin American country to reach an open-skies pact with the United States.

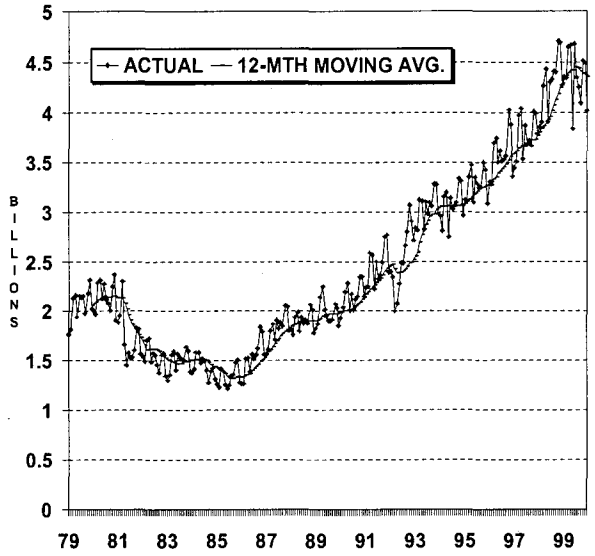






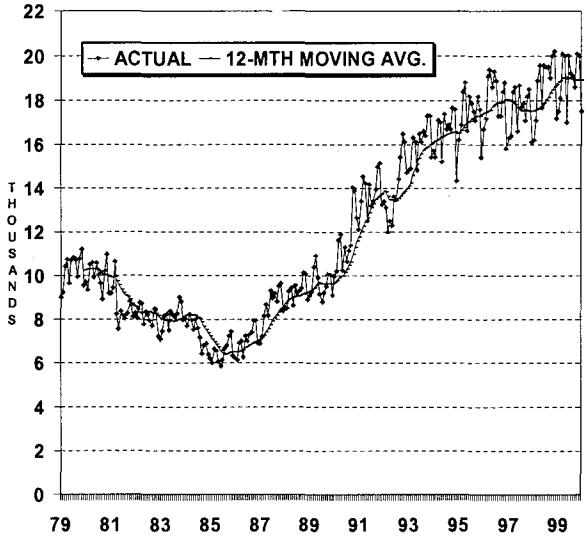
U.S. AIR CARRIER TRAFFIC TRENDS: LATIN AMERICAN ROUTES

AVAILABLE SEAT MILES



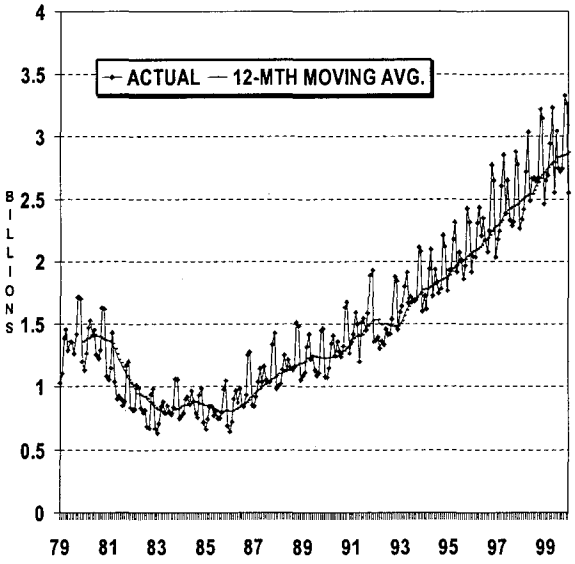
FISCAL YEAR BY MONTH

AIRCRAFT DEPARTURES



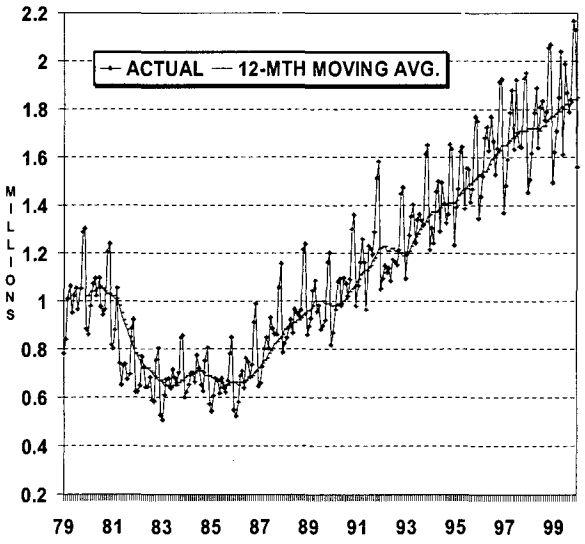
FISCAL YEAR BY MONTH

REVENUE PASSENGER MILES



FISCAL YEAR BY MONTH

ENPLANEMENTS



FISCAL YEAR BY MONTH

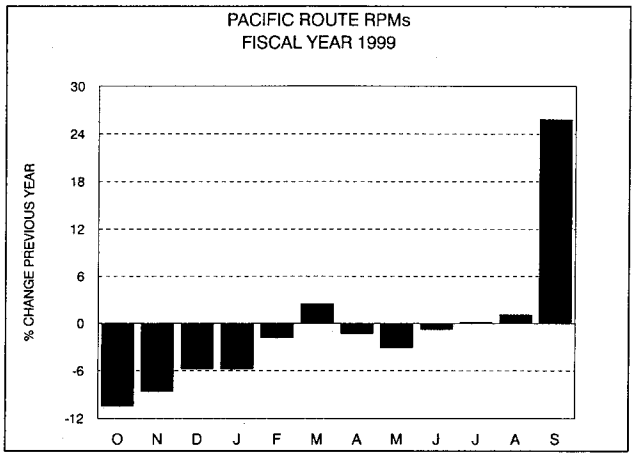
Pacific Routes

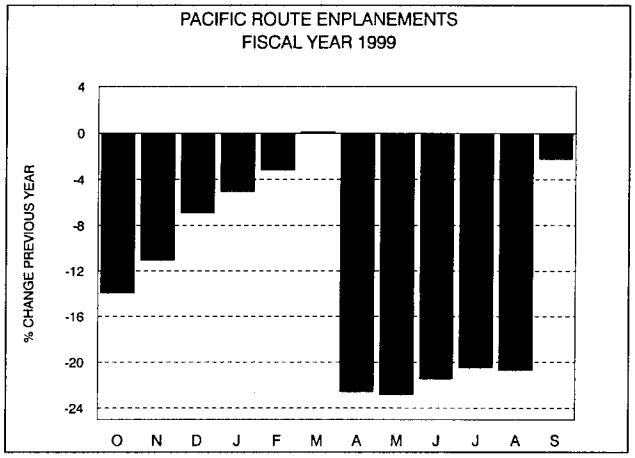
The financial and economic problems of the Asia/Pacific region, which began in 1997, have quickly faded away. Foreign capital is returning and the economies of the region are showing signs of recovery. Japan, Malaysia, the Philippines, South Korea, and Thailand, all are expected to record positive economic growth in 1999, following significant declines in 1998. The economies of Indonesia and Hong Kong continued to contract in 1999, but at a slower rate than 1998; they both are expected to rebound in 2000. The dramatic and rapid reversal of the region's economic fortunes has not yet had a significant impact on U.S. air carrier activity in the region, although there are signs of recovery.

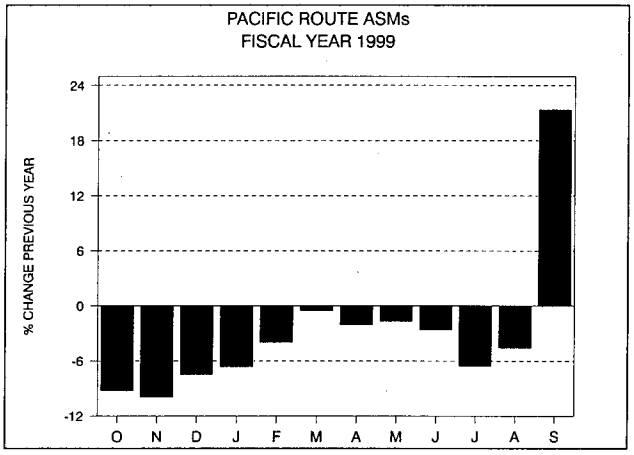
U.S. flag carrier RPMs fell 1.1 percent in 1999, a slowdown from the 7.3 percent drop in 1998. The decline in ASMs also slowed to 3.4 percent, pushing the load factor up for the region by 1.7 percentage points to 74.5 percent.

The U.S. passenger carriers serving the Pacific market had an operating loss of $181.9 million in 1999; in 1998 they had an operating loss of $369.8 million.

The recent open-skies agreements reached with Malaysia, New Zealand, Taiwan, Singapore, Brunei, and Korea, as well as new liberal bilateral agreements with Japan and China, will surely stimulate aviation growth. Over the long-term, these agreements will provide travelers with service to more cities and lower fares.

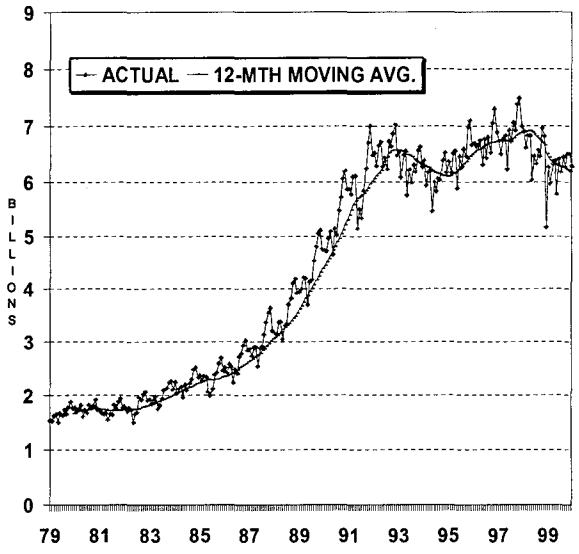






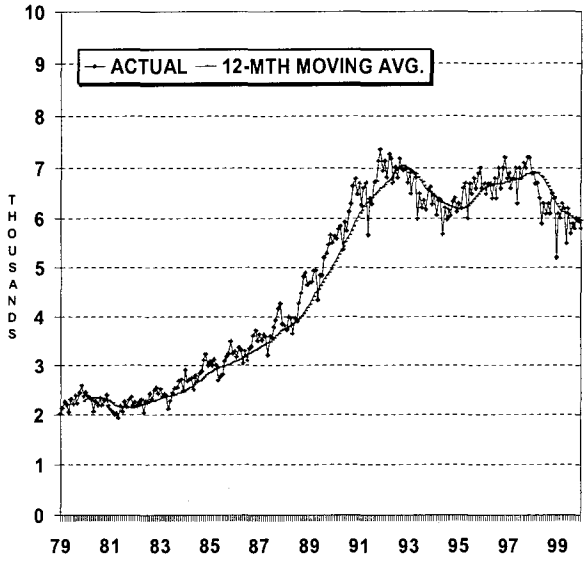
U.S. AIR CARRIER TRAFFIC TRENDS: PACIFIC ROUTES

AVAILABLE SEAT MILES



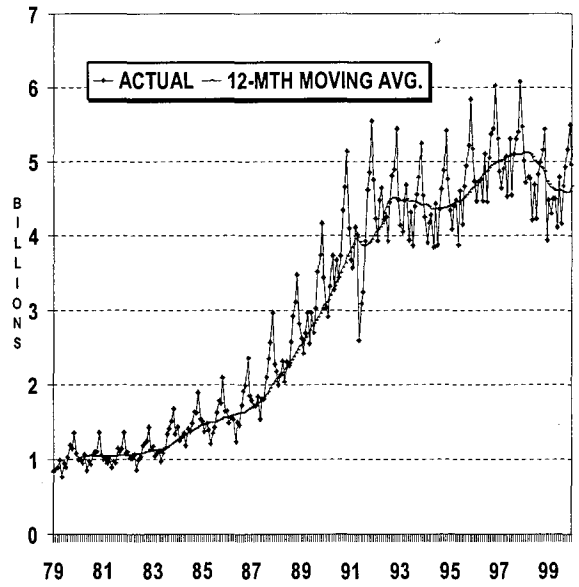
FISCAL YEAR BY MONTH

AIRCRAFT DEPARTURES



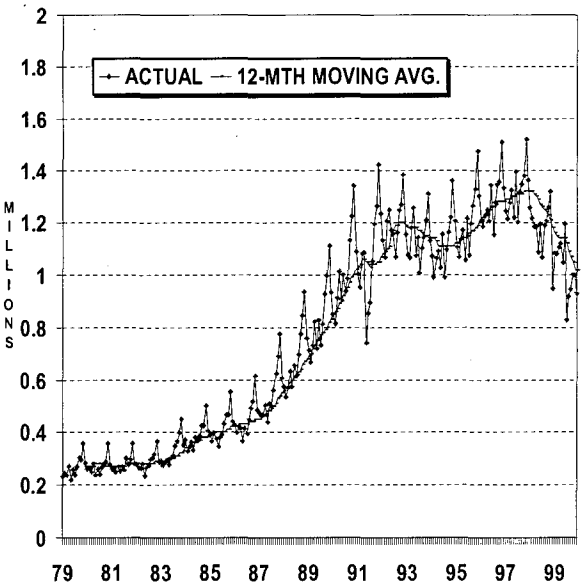
FISCAL YEAR BY MONTH

REVENUE PASSENGER MILES



FISCAL YEAR BY MONTH

ENPLANEMENTS



FISCAL YEAR BY MONTH

NONSCHEDULED TRAFFIC AND CAPACITY

The number of nonscheduled (charter) passengers flying on U.S. commercial air carriers fell 2.8 percent in 1999, to a total of 11.0 million. Domestic enplanements declined 4.8 percent, while international enplanements increased 0.6 percent. Nonscheduled RPMs declined at a faster rate than ASMs, which reduced the load factor from 69.2 to 68.9 percent.

AIR CARGO TRAFFIC

Air cargo revenue ton miles (RTMs) flown by U.S. air carriers totaled 28.0 billion in 1999, down 1.4 percent from 1998. Domestic cargo RTMs (13.9 billion) were up 0.3 percent, while international RTMs (14.1 billion) declined 3.0 percent.

Freight/express RTMs (25.0 billion) decreased 1.9 percent in 1999. This included 11.5 billion domestic RTMs (down 0.6 percent) and 13.6 billion international RTMs (down 3.0 percent). Mail RTMs (2.9 billion) increased 3.1 percent in 1999. This included 2.4 billion domestic RTMs (up 4.8 percent) and 508.9 million international RTMs (down 3.9 percent).

Air cargo RTMs flown by all-cargo carriers were 60.7 percent of total RTMs in 1999; passenger carriers flew the remainder, or 39.3 percent of the total. Total RTMs flown by all-cargo carriers decreased 2.4 percent in 1999, from 17.4 billion to 17.0 billion. Total RTMs flown by passenger carriers were 11.0 billion in 1999 (up 0.2 percent).

GLOBAL INDUSTRY AND MARKET ASSUMPTIONS

The background against which the present forecasts for the next 12-year period (2000 to 2011) are developed are based upon a set of assumptions concerning changes in the economy, structural changes in the air carrier industry, and changes in the market for air transportation. Clearly, the probability of achieving the forecasts presented in this document is largely dependent upon the probability of realizing the economic projections and industry assumptions.

INDUSTRY STRUCTURE

Significant changes in the structure of the industry both domestically and internationally are intensifying competition, moving carriers to increase efficiency and productivity, reduce operating costs, and lower fares.

New, low-cost carriers are entering the domestic market, encouraged by the financial success of Southwest Airlines and large profit margins on many routes. Since CY 1989, 84 new entrant scheduled passenger carriers have applied for certification. Currently, 17 are still operating and five have been authorized but have not yet started operations.

After a two-year lull, applications by carriers are flowing into DOT and entry is occurring. Two carriers that began operations in CY 1999 are Access Air and National. Some of the new carriers awaiting certification include Legend Airlines, CityLink Airlines, JetBlue Airways, Ozark Airlines, and Puerto Rico Airlines. New entrants are needed to ensure that competitive forces remain strong in the industry. The benefits to the American consumer brought about by low-cost, low-fare airlines have been

substantial. A recent report by DOT estimated that consumer savings, due to low-cost service, are now $6.3 billion annually.

High-cost carriers are continuing to restructure to reduce their unit costs to the levels achieved by the most efficient airlines. The restructuring includes route realignments, reducing service or withdrawing from unprofitable hubs, seeking work rule changes and wage concessions, purchasing more efficient aircraft, and increasing productivity.

The development of "two-tier" airlines such as Shuttle by United, Delta's new airline (Delta Express, which is structured for unit costs below 7.5 cents), and US Airways MetroJet has created an additional dynamic force in the industry. The success of these operations may encourage other carriers to lower their operating costs and increase their product differentiation by moving in this direction.

The airline industry could be entering a new era of consolidation with Northwest's purchase of 13 percent of Continental Airlines common stock. When the partnership was announced in 1998, United and Delta and American and US Airways were encouraged to begin discussions on alliance plans. These plans have now moved forward with the implementation of joint marketing and service agreements. The expansion of these proposed alliances could significantly alter the structure of the industry and have a far reaching effect on the forecasts presented in this document.

The current system of bilateral agreements, which started back in the 1940s, severely restricts competition in international markets. History has amply demonstrated that competition improves efficiency, productivity, and worldwide economic growth. At the present time, DOT is attempting to create a more competitive international aviation environment for the U.S. airlines through the continuing expansion of open-skies agreements. DOT is also assessing the pros and cons of modifying cabotage constraints, modifying seventh freedom rights, and increasing foreign investment in U.S. air carriers from the current 25 percent.

During the last seven years, the Administration has achieved 77 new and expanded bilateral agreements, 41 of which are open-skies. An analysis conducted by DOT showed that from 1996 to 1998, on routes connecting interior cities in both the United States and foreign countries, the average decline in fares was 17.5 percent where open-skies was in effect. In markets where there were no open-skies agreements, the average decline in fares was only 3.5 percent.

In CY 1999 new bilateral agreements were reached with China, Mexico, and Russia, and open-skies agreements were signed with Argentina, four countries from the Middle-East, and one from Africa. The new air service agreement with China doubles the number of weekly scheduled flights for airlines from each side. By CY 2002, U.S. carriers will be able to serve 20 more Chinese cities through codesharing arrangements with its Chinese partners, while Chinese carriers will be able to serve 30 more U.S. cities with its U.S. codeshare partners. Also, by 2001 an additional carrier will be licensed from each side.

Discussions concerning the liberalization of markets are also proceeding with other countries throughout the world. The expansion of these agreements over the next several years could significantly increase the level of activity of the more efficient U.S. carriers vis-à-vis foreign flag carriers.

The industry is expected to continue toward globalization, through the use of code-sharing agreements and alliances. Four large alliances have formed and are continuing to add members and network connections. The four are Delta-Air France, Star Alliance (United-Lufthansa), Oneworld (American-British Airways), and Norwthwest-KLM. The alliances have been

able to reduce costs through economies of scale while increasing revenues by providing seamless travel for their passengers. Passengers have also benefited from alliances through reduced fares. A recent study conduced by K. Brueckner and W. Tom Whalen of the University of Illinois, showed that fares on international routes served by nonaligned airlines were 36 percent higher than those of the allied airlines' fares.

To summarize, the industry is dynamic, with new entrants, restructuring, new, low-cost options on the part of existing carriers, and the possibility of a number of mergers and international agreements. It is expected that the net effect of these changes will be increased air carrier efficiency, reduced unit costs and fares, and increased demand for air travel.

MARKET CHANGES

Some of the more important trends of the industry are: 1) the ability of air carriers to more closely adjust the number of discounted seats to maximize revenues and profits; 2) the growth of competition by low-cost carriers during most of the 1990s; 3) the success of the large air carriers in restructuring and reducing unit costs; 4) expanding global alliances; 5) increased numbers of open-skies agreements; 6) increased efficiency and productivity; and 7) declining real fares. On the demand side, we see increasing sensitivity of business travelers to the cost of air trips, a shift in consumer preference for pleasure travel by air, and a long-term expansion of the economy.

As alternatives to business travel grow because of improvements in communication technologies and the development of more productive and efficient corporate aircraft, business demand for air travel will become more price elastic. While it will always be necessary to conduct face-to-face meetings, innovative new technologies, such as videoconferencing, could substitute for many of today's business trips. Consequently, it is essential that airline costs and relative fares continue to decline in order to expand the scope of the market and increase operating revenues.

The demand for leisure travel during the 1990s has also experienced major shifts because of increasing consumer preference for air travel, increasing disposable income, and expanding personal wealth. The 1998 Air Travel Survey conducted by the Air Transport Association of America shows that the percent of individuals who have ever flown increased from 74 percent in 1990 to 81 percent in 1997.

Upward shifts in demand accompanied by increasing capacity, and lower relative fares, have significantly expanded the number of air travelers. If the economy slows during the next several years, growth within the industry can continue if costs and fares follow their long-term downward trend.

It is an inescapable conclusion that increasing productivity, growth in capacity, and competitive markets must be achieved to keep relative fares declining. These market conditions will assure growth in demand and provide the industry with acceptable rates of return on capital.

GLOBAL RISKS AND UNCERTAINTIES

The forecasts of scheduled commercial air carrier demand are based on a specific set of assumptions concerning economic growth in the United States and abroad, the political environment in which they will take place, Government tax policy, and changes in industry structure. To be sure, there are many uncertainties in all these areas that could significantly alter the short- and long-term environment, and cause the outcomes to be

significantly different from those forecast. Some developments that could alter the forecasts include:

- the strength and duration of the current United States economic expansion;
- the continuing recovery of the Asia/Pacific nations from the 1997-1998 financial crisis;
- the strength and duration of economic growth in Europe and Latin America;
- the impact of regional jets;
- the number of business cycles that occur over the forecast period;
- future oil price shocks;
- structural changes in the international markets that affect U.S. carrier shares;
- the degree of competition in both the domestic and international markets;
- how far carriers can reduce unit costs;
- how fast yields decline due to increased competition and cost reductions;
- when and if the industry reaches equilibrium; and
- how many carriers survive.

In addition, the network of bilateral pacts that the United States currently has in place in Europe, the Far East, and South America could significantly inhibit the expansion plans of air carriers operating in these international regions and restrain traffic growth. On the other hand, the move towards deregulation, privatization of national carriers, and expansion of open-skies agreements could result in significantly greater traffic growth.

DOMESTIC PASSENGERS: ASSUMPTIONS AND FORECASTS

During the past several years the FAA has adopted a decision-theoretic forecasting system. The approach is generally accomplished in two stages. Initially, projections are made with the use of econometric and time series models. The model equations and outcomes are then adjusted based upon "expert industry opinion" to arrive at posterior forecasts for use in the decision-making process.

We believe that optimum policy forecasts can only be achieved by combining model forecasts and judgment. Since models are relatively simple descriptions of very complex systems, they cannot account for all the political, social, psychological, and economic factors and their interactions that will lead to a particular set of outcomes. Therefore, it is essential to use judgment to account for the complexities of the operating environment. This can be accomplished by adjusting the exogenous variables, adjusting the model outputs, or revising the models initial parameter estimates.

A forecasting system should be frequently reviewed and revised with the objective of reducing forecast errors. The decision-theoretic approach has produced excellent results for the FAA. Forecast errors are declining. In addition, the forecasts errors tend to be normally distributed about a zero mean, showing that the forecasts are not consistently high or low. Over a long planning horizon, this forecasting structure will significantly increase the efficiency of the investment process.

Some of the important outside sources for adjusting FAA's projections are forecasts developed by: 1) the International Civil Aviation Organization's (ICAO) Asia/Pacific Area

Traffic Forecasting Group (May 1999); 2) the North Atlantic Traffic Forecasting Group (June 1999); and 3) the National Academy of Sciences' Transportation Research Board Future Aviation Activities International Workshop (September 1999).

MODELING DOMESTIC RPMS AND ENPLANEMENTS

The model used for developing FAA domestic commercial air carrier forecasts relies upon a system of statistical and deterministic equations. The pivotal equations of the system relate RPMs and enplanements to two primary independent variables--GDP and yield--both adjusted for inflation. Prior to 1997, enplanement forecasts were derived by dividing RPM projections by average trip length; the average trip length was developed from historical trends and assumptions concerning changes in commercial air carrier marketing strategies. The shift in the analytical framework for forecasting enplanements ties the domestic forecast model closer to projected changes in economic activity and reduces the number of subjective inputs. This approach is expected to reduce the standard errors of the forecasts.

During the pre-deregulation era, prices were set by the now defunct Civil Aeronautics Board, and generally did not respond to shifts in demand and supply. Therefore, single-equation least squares methods were adequate for forecasting domestic demand. Market forces quickly took hold following deregulation in 1978. To adjust for the jointly dependent variables in the demand and supply equations, two-stage least squares is used to estimate the demand equations. The primary exogenous variable specified to estimate the independent variable, real yield, are operating costs per ASM. A dummy variable is included in the model to distinguish between the pre- and post-deregulation periods.

Other measures of income and demographic variables were tested in the aggregate demand equations to determine if we could reduce the standard errors and adjust for collinearity problems. The other measures of income were personal income per capita and median family income. The results using either variable were consistent with the use of GDP as the measure of economic activity. Further, the forecasts of aviation activity using the two different formulations were not significantly different from those constructed using only GDP and yield.

Although it is aggregate demand that we forecast, it would be preferable to use different models to estimate the two distinct components of each market--business and personal travel. A further refinement would distinguish the long-haul from the short-haul market. This approach would provide important information for developing public policy and would most likely improve the accuracy of the forecasts. Clearly, these markets are affected by different sets of variables, and adjust at different rates to them.

For example, most experts in the industry would agree that the price elasticity of demand for business travel differs from the price elasticity of demand for pleasure travel. Furthermore, theory would suggest that business profits are a factor in determining business travel, and that some measure of personal or family income is an important variable affecting pleasure travel.

At this time, however, the lack of an adequate data base subdivided into these four components precludes the development of forecasts for each market at the national level. Additional research and data collection are necessary to advance this approach.

U.S. AIR CARRIERS' YIELDS AND OPERATIONAL VARIABLES

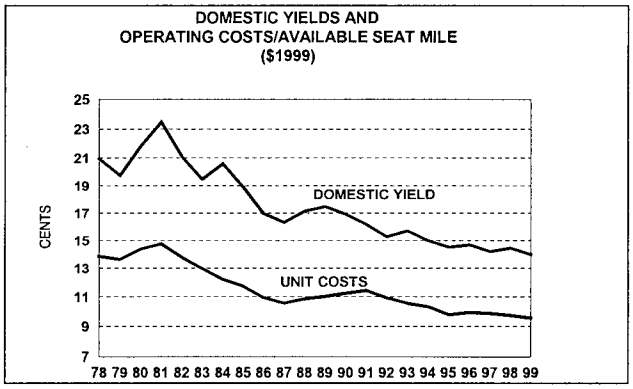
Passenger Yields

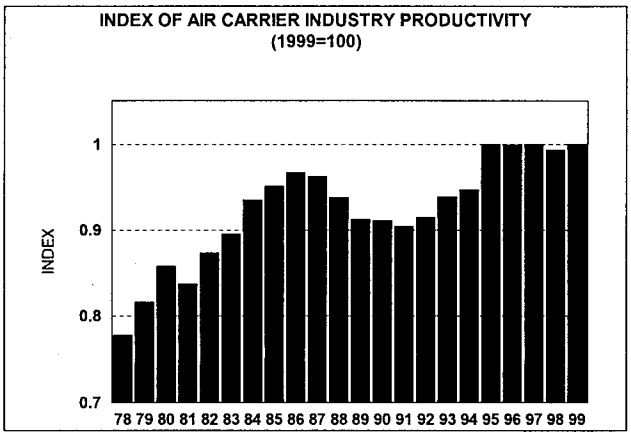
During the period 1970 through 1977 domestic real yields declined at a relatively slow rate of 1.2 percent a year. Real yields averaged 23.32 cents with a standard deviation of only 0.91 cents. Since deregulation, there has been a steady decrease in real yields, with the causes of the decrease changing, but always with the result that yields moved downward. By 1999 real yield fell to 13.97 cents, an average yearly decline of 2.1 percent--1.8 times higher than the rate achieved during the 1970s.

In the 1970s the dominant reason for the decrease was the introduction of large numbers of more efficient jet aircraft into the fleets operated by air carriers. In the 1980s the airlines started to adjust to a deregulated industry by rationalizing their route structures, and increasing labor productivity.

Financial weakness of the industry in the early 1990s along with excess capacity, the growth of new-entrant, low-cost carriers, and the expansion of Southwest into new markets has brought about intense fare competition. Competition has pushed high-cost carriers into restructuring, increasing productivity, and lowering unit costs.

Since deregulation, unit costs (real operating costs adjusted for ASMs) have been declining along with yields. In fact, our analysis has shown that there is a high positive correlation between domestic real yields and unit costs, and that a 1.0 percent decline in unit costs will, on average, reduce real yields by about 1.0 percent. Also, productivity in the industry, as measured by ASMs per dollar of real operating costs less fuel and oil expenses, has been increasing by approximately 1.2 percent a year since 1978.

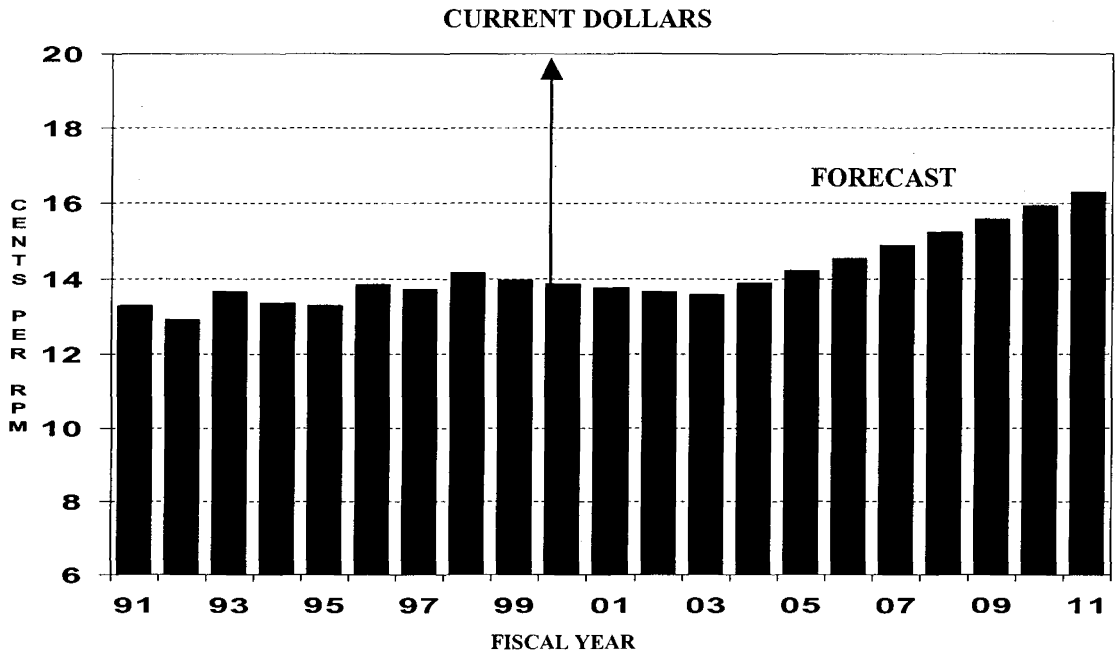


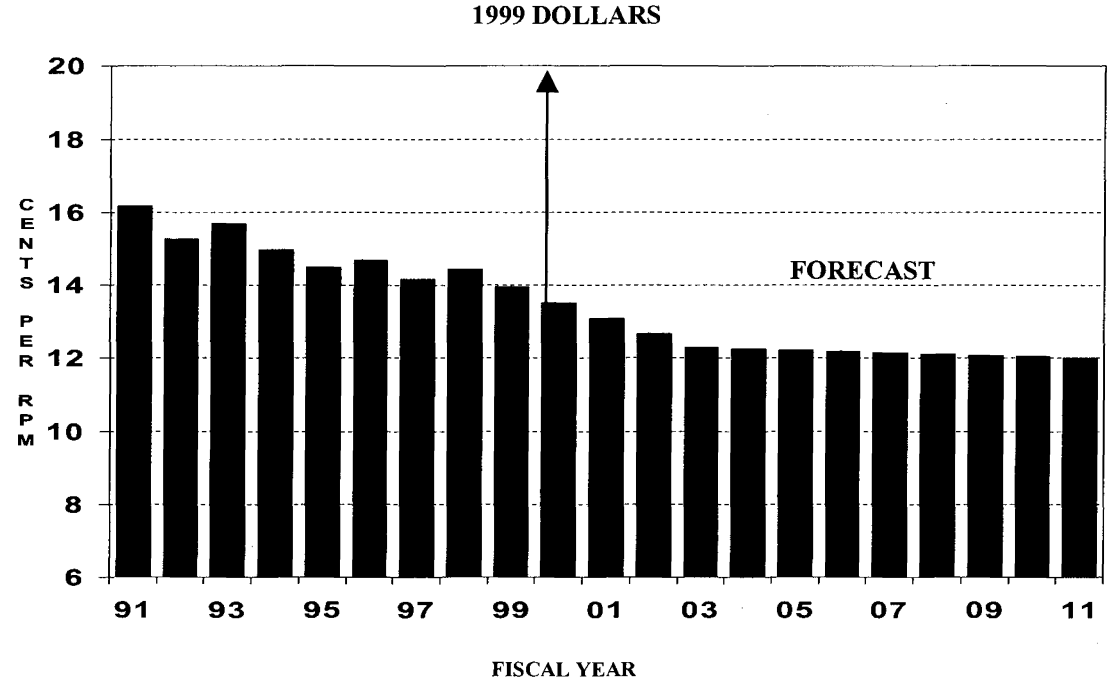


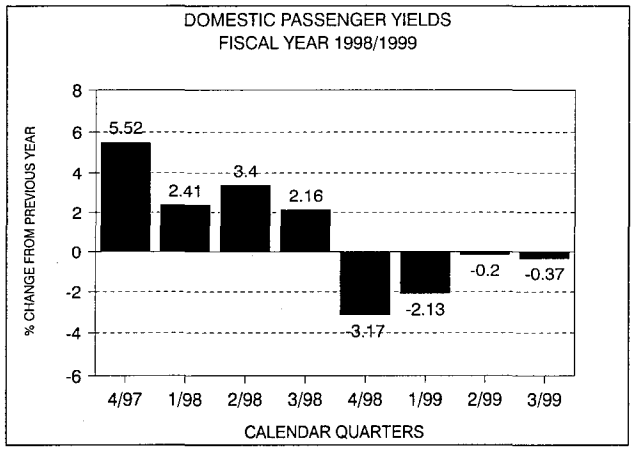
In developing the demand forecasts it was assumed that over the long-run: 1) industry improvements in efficiency and productivity continue at historical rates; 2) competitive forces remain strong; and 3) capacity is continuously adjusted so that demand and supply are in equilibrium.

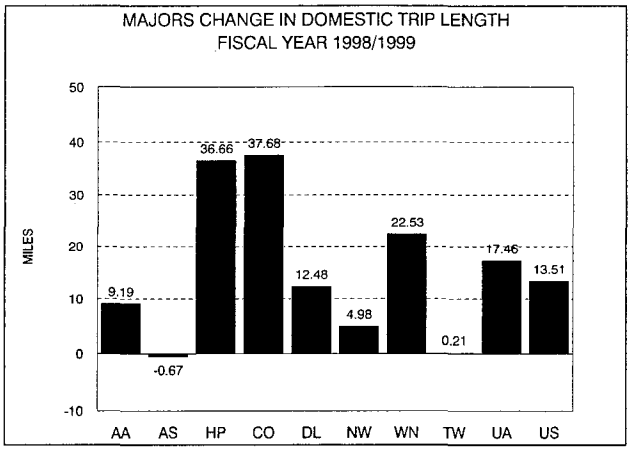
In 1998, nominal yields increased in every quarter. For the year nominal and real yields were up 3.3 and 1.9 percent, respectively. During 1999 we saw a reversal of this pattern, with nominal yields declining in every quarter, and real yields down 3.3 percent for the year. Changes in capacity during the past two years were a likely contributor to this pattern. In 1998 ASMs increased only 0.7 percent, the lowest increase since 1991. In 1999, capacity increased 5.2 percent, the largest increase since 1990. To be sure, all other things being equal, excess capacity will put downward pressure on fares, while shortfalls will tend to push fares up.

U.S. COMMERCIAL AIR CARRIERS: DOMESTIC PASSENGER YIELDS









Nominal yields are expected to decline through 2003, while real yields fall 3.2 percent a year. The relatively large declines experienced in the short-term are for the most part due to the slowing of the U.S. economy, expanding capacity, and heightened competition. For the remainder of forecast period the U.S. economy is expected to resume its long-term average growth. It is also assumed that the air carriers will optimally adjust their capacity to meet future demand. For the period 2004 through 2011, nominal yields increase 2.2 percent a year, while real yields fall 0.3 percent. Over the 12-year forecast period, nominal yields increase from 13.97 cents in 1999 to 16.30 cents in 2011, while real yields decline 1.3 percent a year.

Passenger Trip Length

In 1999 the average domestic passenger trip length increased 7.6 miles; the increase for the 10 passenger majors was more than 13.4 miles. The relatively large increase for the majors was mainly due to the turning over of short-haul routes to code-sharing regional partners, expansion of nonstop service, and America West, Southwest, and Continental moving into longer-haul markets.

The rapid integration of new state-of-the-art aircraft into the regional/commuter fleet--especially regional jets and large, high-speed turboprops with ranges of up to 1,000 miles--could significantly alter the route system of the industry. These new aircraft are enabling regional/commuters to greatly expand the number of markets they serve.

The continued turnover of short-haul markets by the majors to their code-sharing regional partners, expansion of low-cost carriers into longer-haul markets, restructuring of the regional/commuter fleets, and expansion of point-to-point service are expected to increase the domestic trip length during the forecast period. In 2000 the domestic trip length is forecast to increase 6.0 miles. For the entire forecast period, the average trip length is expected to increase 4.3 miles per year, increasing from 821.1 miles in 1999 to 872.1 miles in 2011.

Average Aircraft Size

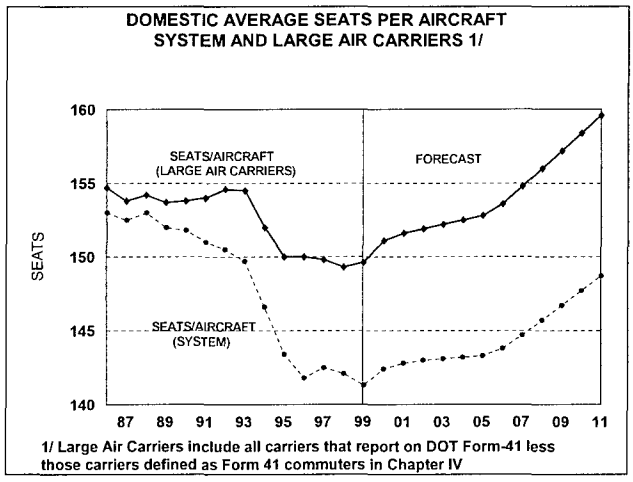
Between 1978 and 1983, the average seating capacity of aircraft used by U.S. commercial air carriers in domestic markets increased by over 17 seats (136.4 seats to 153.6 seats). Between 1983 and 1993, however, the average number of seats remained relatively stable at 152.1, with a standard deviation of only 1.3 seats. From 1993 through 1999, the average number of seats fell

precipitously from 149.7 to 141.3 seats--the largest decline during the past 20 years.

The large increase in domestic short-haul traffic by the low-cost, low-fare carriers (Southwest, Reno Air, AirTran, etc.) had been only partly responsible for this occurrence. The most probable cause of the big decline in the average number of seats was the increased number and activity of regionals/commuters reporting on DOT Form 41. If regionals/commuters operate one aircraft with more than 60 seats, even though most of their aircraft are under 60 seats, they must report all traffic statistics on DOT Form 41.

To test this premise, we recalculated the number of seats for the domestic fleet for the period 1986 through 1999 without the regional carriers reporting on Form 41, whose average seating capacity for the period was 35.5 seats. These carriers generally operate in short-haul markets with turboprop or the new regional jet aircraft. For the period, excluding the regional carriers, average yearly seating capacity for the large air carriers was 4.3 seats higher.

In 1999 the average number of seats for all domestic Form 41 carriers declined 0.8 seats. The average number of seats for the large air carriers expanded by 0.3 seats, while the average number of seats for regional carriers' reporting on DOT Form 41 increased 2.0 seats.



Current fleet plans by both the large air carriers and regionals/commuters show that the average seat size is increasing. Most new aircraft entering the fleet--either for replacement or expansion of capacity--will be larger. The result will be an increase in the average seat size throughout the forecast period.

The seating capacity for domestic large air carriers is forecast to increase, on average, 0.8 seats per year, while the regionals reporting on DOT Form 41 are forecast to increase 0.6 seats per year. For all DOT Form 41 domestic carriers, average seating capacity increases 0.6 seats per year.

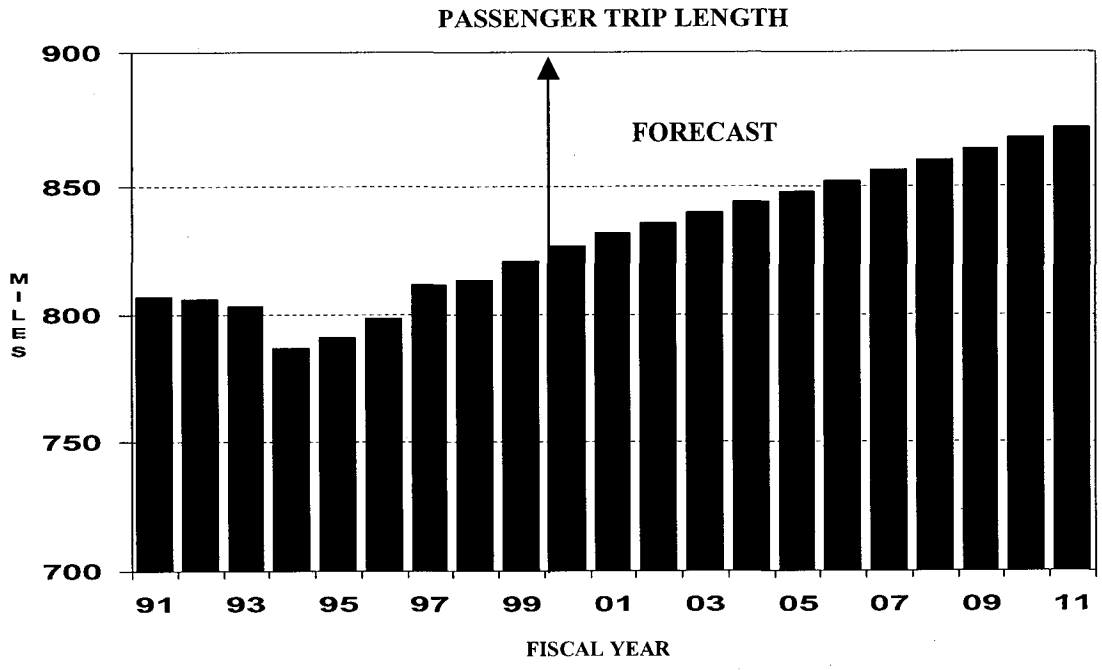
Passenger Load Factor

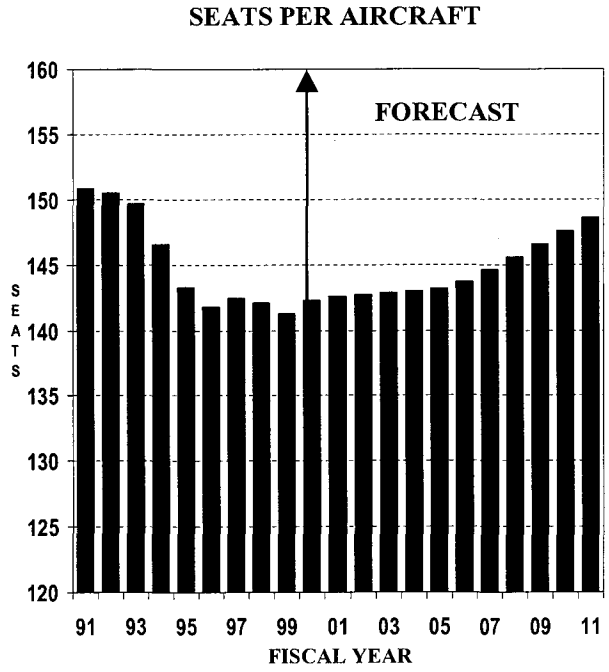
Domestic load factors were relatively stable over the period 1978 through 1993, ranging from a low of 57.7 percent to 63.0 percent, with a mean of 60.4 percent and a standard deviation of only 1.7 points. From 1993 through 1999, the load factor increased 8.5 percentage points, expanding from 61.3 percent to 69.8 percent. During this period, the carriers developed the capability to rapidly adjust capacity to changing conditions in both the domestic and international markets to meet demand while pushing up load factors.

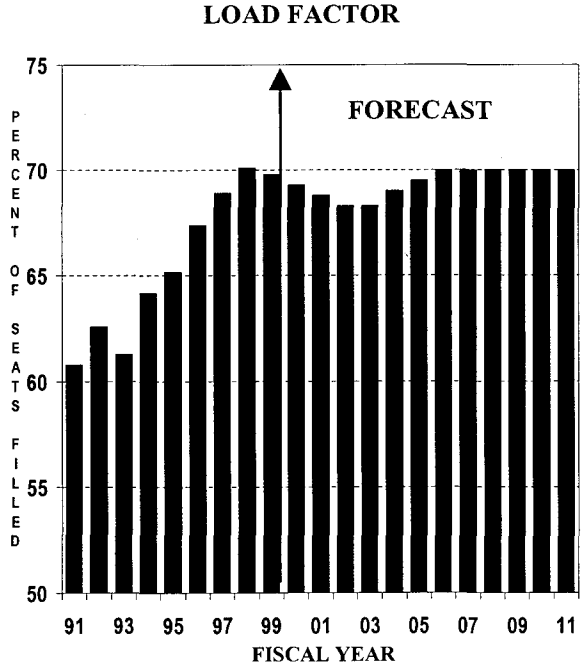
Capacity expanded only 0.7 percent in 1998, which increased the load factor to 70.1 percent--the highest average yearly level ever achieved on domestic routes. In 1999, capacity surged 5.2 percent, reducing the load factor 0.3 percentage points to 69.8 percent.

Through 2002, relatively large increases in capacity as new aircraft enter the fleet, along with the slowing of U.S. economic growth, will put downward pressure on load factors. ASMs are forecast to increase 4.7 percent in 2000, 4.4 percent in 2001, and 4.2 percent in 2002. Slower growth in RPMs during this period will

U.S. COMMERCIAL AIR CARRIERS: DOMESTIC OPERATIONAL VARIABLES







reduce the load factor to 69.3 percent in 2000, 68.8 percent in 2001, and 68.3 percent in 2002. As the economy picks up in 2004 and the carriers adjust capacity, the load factor again begins to increase. In 2005 the load factor reaches 69.5 percent and in 2006 it climbs to 70.0 percent. For the remainder of the forecast period it is assumed that ASMs will be adjusted at the same rate in response to changes in demand so that demand and supply will be in equilibrium. For the period 2007 through 2011, capacity and RPMs are expected to grow 4.3 percent a year, resulting in an average load factor of 70.0 percent.

FORECASTS

Revenue Passenger Miles

Since the most recent economic expansion began in 1991, domestic RPMs have been continuously increasing. For the period 1991 thorugh 1999, RPMs increased at an average annual rate of 4.5 percent. Scheduled domestic RPMs totaled 473.1 billion in 1999, up 4.8 percent compared to only 2.4 percent in 1998. Continued traffic growth in 1999 was influenced by strong growth in the U.S. economy, lower real fares, and heightened consumer confidence.

The expected slowing of the U.S. economy in 2000 through 2003 will slow the growth of traffic. Domestic traffic is projected to increase 4.0 percent in 2000, 3.6 percent in 2001, and 3.4 percent in 2002 and 2003. As the economy returns to its long-term growth rate in 2004, traffic increases, on average, 4.4 percent a year for the remainder of the forecast period. The average annual increase in domestic RPMs over the 12-year planning horizon is estimated at 4.1 percent, reaching 767.6 billion in 2011.

Passenger Enplanements

U.S. scheduled domestic air carriers enplaned a total of 576.1 million passengers in 1999, up 3.8 percent compared to only 2.2 percent in 1998. Domestic passenger enplanements are forecast to increase 3.2 percent in 2000, 3.0 percent in 2001, and 2.9 percent in 2002 and 2003. For the remainder of the forecast period, enplanements increase 3.9 percent a year. The growth in enplanements is expected to average 3.6 percent annually during the 12-year forecast period, with the number of domestic enplanements reaching 880.1 million in 2011.

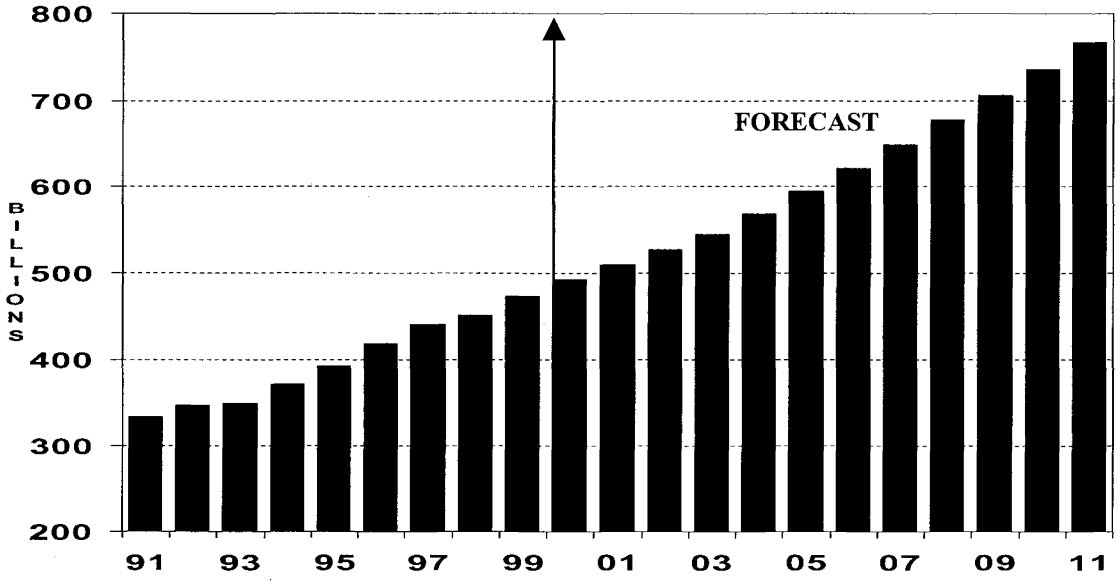
INTERNATIONAL PASSENGERS: ASSUMPTIONS AND FORECASTS

MODELING INTERNATIONAL RPMS AND ENPLANEMENTS

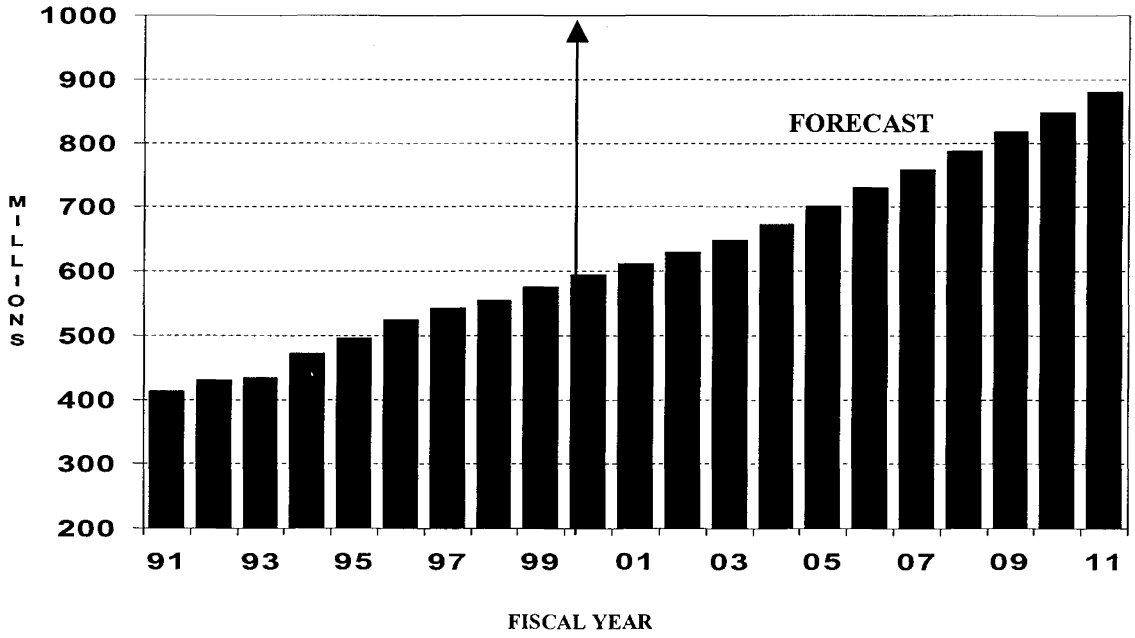
A new system of statistical and deterministic equations was developed in 1997 for forecasting U.S. flag carriers' international RPMs and enplanements for the three world regions--Atlantic, Pacific, and Latin America. Initially, the parameters of a gravity model are estimated, which relates total passengers (U.S. and foreign flag carriers) in each world region to the region's GDP and U.S. GDP. Secondly, projections of U.S. and regional GDP, along with assumptions concerning U.S. market share in each region, are used to forecast U.S. flag carriers' international enplanements. The forecasts of enplanements and assumptions concerning average trip length are then used to derive U.S. flag carriers' international RPM

U.S. COMMERCIAL AIR CARRIERS: DOMESTIC FORECASTS

SCHEDULED REVENUE PASSENGER MILES



SCHEDULED PASSENGER ENPLANEMENTS



projections. This approach ties U.S. flag carrier activity in the international regions to total demand and should, over the long-term, increase the accuracy of the workload and trust fund revenue projections.

Although economic theory suggests that fares, exchange rates, and relative country consumer prices should be important arguments in an international demand equation, the analyses clearly demonstrate that aggregate economic activity explains a large percentage of the variability in demand and is sufficient to develop accurate macro international forecasts. However, these aggregate results may differ significantly from micro analyses of individual markets categorized by distance, type of flying, and level of competition.

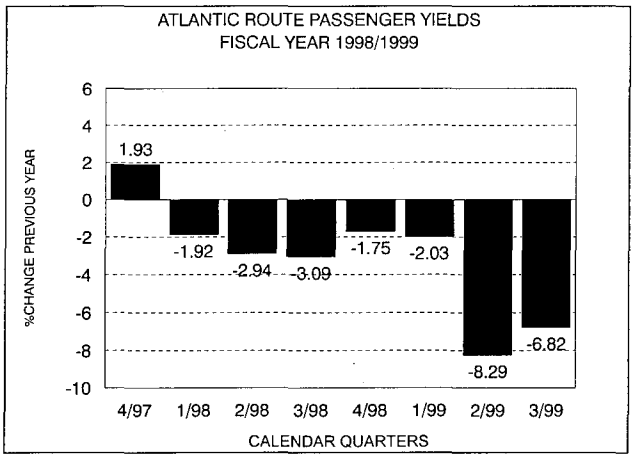
ATLANTIC MARKET

U.S. Air Carriers' Yields and Operational Variables

Passenger Yields

In 1999 current dollar yield (9.61 cents) declined 5.1 percent, while real yields in the market fell 6.9 percent. This followed a drop in real yield in 1998 of 3.1 percent. Falling yields throughout 1999 can be attributed to the significant increase in capacity (ASMs up 8.5 percent) and competition in the market.

Real yields in the Atlantic segment of the international market are expected to continue to fall at the relatively high rate of 3.0 percent through 2003 due to the expected slowdown in the U.S. economy and intense competition. For the balance of the forecast period, real yields are projected to decline 0.4 percent a year, while nominal yields are expected to increase at an annual rate of 1.2 percent. For the period 1999 through 2011, nominal yields increase from 9.61cents to 11.13 cents.



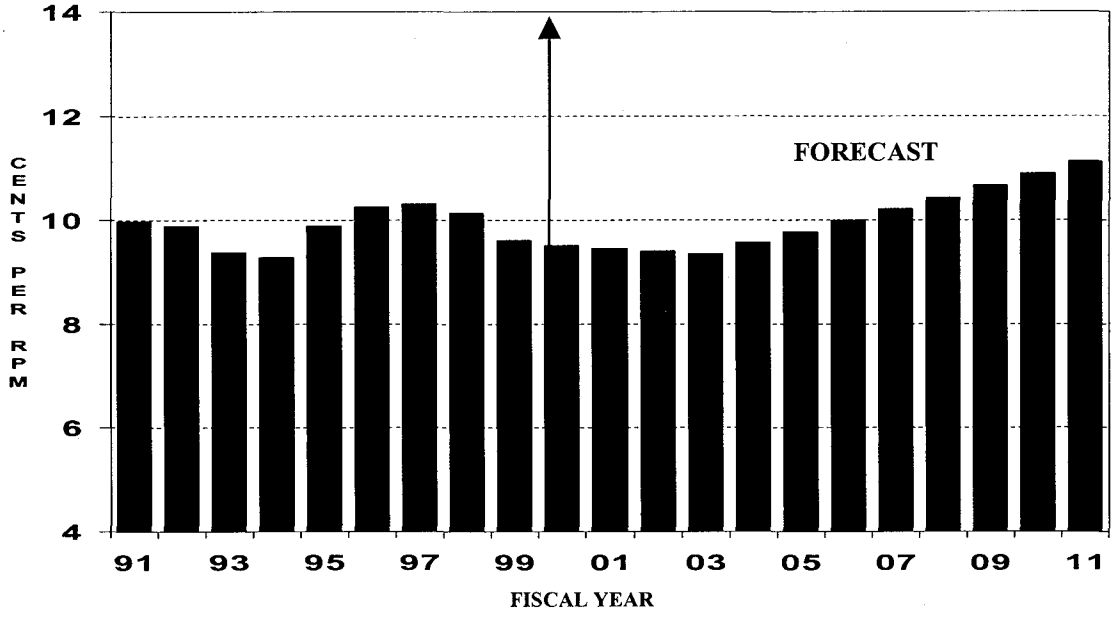
Passenger Trip Length

In 1999 the average passenger trip length in the Atlantic market increased 26.5 miles. Since 1990 the average trip length increased from 3,341.4 miles to 4,161.9 miles--up 820.5 miles. The increase in average passenger trip length over the period was primarily due to more direct flights and expanded service into Central and Eastern Europe. This trend is expected to continue over the 12-year forecast period.

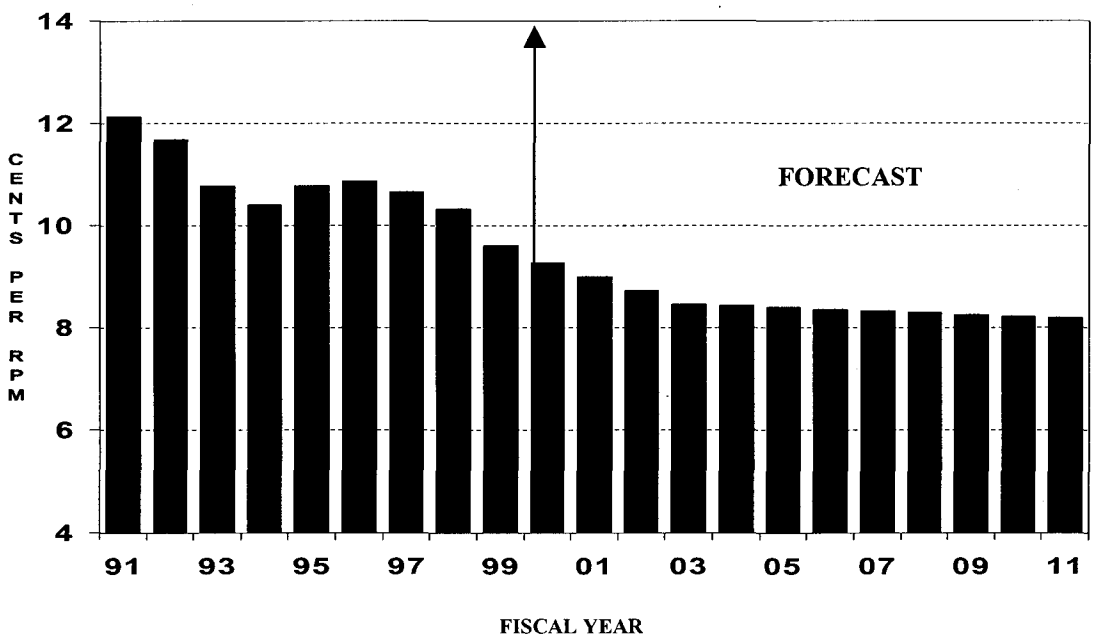
The average trip length is forecast to increase 20.0 miles in 2000 and 14.0 miles in 2001. For the remainder of the planning period--2002 through 2011--the average trip length increases 12.5 miles a year. For the period 1999 through 2011, the Atlantic market trip length increases from 4,161.9 miles to 4,320.9 miles--up 159 miles.

U.S. COMMERCIAL AIR CARRIERS: ATLANTIC PASSENGER YIELDS

CURRENT DOLLARS



1999 DOLLARS



Average Aircraft Size

The average aircraft size in the Atlantic market continuously increased during the 1970s and early 1980s as the widebody DC-10s/L-1011s and B-747s began to dominate the market. Aircraft size peaked in 1986 at 330.9 seats. With the advent of the B-767 and other aircraft flying Extended-Range Twin-Engine Operations (ETOPS) since the mid 1980s, the average seat size has steadily declined. In 1999 the average aircraft size was 229.6 seats--a decline of over 101.3 seats from 1986.

Over the 12-year forecast period, the average aircraft size in the Atlantic market is expected to gradually increase as the major carriers expand the number of non-stop city-pair services and begin using larger two-engine widebody aircraft. The average aircraft size is forecast to increase to 246.1 seats by 2011--an increase of approximately 1.5 seats per year.

Passenger Load Factor

Atlantic market load factors were relatively stable over the period 1980 through 1989, ranging from a low of 56.0 percent to 65.7 percent, with a mean of 65.3 percent and a standard deviation of 3.6 points. From 1989 through 1999, the load factor increased 11.8 percentage points, expanding from 65.7 percent to 77.5 percent.

Although capacity expanded 9.1 percent in 1998, RPM growth of 9.4 percent increased the load factor to 78.9 percent--the highest average yearly level ever achieved in the Atlantic market. In 1999, capacity increased 8.5 percent, while RPMs increased 6.7 percent, which reduced the load factor 1.3 percentage points to 77.5 percent.

Through 2002, relatively smaller increases in ASMs are expected as U.S. carriers move capacity back into an expanding Asia/Pacific market. ASMs are forecast to increase 4.9 percent in 2000, 4.7 percent in 2001 and 4.3 percent in 2002. Higher growth in RPMs during this period will increase the load factor to 77.8 percent in 2000 and 77.9 percent in 2001. In 2002 the load factor increases to 78.0 percent and remains at this level through the entire forecast period as the market achieves equilibrium.

Forecasts

Total Passengers: U.S. and Foreign Flag Carriers

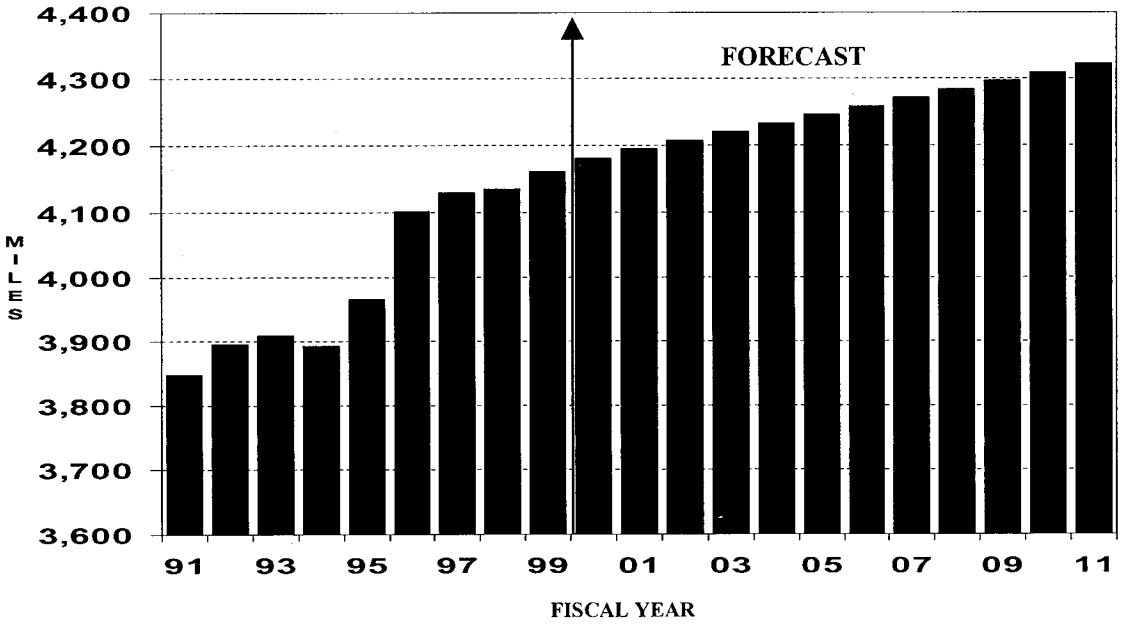
Based on Immigration and Naturalization Service (INS) data, which is compiled by the Department of Commerce, total passengers in the Atlantic market grew 6.6 percent in CY 1998 (the latest full year for which data is available). Preliminary data shows total passengers increasing about 5.0 percent in 1999.

U.S. air carrier's market share for the Atlantic region has been steadily declining since 1988, when it peaked at 48.5 percent. In 1998 U.S. market share declined to 39.6 percent. Also, the percent of total passengers that are U.S. citizens traveling in the Atlantic market has been falling. In 1985, a peak year, the ratio stood at 67.7 percent. In 1998, the percentage fell to where approximately half the passengers traveling between the U.S. and the Atlantic region are U.S. citizens.

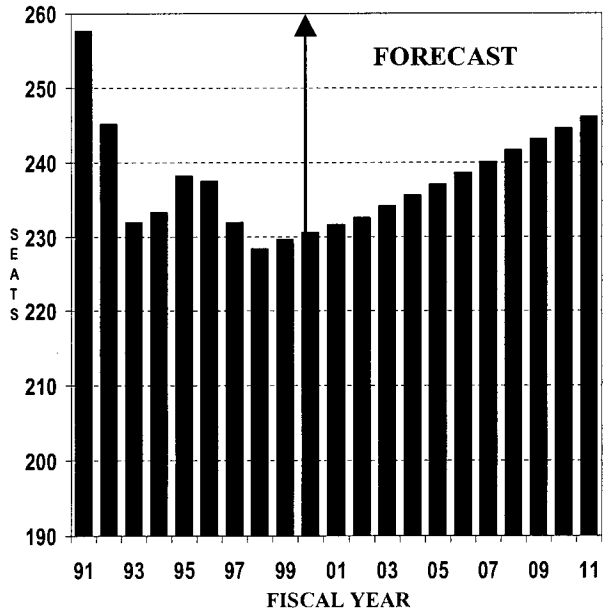
Using the latest forecasts of GDP for the U.S. and Atlantic regions, total passengers traveling in the Atlantic market are expected to increase 4.3 percent in CY 2000 and 4.2 percent in 2001 and 2002. Over the entire forecast period total passengers increase from 48.9 million in 1999 to 81.3 million in CY 2011, up 4.3 percent a year.

U.S. COMMERCIAL AIR CARRIERS: ATLANTIC OPERATIONAL VARIALBES

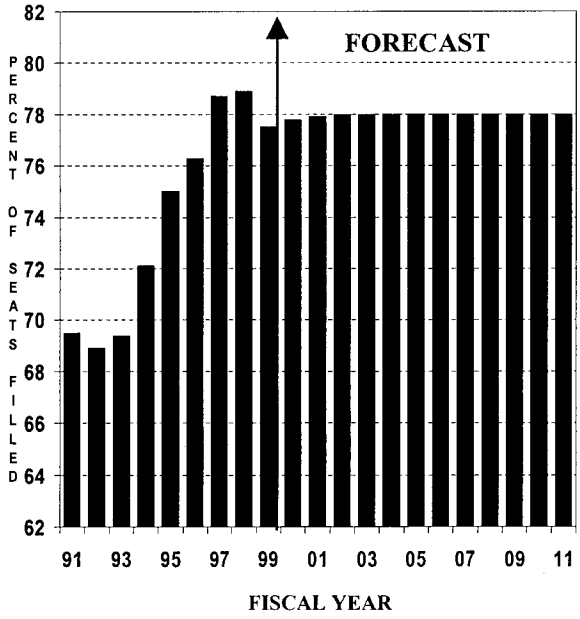
PASSENGER TRIP LENGTH



SEATS PER AIRCRAFT



LOAD FACTOR



ICAO's North Atlantic Traffic Forecasting Group (Canada, U.S., U.K., and Portugal) was formed with the primary objective of developing forecasts of air traffic over the North Atlantic and between North American and the Caribbean. Annual forecasts are provided for both total passengers and aircraft movements to support air navigation systems planning activity for ICAO and its member states.

The Group develops baseline, optimistic, and pessimistic forecasts based upon changing assumptions of available capacity, yields and economic growth. The Group's baseline forecast shows passengers increasing 4.4 percent a year for the period 1999 through 2015. For the optimistic scenario, passengers increase 5.8 percent per year, while the pessimistic scenario shows an annual growth rate of 3.5 percent. Aircraft movements for the baseline scenario expand 3.0 percent a year. The optimistic and pessimistic scenarios show growth rates of 3.7 and 1.9 percent, respectively.

Copies of the reports entitled, "*North Atlantic Air Traffic Forecasts for the Years 1999-2004, 2005, 2010, and 2015,*" can be obtained from the FAA's Statistics and Forecast Branch, Office of Aviation Policy and Plans, phone (202) 267-3355.

U.S. Flag Carriers' Passenger Enplanements

U.S. scheduled air carriers in the Atlantic market enplaned a total of 19.1 million passengers in 1999, up 6.0 percent compared to an increase of 9.2 percent in 1998. Atlantic market passenger enplanements are forecast to increase 4.8 percent in 2000. The growth in enplanements is expected to average 4.4 percent annually during the 12-year forecast period, with the number of Atlantic market enplanements reaching 32.2 million in 2011—68.4 percent higher than in 1999.

U.S. Flag Carriers' Revenue Passenger Miles

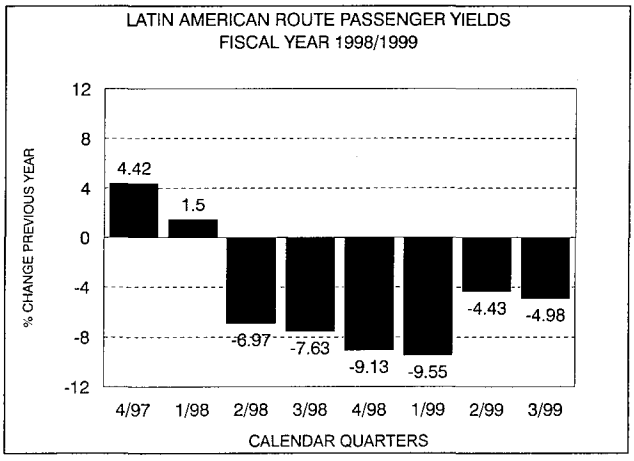
Since 1991, Atlantic market RPMs have been continuously increasing due to strong, steady economic growth in the U.S. and Europe and declining real yields. For the period 1991 thorugh 1999, RPMs increased 6.8 percent a year. Atlantic market RPMs totaled 79.6 billion in 1999, up 6.7 percent from 1998. In 1998, RPMs increased 9.4 percent. Atlantic market RPMs are forecast to increase 5.3 percent in 2000. The average annual increase in RPMs over the 12-year planning horizon is 4.8 percent, reaching 139.2 billion in 2011.

LATIN AMERICAN MARKET

U.S. Air Carriers' Yields and Operational Variables

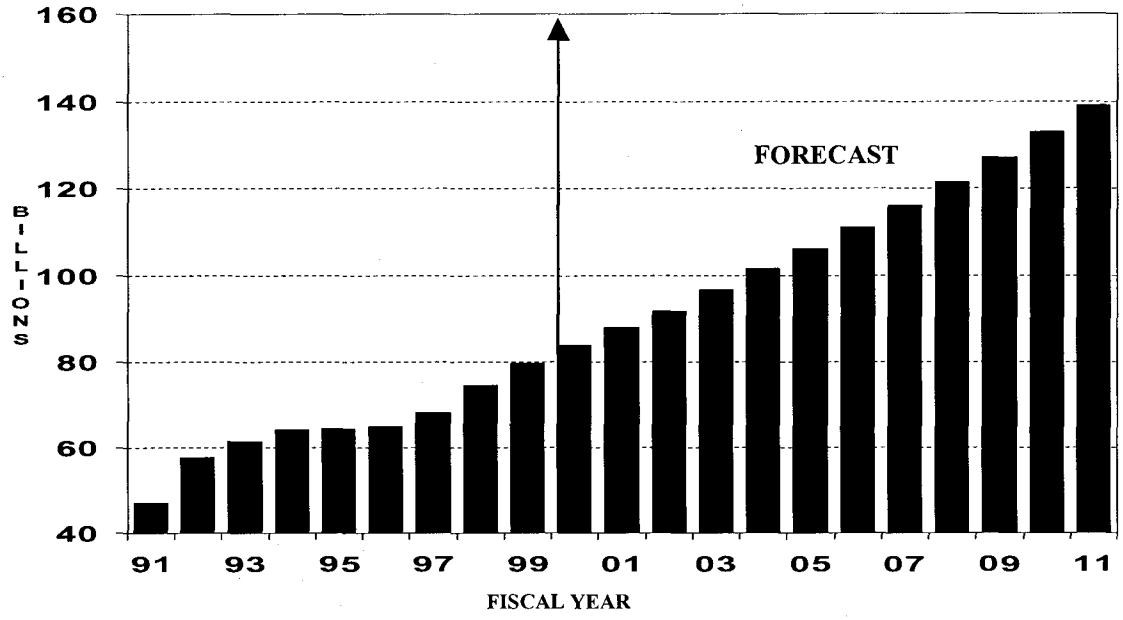
Passenger Yields

In 1999 Latin American yield (12.76 cents) fell 7.0 percent, while real yield declined 8.8 percent. In 1998 nominal and real yield both declined 2.4 and 3.8 percent, respectively. Since 1994, real yield in the market declined 19.1 percent.

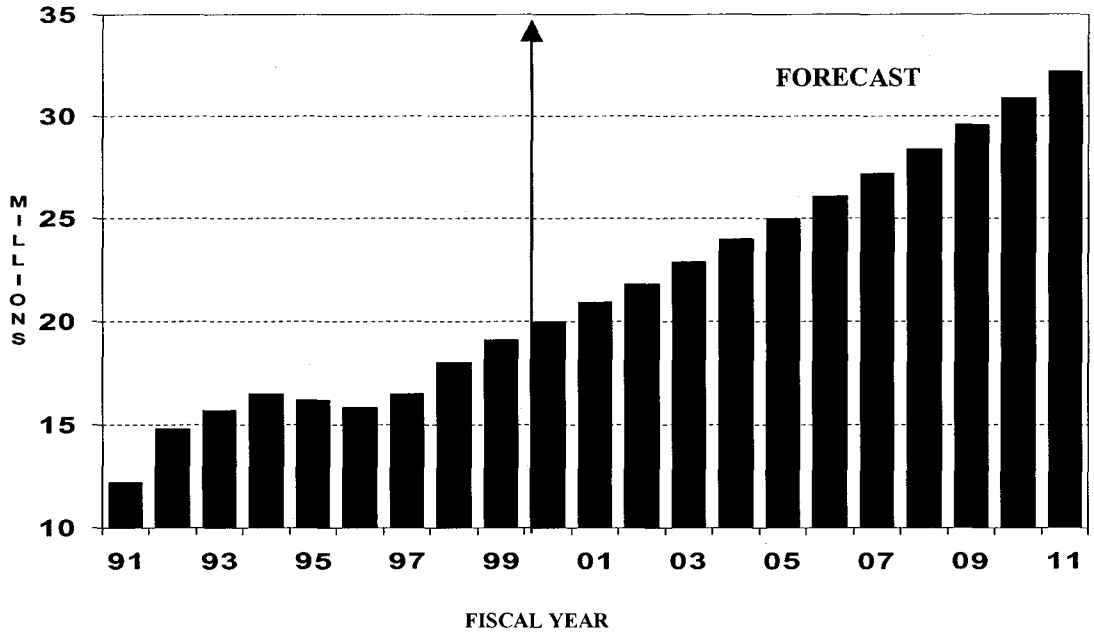


U.S. COMMERCIAL AIR CARRIERS: ATLANTIC FORECASTS

SCHEDULED REVENUE PASSENGER MILES



SCHEDULED PASSENGER ENPLANEMENTS



In 1999 ASMs in the region increased 1.6 percent, following increases in capacity of 13.6 percent in 1998 and 7.9 percent in 1997. Since 1994 capacity in the market has increased over 42.0 percent. Ample capacity, softening of the U.S. economy over the next several years, intense competition, and increased productivity should continue to push real yields down in both the short- and long-term.

It is expected that real yields will decline 3.0 percent a year through 2003, and continue to decline throughout the remainder of the forecast period but at a slower rate of 0.4 percent a year. Over the forecast period, real yields are projected to decline 1.3 percent a year, while nominal yields increase at an annual rate of 1.3 percent, reaching 14.86 cents in 2011.

Passenger Trip Length

The expansion of U.S. carriers into deep South America--Argentina, Brazil and Chile--and the continued slowing of traffic growth into the Caribbean increased the average trip length 34.1 miles in 1999 miles. Since 1990 the average trip length expanded from 1,227.3 miles to 1,559.1 miles--up 331.8 miles. This trend is expected to continue over the 12-year forecast period.

The average trip length is forecast to increase 20.0 miles in 2000, 15.0 miles in 2001, and 12.0 miles in 2002. For the remainder of the planning period--2003 through 2011--the average trip length increases, on average, 5.6 miles a year. For the period 1999 through 2011, the Latin American market trip length expands from 1,559.1 miles to 1,656.1 miles.

Average Aircraft Size

The average aircraft size in the Latin American market increased during the 1970s and early 1980s as widebody aircraft dominated the market. Average seat size peaked in 1986 at 220.2 seats. With the advent of the B-757 and other flying ETOPS since the mid 1980s, the average seat size has steadily declined. In 1999 the average aircraft size was 176.6 seats--a decline of over 43.6 seats from 1986.

Over the 12-year forecast period, the average aircraft size in the Latin American market is expected to gradually increase as the major carriers expand the number of non-stop city-pair services into deep South America, and begin using larger two-engine widebody aircraft. The average aircraft size is forecast to increase to 187.6 seats by 2011--an increase of approximately 0.9 seat per year.

Passenger Load Factor

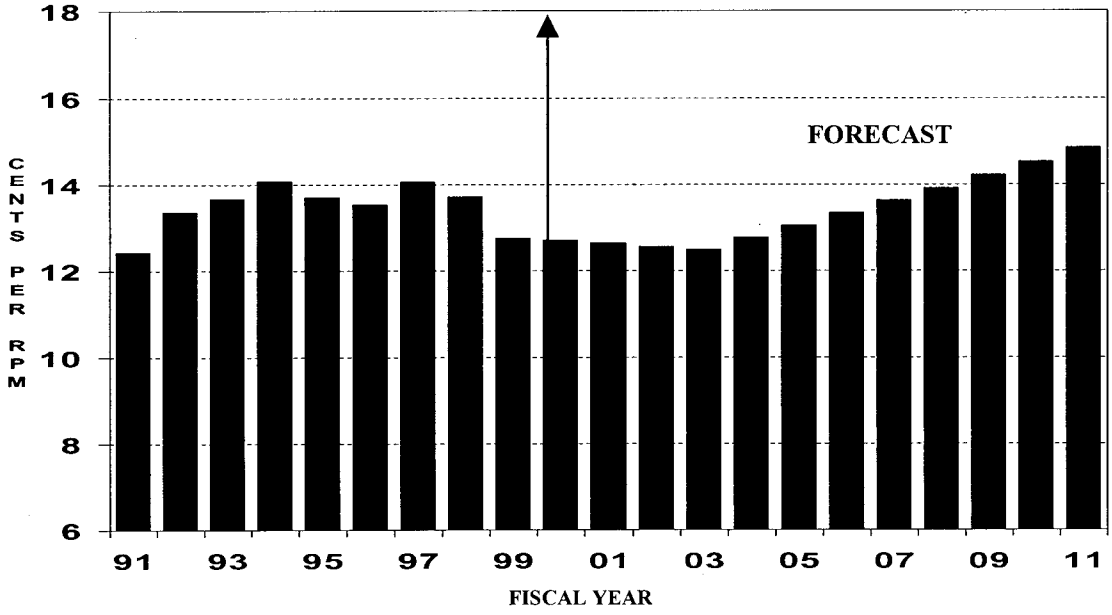
Load factors in the Latin American market showed little variability from 1987 through 1994. The load factors ranged from a low of 57.9 percent to 62.5 percent, with a mean of 60.5 percent and a standard deviation of only 1.6 points. From 1994 through 1999, the load factor increased 5.0 percentage points, expanding from 60.9 percent to 65.9 percent.

Although capacity increased 1.6 percent in 1999, RPM growth of 6.5 percent pushed the load factor up to 65.9 percent--the highest average yearly level ever achieved in the Latin American market. In 1998, capacity increased 13.6 percent, while RPMs increased 8.7 percent, which reduced the load factor 2.8 percentage points to 62.9 percent.

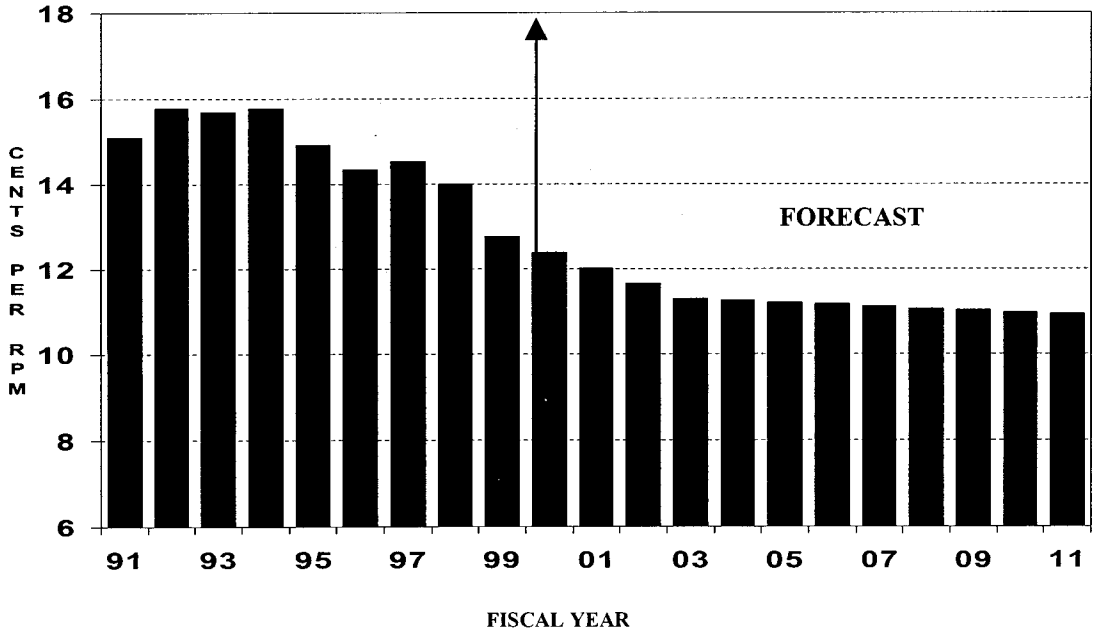
Through 2003, it is expected that smaller increases in ASMs relative to RPMs will increase the load factor over this period. ASMs are forecast to increase 4.3 percent in 2000, 4.3 percent in 2001, 5.3 percent in 2002, and 7.4 percent in 2003. Higher growth in RPMs from 2000 to 2003 will increase the load factor from 66.9 to 67.5 percent. The load factor levels off at 68.0 percent in 2004 and stays at

U.S. COMMERCIAL AIR CARRIERS: LATIN AMERICAN PASSENGER YIELDS

CURRENT DOLLARS

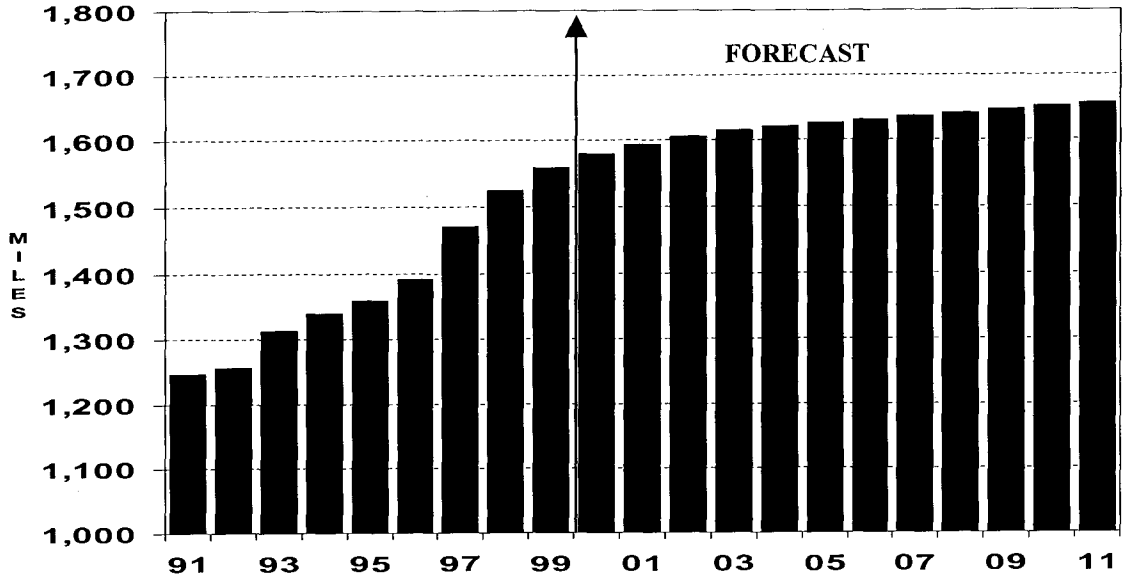


1999 DOLLARS

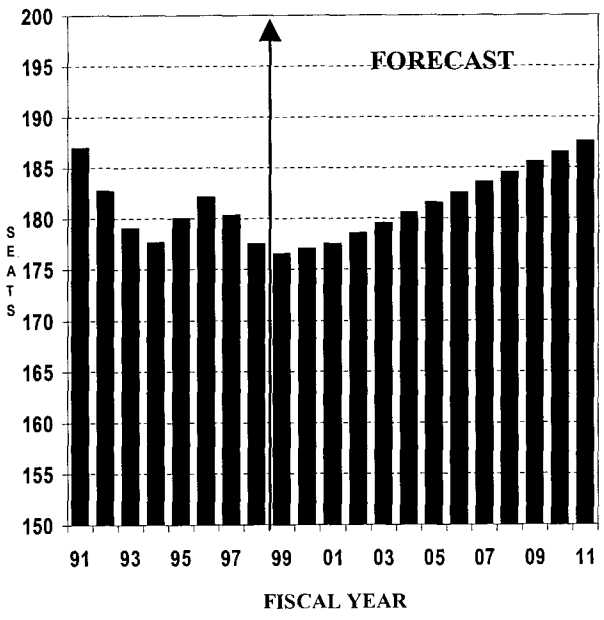


U.S. COMMERCIAL AIR CARRIERS: LATIN AMERICAN OPERATIONAL VARIABLES

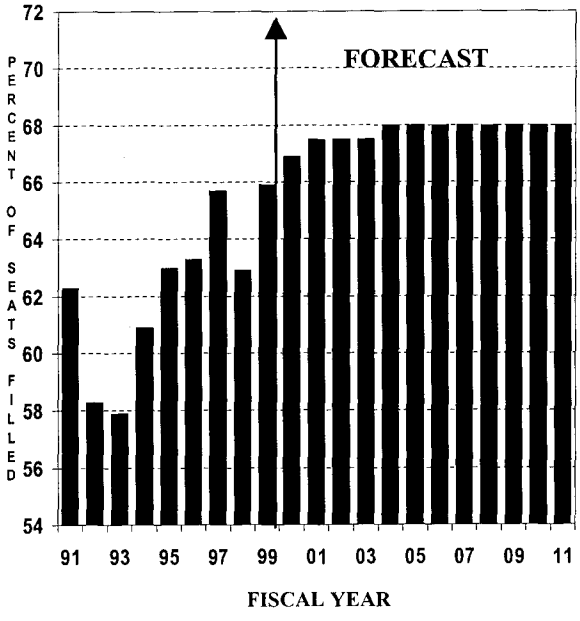
PASSENGER TRIP LENGTH



SEATS PER AIRCRAFT



LOAD FACTOR



this level for the remainder of the forecast period as the market reaches equilibrium.

Forecasts

Total Passengers: U.S. and Foreign Flag Carriers

Based on INS data, total passengers in the Latin American market (South America, Central America/Mexico, and the Caribbean) grew 6.6 percent in CY 1998. The largest increase occurred in the Central American/Mexico region--up 7.1 percent. The South American region increased 5.3 percent, while the Caribbean increased only 0.1 percent. Since 1990, the South American region has been the fastest growing with passengers increasing 10.2 percent a year. During this period, the Central American/Mexico market increased 5.3 percent per annum, while the Caribbean market increased only 0.1 percent a year.

U.S. air carriers' market share for the Latin American region has been relatively stable since 1990. For the period 1990 through 1998, the average market share was 62.8 percent with a standard deviation of 2.1 percentage points. In 1998 market share was 62.9 percent. The market shares for the Caribbean, Central America/Mexico, and South America were 70.6, 60.3, and 57.2 percent, respectively.

Since 1990, the percent of total passengers that are U.S. citizens traveling in the Latin American market has shown little variation. The mean for the period was 50.5 percent with a standard deviation of 1.6 percentage points. In 1998, 52.0 percent of total passengers in the market were U.S. citizens.

Using the latest forecasts of GDP for the U.S. and Latin American regions, total passengers traveling in the Latin American market are expected to increase 4.5 percent in CY 2000 and 4.3 percent in 2001 and 2002. Over the entire forecast period total passengers increase from 39.2 million in 1999 to 79.4 million in 2011, up 6.1 percent a year.

U.S. Flag Carriers' Passenger Enplanements

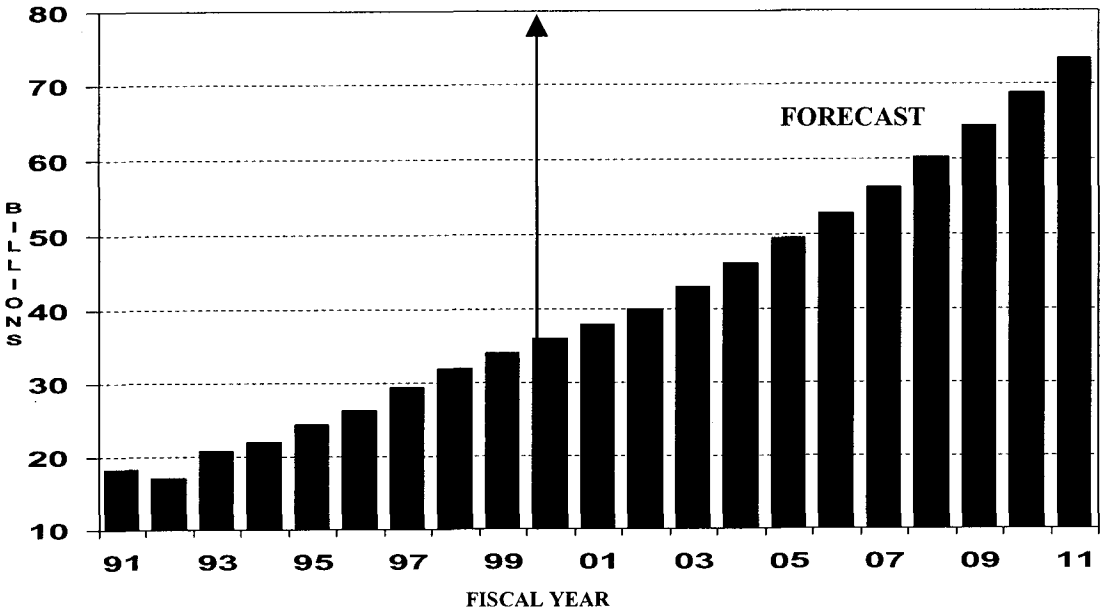
U.S. scheduled air carriers in the Latin American market enplaned a total of 21.9 million passengers in 1999, up 4.2 percent. In 1998, enplanements increased 4.8 percent. Latin American market passenger enplanements are forecast to increase 4.5 percent in 2000. The growth in enplanements is expected to average 6.1 percent annually during the 12-year forecast period, with the number of Latin American market enplanements reaching 44.4 million in 2011--more than double the level achieved in 1999.

U.S. Flag Carriers' Revenue Passenger Miles

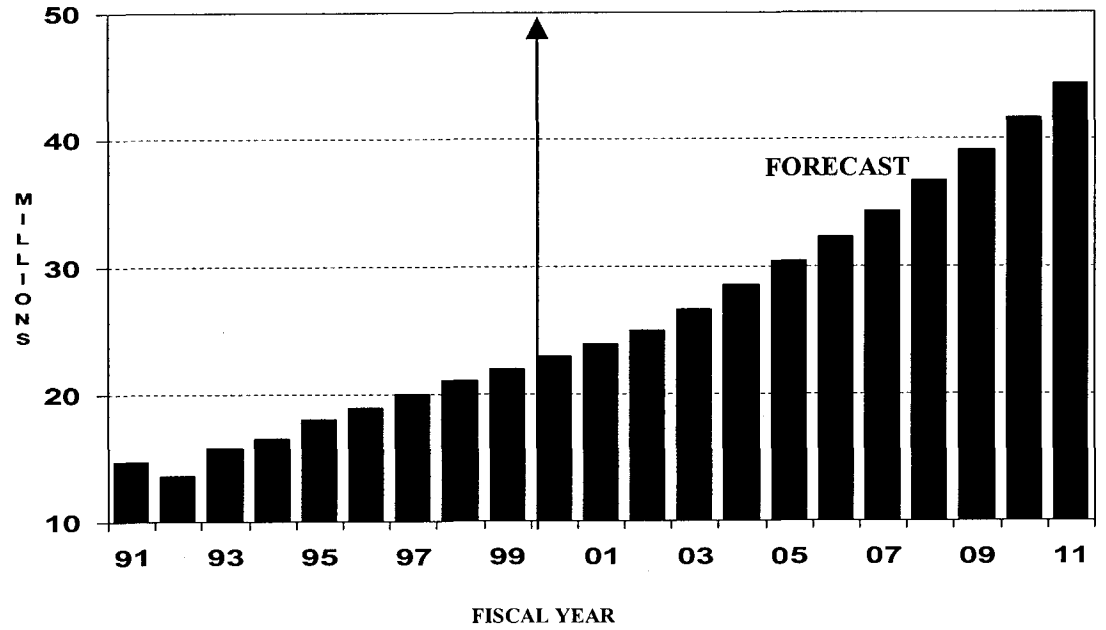
Since 1993, Latin American market RPMs have been continuously increasing due primarily to strong economic growth in the U.S. and Latin American and declining real yields. For the period 1993 through 1999, RPMs increased 8.6 percent a year. Latin American market RPMs totaled 34.1 billion in 1999, up 6.5 percent from 1998. In 1998, RPMs expanded 8.7 percent. Latin American RPMs are forecast to increase 5.8 percent in 2000. The average annual increase in RPMs over the 12-year planning horizon is 6.6 percent, reaching 73.5 billion in 2011.

U.S. COMMERCIAL AIR CARRIERS: LATIN AMERICAN FORECASTS

SCHEDULED REVENUE PASSENGER MILES



SCHEDULED PASSENGER ENPLANEMENTS

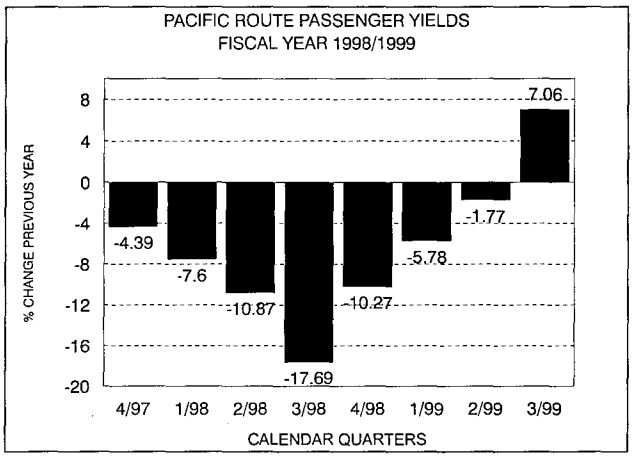


PACIFIC MARKET

U.S. Air Carriers' Yields and Operational Variables

Passenger Yields

Nominal yield in the Pacific market decreased 2.7 percent in 1999, while real yield declined 4.6 percent. In 1998 nominal and real yields fell 10.5 and 11.7 percent, respectively. The slowing in the decline in yields is an indication that the market is beginning to recover from the financial and economic problems that began in 1997.



Real yield is expected to decline only 1.0 percent in 2000, 0.7 percent in 2001, and remain unchanged in 2002 and 2003 as the Asian economies recover from the 1997-1998 recession. Over the forecast period nominal yield increases from 9.00 cents in 1999 to 11.17 cents in 2011--an increase of 1.8 percent a year.

Passenger Trip Length

In 1999 the average passenger trip length in the Pacific market increased 540.1 miles. Since 1990 the average trip length increased from 3,718.0 miles to 4,563.7 miles--up 845.7 miles. The increase in average passenger trip length over the period was primarily due to more direct flights and expanded service into the Asia/Pacific region. This trend is expected to continue over the 12-year forecast period.

The average trip length is forecast to increase 60.0 miles in 2000 and 2001, and 40 miles in 2002. For the remainder of the planning period--2003 through 2011--the average trip length increases 12.5 miles a year. For the 12-year forecast period, the Pacific market trip length increases from 4,563.7 miles to 4,843.7 miles--up over 6.1 percent.

Average Aircraft Size

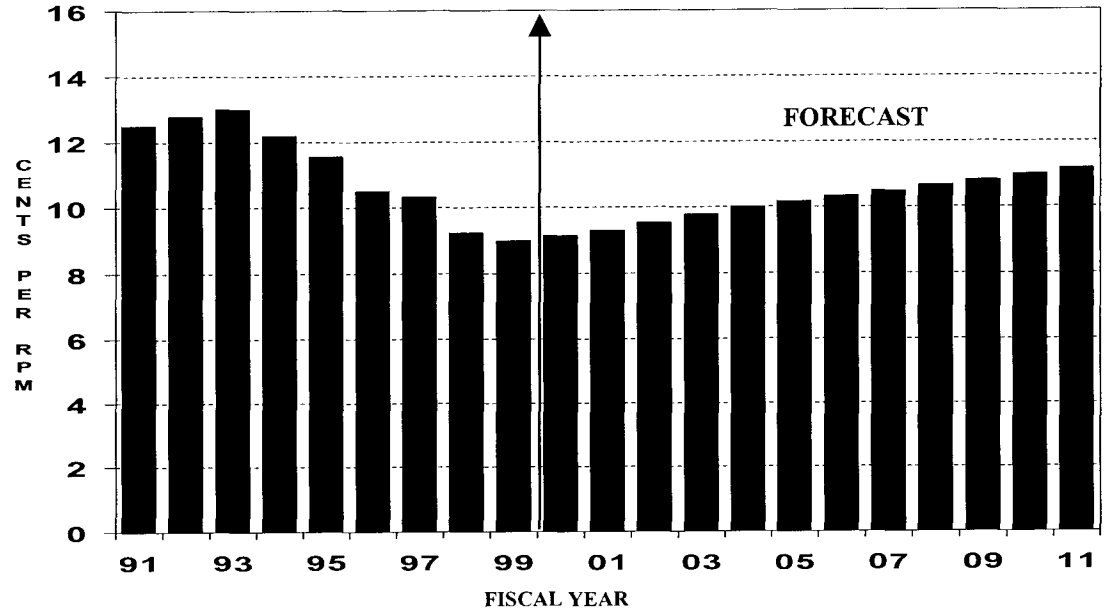
The average aircraft size in the Pacific market increased from 318.6 seats in 1990 to 329.1 seats in 1997. As traffic rapidly increased during this period, a large percentage of the additional capacity provided by the U.S. carriers came from adding larger B-747s to the routes.

When activity in the region began to shrink in 1998 due to the economic problems of the region, U.S. carriers began shifting capacity to the U.S. domestic, Latin American, and Atlantic markets. ASMs declined 5.4 percent in 1998 and 3.4 percent in 1999. The average number of seats per aircraft in the Pacific market declined 10.9 in 1998 and 14.4 in 1999.

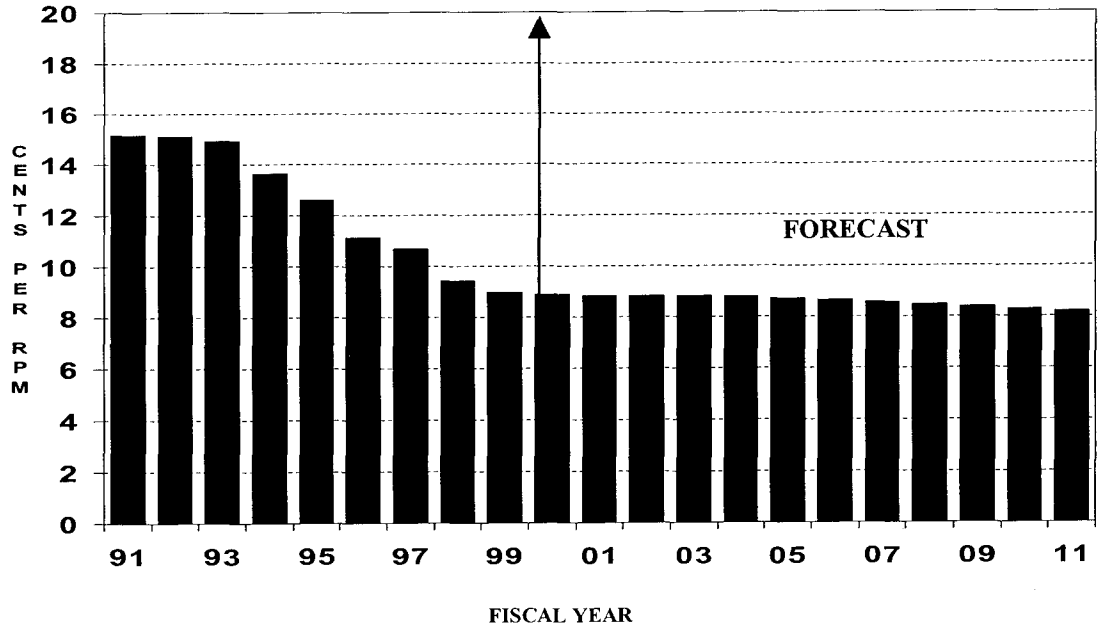
As the market recovers during the next several years and continues to grow through the remainder of the 12-year forecast period, average aircraft size is expected to increase as the carriers expand their fleets with larger widebody aircraft. The average aircraft size is forecast to increase from 303.8 seats in 1999 to 329.0 seats by 2011.

U.S. COMMERCIAL AIR CARRIERS: PACIFIC PASSENGER YIELDS

CURRENT DOLLARS



1999 DOLLARS



Passenger Load Factor

The Pacific market load factor increased from 66.7 percent in 1991 to 74.3 percent in 1997--up 5.9 percentage points. In 1998 the load factor dropped 1.5 percentage points as capacity fell 5.4 percent and RPMs declined 7.3 percent. In 1999, the decline in capacity slowed to 3.4 percent, while RPMs were down only 1.1 percent. The relatively slower decline in capacity boosted the load factor 1.7 percentage points to 74.5 percent.

The load factor is forecast to decline to 74.0 percent in 2000 as capacity expands at a faster rate than RPMs. As traffic begins to return to its long-term growth path in 2002 and 2003, the load factor increases to 74.1 percent in 2001 and 74.5 percent in 2002. The load factor is projected to remain at 74.5 percent for the period 2003 through 2011 as ASMs and RPMs expand at the same rate.

Forecasts

Total Passengers: U.S. and Foreign Flag Carriers

Based on INS data total passengers in the Pacific market declined 11.6 percent in CY 1998. Preliminary 1999 data indicates that total passenger will increase about 3.0 percent. U.S. air carrier's market share for the Pacific region increased during the 1980s peaking at 55.1 percent in 1990. Since 1990, however, the U.S. carriers' market share has declined 12.3 percentage points to 42.8 percent in 1998.

Using the latest forecasts of GDP for the U.S. and Pacific regions, total passengers traveling in the Pacific market are expected to increase 4.5 percent in CY 2000, 5.0 percent in 2001, 6.5 percent in 2002. Over the entire forecast period total passengers increase from 24.1 million in 1999 to 48.4 million in 2011, up 6.0 percent a year.

ICAO's Asia/Pacific Traffic Forecasting Group was formed with the primary objective of developing forecasts of air traffic over the Pacific between North America and the Asia/Pacific region. Annual forecasts are provided for both total passengers and aircraft movements to support air navigation systems planning activity for ICAO and its member states.

The Group's baseline forecast shows passengers increasing 6.6 percent a year for the period 1999 through 2014. For the optimistic scenario, passengers increase 9.0 percent per year, while the pessimistic scenario shows a growth rate of 5.2 percent. Aircraft movements for the baseline scenario expand 4.4 percent a year. The optimistic and pessimistic scenarios show growth rates of 6.5 percent and 3.3 percent, respectively.

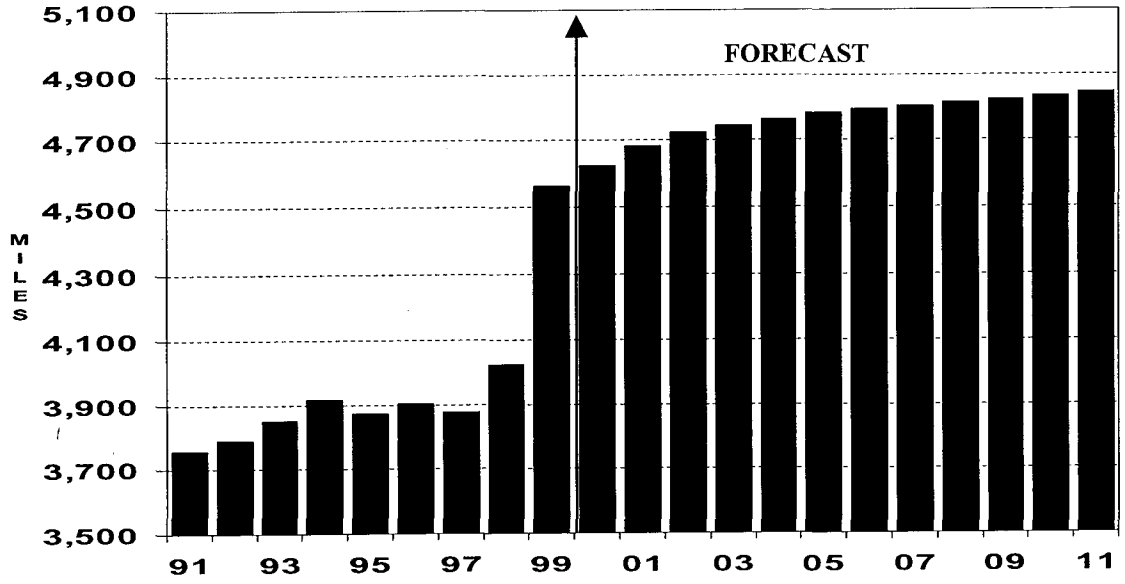
Copies of the reports entitled, "*Asia/Pacific Area Traffic Forecasts, 1999-2014,*" can be obtained from the FAA's Statistics and Forecast Branch, Office of Aviation Policy and Plans, phone (202) 267-3355.

U.S. Flag Carriers' Passenger Enplanements

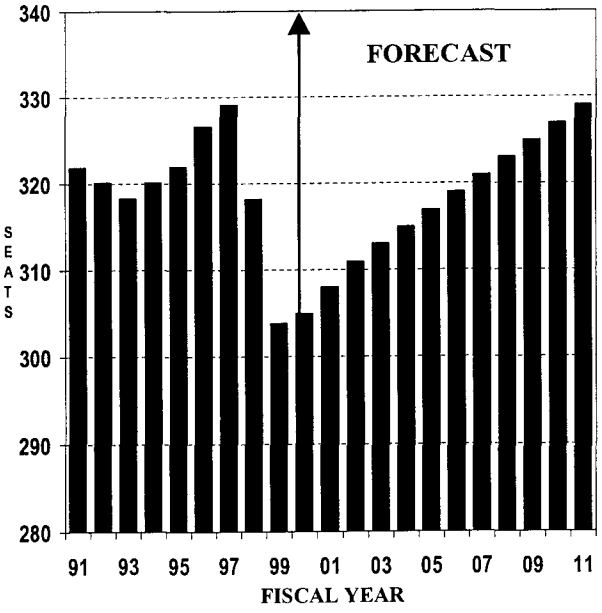
U.S. scheduled air carriers in the Pacific market enplaned a total of 12.3 million passengers in 1999, down 12.8 percent. In 1998, enplanements declined 10.6 percent. Pacific market passenger enplanements are forecast to increase 3.6 percent in 2000, 4.7 percent in 2001, and 6.8 percent in 2002. The growth in enplanements is expected to average 6.1 percent annually during the 12-year forecast period, with the number of Pacific market enplanements reaching 25.1 million in 2011--more than double the 1999 level.

U.S. COMMERCIAL AIR CARRIERS: PACIFIC OPERATIONAL VARIABLES

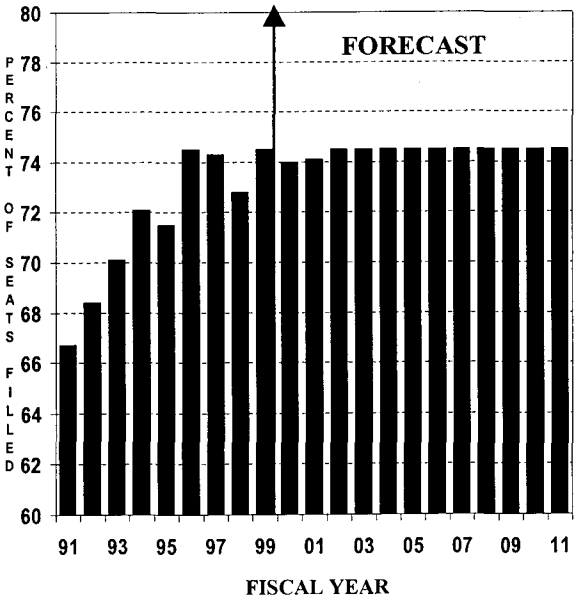
PASSENGER TRIP LENGTH



SEATS PER AIRCRAFT



LOAD FACTOR



U.S. Flag Carriers'
Revenue Passenger Miles

Before the economic and financial problems developed in the Asia/Pacific region in 1997, U.S. air carrier traffic in the Pacific market was growing significantly faster than all other markets--both domestic and international. Between 1980 and 1997, RPMs were expanding at 8.4 percent a year--about double the rate of growth experienced in the domestic market. In 1998 and 1999 RPMs declined 7.3 and 1.1 percent, respectively. Traffic in the Pacific market is forecast to increase 4.9 percent in 2000, 6.1 percent in 2001, and 7.7 percent in 2002 as the economies of the region return to their long-term historical growth. The average annual increase in RPMs over the 12- year planning horizon is 6.7 percent, reaching 121.6 billion in 2011.

U.S./CANADA TRANSBORDER TRAFFIC

The transborder forecasts shown in this document (Chapter X-Table 10) were developed with the use of Transport Canada's models and FAA's projections of expected growth in this market.

In CY 1995, the U.S. and Canada signed an open-skies agreement. Since the agreement, transborder traffic has been growing 7.5 percent a year. Transborder traffic is forecast to increase 3.5 percent in 2000. For the 12-year forecast period transborder traffic increases from 19.8 million in CY 1999 to 30.3 million in 2011--an increase of 3.6 percent a year.

AIR CARGO

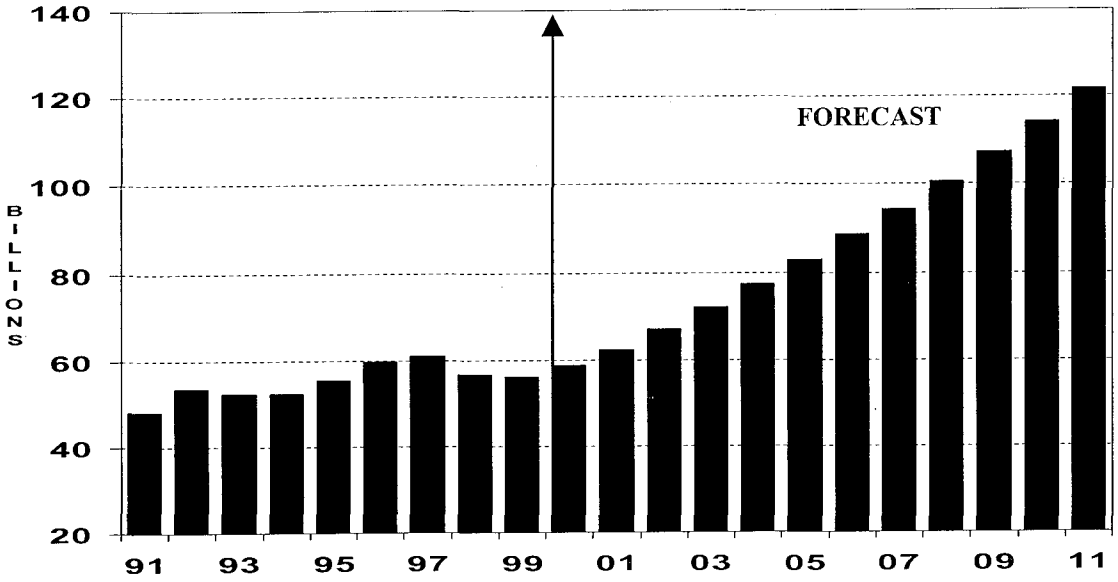
Air cargo traffic is comprised of domestic and international revenue freight/express and mail. The demand for air cargo transportation is a derived demand resulting from economic activity. Cargo is moved in the bellies of passenger aircraft and in dedicated all-cargo aircraft, on both scheduled and nonscheduled service. In addition, a portion of the cargo activity, as reported on DOT Form 41, is handled exclusively by truck.

In 1999, the total number of domestic and international air cargo RTMs flown by U.S. commercial air carriers was 28.0 billion. The top five carriers accounted for nearly two-thirds of this total. The top five carriers in terms of RTMs and their percentage shares were: Federal Express (24.7 percent), United Parcel Service (14.5 percent), United Airlines (10.8 percent), Northwest Airlines (8.1 percent), and American Airlines (7.2 percent).

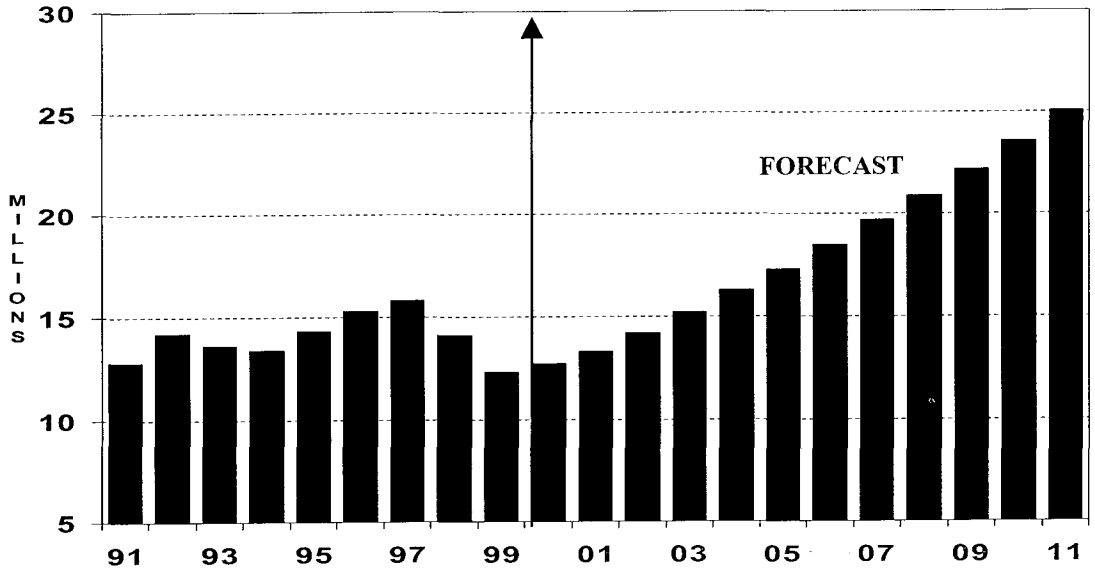
The total number of enplaned domestic and international air cargo tons at U.S. airports by U.S. commercial air carriers in 1999 was 14.6 million. The top five airports accounted for more than a quarter of the nation's enplaned cargo tonnage. The top five airports in terms of enplaned tons and their percentage shares were: Memphis International (8.9 percent), Louisville International (5.5 percent), Los Angeles International (5.0 percent), Charlotte/Douglas International (4.1 percent), and Miami International (3.7 percent). Memphis, Louisville, and Charlotte serve as hubs for Federal Express, United Parcel Service, and US Airways, respectively. Los Angeles and Miami are major international gateways.

U.S. COMMERCIAL AIR CARRIERS: PACIFIC FORECASTS

SCHEDULED REVENUE PASSENGER MILES



SCHEDULED PASSENGER ENPLANEMENTS



HISTORIC FREIGHT/EXPRESS TONNAGE

Historic data were derived for domestic and international freight/express tonnage. The domestic figures represent enplaned domestic freight/express tons at U.S. airports on U.S. commercial air carriers. These data were compiled on a calendar year basis using the DOT Onboard T3 and T100 databases. (The domestic estimates include some transborder tonnage to Canada that is not reported separately.) Enplaned domestic freight/express tonnage grew from 5.6 million tons in 1991 to an estimated 10.2 million tons in 1999, an average annual increase of 7.8 percent. The 1999 level represents a 4.5 percent decline from the 10.7 million tons enplaned in 1998.

The international figures are enplaned and deplaned international freight/express tonnage at U.S. airports on U.S. and foreign flag carriers. These data were compiled on a calendar year basis using the DOT International T100 database. International freight/express tonnage on U.S. and foreign flag carriers grew from 3.9 million tons in 1991 to 7.0 million tons in 1998, an average annual increase of 8.5 percent. The 1998 level represents an increase of 2.0 percent from 6.9 million tons in 1997. The U.S. flag carrier portion of the total international tonnage has increased from 38.6 percent in 1991 to 43.6 percent in 1998. The distribution of total tonnage for U.S. and foreign flag carriers by world region in 1998 was: Atlantic (40.7 percent), Pacific (32.3 percent), Latin America (25.4 percent), and Canada (1.6 percent).

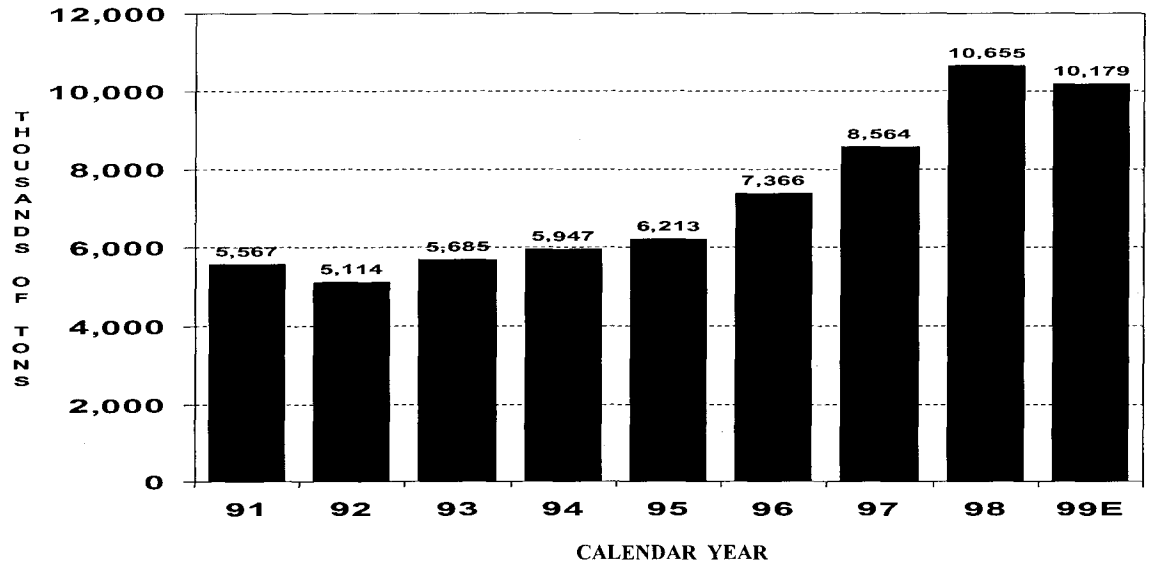
REVENUE TON MILES

Historic data and forecasts are presented for domestic and international freight/express and domestic and international mail RTMs. In addition, within each of these four components trends and forecasts are presented for all-cargo carriers and passenger carriers. Passenger carriers carry cargo predominantly in the bellies of their aircraft.

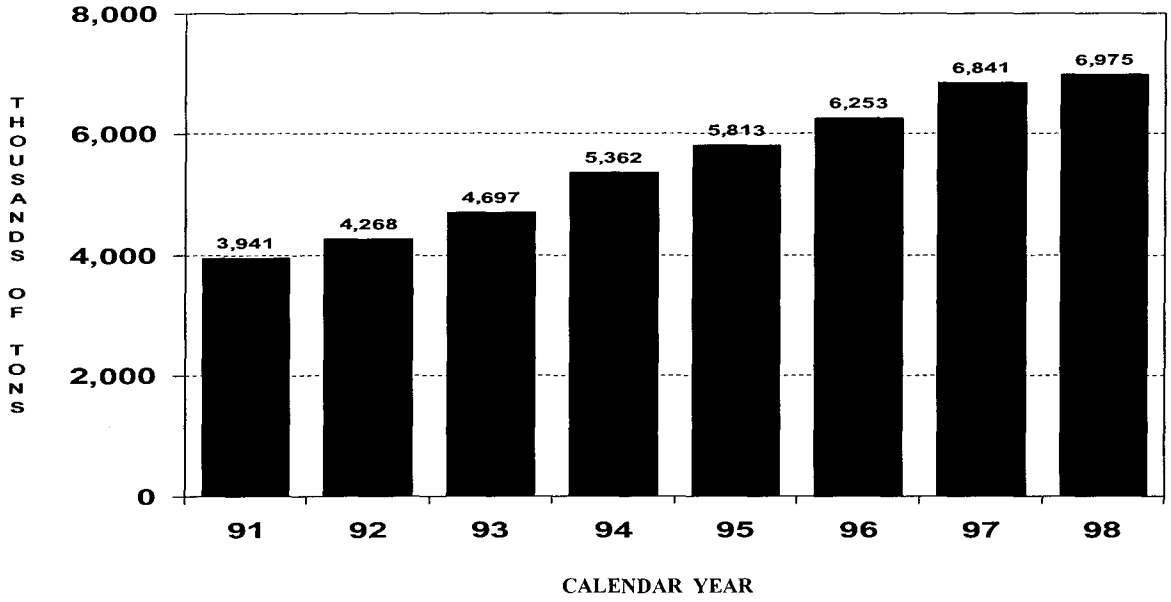
Historically, air cargo activity has been highly correlated with GDP. Additional factors that have affected the growth in air cargo traffic include declining real yields, improved productivity, and globalization. In the future, other factors that could potentially stimulate demand for air cargo include increased market opportunities from open skies agreements, decreased costs from global airline alliances, and increased business volumes from e-commerce. Factors that could potentially limit growth include increased use of e-mail, decreased costs of sending documents via facsimile, and the increased costs to airlines in meeting environmental restrictions.

Forecasts of domestic freight/express and mail RTMs were developed from regression equations using real U.S. GDP as the independent variable. The near term domestic growth patterns were adjusted for freight/express and mail RTMs based in part on input from the Air Cargo Panel of the FAA/TRB 11th International Workshop on Future Aviation Activities (held in September 1999). Projections of international freight/express and mail RTMs were derived from equations which related these variables to world GDP, adjusted for inflation. This methodology implicitly assumes that adequate capacity will be available and that other influences will impact cargo in a manner similar to that in the past. The distribution of RTMs between passenger carriers and all-cargo carriers was forecast based on an

ENPLANED DOMESTIC FREIGHT/EXPRESS TONS



ENPLANED/DEPLANED INTERNATIONAL FREIGHT/EXPRESS TONS AT U.S. AIRPORTS



analysis of historic trends in shares and discussions with industry representatives.

From 1991 to 1999, total cargo flown on U.S. commercial air carriers reporting on DOT Form 41 increased from 16.3 billion to 28.0 billion RTMs. This growth, which averaged 7.0 percent per year, was faster than the rate of growth in passengers. The fastest growing component of air cargo activity has been international freight/express, which increased an average of 8.8 percent annually from 1991 to 1999.

Growth in domestic freight/express RTMs, which averaged 5.5 percent annually between 1991 and 1999, has been dominated by all-cargo carriers. These carriers have increased their market share, accounting for more than three quarters of domestic freight/express RTMs in 1999. Federal Express and United Parcel Service are the two largest domestic all-cargo carriers. Both of these carriers are integrated carriers who provide door-to-door service using intermodal systems.

Revenue Ton Miles Forecast

In 1999 total cargo RTMs was 28.0 billion, a 1.4 percent decline from 1998. Three of the four components, namely domestic freight/express and international freight/express and mail RTMs, declined in 1999. Only domestic mail RTMs increased in 1999. The decline in international cargo activity is attributable primarily to the economic problems in Latin America and the Asia/Pacific regions. Based on discussions with industry representatives, there is no clear cut reason why domestic freight/express RTMs declined in 1999. Total RTMs are forecast to increase to 55.6 billion in 2011. This represents a 5.9 percent average annual increase from 1999 to 2011.

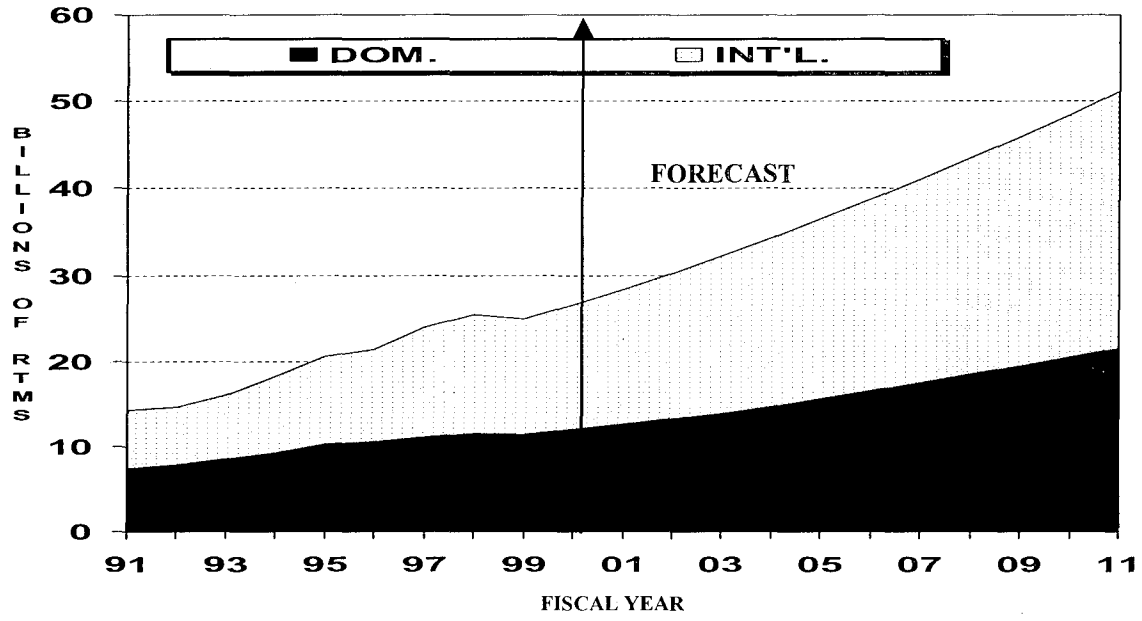
Freight/Express Revenue Ton Miles

Total freight/express RTMs flown by U.S. commercial air carriers was 25.0 billion in 1999, a 1.9 percent decrease from 1998. Domestic freight/express RTMs, which declined by 0.6 percent in 1999 to 11.5 billion, is forecast to increase to 21.6 billion in 2011. This represents an average annual growth rate of 5.4 percent between 1999 and 2011. Historically all-cargo carriers have increased their share of domestic freight/express RTMs flown, from 61.0 percent in 1991 to 78.2 percent in 1999. This has resulted from the significant growth of express service by Federal Express and United Parcel Service and the lack of growth of domestic freight/express business for passenger carriers. Passenger carriers have experienced growth in their load factors and thus are increasingly using belly capacity for passenger luggage. The trend in market shares is expected to continue throughout the forecast period, resulting in a forecast market share for the all-cargo carriers of 87.7 percent in 2011.

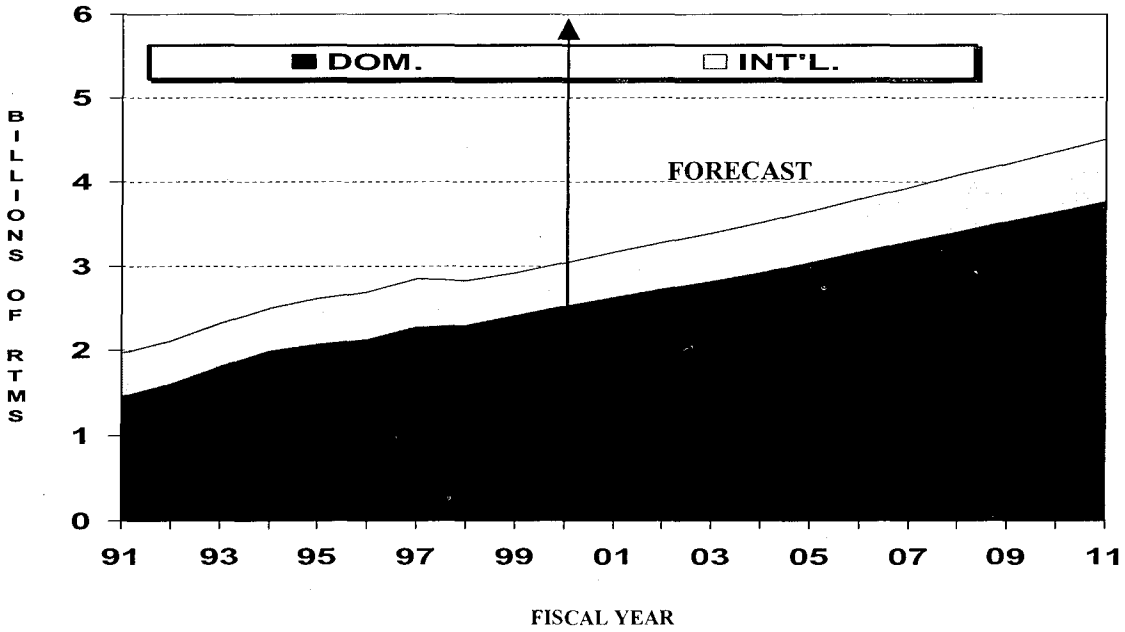
International freight/express RTMs declined to 13.6 billion in 1999, a decline of 3.0 percent from 1998. International freight/express RTMs are forecast to increase by an average of 6.7 percent over the entire forecast period to 29.5 billion. This forecast is based on the projected strong economic growth in world GDP, especially in the Latin America and Asia/Pacific regions. The all-cargo carriers have increased their share of international freight/express RTMs flown, from 50.5 percent in 1991 to 53.6 percent in 1999. This trend is forecast to continue in the future with the increase in international express service offered by carriers like United Parcel Service. All-cargo carriers share of international freight/express RTMs is forecast to increase to 64.4 percent in 2011.

U.S. COMMERCIAL AIR CARRIERS: REVENUE TON MILES

FREIGHT/EXPRESS



MAIL



Mail Revenue Ton Miles

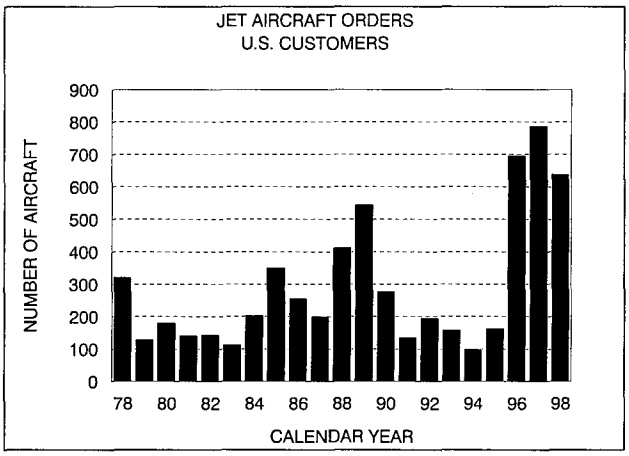
Total mail RTMs flown by U.S. commercial air carriers was 2.9 billion in 1999. This represented an increase of 3.1 percent from 1998. Domestic mail increased by 4.8 percent in 1999 to 2.4 billion RTMs. Domestic mail is forecast to grow an average of 3.8 percent per year between 1999 and 2011. The forecasted total for domestic mail RTMs in 2011 is 3.8 billion. Historically passenger carriers have accounted for the majority of domestic mail RTMs. The all-cargo carriers have increased their share, though, from 5.5 percent in 1991 to 28.7 percent in 1999. This trend has resulted from the increased use of all-cargo carriers such as Emery Worldwide by the U.S. Postal Service as a means to improve control over delivery. Factors cited by the U.S. Postal Service in determining the use of all-cargo versus passenger carriers includes capacity, availability, and on-time performance. The all- cargo share of domestic mail is forecast to increase to 34.0 percent in 2011.

International mail totaled 508.9 million RTMs in 1999. This represented a decline of 3.9 percent from 1998. International mail is forecast to grow an average of 3.1 percent per year between 1999 and 2011. The projected total for international mail RTMs in 2011 is 735.5 million. Passenger carriers have increased their share of international mail from 86.4 percent in 1991 to 92.4 percent in 1999. Historically, passenger carriers have been able to handle the volume of international mail at lower rates than the all-cargo carriers. According to the U.S. Postal Service, the current share distribution between the passenger carriers and the all-cargo carriers is not likely to change significantly in the future. Consequently, the market shares by carrier group for international mail were held constant for the forecast period at their 1999 levels.

AIR CARRIER FLEET

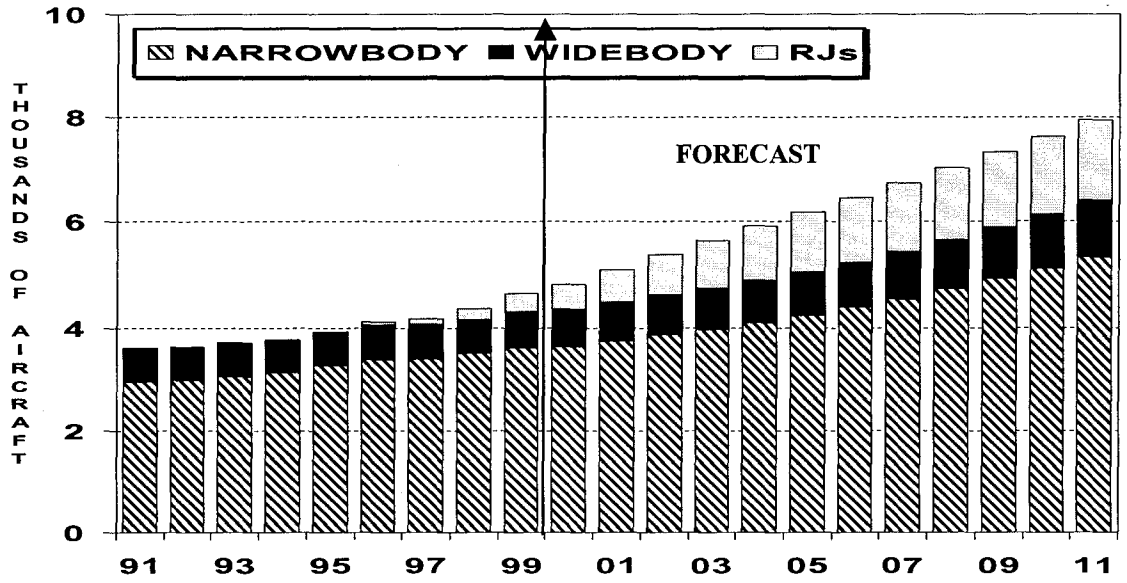
U.S. air carriers placed orders for an estimated 639 jet aircraft during CY 1998--the third largest ever made by the industry. Total orders placed during the past three years (2,124) is greater than the number of orders placed during the eight-year period, 1988 through 1995. During the past 40 years, the average number of orders per year was 223.

Of the total number of orders, 445 (69.6 percent) were for narrowbody two--engine (B-717, B-737, B-757, MD-80, and A-319/320/321) aircraft, and 113 (17.7 percent) were for the two-engine (A-300/330, B-767, and B-777) widebody aircraft. Regional jet orders (CRJs and EMBs) accounted for 8.9 percent of the total (57 aircraft).

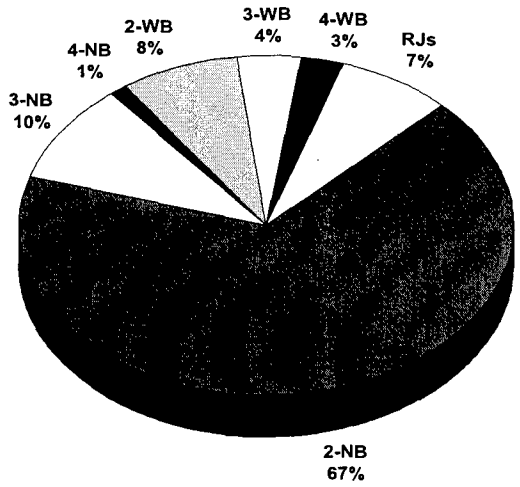


Aircraft manufacturers delivered 358 jet aircraft to U.S. customers in CY 1998--the largest number of deliveries since 1968. Of this total, 195 (54.5 percent) were two-engine narrowbody aircraft, 41 (11.5 percent) were for two-engine widebody aircraft, and 100 were for regional jets (27.9 percent).

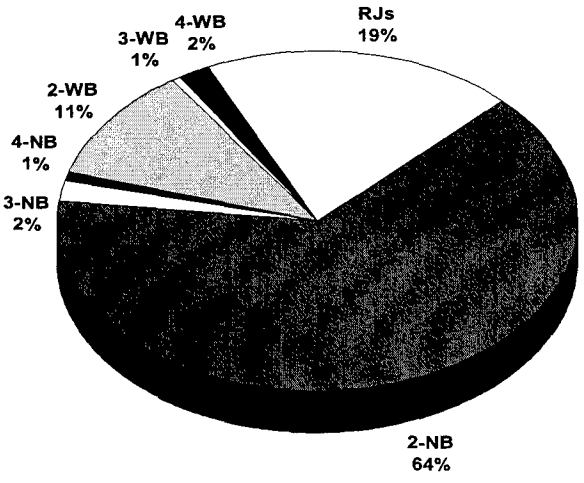
U.S. COMMERCIAL AIR CARRIERS: PASSENGER JET AIRCRAFT



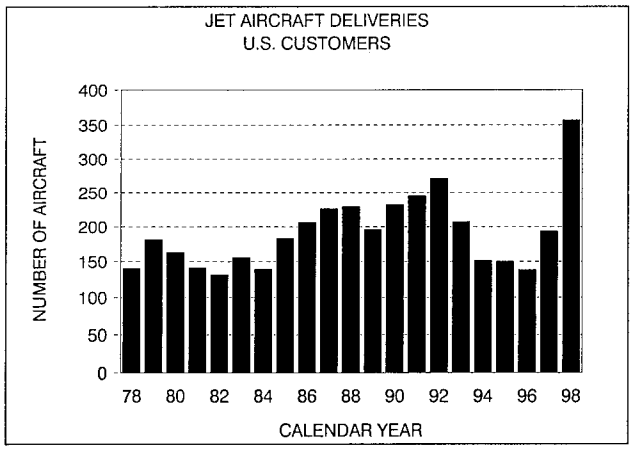
PERCENT BY AIRCRAFT TYPE



1999



2011



Passenger Jet Aircraft

In CY 1999, the fleet of passenger jet aircraft for U.S. air carriers expanded by an estimated 287 aircraft, the largest yearly increase during the past ten years. As expected, there was a large increase in two-engine narrowbody aircraft (up 176 aircraft or 6.0 percent), two-engine widebody aircraft (up 51 or 16.5 percent), and regional jets (up 140 aircraft or 68.9 percent).

Based on the backlog of aircraft orders and the projections of air carrier traffic, seat capacity, load factors, fleet requirements, and aircraft productivity, the U.S. commercial air carrier passenger fleet is projected to increase from an inventory of 4,655 aircraft in 1999, to 7,946 aircraft by 2011. This involves a net addition to the fleet (after retirements of obsolete aircraft) of approximately 274 aircraft annually.

The two-engine narrowbody fleet is projected to grow by an average of 167 aircraft annually. By 2011, two-engine narrowbody aircraft are expected to account for 64.5 percent of the fleet. The number of three-engine narrowbody (B-727) aircraft is forecast to decline from 444 aircraft (9.5 percent of fleet) in 1999 to 142 (1.8 percent of fleet) by 2011. The number of four-engine narrowbody aircraft will show a small increase from 57 aircraft in 1999 to 67 aircraft in 2011.

The fleet of two-engine widebody aircraft (A-300/310/330, B-767, and B-777) is the fastest growing of the widebody group. This group is expected to increase by an average of 42 aircraft per year (7.5 percent), expanding from 360 aircraft in 1999 to 860 aircraft in 2011. The three-engine widebody fleet (MD-11, DC-10, and L-1011) is projected to decline over the forecast period from 195 aircraft in 1999 to 55 aircraft in 2011. Four-engine widebody (B-747 and A-340) aircraft are forecast to increase from 131 aircraft in 1999 to 152 aircraft in 2011, an annual increase that averages 1.2 percent.

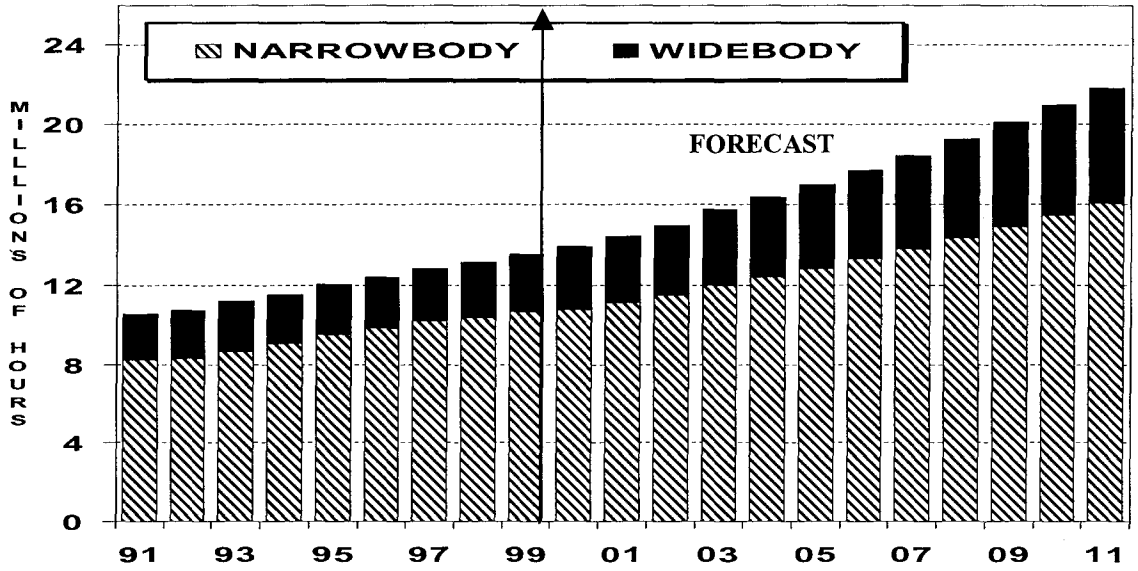
The regional fleet is forecast to expand from 343 aircraft in 1999 to 1,546 aircraft in 2011, an increase of 13.4 percent a year. By 2011 the regional fleet will account for 19.0 percent of the total passenger jet fleet; in 1999 the regional jet fleet accounted for only 7.0 percent of the fleet.

Cargo Jet Aircraft

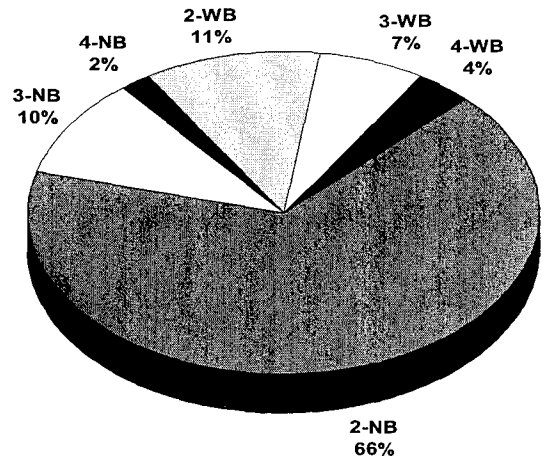
In CY 1999, the jet fleet of U.S. air carrier cargo aircraft increased by 4.8 percent to 1,013 aircraft. Based on the backlog of aircraft orders and the projections of air cargo demand, the U.S. commercial cargo fleet is projected to increase to 1,631 aircraft by CY 2011. This involves an average net addition to the fleet (after retirements of obsolete aircraft) of 52 aircraft annually or 4.0 percent per year.

Narrowbody aircraft, which accounted for 67.7 percent of the cargo fleet in 1999, are projected to account for 49.4 percent in 2011. The fleet of two-engine narrowbody aircraft is expected to increase from 172 aircraft in 1999 to 284 aircraft in 2011, an average annual increase of 4.3 percent.

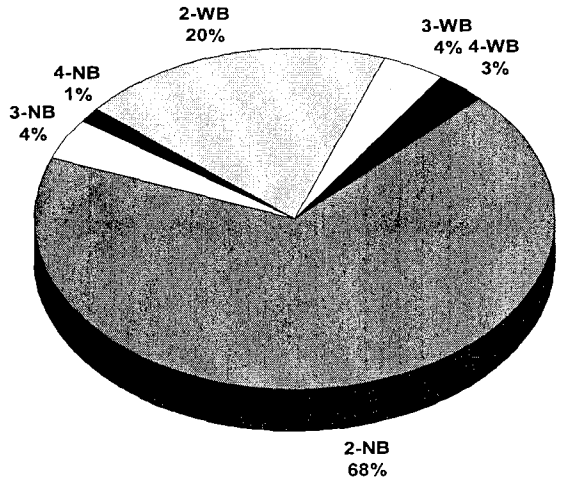
U.S. COMMERCIAL AIR CARRIERS: AIRBORNE HOURS 1/



PERCENT BY AIRCRAFT TYPE



1999



2011

1/Includes both passenger (excluding regional jets) and cargo aircraft.

The number of three-engine narrowbody aircraft is expected to remain relatively constant over the forecast period. This fleet category is expected to total 333 aircraft in 2011. The number of four-engine narrowbody aircraft is expected to grow from 180 aircraft in 1999 to 188 in 2011.

Widebody aircraft accounted for 32.3 percent of the cargo fleet in 1999. The fleet of widebody aircraft is expected to increase to 50.6 percent of the cargo fleet in 2011. The largest increase in the number of widebody aircraft are projected to occur in the two-engine widebody category. This category is expected to grow by an average of 33 aircraft per year (12.4 percent), expanding from 128 aircraft in 1999 to 518 aircraft in 2011.

The three engine widebody fleet is projected to increase over the forecast period from 143 aircraft in 1999 to 240 aircraft in 2011. This represents an average annual increase of 8 aircraft or 4.4 percent per year. Four-engine widebody aircraft are forecast to increase from 56 aircraft in 1999 to 68 aircraft in 2011, an average annual increase of 1.6 percent.

AIRBORNE HOURS

U.S. large commercial air carriers (passenger and cargo excluding regional jets) flew an estimated total of 13.6 million hours in 1999, up from 13.1 million hours in 1998. Two aircraft categories accounted for over three-fourths of total airborne hours: two-engine narrowbody (66.8 percent), and two-engine widebody (11.0 percent).

In 2011, the total number of hours is forecast to expand to 21.8 million, an average annual increase of 4.0 percent. Airborne hours are projected to increase 2.9 percent in 2000 to 13.9 million, and 3.5 percent in 2001, to 14.4 million.

Two-engine aircraft (both narrowbody and widebody) are expected to account for 87.9 percent of all airborne hours flown in 2011. Narrowbody two-engine aircraft hours, which make up 68.4 percent of total hours in 2011, increase, on average, 4.3 percent per year. Widebody two-engine aircraft hours, which account for 19.6 percent of total hours in 2011, increase 9.2 percent per year. Four-engine widebody aircraft hours flown are forecast to increase 2.6 percent.

The number of hours flown by three-engine widebody and narrowbody aircraft are projected to decline through 2011. Three-engine widebody hours flown are expected to decrease 0.8 percent a year; and three-engine narrowbody aircraft hours are forecast to fall 3.7 percent, reflecting the retirement of large numbers of B-27 aircraft. The share of total hours flown by three-engine aircraft will decrease from 16.6 percent in 1999 to 7.7 percent in 2011. Hours for the four-engine narrowbody fleet, made up primarily of DC-8s, are expected to decline 0.1 percent a year.

CHAPTER IV

REGIONALS/COMMUTERS

CHAPTER IV

REGIONALS/COMMUTERS

The regional/commuter airline industry, for the purpose of this forecast, is defined as those air carriers that provide regularly scheduled passenger service and whose fleets are composed primarily of aircraft having 60 seats or less. During 1999, 93 regional/ commuter airlines re-ported traffic data to the Department of Transportation (DOT), Office of Airline Information, either on DOT Form 298-C or Form 41.

The FAA historical database has been revised to be more comprehensive. In addition to the activity for all U.S. regional/commuters operating in the 48 contiguous states, Hawaii, Puerto Rico, and the U.S. Virgin Islands, it has been expanded to include Alaska, trans-border traffic for Canada and Mexico, and Caribbean areas.

Additionally, the regional/commuter traffic statistics include duplicated enplanement and revenue passenger miles (RPMs) data for certain operators that are also included in the commercial air carrier traffic statistics. This duplication results from regional/commuter carriers operating both large turboprops and turbojets (over 60 seats) as well as commuter type aircraft. The level of duplicated traffic (enplanements and RPMs) is presented in the technical notes at the beginning of Chapter X for Tables 11 and 21. In 1999, a total of eight carriers reported for all, or part of the year, on DOT Form 41.[1] In the regional/commuter industry discussion that follows, references to or distinctions between the two groups of carriers will be made in terms of carriers that operate only commuter aircraft of 60 seats or less (Form 298-C carriers) and carriers that operate both large aircraft over 60 seats and smaller commuter aircraft (Form 41 carriers).

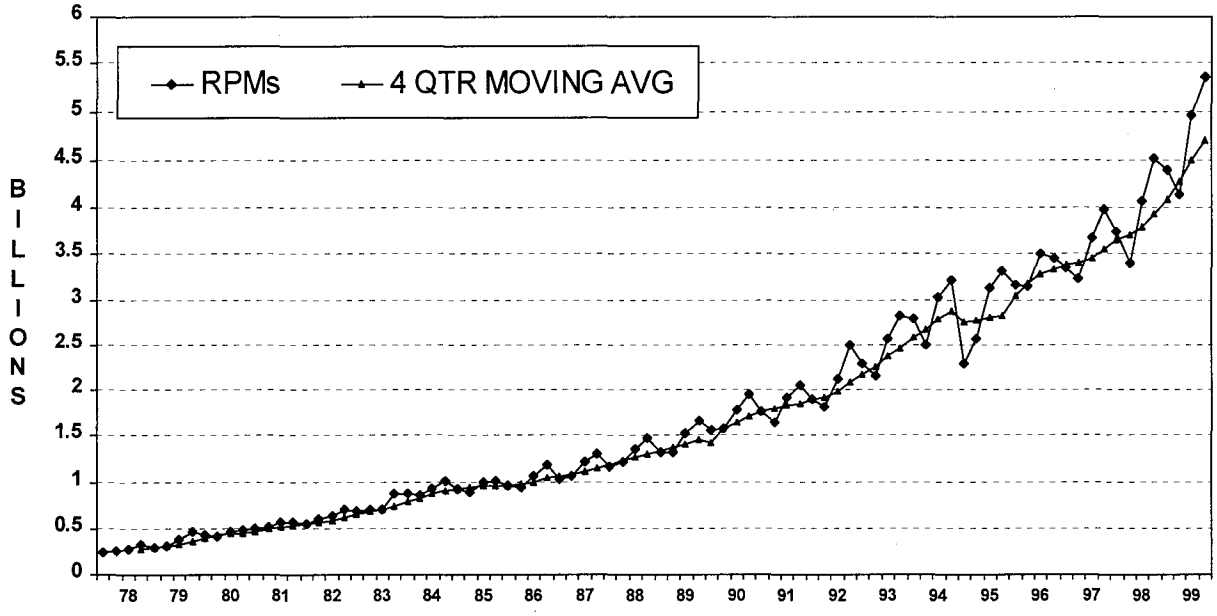
REVIEW OF 1999

The evolution of the regional/commuter airline industry, especially since the mid-1980s, has been defined by three factors. First, there was dramatic growth in the number of code-sharing agreements with the major air carriers. Second, was the wave of air carrier acquisitions of, or purchases of equity interest in, their regional/commuter code-sharing partners. The evolution of these relationships with the larger air carriers resulted in the transferring of large numbers of low to medium density, short-haul

[1] American Eagle(includes Flagship, Simmons, and Wings West), Atlantic Southeast, Continental Express, Executive, Horizon, Mesaba , Trans States, and United Feeder Service.

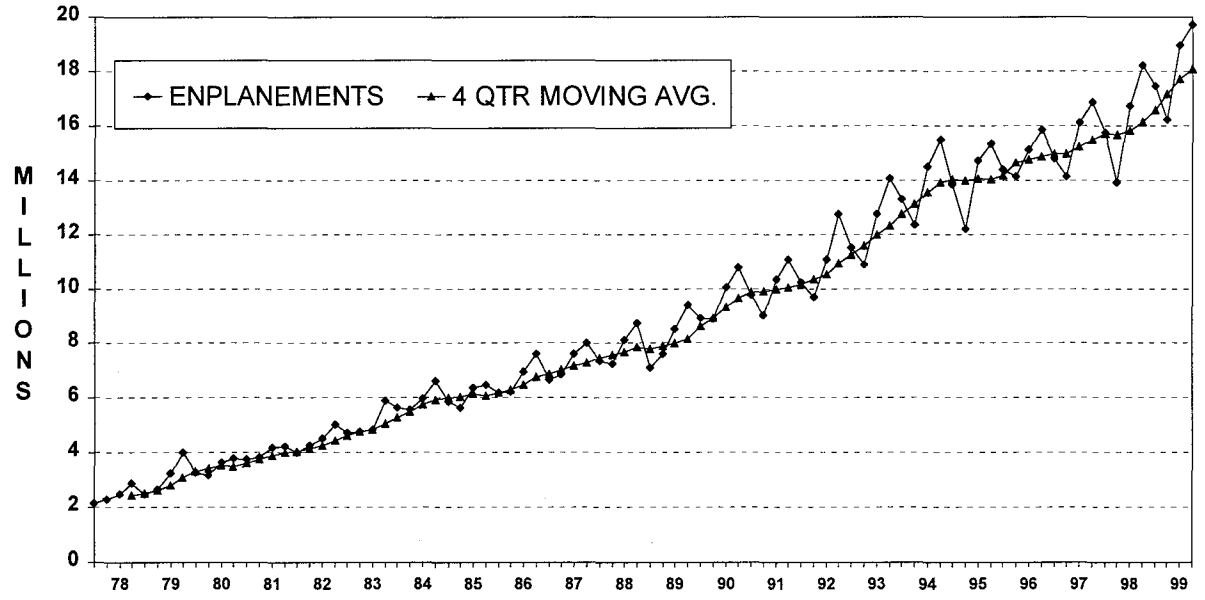
U.S. REGIONALS/COMMUTERS TRAFFIC TRENDS

SCHEDULED REVENUE PASSENGER MILES



FISCAL YEAR BY QUARTER

SCHEDULED PASSENGER ENPLANEMENTS



FISCAL YEAR BY QUARTER

jet routes to their regional partners. It is this transfer of routes which has sustained the regional industry's historically high rate of growth over the past decade. Together, these actions have resulted in a process of industry consolidation, concentration, and increasing integration with the large commercial air carriers that has continued through 1999. Today, the third defining influence on the industry is the integration of regional jets into regional/commuter fleets, which opens up a whole new horizon to the regional/commuter airline industry.

INDUSTRY SUMMARY

The number of regional/commuter airlines totaled 93 in 1999, down from 102 carriers in 1998 and 105 in 1997. While the number of reporting airlines has declined significantly over the past decade (down from 151 carriers in 1990), industry traffic has almost doubled over the same period (enplanements up 91.4 percent). However, Form 298-C traffic statistics have actually under-stated the level of growth in enplanements since 1997. This results from the enforcement of data reporting requirements that had not been strictly enforced in the past. Carriers reporting to DOT on Form 298-C are required to report origin and destination (O&D) passenger traffic. The difference between O&D and enplanements did not become a significant issue until regional carriers began to service more markets involving multiple flight segments. This problem will become more of an issue in the future, especially with the increased use of regional jets. While growth in the enplanements in 1997 was understated (estimated at between 1.5 and 2.0 percent by the Regional Airline Association), 1998 and 1999 rates of growth are computed on data filed under the same reporting requirements and, therefore, reflect actual growth in originating passengers. However, the data continues to understate the actual number of passenger enplanements. The change in reporting requirements do not impact the reporting of revenue passenger miles (RPMs) data.

REVENUE PASSENGER ENPLANEMENTS

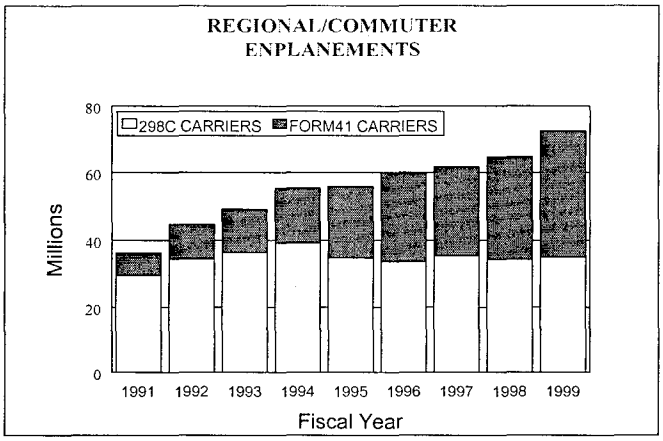
Total revenue passenger enplanements for the regional/commuter airlines, including Alaska and foreign territories, totaled 72.4 million in 1999 an increase of 12.0 percent over 1998. Form 41 carriers enplaned 37.3 million passengers (51.6 percent of the total) while Form 298-C carriers transported 35.0 million passengers.

48 Contiguous States

For the 48 contiguous states, enplanements increased 12.6 percent in 1999, reaching 67.9 million. Form 298-C carriers enplaned 32.3 million passengers in 1999, an increase of 2.6 percent over 1998. The eight Form 41 carriers enplaned 35.6million passengers, an increase of 23.5 percent over 1998. The relatively high growth for the Form 41 carriers (and conversely, the low rate of growth for Form 298-C carriers) is the result of three large American Eagle carriers being merged into the certificate of American Eagle during 1998. Flagship and Wings West reported traffic on Form 298-C for the first half of 1998 and on Form 41 for the last two quarters of 1998 and all of 1999. These two carriers were merged with Simmons, which reported data on Form 41 for the full year in both 1998 and 1999.

In 1999, the Form 41 carriers accounted for 52.4 percent of all regional/commuter passengers enplaned in the 48 contiguous states compared to only 11.5 percent in 1990. Over this 9-year period, these carriers' enplanements have increased from 4.7 million in 1990 to the

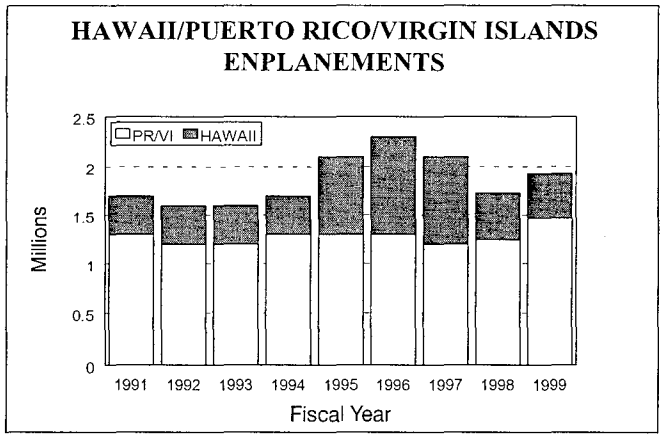
current 35.6 million, an average annual increase of 25.2 percent. On the other hand, Form 298-C carriers' passenger enplanements increased by only 0.3 percent annually—from 31.4 million in 1990 to 32.3 million in 1999.



The significantly higher growth rate for the Form 41 carriers reflects a combination of two factors—more reporting carriers and higher growth by the reporting carriers relative to the rest of the industry. In 1990 only three regional carriers reported on Form 41 compared to eight today. However, these eight carriers' enplanements have grown at rates significantly higher than the industry as a whole. Since 1990, growth for the eight carriers have averaged 12.0 percent annually compared to 7.5 percent for the industry.

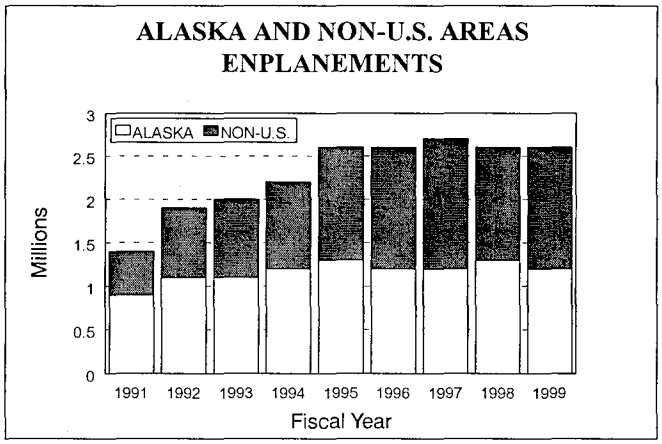
Hawaii/Puerto Rico/Virgin Islands

Enplanements in Hawaii, Puerto Rico, and the Virgin Islands totaled 1.9 million in 1999, an increase of 11.6 percent. The number of enplanements in Puerto Rico and the Virgin Islands increased 17.9 percent in 1999. Enplanements in Hawaii declined 4.4 percent in 1999, the third consecutive year of decline. This is due primarily to two carriers going out of business during this time.



Alaska/Non-U.S. Areas

Enplanements in Alaska and non-U.S. areas totaled 2.6 million in 1999, unchanged from 1998. Alaskan enplanements decreased 8.7 percent, totaling just under 1.2 million. However, this was offset by the growth in U.S. regional/commuter enplanements in areas outside of the U.S. which totaled 1.4 million in 1999, an increase of 6.1 percent. This growth was driven primarily by a 10.5 percent increase in Canadian and Mexican transborder enplanements and a 4.9 percent increase in the Caribbean passenger enplanements.

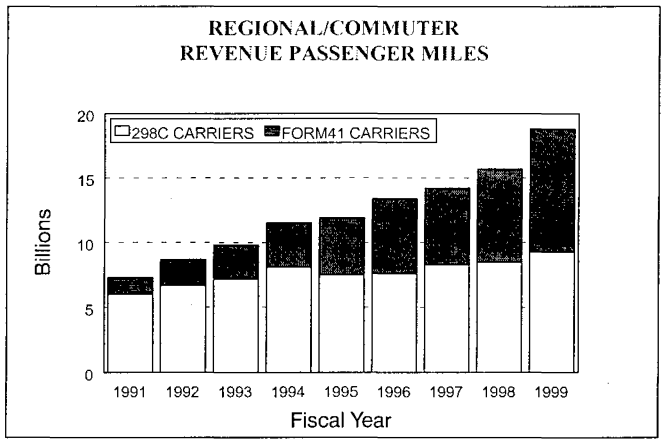


REVENUE PASSENGER MILES

In 1999, industry RPMs totaled just over 18.8 billion, an increase of 19.7 percent over 1998. Form 41 carriers RPMs totaled 9.5 billion (50.6 percent of the total) and Form 298-C carriers RPMs totaled 9.3 billion.

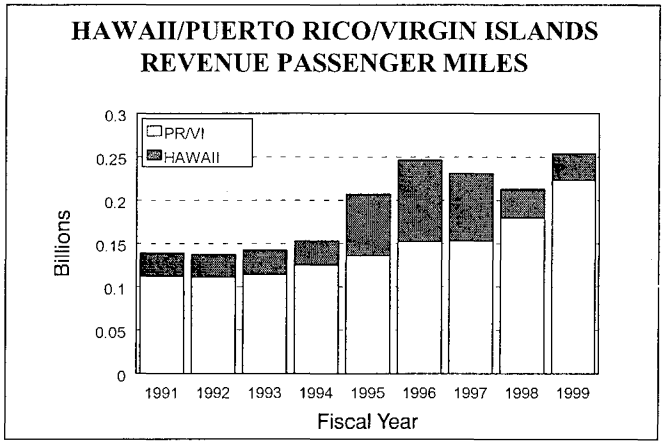
48 Contiguous States

Regional/commuter RPMs in the 48 contiguous states increased 20.1 percent in 1999, totaling just under 18.0 billion. Form 298-C carriers reported 8.7 billion RPMs, an increase of 7.6 percent. The Form 41 carriers reported 9.3 billion RPMs in 1999, an increase of 34.8 percent.



In 1999, the Form 41 carriers accounted for 51.7 percent of all RPMs in the 48 contiguous states, up from only 14.5 percent in 1990. Since 1990, these carriers' RPMs have increased from 1.0 to 9.3 billion, an average annual increase of 28.1 percent. The Form 298-C carrier RPMs increased by 4.6 percent annually during the same time period—from 5.8 to 8.7 billion. Again, the high growth rate for the Form 41 carriers is due to a combination of more carriers and rates of growth higher than the industry average.

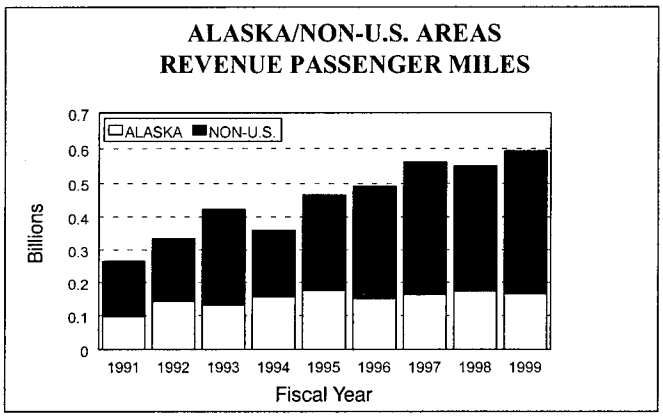
Hawaii/Puerto Rico/Virgin Islands



The combined RPMs of U.S. regional/commuter airlines operating in Hawaii, Puerto Rico, and the Virgin Islands totaled 254 million in 1999, an increase of 19.6 percent compared to 1998. RPMs in Puerto Rican and U.S. Virgin Islands markets' (223 million) were up 24.0 percent while Hawaiian RPMs (30.9 million) decreased 5.1 percent in 1999.

Alaska/Non-U.S. Areas

Regional/commuter RPMs in Alaskan and other non-U.S. areas' (Canada, Mexico and the Caribbean) totaled 594.6 million in 1999, an increase of 8.1 percent. Alaskan RPMs totaled 165.1 million (down 5.0 percent) while RPMs in the non-U.S. areas totaled 429.5 million (up 14.0 percent). The decrease in Alaskan RPMs was due to industry contraction/consolidation, and the increase in non-U.S. areas' RPMs was driven primarily by growth in Canadian and Mexican transborder (up 11.6 percent) and Caribbean traffic (up 16.0 percent).



FINANCIAL RESULTS

The regional/commuter airline industry again posted solid financial results in 1999. Industry operating revenues increased by over 9.3 percent in 1999 to just over $7.0 billion. During the same period, operating expenses increased just under 8.7 percent to $6.3 billion. This resulted in an operating profit of $695.9 million, 15.5 percent higher than the $602.5 million operating profit recorded in 1998. Through the end of fiscal year 1999, the regional/commuter industry has posted a string of 11 consecutive quarters of improving levels of operating profits.

The eight regional Form 41 air carriers' operating profit totaled $369.1 million in 1999, or 53.0 percent of the total industry operating profit. The 85 298-C regional/commuter carriers posted an operating profit of $326.8 million. However, a large part of the regional/commuter industry's operating profits was accounted for by a relatively small number of carriers, while a vast majority of the smaller operators contributed very little to industry profitability. This raises concern about the continued viability of some of the smaller 298-C operators.

Regional/commuter passenger yields in 1999 were two-and-a-half times higher than those of the larger air carriers (35.1 compared to 13.97 cents), a 3.8 percent decline from 36.5 cents in 1998. Form 41 regional operators' yield decreased from 37.5 cents in 1998 to 34.4 cents in 1999, a decline of 8.3 percent. This decline is due, in large part, to the greater efficiencies achieved by regional jets. Passenger yield for the 298-C air carriers increased slightly, from 35.5 cents in 1998 to 35.7 cents in 1999.

INDUSTRY COMPOSITION

The fundamental character of the regional/commuter industry has changed considerably since the mid-1980s. These changes include the relative size and sophistication of airline operations, the carriers involved (especially the dominant industry operators), the aircraft fleet mix, and the industry's relationship with the large commercial air carriers in the national air transportation system. But the role of the regional/commuter industry has changed very little since its inception--providing feeder service to the large hubs served by the large commercial air carriers. However, the greater use of regional jets will alter this role in the future as carriers serve longer distance point-to-point markets.

The composition of the regional/commuter airline industry continued to evolve during 1999. The factors contributing to this change include economic and competitive influences, marketing strategies, and alliances with the larger commercial air carriers. Two distinct, but interrelated, trends have provided the basis for the changing character and composition of the industry since the mid-1980s. They are industry consolidation and the increasing integration of its operations with the larger air carriers.

INDUSTRY CONSOLIDATION

The number of regional/commuter airlines has declined by almost two thirds since 1981, from 250 to only 93 carriers in 1999. The 93 operators in 1999 represent a loss of 9 carriers since 1998. However, the decline is even more dramatic since there were only 86 active carriers providing scheduled service at the end of the 1999. Because of the increased integration of operations with the larger commercial air carriers (through code-sharing agreements and acquisition of regionals, totally or in part), the success of many regionals is tied closely to the success of their larger partners. At the present time, there is no reason to assume that the trend towards further consolidation of the regional/commuter industry will not continue for at least several more years.

INDUSTRY CONCENTRATION

While the number of carriers has been declining, the size of the dominant industry carriers has been increasing, the result being increased industry concentration. In 1999, the top 50 carriers accounted for approximately 99.5 percent of total industry enplanements, a slight increase over 1998. While total regional/commuter enplanements increased by 12.0 percent in 1999, the top 50 carriers' enplanements grew by 14.6 percent. Within this group of carriers, the top five carriers alone accounted for 47.5 percent of industry enplanements and the top 10 carriers accounted for 72.5 percent of the total.

The top 50 carriers in 1999 are listed in Table IV-1. Although the relative ranking has changed, the composition of the group is basically unchanged from 1998. The top 50 carriers' data are based on DOT Form 298-C and Form 41 reporting entities. However, this listing does not fully reflect the level of industry consolidation, concentration, and integration with the large air carriers. Some of the regionals are owned, totally or in part, by their larger code-sharing partners, and still others are owned by other regionals. A total of 15 regionals are owned, totally or in part, by eight of the larger commercial air carriers, and five more are owned by four other regionals. But because of declining numbers of regional/commuter airlines, the list of the top 50 carriers has lost much of its former significance.

A truer picture of the current industry composition is presented in Table IV-2 which portrays the industry from a corporate structure point of view. As an example, American Airlines owns its three American Eagle carriers (Simmons, Business Express, and Executive). This table lists the top 20 regional/commuter corporate structures and their percentage share of 1999 industry enplanements. Viewed in this manner, it can be seen that that there is a much higher level of concentration and integration with the large commercial airlines. Enplanements of the top 20 air carriers increased by 14.9 percent and accounted for almost 97.6 percent of total industry enplanements. The top five corporate air carrier groups accounted for 68.8 percent of total industry enplanements, and the top 10 accounted for almost 90.9 percent of regional/commuter passengers.

FORECAST ASSUMPTIONS

Industry growth is expected to continue to outpace that of the larger commercial air carriers, and to be driven, in large part, by the increased demand for aviation services. The increasing number of new state-of-the-art aircraft, especially large high -speed turboprops

TABLE IV-1

TOP 50

REGIONAL/COMMUTER AIRLINES

RANKED BY TOTAL PASSENGER ENPLANEMENTS

FISCAL YEAR 1999

1. Simmons Airlines	26. ERA Aviation
2. Continental Express	27. Eagle Canyon Airlines
3. Comair	28. Astral Aviation
4. SkyWest Airlines	29. Peninsula Airways
5. Mesaba	30. Paradise Island
6. Horizon	31. Corporate Express Airlines
7. Atlantic Southeast	32. Shuttle America
8. Piedmont Airlines	33. Air Vegas
9. Mesa	34. Colgan Air
10. Atlantic Coast Airlines	35. Big Sky Airlines
11. Trans States Airlines	36. Pacific Island Aviation
12. Allegheny Airlines	37. Freedom Air
13. Executive Airlines	38. Seaborne Aviation
14. Business Express	39. Samoa Air
15. PSA Airlines	40. Harbor Airlines
16. Express Airline I	41. Viequies Air Link
17. Great Lakes	42. Taquan Air Service
18. CCAir	43. Kenmore Air Harbor
19. Gulfstream International	44. Scenic Airlines
20. Chautauqua	45. Hagland Aviation Services
21. United Feeder Service	46. Cape Smythe
22. Air Midwest	47. Grant Aviation
23. Air Midwest	48. Bering Air
24. Cape Air	49. Warblow's Air Venture
25. Aloha IslandAir	50. Frontier Flying Services

Source: DOT Form 298-C and Form 41

TABLE IV-2

TOP 20 CORPORATE STRUCTURES

Carrier/ Carrier Group	Percent of Industry Enplanements	Carrier/ Carrier Group	Percent of Industry Enplanements
1. Delta Connection	21.9	11. Gulfstream International	1.3
2. American Eagle	20.1	12. Chautauqua	1.0
3. USAirways Express	9.3	13. Commutair	0.8
4. Continental Express	8.8	14. Cape Air	0.7
5. Northwest Airlink	8.7	15. Aloha IslandAir	0.6
6. Alaska	6.9	16. ERA Aviation	0.6
7. Mesa Air Group	5.9	17. Eagle Canyon Airlines	0.6
8. Trans States	4.2	18. Midwest Express	0.5
9. Atlantic Coast	3.8	19. Peninsula Airways	0.3
10. Great Lakes	1.4	20. Corporate Express	0.2

Source: DOT Form 298-C and Form 41

and regional jets with ranges of up to 1,000 miles, is opening up new opportunities for growth in nontraditional regional/commuter markets. However, the primary role of the regional industry will remain that of feeding traffic to the major and national carriers, even as they expand into new markets with longer route segments.

The regional airline industry is expected to continue to benefit from the continuing integration of service with the larger commercial air carriers, and further route rationalization by its larger partners. The continued need of the larger commercial air carriers to reduce overall costs and fleet size, insures that these carriers will continue to transfer its smaller, marginally profitable markets to their regional partners. In fact, the increased use of regional jets is expected to lead to another round of route rationalization by the large commercial carriers, including low-density markets in the 500-mile range and beyond. Regional jets can serve these markets with the speed and comfort of a large jet, and at the same time, offer greater service frequency than would be economically feasible with larger jet aircraft. This is expected to be one of the major drivers of growth during the early years of the forecast period.

While the hand-off of selected routes is expected to accelerate during the early years of the forecast period, this phenomenon is expected to diminish considerably during the mid to latter years of the forecast period. Consequently, the rate of growth in enplanements will be lower than that experienced in the past. Also contributing to the slower growth in passenger traffic is the fact that the large commercial carriers are operating at relatively high load factors. This tends to diminish the value of additional feed traffic. As long as the major and national air carriers continue to operate at load factors of 70.0 percent or more, they may not be able to handle greater increases in feeder traffic from their regional partners.

TABLE IV-3

AIR CARRIER/COMMUTER AIRLINES CODE-SHARING AGREEMENTS

Air Carrier Program Name	Designated Commuter Carrier	Hubs Served
1. Air Tran Florida Connection	Comair	Florida
2. Alaska Airlines	Horizon*	Boise Portland Seattle Spokane
	Trans States*	Los Angeles San Francisco
3. Aloha Airlines	Aloha IslandAir	Honolulu
4. America West Express	Mesa	Columbus Phoenix
5. American Eagle	Executive Airlines* Flagship Airlines	San Juan Boston Miami New York
	Simmons*	Dallas/Ft. Worth Chicago
	Wings West	Los Angeles San Jose
6. American Connection	Aspen Mountain Air Business Express	Dallas/Ft. Worth Boston
7. American Trans Air	Chicago Express	Chicago
8. Continental Express	Continental Express	Cleveland Houston Newark
	Gulfstream International	San Juan
9. Delta Connection	Atlantic Southeast*	Atlanta Dallas/Ft. Worth New York

AIR CARRIER/COMMUTER AIRLINES
CODE SHARING AGREEMENTS (Continued)

Air Carrier Program Name	Designated Commuter Carrier	Hubs Served
9. Delta Connection (Continued)	Business Express	Boston
	Comair	Boston
		Cincinnati
		Florida
	SkyWest Airlines	Los Angeles
		Salt Lake City
10. Frontier Airlines	Mountain Air Express	Denver
11. Midwest Express	Astral Aviation	Milwaukee
		Minneapolis/St. Paul
12. Northwest Airlink	Business Express	Boston
	Express Airlines I	Memphis
	Horizon*	Portland
		Seattle
	Mesaba*	Detroit
		Minneapolis/St. Paul
	Trans States*	Los Angeles
13. Trans World Express	Gulfstream International	San Juan
	Trans States*	St. Louis
14. United Express	Atlantic Coast	Washington, D.C.
	Great Lakes	Chicago
		Denver
	Gulfstream International	Miami
		San Juan
	SkyWest Airlines	Las Vegas
		Los Angeles
		Phoenix
		San Francisco
	United Feeder Service*	Chicago
15. USAirways Express	Air Midwest	Kansas City
	Allegheny Commuter	Baltimore
		Pittsburgh
		Philadelphia

AIR CARRIER/COMMUTER AIRLINES
CODE SHARING AGREEMENTS (Continued)

Air Carrier Program Name	Designated Commuter Carrier	Hubs Served
15. USAirways Express (Cont.)	CCAir	Charlotte
	Chautauqua	Orlando
		Pittsburgh
	Colgan	Boston
		New York
	Commutair	Boston
		New York
		Syracuse
	Mesa	Pittsburgh
		Tampa
	Piedmont Airlines	Baltimore
		Charlotte
		Florida
		Philadelphia
	PSA	Baltimore
		Indianapolis
	Trans States*	Los Angeles

*Carrier operates both large aircraft (over 60 seats), and commuter aircraft.

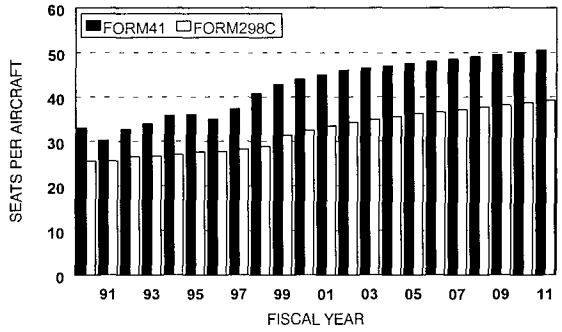
RPMs are expected to increase at a faster rate than enplanements due to the fact that the regional/commuter airlines are expected to acquire greater numbers of larger aircraft with significantly longer-range capabilities. This is expected to open up additional markets for the regional/commuter operators. Although the average passenger trip length is expected to increase significantly during the forecast period, the regional/commuter carriers will continue to serve primarily shorter-haul markets. The emphasis will be on improved service quality and schedule frequency in the markets best suited to their operations.

The baseline assumptions for the average aircraft seat size, passenger trip length, and load factor are presented in Chapter X, Table 23.

AVERAGE AIRCRAFT SIZE

The most significant change in fleet composition will result from the integration of large numbers of regional jet aircraft into the fleet, most of which fall in the "41 to 60 seat" category. These aircraft will contribute to increased public acceptance of regional airline service, and will offer the greatest potential for replacement service on selected jet routes.

AVERAGE SEATS PER AIRCRAFT



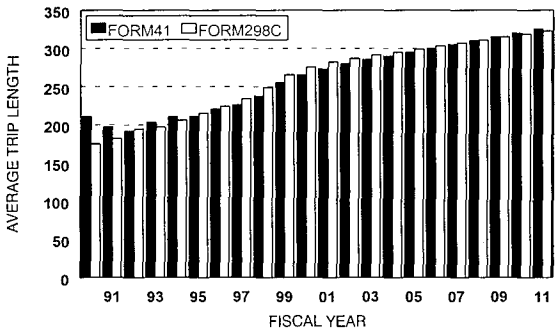
It is also expected that the regional/commuter aircraft fleet will continue to grow during the forecast period. The average seats per aircraft (calculated by dividing available seat miles by miles flown) is expected to increase by 0.7 seats annually over the 12-year forecast period, from 36.0 seats in 1999 to 44.3 seats in 2011.

Most of the growth in seat size is expected to come from those carriers operating the larger turboprop and regional jets. The average aircraft size of the Form 41 carriers is projected to increase from 42.8 seats in 1999 to 50.5 seats in 2011. The average aircraft size of 31.3 seats in 1999 for the Form 298-C carriers is expected to grow to 39.2 seats in 2011.

PASSENGER TRIP LENGTH

The growth in the average passenger trip length, and resulting higher growth in RPMs relative to enplanements, will be driven, in large part, by the increased numbers of larger regional jets and high-speed turboprops entering the regional/commuter carrier fleets. With increased speed and capacity, these aircraft can serve an expanded market area on a timely and efficient basis. The average trip length is projected to increase from 260.2 miles in 1999 to 324.1 miles in 2011, an increase of just over 5.3 miles annually.

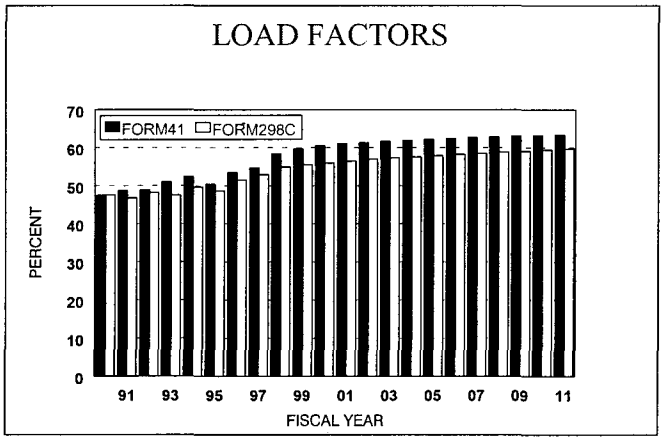
AVERAGE TRIP LENGTH



The trip length for the Form 41 carriers is forecast to increase from 255.2 miles in 1999 to 325.0 miles in 2011. For Form 298-C carriers, the trip length is expected to increase from 265.7 miles in 1999 to 323.0 miles in 2011. The higher trip length of the Form 298-C carriers reflects the dominance of regional jet operators on this carrier grouping. In 1999, the three major operators of regional jets (Atlantic Coast, Comair, and Mesa) had a combined average passenger trip length of almost 389 miles. Excluding these carriers from the statistics reduces the 298-C carries' average passenger trip length to 204.4 miles

PASSENGER LOAD FACTOR

With the introduction of larger jet aircraft into the regional fleet, the industry load factor is expected to rise slowly, as the average seat size of the fleet also increases. The average regional/commuter industry load factor is expected to increase from 57.6 percent in 1999 to 61.6 percent in 2011. It is also assumed the regional/commuter industry will continue to emphasize frequency of service. This should keep the regional/commuter load factors from reaching the level of the major airlines.



The load factor for Form 41 carriers is projected to increase from 59.7 percent in 1999 to 63.4 percent in 2011. The load factor for the Form 298-C carriers increases from 55.5 percent to 59.7 percent over the same time period.

REGIONAL/COMMUTER FORECASTS

There has been an accelerated decline in the number of 19-seat aircraft from the regional fleet as carriers move to larger, more productive sized aircraft. At this point in time the only negative effect on traffic appears to be that some very small communities have lost scheduled service. This is because they cannot be served profitably by the regional/commuter airlines using aircraft with more than 19 seats; and passenger demand at these locations cannot support service with larger aircraft.

Regional/commuter forecasts of enplanements, RPMs, fleet, and hours flown are presented in tabular form in Chapter X, Tables 24 and 25.

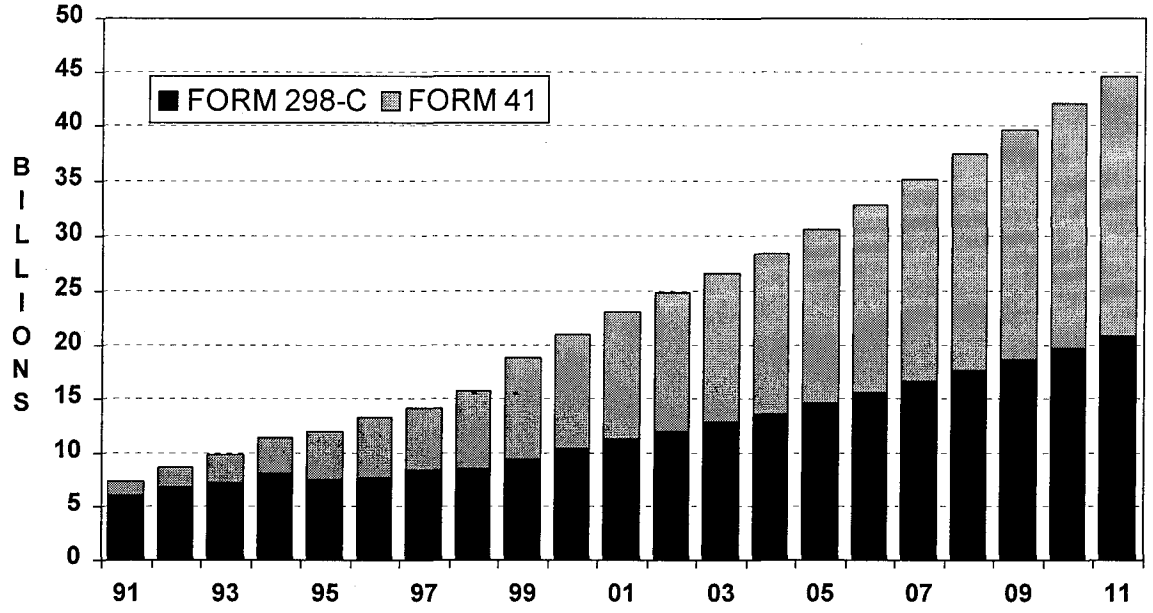
REVENUE PASSENGER ENPLANEMENTS

Regional/commuter passenger enplanements are projected to increase by 8.1 percent in 2000 (to 78.2 million), and then slow to 5.6 percent over the next four years as the U.S. economy slows. Passenger enplanements are expected to increase at an average annual rate of 5.5 percent during the 12-year forecast period, and reach a total of 137.5 million in 2011.

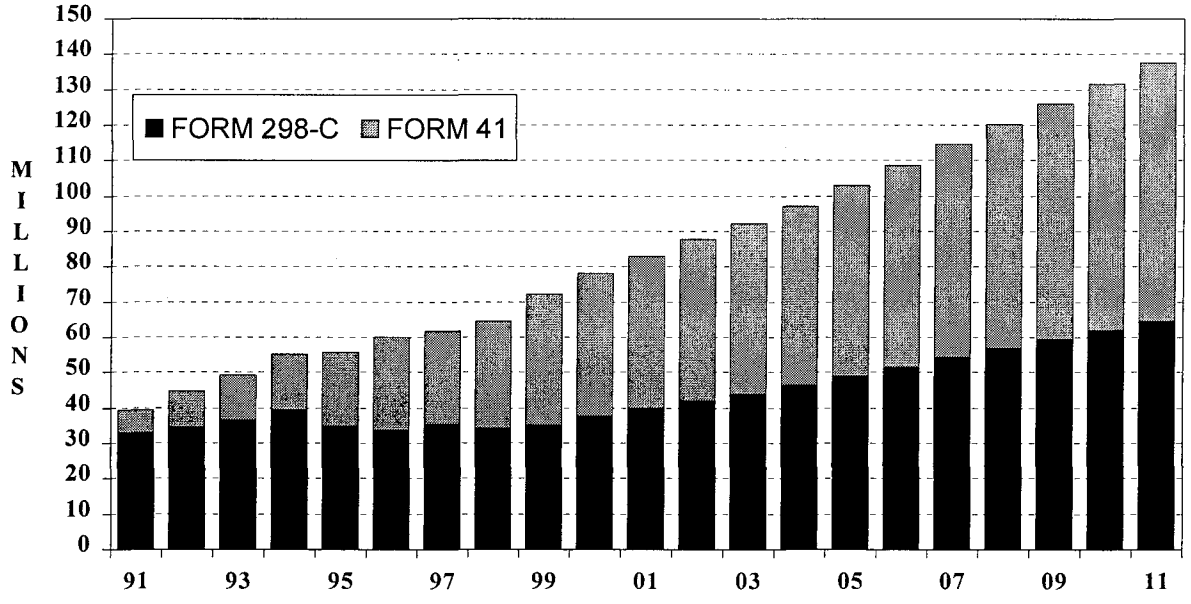
Form 41 carrier enplanements are projected to increase 8.6 percent (to 40.5 million) in 2000, and then slow to an average annual growth of 5.9 percent over the next four years. Over the forecast period, enplanements for this group of carriers are forecast to increase at 5.7 percent annually, totaling 72.9 million in 2011.

U.S. REGIONALS/COMMUTERS FORECASTS

SCHEDULED REVENUE PASSENGER MILES



SCHEDULED PASSENGER ENPLANEMENTS



Form 298-C carrier passenger enplanements are projected to total 37.7 million (up 7.6 percent) in 2000 and 39.9 million in 2001 (up 5.9 percent). Over the entire forecast period, enplanements for these carriers are expected to increase at an average annual rate of 5.2 percent, totaling 64.6 million in 2011.

REVENUE PASSENGER MILES

Regional/commuter RPMs are expected to increase 12.2 percent (to 21.1 billion) in 2000, then slow to an average growth of 7.7 percent over the next four years. RPMs are forecast to increase at an average annual rate of 7.4 percent over the 12-year forecast period, and total 44.6 billion in 2011.

Passenger miles for the Form 41 carriers are forecast to increase 13.0 percent (to 10.8 billion) in 2000 and 9.6 percent in 2001 (to 11.8 billion). During the 12-year forecast period, passenger miles are expected to increase at an annual rate of 7.9 percent, totaling 23.7 billion in 2011.

Passenger miles for the Form 298-C carriers are projected to increase to 10.4 billion (up 11.4 percent) in the year 2000 and to 11.3 billion (up 8.6 percent) in 2001. During the 12-year forecast period, passenger miles are expected to grow at an average annual rate of 7.0 percent and total 20.9 billion in 2011.

REGIONAL/COMMUTER FLEET

The current composition of the regional/ commuter fleet underscores the growth of the industry and quality of service provided. From a fleet once composed predominantly of general aviation aircraft, today's fleet is increasingly composed of new state-of-the-art turboprops and regional jets offering amenities similar to those found on large jet aircraft. Today's regional/commuter airlines have a large variety of aircraft from which to choose. Consequently, regional/commuter carriers can tailor their fleet to the specific markets they serve.

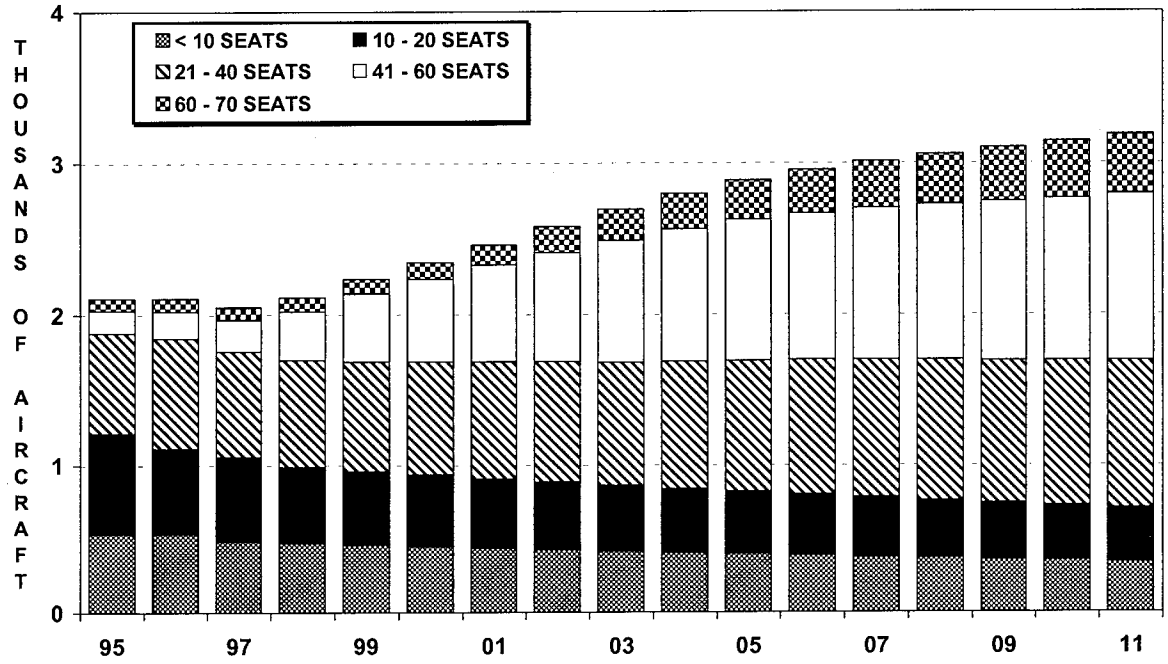
The seat categories included in this year's forecast represent a change from last year and are intended to more accurately reflect the changing nature of this fast growing industry. More specifically, the changes are intended to include categories which cover the three seating configurations of regional jets that are projected to enter the regional fleet during the next 12 years--32, 50, and 70 seats--as well as eliminate categories for which relevant aircraft no longer exist.

The average seat size of the fleet is based on the projected fleet growth and its composition within the five aircraft size categories. The growth in the average seat size of the fleet reflects the continued introduction of larger aircraft into the fleet. The fleet is projected to grow at an average annual rate of 3.0 percent, increasing from 2,237 aircraft in 1999 to 3,186 aircraft in 2011, with the average number of seats expected to increase from 36.0 in 1999 to 44.3 seats in 2011.

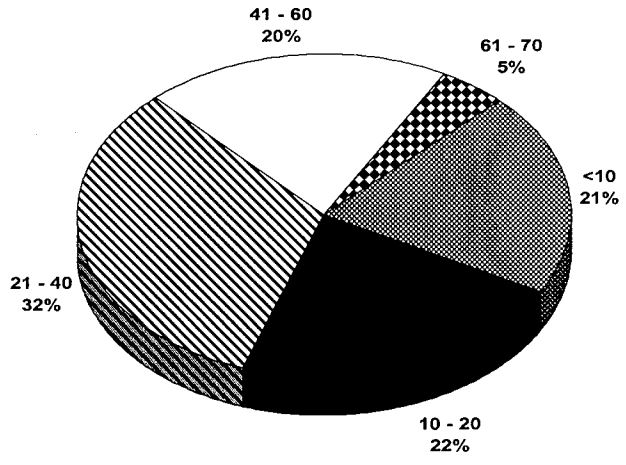
Regional aircraft having less than 10 seats once made up the bulk of the fleet--60.9 percent in 1980. In 1999, this category totaled 459 aircraft and accounted for only about one-fifth of the total regional fleet. Most of the aircraft in this category are operated by Alaskan regional carriers. Between 1999 and 2011, the number of aircraft in this category is expected to decline by 26.1 percent to 339 aircraft, and account for only 10.6 percent of the total fleet in 2011. It is assumed that the decline in this category will occur almost entirely among regional airlines operating within the 48 contiguous states.

In 1999, the "10 to 20 seats" category, which made up the largest portion of the fleet during the early to mid 1990s, continued to decline. In 1999, aircraft in this category totaled 500 (down

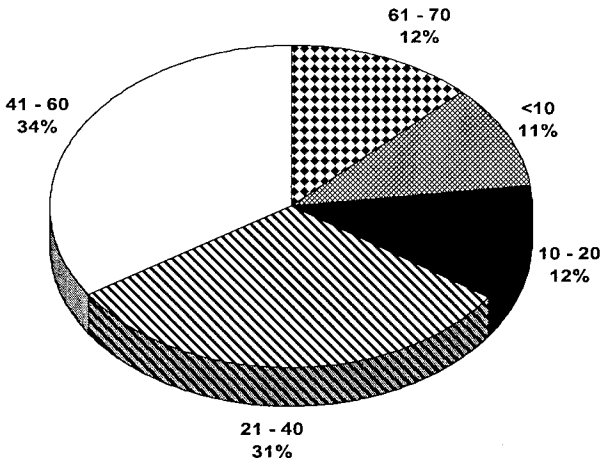
U.S. REGIONALS/COMMUTERS PASSENGER AIRCRAFT



PERCENT BY AIRCRAFT TYPE



1999



2011

3.3 percent from 1998), and accounted for only 22.4 percent of the total fleet. The recent decline in this group is expected to continue throughout the current forecast period. It is projected that the "10 to 20 seats" category will decline to 367 in 2011, and account for only 11.5 percent of the fleet in that year.

Changes in the regional/commuter airline industry are being defined by the changes taking place in the composition of the regional/commuter aircraft fleet. The introduction of regional jet aircraft will accelerate greatly during the forecast period. By the year 2011, it is projected that over 1,200 new regional jet aircraft will be added to the fleet. These aircraft will range in size from 32 seats to 70 seats. While the overall average annual growth in the regional fleet is expected to be about 3.0 percent, the number of regional jets will grow at an average annual rate of 13.4 percent. Regional jets account for 15.3 percent of the fleet today. By 2011, it is forecast that they will account for nearly half of the fleet. In 2011 22 percent of the regional jets will be in the "21 to 40 seats" category, 54percent will be in the "41 to 60 seats" group, and just over 24 percent will be in the "61 to 70 seats" category.

The greatest growth in the fleet is expected to occur in the "21 to 40 seats," "41 to 60 seats" and "greater than 60 seats" categories. This is due to the continued substitution of service and new route opportunities created through the use of larger, longer-range regional aircraft. It is projected that well over 1,500 regional jets (with up to 70 seats) will be in operation by the end of the forecast period, compared to an estimated 343 aircraft in 1999.

In 1999, aircraft in the "21 to 40 seats" category accounted for 32.8 percent of the regional fleet, the "41 to 60 seat" group made up 19.8 percent, and aircraft with "61 to 70 seats" accounted for only 4.5 percent. However, it is the growth in the "41 to 60 seats" category that will be most dramatic over the forecast period. The bulk of the regional jets that will be introduced into the fleet will fall in this category.

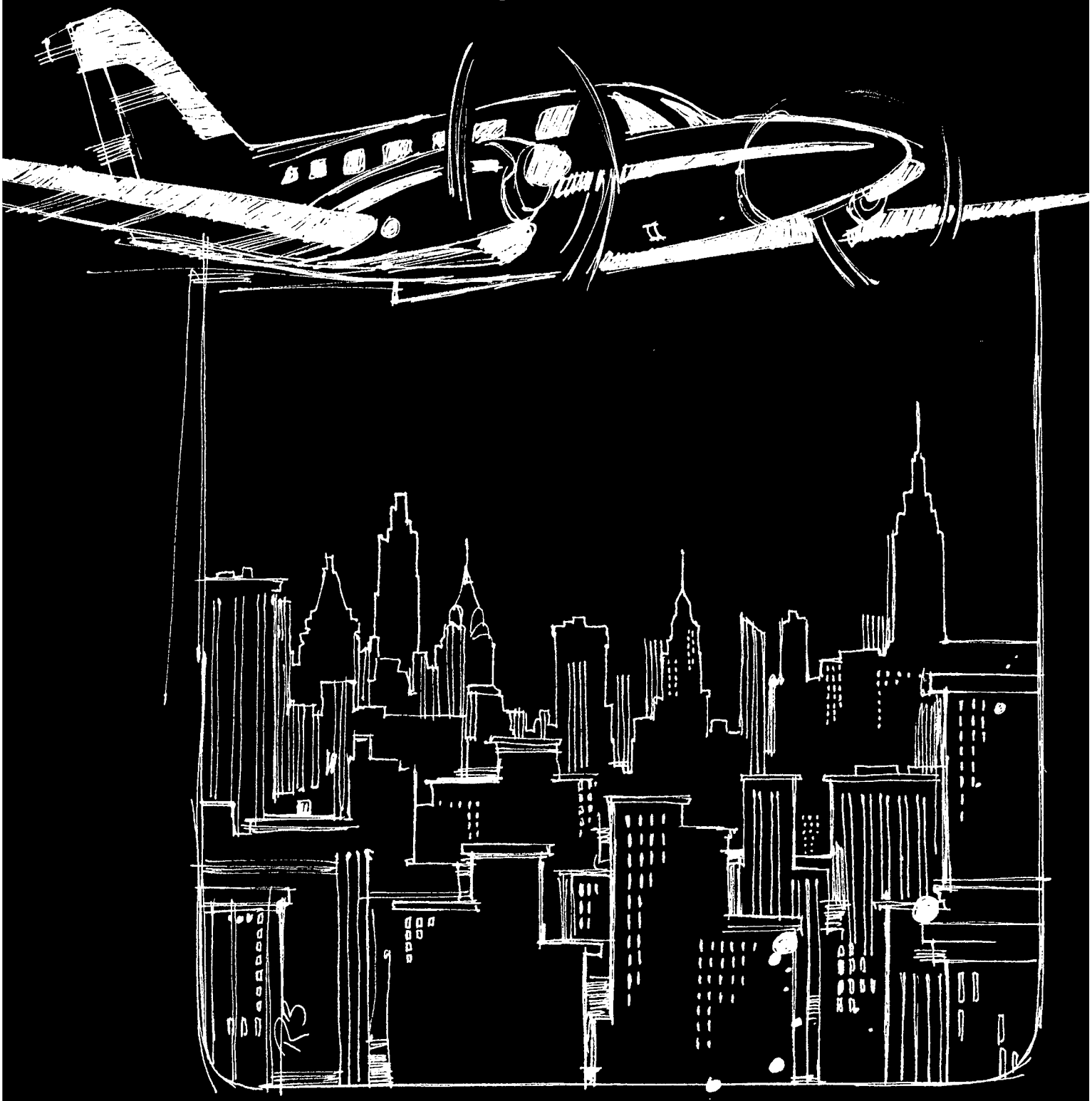
By the year 2011, these three aircraft categories are expected to account for a combined 77.9 percent of the total fleet--31.1 percent in the "21 to 40 seats" category, 34.3 percent in the "41 to 60 seats" group and 12.5 percent in the "61 to 70 seats" category. During the 12-year forecast period through 2011, aircraft having 21 to 40 seats are forecast to increase from 734 to 990, an average annual increase of 2.5 percent. The number of aircraft in the "41 to 60 seats" category is projected to increase from 443 to 1,093, up 7.8 percent on an annual basis. During the same time frame aircraft in "61 to 70 seats" category are expected to increase from 101 in 1999 to 397 in 2011, an average annual growth of 8.8 percent.

FLIGHT HOURS

Regional/commuter flight hours, as reported on DOT Form 298-C and Form 41, totaled just under 3.7 million hours in 1999, up 3.6 percent compared to 1998. During the forecast period, industry flight hours are expected to increase to 3.9 million (up 3.8 percent) in 2000 and to just under 4.0 million (up 7.3 percent) in 2001. During the 12-year forecast period, flight hours are forecast to increase at an average annual rate of 3.0 percent, totaling just over 5.3 million hours in 2011.

CHAPTER V

GENERAL AVIATION



CHAPTER V

GENERAL AVIATION

The term "general aviation" is used to describe a diverse range of aviation activities and includes all segments of the aviation industry except commercial air carriers (including commuter/ regional airlines) and military. Its activities include the training of new pilots, sightseeing, the movement of large heavy loads by helicopter, and flying for corporate/business or personal reasons. Its aircraft range from a one-seat single-engine piston to the long-range corporate jet.

General aviation is an important component of both the aviation industry and our national economy. It provides on-the-spot efficient and direct aviation services to many medium and small sized communities that commercial aviation cannot or will not provide. In addition, 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.

REVIEW OF 1998-99

It has been five years since the passage of the General Aviation Revitalization Act of 1994 and all indications are that the Act is accomplishing its purpose. The industry, hurt by rising product liability costs, had gone from producing a high of almost 18,000 aircraft in 1978 down to only 928 aircraft in 1994. The decline in production also resulted in the loss of 100,000 jobs in the industry.

With five years worth of data compiled, the success of the Act can be measured. Resurgence of the industry is evidenced by increasing general aviation activity at FAA air traffic facilities, an increasing active fleet size, and record shipments and billings of fixed-wing general aviation aircraft. While the past five years have seen a resurgence for general aviation products and services, it appears that the immediate future shows promise as well.

Promise in the future is evidenced by the industry's actions to stimulate the development and production of new general aviation products and services. New manufacturing facilities are being built and old facilities are being expanded. Dollars spent on research and development are advancing avionics and computer technology; advances expected not only to increase the safety of flying, but also to make flying easier to learn. Of course, without pilots to fly the planes there would be no industry. To stimulate growth in the pilot population, the industry is promoting flying with "learn to fly" programs.

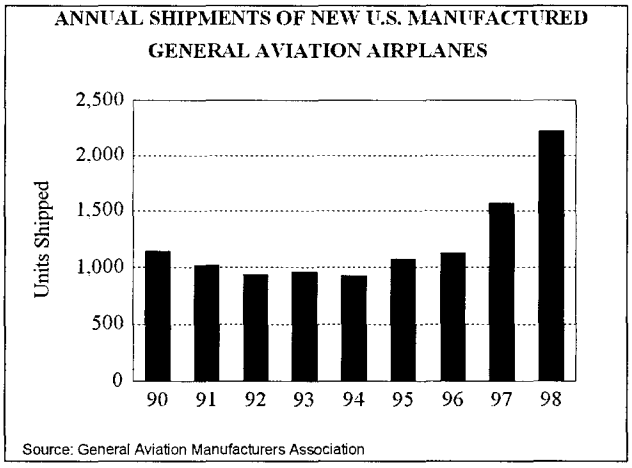
The industry is also developing programs to assist schoolteachers in bringing aviation into the classroom with the hope of encouraging students to pursue careers in the field of aviation.

What follows is a review of the industry's performance during 1998 and 1999. For the most part, results for this period have been positive. These positive results are the foundation on which the industry can plan and build for the foreseeable future.

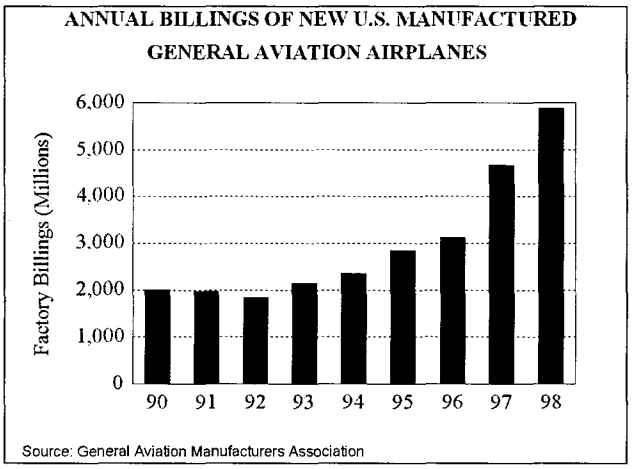
AIRCRAFT SHIPMENTS AND BILLINGS

According to the General Aviation Manufacturers Association (GAMA), sales figures show strong gains for both piston and turbojet aircraft in 1999. In the first 3 quarters of 1999, general aviation aircraft shipments totaled 1,692. This is an increase of 13.4 percent over the same period in 1998, and marks the fifth consecutive year of increased demand for general aviation aircraft. Shipments of piston aircraft and jets were up 10.8 and 26.2 percent, respectively. Shipments of turbo-prop aircraft have shown increases over the past two years, up 14.8 percent in 1998 and 8.6 percent year-to-date 1999.

The continued increase in new aircraft deliveries can be attributed to a number of factors. These include new product offerings such as the Boeing Business Jet, the Cessna Stationair, and the Mooney Eagle; a strong U.S. economy; the success being experienced by fractional ownership companies; and an increase in the number of traditional flight departments being operated by corporate America.



Total billings for the first nine months of 1999 are up 41.6 percent and total $5.5 billion, well on its way to exceeding the record $5.9 billion billed in 1998. Over the same period, export shipments are up by 12.1 percent to 399 aircraft. This represents 23.6 percent of all U.S. manufactured aircraft shipped.



PILOT POPULATION

At the end of 1999, the total pilot population totaled 640,113, almost 22,000 more pilots (up 3.5 percent) than a year earlier. All four major groupings—student, private, commercial, and airline transport—registered increases in 1999. These four groupings totaled 622,652 and accounted for 97.3 percent of all pilots in 1999. The three strictly general aviation groupings

totaled 485,010 and accounted for 75.8 percent of all pilots.

The estimated number of active student pilots increased for a third consecutive year in 1999, up 4.4 percent to 102,000. [1] Preliminary estimates indicate original student certificates issued increased 16.9 percent over the first 8 months of 1999 while the total number of student certificates issued were up 12.6 percent over the same timeframe. Increasing the number of student pilots is considered essential to the health of general aviation.

STUDENT CERTIFICATES ISSUED
% CHANGE FROM 1998 TO 1999 – ESTIMATED

Month	Original Certificates % Change '98-'99	Total Certificates* % Change '98-'99
January	13.67	8.36
February	11.03	7.92
March	19.52	16.23
April	18.72	13.24
May	30.25	23.55
June	14.32	10.62
July	14.32	10.62
August	14.32	10.62
Jan.-Aug.	16.85	12.57

*Total certificates includes original issues plus renewals.

Industry initiatives are underway to continue the positive growth in student pilots since they are seen as the future of general aviation. The industry's efforts to revive the market for its products and services will, in large part, depend on how successful its programs are in attracting new pilots. The increased supply for student pilots may not only be generated by those seeking private pilot certificates for personal enjoyment, but also for those seeking a career in aviation. Driven by the requirements of air carriers, fractional ownership providers, and corporate flight departments, there is a perceived demand for additional commercial and air transport pilots.

Private pilots totaled 258,749 (up 4.7 percent) in 1999 while the number of commercial pilots totaled 124,261 (up 1.8 percent). The number of airline transport pilots (137,642) was up 2.3 percent in 1999, the 43rd consecutive year that this category has posted increased numbers.

The number of helicopter pilots (those holding helicopter certificates only) increased by 11.0 percent to 7,728 in 1999. The number of recreational pilots (343) increased 12.5 percent in 1999 while the number of glider pilots (9,390) declined slightly.

The number of instrument-rated pilots (308,951) increased 2.9 percent in 1999. Instrument-rated pilots are currently 57.5 percent of total active pilots (excluding student and recreational pilots). This compares with only 51.0 percent in 1989, and reflects the increased sophistication of both aircraft and pilots utilizing the National Airspace System.

ACTIVITY AT FAA AIR TRAFFIC FACILITIES

General aviation activity at combined FAA and contract towered airports increased for the third consecutive year in fiscal year (FY) 1999, up 13.4 percent over the 3-year period. In FY 1999, general aviation operations totaled 40.0 million, up 5.2 percent over 1998. Most of the increase occurred in local operations (17.0 million), which were up 6.5 percent. Itinerant operations totaled 23.0 million, a gain of 4.3 percent. Since 1996, local operations are up 17.4 percent and itinerant operations up 10.7 percent.

[1] In reporting its active student pilot statistics for 1999, staff at the FAA Aeronautical Center, which maintains the official airmen certification records, noted that its reported number is likely to be in error. This is due to computer software problems that prevented the Civil Aeronautical Medical Institute from transmitting data to the Comprehensive Airmen Information System since August. Therefore, the FAA in consultation with industry representatives, developed an estimate of 102,000 active student pilots for the year 1999. This estimate is based on historical relationships between the number of student pilot certificates issued during the year and the number of active student pilots at year-end.

In 1999, of the 454 combined FAA and contract towered airports, the top 10 general aviation airports, as ranked by operations, accounted for 9.7 percent of all general aviation operations, and 5.8 percent of all operations at towered airports. Eight of the top 10 airports are located in the fast growing sun-belt states: 4 are in California, 2 are in Texas, and 2 are in Florida.

The 10 fastest growing airports, as ranked by percentage increase in general aviation operations, grew from 453,377 general aviation operations in 1996 to 880,663 in 1999, an increase of 94.2 percent. These 10 airports account for 2.2 percent of all general aviation operations. The two fastest growing airports during this three-year period were Battle Creek/Kellogg, which grew by 126.7 percent (from 44,436 to 100,733 operations), and San Antonio/Stinson, which grew by 111.0 percent (from 50,766 to 107,115 operations).

FASTEST GROWING GENERAL AVIATION AIRPORTS RANKED BY % CHANGE IN OPERATIONS: 1996-1999

Fac. Id.	City/Airport	1999	1996	% Ch. 96-99
BTL	Battle Creek/Kellogg	100,733	44,436	126.7
SSF	San Antonio/Stinson Field	107,115	50,766	111.0
DFW	Dallas/Fort Worth Int'l.	58,554	27,965	109.4
PMP	Pompano Beach Airpark	181,440	92,513	96.1
KOA	Kailua/Kona Int'l.	37,501	19,694	90.4
CVG	Covington/Cincinnati Int'l.	27,065	14,511	86.5
HUT	Hutchinson Municipal	62,636	34,545	81.3
MSP	Minneapolis-St. Paul Int'l.	99,558	55,004	81.0
FAT	Fresno Yosemite Int'l.	144,741	80,022	80.9
AVP	Wilkes-Barre/Scran. Int'l.	61,320	33,921	80.8

Two of the fastest growing airports, Pompano Beach Airpark and Fresno Yosemite International, are now included in the list of top 100 general aviation airports as ranked by operations. Pompano Beach (ranked 52), and Fresno Yosemite (ranked 77), jumped 84 and 83 notches, respectively.

Surprisingly, the list of the top 10 fastest growing general aviation airports includes three commercial air carrier hubs--Dallas/Fort Worth (DFW), Covington/Cincinnati International (CVG), and Minneapolis/St. Paul (MSP). From 1996 to 1999, general aviation operations at these three hub airports increased 109.4, 86.5, and 81.0 percent, respectively. As well, general aviation operations (as a percent of total airport operations) increased from 3.2 to 6.8 percent at DFW; from 3.7 to 5.8 percent at CVG; and from 10.7 to 19.7 percent at MSP.

General aviation activity at the 29 large hub airports (defined as an airport enplaning one percent or more of total U.S. passengers) totaled 1.3 million in 1999, an 8.5 percent increase over the 3-year period 1996 to 1999. Of the 29 large hubs, 14 recorded increased general aviation operations, while 15 registered declining general aviation activity. The three major hubs with the largest number of general aviation operations in 1999 were Las Vegas/McCarran International (127,613 operations), Minneapolis/St. Paul (99,558 operations), and Honolulu International (93,110 operations). In 1999, general aviation operations, as a percent of total operations, at these three airports, were 24.3, 19.7, and 27.0 percent respectively.

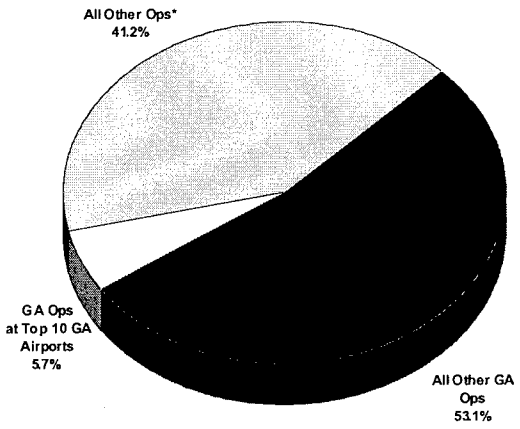
General aviation instrument operations at combined FAA and contract tower airports (20.9 million) increased 4.8 percent in 1999, up for the third consecutive year. General aviation instrument operations have now increased during 5 of the last 6 years, with activity gains totaling 17.4 percent over the period.

The number of general aviation aircraft handled at en route centers (8.8 million) was up 1.9 percent in 1999. This marks the eighth consecutive year of increased activity, a period during which general aviation activity increased 20.3 percent. While the increase in local general aviation activity coincides with a resurgence in the number of student pilots, the gains in instrument and en route operations accompany the expanding fleet of turbojet aircraft and the increase in longer-range business/corporate traffic.

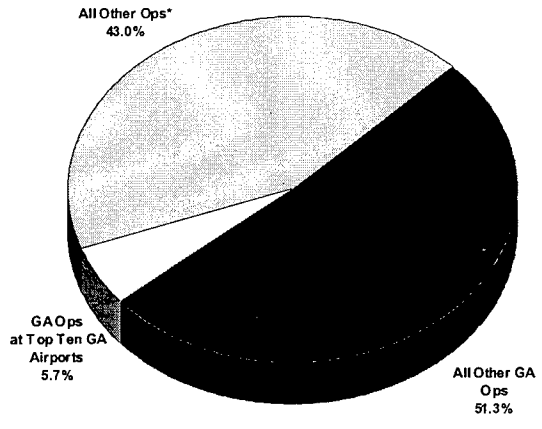
LARGEST GENERAL AVIATION AIRPORTS RANKED BY 1999 AIRCRAFT OPERATIONS

Facility ID	City/Airport	1999	1996
VNY	Van Nuys	564,979	528,659
LGB	Long Beach/Daughtery Field	480,538	467,412
APA	Denver/Centennial	401,493	361,228
DAB	Daytona Beach International	368,858	255,923
SFB	Orlando/Sanford	367,481	290,438
SNA	Santa Ana/John Wayne	358,612	373,310
PTK	Pontiac/Oakland County International	351,953	298,462
PRC	Prescott/E. A. Love Field	349,299	339,203
FTW	Fort Worth Meacham	335,908	299,309
OAK	Metropolitan Oakland International	290,175	280,800
	Operations -- Top 10 GA Airports	**3,869,296**	**3,526,343**
	Total GA Operations	**40,040,952**	**35,298,290**

PERCENT OF AIRCRAFT OPERATIONS BY AIRCRAFT TYPE



1999

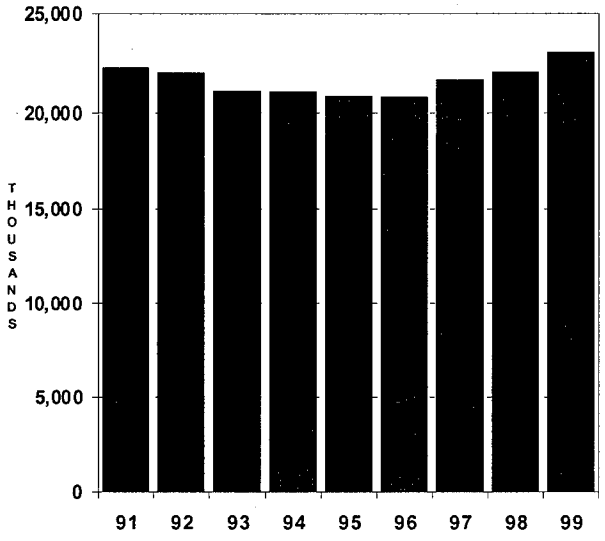


1996

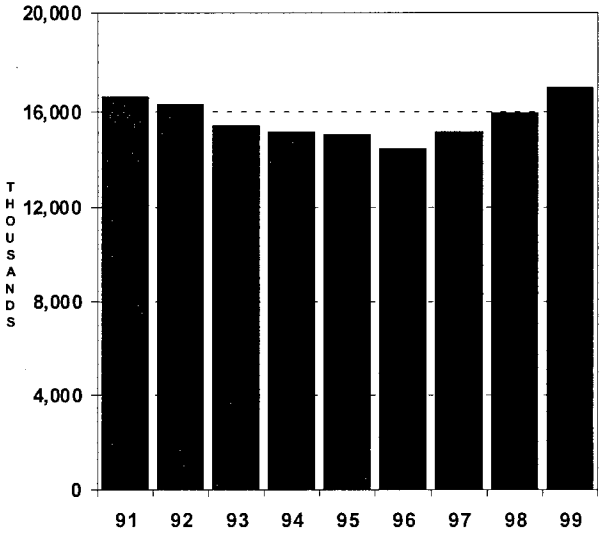
*Includes air carrier, air taxi/commuter, and military operations.

GENERAL AVIATION ACTIVITY

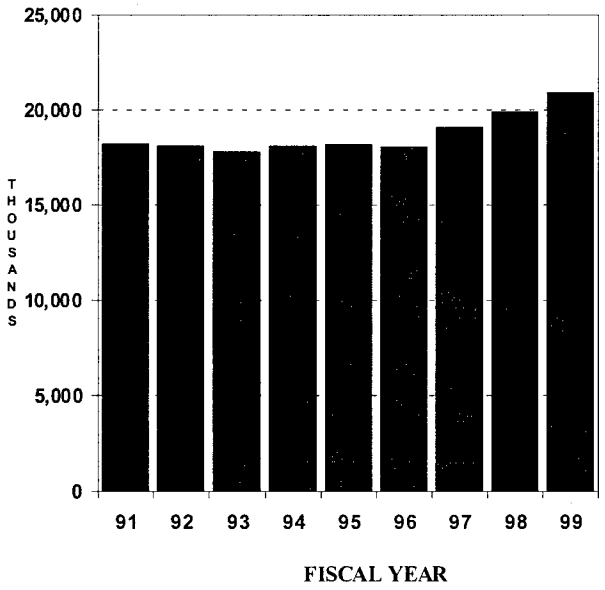
ITINERANT AIRCRAFT OPERATIONS
(FAA AND CONTRACT TOWERS)



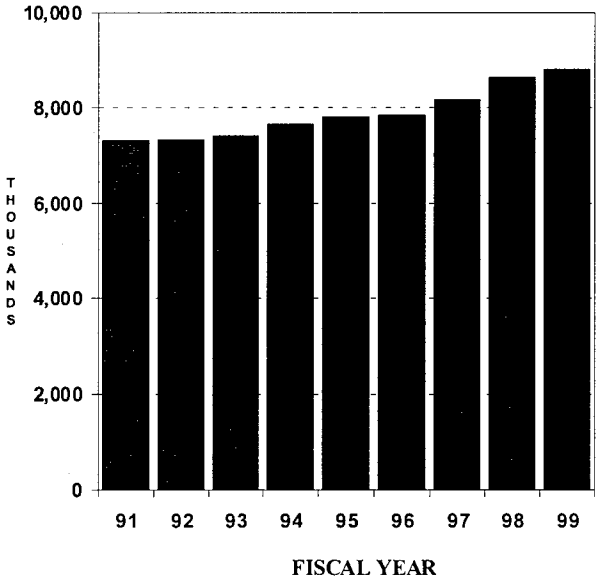
LOCAL AIRCRAFT OPERATIONS
(FAA AND CONTRACT TOWERS)



INSTRUMENT OPERATIONS
(FAA AND CONTRACT TOWERS)



IFR AIRCRAFT HANDLED AT FAA AIR
ROUTE TRAFFIC CONTROL CENTERS



1998 GENERAL AVIATION AND AIR TAXI ACTIVITY SURVEY

The historical general aviation active fleet and hours flown discussed in this chapter and Chapter VI (Helicopters) are derived from the General Aviation and Air Taxi Activity Survey. This survey is conducted annually (avionics questions are included only every second year) by the FAA's Statistics and Forecast Branch. The fleet data are estimated using a sample from the FAA Aircraft Registry. As in any sample survey, variability could be caused by traditional sampling error and by nonsampling errors. With small groups (such as, rotorcraft, turbojets, etc.), the estimates are heavily influenced not only by the number of respondents, but also by who responds. For example, if a large operator with high utilization rates for a particular aircraft type chooses to respond one year but not the next, the effect would be to reduce the activity estimates for that particular aircraft type. This would happen even if that operator had no change in activity for that particular year.

To improve on response, the survey includes a letter, jointly signed by chief executives of seven general aviation trade associations, which stresses the confidentiality of the individual survey responses and the importance of the survey data to the industry and its members. This is thought to have improved the quality of the responses, i.e., respondents were more likely to report their true activity rather than reporting that the aircraft did not fly during the year.

Several changes have been made to the survey, which have caused some discontinuities in the historical series. For a description and discussion of changes to the surveys conducted in 1993 through 1996, please refer to previous year's forecast publications. Also, with the processing of the 1997 survey data, changes in edits and estimation resulted in substantial upward revisions in survey estimates of fleet size and hours for 1995 and 1996. Estimates for earlier years have not been revised and so may not be comparable to those for 1995 and later years.

To adjust for the effect of nonresponse, telephone surveys were conducted during the summers of 1997 (1996 Survey) and 1999 (1998 Survey) to determine the utilization of aircraft whose owners failed to respond to the mail survey. Results from the 1997 and 1999 telephone surveys posed mixed results, i.e., the 1997 survey suggested that aircraft owned by those not responding to the mail survey had higher utilization rates than those who responded while the 1999 survey suggested the exact opposite. The active fleet estimates for 1991 through 1995 were revised to reflect the higher level of utilization rates recorded in the 1997 telephone survey. In effect, the historical series for 1991 through 1997 is a consistent series that can be used for developing trends.

However, based on the inconsistencies that appeared between the 1997 and 1999 telephone survey results, the combined results of the two telephone surveys were used to adjust the 1998 survey results; however, no adjustments were made to previous year estimates. This adjustment, combined with other changes in estimating procedures, has resulted in some apparent anomalies with respect to historical trends, particularly in the single and multi-engine aircraft categories. These inconsistencies and/or irregularities will be discussed in greater length in the following paragraphs that detail the numerical results of the 1998 Survey.

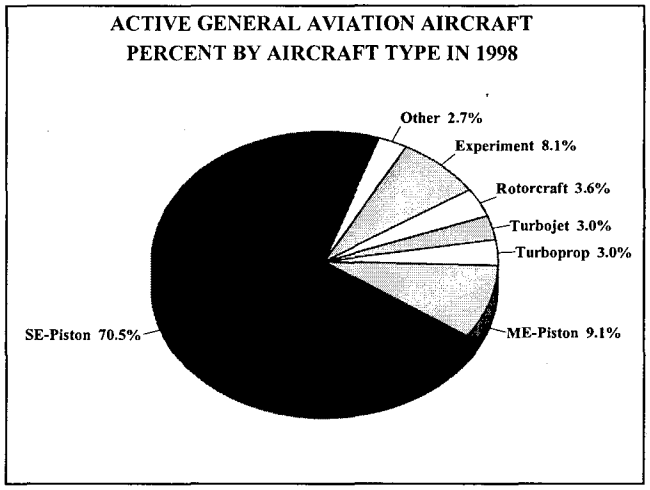
The results of the 1998 survey for active fleet and hours flown, by aircraft type and use category, as well as the fleet and hours for the period 1992 to 1997, are detailed in Tables V-1 through V-4.

The 1998 survey results, collected in 1999, for active general aviation aircraft are reported as of

December 31, 1998. The 1999 survey results for hours flown, collected in 1999, are reported as CY 1998.

ACTIVE AIRCRAFT

The "active fleet" consists of any aircraft flown at least one hour during the previous year. Single-engine piston aircraft continued to dominate the fleet in 1998, accounting for 70.5 percent of the total active fleet. The next largest groups are multi-engine piston (9.1 percent) and experimental aircraft (8.1 percent). Turboprops, turbojets, and rotorcraft make up a relatively small share of the active fleet, accounting for 3.0, 3.0, and 3.6 percent, respectively. However, the hour's chart on the following page shows that higher utilization rates (average hours per aircraft) give turboprops, turbojets and rotorcraft a disproportionate share of the total hours operated. These three aircraft categories comprise less than 10 percent of the fleet but account for nearly 23 percent of hours flown.



Based on results of the 1998 survey, the active fleet has increased for 4 consecutive years, up 18.4 percent over this 4-year period. The active general aviation fleet totaled 204,710 in 1998, a 6.4 percent increase over the 1997 estimate.

The 1998 Survey results for individual aircraft categories are as follow:

- The number of active fixed-wing piston aircraft totaled 162,963, up 4.4 percent;
  - single-engine piston aircraft increased from 140,038 to 144,234, up 3.0 percent, and
  - multi-engine piston aircraft increased from 16,017 to 18,729 up 16.9 percent.[2]

- The number of active fixed-wing turbine aircraft totaled 12,240, up 13.4 percent;
  - turboprop aircraft increased from 5,619 to 6,174, up 9.9 percent, and
  - turbojet aircraft increased from 5,178 to 6,066, up 17.1 percent.

- The active rotorcraft fleet totaled 7,426, up 9.4 percent;
  - turbine-powered rotorcraft increased from 4,526 to 4,881, up 7.8 percent, and
  - piston-powered rotorcraft increased from 2,259 to 2,545, up 12.7 percent.

- Active experimental aircraft totaled 16,502, an increase of 12.4 percent;
  - amateur builts totaled 13,189, up 28.5 percent,
  - exhibition aircraft totaled 1,630, down 9.3 percent, and
  - other experimental aircraft totaled 2,141, a decline of 18.3 percent.

- The "other aircraft" category totaled 5,580, up 36.4 percent;
  - gliders totaled 2,105, up 4.4 percent, and
  - lighter-than-air aircraft totaled 3,475, up 67.5 percent.

[2] This relative large increase can be explained by two factors: (1) an increase in the registered multi-engine piston aircraft population between 1997 and 1998 (382 aircraft); and (2) an increase in the estimated number of active aircraft in the population (from 73.3 percent in the 1997 Survey to 84.2 percent in the 1998 Survey)—an increase of 2,390 aircraft.

TABLE V-1

GENERAL AVIATION ACTIVE AIRCRAFT BY AIRCRAFT TYPE

(In Thousands)

AIRCRAFT TYPE	1998	1997	1996 1/	1995 1/	1994	1993
Fixed Wing - Total	**175.2**	**166.8**	**163.7**	**162.3**	**150.2**	**156.9**
Piston -- Total	**163.0**	**156.1**	**153.6**	**152.8**	**142.2**	**149.2**
One Engine	144.2	140.0	137.4	137.0	127.4	133.5
Two Engine	18.7	15.9	16.1	15.7	14.8	15.6
Other Piston	0.1	0.1	0.1	0.0	0.1	0.0
Turboprop -- Total	**6.2**	**5.6**	**5.7**	**5.0**	**4.1**	**4.1**
Single Engine	1.0	0.7	0.7	0.7	0.5	0.7
Two Engine	5.1	4.9	4.9	4.3	3.6	3.4
Other Turboprop	0.1	0.0	0.1	0.0	0.0	0.0
Turbojet -- Total	**6.1**	**5.2**	**4.4**	**4.6**	**3.9**	**3.7**
Two Engine	5.5	4.6	4.1	4.1	3.7	3.4
Other Turbojet	0.6	0.5	0.3	0.5	0.3	0.2
Rotorcraft -- Total	**7.4**	**6.8**	**6.6**	**5.8**	**4.7**	**4.7**
Piston	2.5	2.3	2.5	1.9	1.6	1.8
Turbine	4.9	4.5	4.1	4.0	3.1	2.9
Single Engine	4.0	3.8	3.4	3.2	2.5	2.2
Multi-engine	0.8	0.8	0.6	0.7	0.6	0.6
Other -- Total	**5.6**	**4.1**	**4.2**	**4.7**	**5.9**	**5.0**
Experimental -- Total	**16.5**	**14.7**	**16.6**	**15.2**	**12.1**	**10.4**
Total All Aircraft	**204.7**	**192.4**	**191.1**	**188.1**	**172.9**	**177.1**

SOURCE: 1993 - 1998 General Aviation Activity and Avionics Surveys.

1/ Estimates have been revised to reflect changes in edit and estimation procedures, and may not be comparable to estimates prior to 1995.

N/A = Not applicable

NOTE: Commuter aircraft are excluded from the survey beginning in 1993. Prior to 1993 Single Engine Turboprops were included in "OtherTurboprop" and experimental aircraft were included in one of the other aircraft types as appropriate.

Columns may not add to totals due to rounding and estimation procedures.

TABLE V-2

TOTAL GENERAL AVIATION HOURS FLOWN BY AIRCRAFT TYPE
(In Thousands)

AIRCRAFT TYPE	1998	1997	1996 1/	1995 1/	1994	1993
Fixed Wing - Total	**24,392**	**24,111**	**23,402**	**23,196**	**21,203**	**21,634**
Piston -- Total	**20,402**	**20,743**	**20,091**	**20,251**	**18,823**	**19,321**
One Engine	16,823	18,345	17,606	17,831	16,404	17,010
Two Engine	3,567	2,380	2,474	2,416	2,408	2,309
Other Piston	11	19	11	4	11	1
Turboprop -- Total	**1,765**	**1,655**	**1,768**	**1,490**	**1,142**	**1,192**
Single Engine	289	321	328	292	203	250
Two Engine	1,459	1,326	1,419	1,181	939	938
Other Turboprop	17	9	22	17	0	3
Turbojet -- Total	**2,226**	**1,713**	**1,543**	**1,455**	**1,238**	**1,121**
Two Engine	1,995	1,557	1,385	1,352	1,172	1,070
Other Turbojet	231	155	158	102	66	51
Rotorcraft -- Total	**2,342**	**2,084**	**2,122**	**1,961**	**1,777**	**1,699**
Piston	430	344	591	337	369	391
Turbine	1,912	1,740	1,531	1,624	1,408	1,308
Single Engine	1,415	1,311	1,282	1,218	1,049	992
Multi-engine	497	429	249	406	359	316
Other -- Total	**295**	**192**	**227**	**261**	**388**	**338**
Experimental -- Total	**1,071**	**1,327**	**1,158**	**1,194**	**724**	**785**
Total All Aircraft	**28,100**	**27,713**	**26,909**	**26,612**	**24,092**	**24,455**

SOURCE: 1993 - 1998 General Aviation Activity and Avionics Surveys.

1/ Estimates have been revised to reflect changes in edit and estimation procedures, and may not be comparable to estimates prior to 1995.

N/A = Not applicable

NOTE: Commuter aircraft are excluded from the survey beginning in 1993.
Prior to 1993 Single Engine Turboprops were included in "OtherTurboprop" and experimental aircraft were included in one of the other aircraft types as appropriate.

Columns may not add to totals due to rounding and estimation procedures.

TABLE V-3

GENERAL AVIATION ACTIVE AIRCRAFT BY PRIMARY USE CATEGORY
(In Thousands)

USE CATEGORY	1998	1997	1996 1/	1995 1/	1994	1993
Public Use	4.0	4.1	4.5	N/A	N/A	N/A
Corporate	11.3	10.4	9.9	10.6	9.4	9.9
Business	32.6	27.7	30.7	28.3	26.5	28.6
Personal	124.3	115.6	113.4	113.4	102.5	104.9
Instructional	11.4	14.7	12.7	14.2	15.0	14.5
Aerial Application	4.6	4.9	5.0	5.0	4.3	5.0
Aerial Observation	3.2	3.3	3.0	4.7	5.1	4.5
External Load	0.3	0.2	0.4	0.2	0.1	0.1
Other Work	1.1	0.7	1.0	1.1	1.2	1.0
Sightseeing	0.7	0.7	0.7	0.8	1.3	1.3
Air Tours	0.3	0.2	0.1	0.2	N/A	N/A
Air Taxi	4.9	4.8	4.1	3.8	3.8	3.5
Other	6.0	5.3	5.6	5.9	4.2	3.9
TOTAL	**204.7**	**192.4**	**191.1**	**188.1**	**172.9**	**177.1**

SOURCE: 1993 - 1998 General Aviation Activity and Avionics Surveys.
1/ Estimates have been revised to reflect changes in edit and estimation procedures, and may not be comparable to estimates prior to 1995.

N/A = Not applicable.

NOTE: Commuter aircraft are excluded from the survey beginning in 1993.

Columns may not add to totals due to rounding and estimation procedures.

TABLE V-4

TOTAL GENERAL AVIATION HOURS FLOWN BY USE CATEGORY
(In Thousands)

USE CATEGORY	1998	1997	1996 1/	1995 1/	1994	1993
Public Use	1,373	1,096	1,047	N/A	N/A	N/A
Corporate	3,213	2,878	2,898	3,069	2,486	2,635
Business	3,523	3,006	3,259	3,335	3,012	3,350
Personal	9,781	9,644	9,037	9,659	8,248	8,202
Instructional	3,961	4,956	4,759	4,410	4,382	4,626
Aerial Application	1,306	1,562	1,713	1,526	1,364	1,283
Aerial Observation	812	1,261	1,057	1,391	1,746	1,627
External Load	153	112	191	128	135	83
Other Work	286	139	265	280	241	180
Sightseeing	169	127	195	179	309	325
Air Tours	183	114	100	124	N/A	N/A
Air Taxi	2,400	2,008	1,734	1,403	1,545	1,334
Other	940	819	656	1,107	622	603
TOTAL	**28,100**	**27,713**	**26,909**	**26,612**	**24,092**	**24,455**

SOURCE: 1993 - 1998 General Aviation Activity and Avionics Surveys.

1/ Estimates have been revised to reflect changes in edit and estimation procedures, and may not be comparable to estimates prior to 1995.

N/A = Not applicable.

Note: Commuter aircraft are excluded from the survey beginning in 1993.

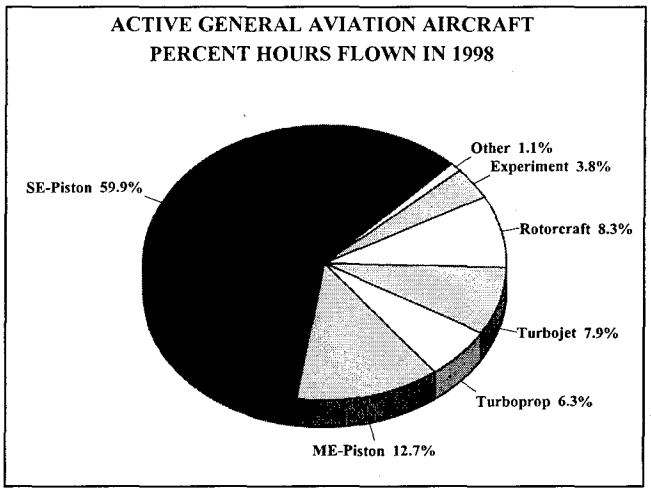
Columns may not add to totals due to rounding and estimation procedures.

One explanation for the large increases recorded in several aircraft categories stems from the relatively large increases recorded in the percentage of aircraft that were considered active in 1998. For the 1998 Survey in total, 80.2 percent of the aircraft were considered active compared to only 76.5 percent in the 1997 Survey. These increases were experienced throughout the various aircraft categories: piston fixed-wing, 83.3 percent, up from 80.7 percent; turboprop fixed-wing, 95.9 percent, up from 91.8 percent; turbojet fixed-wing, 87.1 percent, up from 85.2 percent; and rotorcraft, 82.0 percent, up from 80.3 percent.

Another explanation for the large percentage growth or declines for individual aircraft categories may be the result of understated or overstated 1997 estimates. This is particularly true for the experimental aircraft category, which recorded a 12.4 percent increase in 1998 following an 11.7 percent decline in 1997.

HOURS FLOWN

The number of hours flown by general aviation aircraft is also up for a fourth consecutive year in 1998. The hours flown by general aviation aircraft totaled 28.1 million, a 1.4 percent increase over the level reported in 1997 [3] and a 16.6 percent increase over the past 4 years.



The 1998 Survey results for the individual aircraft categories are as follow:

- Hours flown by fixed-wing piston aircraft (72.6 percent of total hours flown) totaled 20.4 million, a decline of 1.7 percent;
  - single-engine piston aircraft hours (16.8 million) a decline of 8.3 percent,
  - multi-engine piston aircraft hours (3.6 million) were up 49.9 percent.

- Hours flown by fixed-wing turbine aircraft increased 18.5 percent, totaling 3.9 million;
  - hours flown by turboprop aircraft were up 6.6 percent, and
  - hours flown by turbojet aircraft were up 29.9 percent.

- Rotorcraft hours flown (2.3 million) were up from 1997;
  - turbine powered rotorcraft flew 1.9 million hours (up 9.9 percent), and
  - piston powered rotorcraft flew 0.4 million hours (up 25 percent).

- The number of hours flown by experimental aircraft (1.1 million) dropped 19.3 percent over the year, despite the increase in active fleet size.

[3] The relatively low growth in hours flown in 1998 is, in large part, the result of significantly lower calculated utilization rates for the single engine piston aircraft—from 131 hours in 1997 to 117 hours in 1998. This appears to be the result of two factors: the nonresponse adjustment; and an apparent 27.6 percent decline in single engine aircraft instructional hours (average utilization of 348 hours). The decline in instructional hours is inconsistent with information received from informal discussions of industry representatives.

PRIMARY USE OF AIRCRAFT

A public use category was added to the Survey in 1996. Because of this change in classification of activity, comparisons with 1995 or earlier data should be made with care.

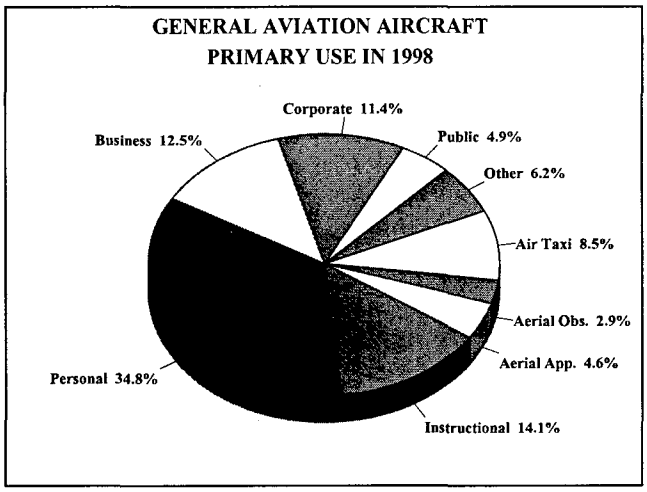
Personal (34.8 percent) and instructional flying (14.1 percent) were the two largest uses of general aviation activity in 1998, accounting for 48.9 percent of all hours flown. Personal use flight hours (9.8 million) were up 1.4 percent from 1997. Instructional (4.0 million) hours were down 20.1 percent from 1997.[4]

Business (12.5 percent) and corporate (11.4 percent) flying, the third and fourth largest uses for general aviation, are up from 1997. Corporate hours increased one percentage point over 1997, while business hours increased 2.3 percentage points. Turbojet hours in corporate and business use supported this trend, increasing 17.3 percent over 1997. This increase is consistent with the increased numbers of business jets delivered over recent years.

Air taxi activity (8.5 percent of hours flown) was up 19.5 percent in 1998, and up 71.1 percent over the past three years. With the explosive growth in the demand for fractional ownership, some of its overflow of corporate/business activity is being contracted to air taxi operators. This could result in higher than expected air taxi hours and lower than expected reporting of corporate/business flying.

In 1998, hours for aerial observation (0.8 million, 2.9 percent of total hours) were down 35.6 percent. Public use, 4.9 percent of all hours flown, increased by 25.3 percent over the year.

Aerial application (1.3 million, 4.6 percent of all hours) recorded a 16.4 percent decline in 1998. External load, other work, sightseeing and air tours accounted for a combined 2.8 percent of general aviation hours while other uses accounted for the remaining 3.3 percent of activity.



REVITALIZATION OF AN INDUSTRY

General aviation continues to be a dominant force in aviation. At year end 1998 there were 18,770 civil and joint use airports/heliports in operation, with 5,352 available for public use. Of these, 660 airports had commercial service certificates (also used by general aviation). This leaves a total of 18,110 airports/heliports (96.5 percent) used exclusively by general aviation aircraft with 4,692 available for public use.

General Aviation represents the largest percentage of civil aircraft in the United States and accounts for the majority of operations handled by towered and nontowered U.S.

[4] The estimated decline in instructional hours for 1998 appears inconsistent with industry and government statistics on student pilot trends in 1998-99. One suggested explanation for the decline is that a large percentage of student pilot training is being shifted to University flight schools. The contention is that university aircraft are either being under sampled or that the owners of the aircraft (generally banks or other lending institutions) are not responding to the survey.

airports, as well as for the majority of certificated pilots in the U.S.

In 1998, there were over 211,000 active civil aircraft in the United States. This includes 204,710 active general aviation aircraft (almost 97 percent of the active fleet), over 5,000 jet aircraft operated by large air carriers (Part 121), and 2,030 regional/commuter aircraft (Part 135).

Of the 640,113 certificated pilots in 1999, general aviation, (excluding those with airline transport ratings), accounted for 75.8 percent of the total. As well, in 1999, general aviation itinerant and local operations totaled 40.0 million, over 58 percent of the total 68.1 million operations at towered and nontowered U.S. airports.

OPTIMISM IN THE INDUSTRY

August of 1999 marked the fifth year since the passage of the General Aviation Revitalization Act. During this 5-year period the industry has witnessed the following: the creation of 25,000 new jobs; a 100 percent increase in the production of general aviation aircraft; a doubling of revenues from the export of general aviation aircraft; a 150 percent increase in investment into research and development by general aviation companies; and increased numbers in student pilot starts.

General aviation is also coming off another record year for billings in 1999, and though starting from very low levels, the past few years have brought impressive growth in the numbers of aircraft shipments. While turbojet shipments were up substantially in 1998, the market continues to be dominated by shipments of piston aircraft. New products have entered the market and new manufacturing facilities have been opened and/or expanded. Student pilot certificates issued are increasing.

The strength of the recovery and the positive outlook throughout the industry can be attributed to a strong U.S. economy and the passage of the General Aviation Revitalization Act in 1994, which brought product liability reform to the industry.

From 1994 through 1998, shipments of general aviation aircraft have increased at an average annual rate of over 24 percent, from 928 units shipped in 1994, to 2,220 units shipped in 1998. It appears that 1999 will also show an increase in shipments once again.

One reason for the rise in shipments is the success of the Cessna single-engine piston models introduced in 1997. Cessna has now recently announced both plans and orders for four new Citation models, the CJ1, CJ2, Sovereign, and Ultra Encore. It is also anticipated that Raytheon will begin deliveries of its Premier I, an entry-level jet that features a composite fuselage with metal wings, this year. Raytheon will follow delivery of the Premier I with its Hawker Horizon, for which deliveries are scheduled to begin in 2001. Mooney is set to begin deliveries of its new aircraft, the Eagle. The New Piper Aircraft, Inc., recently rolled out its first turbine-powered aircraft, the Malibu Meridian, and is expected to begin deliveries on that model in 2000.

Another sign of optimism to the industry is the entry of commercial manufacturers into general aviation. Boeing Business Jets plans to build a larger version of its long-range corporate jet – the BBJ 2. Boeing Business Jets, a joint enterprise of Boeing and General Electric, entered the market a year ago with the long-range BBJ based on a hybrid of the 737-700/ 800 aircraft. Twenty-eight aircraft have been delivered to date. The first BBJ 2 is expected to be delivered by early 2001, and five orders are anticipated by the end of 1999. Airbus and Fairchild are also marketing business jets based on aircraft originally designed for commercial operations.

At the entry level, some kit builders are now becoming production companies. Cirrus Design and Lancair recently received type certificates and will begin delivering production aircraft.

Since their start in the 1980s, fractional ownership providers have steadily been increasing their customer base. Currently, the five major companies in the industry are Executive Jets' Netjets, Bombardier's Flexjet, Raytheon's Travel Air, Flight Options, and TAG Aviation.

From 1993 through the end of 1998, these five major fractional ownership providers have increased their fleet size and shareholders at average annual rates of 65.2 and 66.1 percent, respectively. According to AvDataInc as of September 1999 the fractional ownership fleet numbered 329, and shareholders totaled 1,567. Despite this record growth, it is believed only a small percentage of this market has been developed.

Fractional ownership programs are filling the niche for corporations, celebrities, and business people that do not generate enough flying to warrant a flight department. Fractional ownership providers offer the customer a more efficient use of his time by providing a faster point-to-point travel time and the ability to conduct business while flying. In addition, shareholders of fractional ownerships find the minimum startup concerns, and easier exiting options of great benefit.

While the fractional ownership fleet and shareholders have been growing, so to have the turbine business fleet and flight departments of U.S. businesses, which currently total 12,938 and 8,625 respectively. From 1993 to 1998, the turbine aircraft fleet grew at an annual rate of 5.3 percent while the number of flight departments grew at an annual rate of 4.1 percent.

The business aviation community was initially concerned that the success of fractional ownership programs would result in a shut down of corporate flight departments. These concerns have not come to fruition. Fractional ownership providers generally find their business base to be first-time users of corporate aircraft services, users that traditionally utilized commercial air transportation services. Once introduced to the benefits of corporate flying, some users of fractional programs found it more cost beneficial to start their own flight departments, instead of incurring the costs of a larger share in a fractional ownership program. As a result, the fractional ownership community may be partially responsible for the increase in traditional flight departments since 1993.

Future aircraft production schedules are being increased to meet the expected renewed demand for general aviation aircraft. The Allied Signal *Business Aviation Outlook* forecasts delivery of nearly 6,800 business aircraft over the 2000 to 2010 time period. This is up by 300 aircraft over last year's forecast. The increased numbers result from the demand of new and derivative aircraft models entering service with corporate flight departments, the fractional ownership market growing at double-digit rates, and projected strong economic growth in the United States, Europe, and Latin America.

The market for good, used aircraft has also remained solid. Based on figures from AMSTAT Corporation, (a research organization providing information on the business aircraft market) the National Aircraft Resale Association reported 718 turbojet and 670 turboprop transactions from January through June 1999. Compared to the same 1998 period, turbojet transactions showed a slight decrease of 1.9 percent, while turboprop transactions posted a 9.0 percent gain. It is anticipated that used aircraft sales will remain steady as the U.S. economy grows, and the world economy strengthens.

The number of amateur-built experimental aircraft in the general aviation fleet has increased consistently for more than a quarter of

a century, from 2,100 in 1970 to almost 22,000 today. It is estimated that more than 75 percent of these are active aircraft. According to the industry, about 3,200 kits were sold in 1997 and at least 1,600 are expected to be sold in 1999. The completion rate is about 63 percent (Kit Planes). The popularity of the amateur-built aircraft results from several factors, including affordability and performance. Amateur-built experimental aircraft represent a test-bed for new technologies that will eventually be introduced in the development and manufacture of the next generation of light general aviation production aircraft. The strength of the used aircraft market and the success of the kit aircraft market demonstrate that demand still exists for affordable aircraft.

The 1998 Nall Report, an annual general aviation safety report published by the Aircraft Owners and Pilots Association's (AOPA) Air Safety Foundation, states that in 1997 general aviation celebrated the safest year ever. The 1997 overall general aviation accident rate per 100,000 flying hours has declined over the past 25 years, and is the lowest since 1938, the first year for reporting of accident statistics.

FAA/Government Programs/Initiatives

The partnership between the FAA and the general aviation community is a continuous joint effort aimed at fostering industry improvements and aviation safety.

The FAA is working together with the European Joint Aviation Authority (JAA) and the general aviation industry toward sharing the same standards for certification, units of measure, and basic operational requirements. In February 1996, a new set of "common harmonization patterns" for both U.S. and European small aircraft was developed. These standards apply to new types of aircraft and are intended to expedite certification and increase safety standards. Under these rules, U.S. manufacturers can use the same standard aircraft design to comply with U.S. regulations as well as those in each JAA member country.

At the FAA/JAA 16th Annual Harmonization Conference this past June, the FAA and JAA agreed to support industry's proposal of adopting the "most stringent" of each other's transport category rules, with a few exceptions. The benefits of harmonization for business and general aviation aircraft go beyond their manufacture and maintenance. Harmonization also applies to the infrastructure and air traffic procedures. With harmonization, the hope is to create a seamless international operating environment.

In addition, the FAA is continuing to expend considerable effort to obtain the cooperation of aviation authorities in Russia, China, and elsewhere to develop common aviation standards. These initiatives, combined with efforts by industry, could tap vast new markets for general aviation products in places where general aviation does not currently exist.

FAA Administrator, Jane F. Garvey, has stated that it is FAA policy to foster general aviation while continuing to improve its safety. To this end, a safety program called "Safer Skies" has been established. Together with industry, the FAA will use the latest technology to analyze U.S. and global data to find the root causes of accidents so as to determine the best actions for breaking the chain of events that lead to accidents. For general aviation this means the FAA will embark on major data improvements, including quality, collection, and analysis. Safety areas to be focused on for the General Aviation community are pilot decision making, loss of control, weather, controlled flight into terrain (CFIT), survivability, and runway incursions.

The FAA, the National Aeronautics and Space Administration (NASA), industry, and other government agencies and universities, are working together to improve the safety and efficiency in our transportation system. To this end, NASA and FAA are planning the Smart Air Transport System (SATS) –based on the National General Aviation Roadmap. It is believed that the SATS can satisfy 21st century transportation demand by relieving pressure on existing ground and air systems, and by creating access to more communities in less time. The infrastructure to support the SATS will be "smart" airports that integrate emerging communication, navigation, and surveillance technologies to produce new levels of utility for the Nation's smaller airport infrastructure. Some of the stated goals of SATS are: increase mobility and accessibility by a factor of ten (from 30-50 miles to 300-500 miles, and from 400 airports to 4000 landing facilities) in ten years; reduce the time it takes to become a pilot from 7 months to 3 months; reduce the associated costs of learning to fly by 24 percent; and finally, increase safety with advances in engine design, airframe, and avionics.

FAA and NASA have also collaborated with the general aviation community in research programs aimed at fostering new technologies in general aviation. Two such programs are AGATE (Advanced General Aviation Transportation Experiments) and GAP (General Aviation Propulsion).

The AGATE Consortium, provides a unique partnership between government, industry, and academia. The goal of AGATE is to utilize new technology to produce aircraft that are safer, easier to operate, and more affordable to today's pilot. This will be accomplished through utilization of improved avionics, more crashworthy airframes, and pilot training.

NASA's GAP program focuses on development of improved piston and turbine engines. Under the GAP program, two companies have been contracted and are in the midst of 3-year design projects for new, smoother, quieter, and more affordable engines. The goal is for NASA, aircraft manufacturers, and supplier industries to work together by sharing their technical expertise, financial resources, and facilities to demonstrate new general aviation propulsion systems.

Teledyne Continental Motors, working with its government partners has designed and will demonstrate in 2000 a revolutionary intermittent combustion aircraft engine, the CSD-283. The new engine is to be used in the development of an entry-level, single-engine general aviation aircraft with four seats and a cruising airspeed of about 200 knots. The engine is expected to be more fuel efficient and environmentally friendly and will have lower acquisition and maintenance costs.

Williams International is also working with the partnership to introduce an ultra-quiet, more efficient turbofan engine with low exhaust emissions, the FJX-2. The new design is expected to improve the cruise speed and range of general aviation aircraft at costs competitive with piston engines. It is expected to be flight demonstrated in 2000. In addition, Century Aerospace Corporation has announced plans to reconfigure its CA-100 to a twin engine using the new Williams turbofan engines.

One of the goals of FAA's Safer Skies initiative is to improve weather and other flight information. The Flight Information Service (FIS) program plans to put real time weather information in the cockpit.

The FAA is also committed to improving navigation through satellite based systems such as the Global Positioning System (GPS) for airport precision approach. The FAA is also pursuing Wide Area Augmentation System (WAAS). WAAS is an augmentation to GPS that supports navigation in all phases of flight, improving positional accuracy with a series of ground reference stations monitoring GPS signals. The initial 25 WAAS stations have

been installed and certification is expected by year end 2001. Most IFR aircraft are expected to have GPS/WAAS by 2005.

To promote training of engineers to participate in the advancement of general aviation technology, NASA and the FAA sponsor an annual General Aviation Design Competition for students at U.S. aeronautical and engineering universities. The American Helicopter Society, NASA, and helicopter manufacturers sponsor a similar contest for vertical flight. Students are expected to design their own general aviation aircraft in a manner that focuses on current design challenges.

Manufacturer and Industry Programs/Initiatives

The fractional ownership industry was started just over thirteen years ago and since that time has provided corporate flying services to companies that could not otherwise justify the costs associated with operating a flight department. During this time, fractional ownership providers have operated under Federal Aviation Regulation (FAR) Part 91, which governs general aviation. However, there is pressure for fractional ownership providers to operate under Part 135 regulations that govern commercial aircraft such as air carriers, air taxi, and charters. FAR Part 135 providers regard fractional ownership providers as competition that benefits from the right to fly under the less restrictive FAR Part 91 standards.

The fractional ownership community is concerned that the additional costs and restrictions that will be imposed on them if they are required to operate under Part 135, do not offer any enhancement to safety. Restrictions imposed on Part 135 operators would include having to use airports with longer runways and approved weather and weather equipment. Perhaps the most serious implication of this proposed change for the fractional ownership community is that it would limit the number of airfields available to its members. The implications of operating under Part 135 are not only domestic. If required to operate under Part 135, fractionals would no longer be treated as private owners in foreign countries, and the fractionals would be governed by international bilateral agreements.

The FAA has established a formal rulemaking committee, consisting of members from aircraft manufacturers, corporate flight departments, charter operators, fractional owner providers and their customers, and business aircraft management companies. The committee will review current Federal Aviation Regulations regarding fractional ownership activity and propose revisions as may be appropriate. As this publication goes to print, the committee has prepared a draft proposal that would require fractional ownerships to operate under a subpart of Part 91. However, the committee has not officially transmitted the proposal to the FAA. In addition, the FAA will need to access the economic impact of the proposed before it issues a notice of proposed rulemaking.

Manufacturers are launching programs to make aircraft ownership easier. The New Piper Aircraft, for example, created Piper Financial Services (PFS). PFS offers competitive interest rates for the purchase and/or leasing of Piper aircraft. The Experimental Aircraft Association (EAA) has entered into an agreement with TFC Textron (formerly Green Tree Aircraft) to finance kit built planes. The general aviation industry is also seeking to increase the number of lending institutions that offer special low, competitive rates for aircraft financing.

The fractional ownership market continues to grow. Executive Jet Aviation, purportedly the single largest nonmilitary purchaser of aircraft, continues as the dominant name in fractional ownership. Since 1993, Executive Jet has ordered 386 new aircraft. They continue to add three to four new aircraft per month to meet the

demand of new NetJets owners. In 1998, Executive Jet took delivery of 44 new aircraft, bringing their fleet total to 118. They expect to have an additional 51 new aircraft delivered in 1999. Because of the success of the NetJets program, 150 new pilots were hired in 1998, and an additional 200 pilots are expected to be hired during 1999.

Raytheon provides a fractional ownership program through their Travel Air subsidiary. Travel Air is expected to operate 56 jets by year-end 1999, up almost 20 aircraft from this time last year, and expects to have 400 shareowners by the end of 1999. Raytheon reports that 80 percent of Travel Air's shareowners are first-time business aircraft owners. Bombardier Aerospace's fractional ownership program (Flexjet) is expected to operate 87 aircraft by year-end 1999, up from 59 aircraft a year earlier, and has over 200 customers through their FlexJet program. Fractional ownership providers have greatly increased the accessibility of aircraft ownership for many that could not otherwise afford it.

Over the past several years, the general aviation industry has launched a series of programs and initiatives whose main goals are to promote and assure future growth within the industry. These include the "No Plane, No Gain" program sponsored jointly by GAMA and the National Business Aviation Association (NBAA); "Project Pilot" sponsored by AOPA; the "Flying Start" program sponsored by EAA; and "BE A PILOT."

"No Plane, No Gain" is an advocacy program created in 1992 by GAMA and NBAA to promote acceptance and increased use of business aviation. The program promotes business aviation as a cost-effective tool for increasing the efficiency, productivity, and profitability of companies.

AOPA's "Project Pilot" promotes the training of new pilots in order to rebuild the pilot population. AOPA believes students that have mentors offering advice and help as training progresses are more likely to complete their training than students who don't have mentors. By year-end 1999, AOPA claimed that over the course of the program more than 22,910 members had identified and mentored nearly 33,240 students.

The "BE A PILOT" program is jointly sponsored and supported by more than 100 industry organizations. The program, which started in 1996, encourages people of all ages to "Stop Dreaming, and Start Flying." The approach is multi-faceted: (1) create an influx of new pilots; (2) generate flight training leads; (3) encourage improvement in flight school marketing, and; (4) secure additional funding to expand the effort. "BE A PILOT" started issuing "introductory flight certificates" to interested respondents in May 1997. The certificates can be redeemed for a first flight lesson at a cost of $35. To date, over 75,000 certificates have been requested. The program has over 1,600 participating flight schools and attracts new market entrants via the Internet and cable-television advertising.

Several industry organizations are also targeting young people through the Internet to peak their interest in the world of aviation. The NBAA sponsors "AvKids," a program designed to educate elementary school students about the benefits of business aviation to the community, and career opportunities available to them in business aviation. The National Agricultural Aviation Association is in the process of developing a webpage with information on careers in aerial application. GAMA offers publications, awards, and scholarships to bring education into the nation's classrooms. AOPA's "Apple Program" brings aviation into the classroom, targeting middle and high school students.

GENERAL AVIATION FORECASTS

The general aviation forecasts discussed in the following paragraphs are based on a set of economic assumptions—continuous moderate and sustained economic growth both in the United States and worldwide.

The forecast also assumes that the regulatory environment affecting general aviation will not change dramatically. Specifically, the forecast assumes general aviation activity will not be subject to new user-fees or limited access to airports and airspace. It is also assumed that noise and emissions requirements on business turbine aircraft will remain within the bounds prescribed by current rules and regulations.

In addition, the forecast assumes that the flight school infrastructure will be improved, and that the industry will be more efficient at keeping consumers interested in aviation through promotional "learn-to-fly" activity. As well, it is assumed that new product announcements will enter the market and live up to their expectations in regard to price, performance, and availability.

Finally, the forecast assumes that the fractional ownership market will continue to grow and bring new operators and shareholders into business aviation. The forecast also assumes that the fractional ownership community will not by inhibited by certification and regulatory requirements.

To the extent that industry and government programs/initiatives are successful in expanding the market for general aviation products and services, the forecasts discussed in the following pages are likely to be achieved or possibly exceeded. If the industry and government programs are less than fully successful, the active general aviation fleet, hours flown, and pilots could be considerably lower than forecast.

The assumptions and growth rates developed at the FAA/Transportation Research Board's (TRB) 11th International Workshop (September 15-17, 1999) were used, with modification, in the preparation of this year's general aviation forecasts. FAA/TRB workshop assumptions and projections were supplemented with input from others in the industry, and more current activity indicators collected by FAA. The findings and conclusions of the workshop panels, including the three panels on general aviation--Light General Aviation, Business Aviation, and Vertical Flight--will be published in March 2000. [5]

The current forecasts for the general aviation active fleet, hours flown, and fuel consumption use the data obtained from the 1998 survey as the base year. Therefore, the forecast period for these three activity measures extends from 1999 through 2011, and references to average annual growth rates for the forecast period include 13 years. Forecasts for certificated pilots are based on 1999 data obtained from the official airmen certification records maintained at the FAA Aeronautical Center in Oklahoma City. The forecasts for these series extend from 2000 through 2011, and the average annual growth rates include 12 years.

ACTIVE FLEET

The forecasts of the active general aviation fleets is based, in large part, on panel discussions at the September 1999 TRB workshop. In any year, the U.S. fleet is assumed to be the sum of new production flowing into the fleet, the fleet size carried over from the previous year, and the attrition of existing aircraft during the current year. Attrition occurs from net exports, retirements, and write-offs.

[5] Copies of the Report can be obtained from the Transportation Research Board, National Research Council, 2101 Connecticut Avenue, NW, Washington, DC 20418.

New production depends on economic growth and corporate profitability, new product development and introduction, and the price at which new aircraft are offered for sale.

The active general aviation aircraft fleet is expected to increase at an average annual rate of 0.9 percent over the 13-year forecast period, with the number of active aircraft increasing from 204,710 in 1998 to 230,995 in 2011. The fleet is projected to expand by about 2,100 aircraft annually through 2005 as increased aircraft production and new aircraft products enter the marketplace. Aircraft entering the fleet is expected to slow to approximately 1,900 aircraft by the end of the forecast period. Based on assumed attrition rates of about 1,000 to 1,500 fixed-wing aircraft a year, these figures assume production of 3,500 to 4,000 new fixed-wing general aviation aircraft annually.

While the production of fixed-wing aircraft is almost double what is was in 1990, even after including kit built, gliders, and lighter-than-air aircraft, it is well below the goal of NASA's SATS program of 10,000 aircraft a year within ten years, and 20,000 aircraft within 20 years.

The number of single-engine piston active aircraft is projected to increase from 144,234 in 1998 to 158,400 in 2011, an average net addition of more than 1,000 aircraft annually. Many new products have entered the market and recent product developments and ongoing research promise the addition of several new aircraft models over the forecast period.

Because of the current average age of the single-engine piston fleet, large numbers of the older piston aircraft are expected to be retired throughout the forecast period. If 100LL fuel is eliminated, attrition rates could be higher due to owners retiring their airplane rather than incurring the cost to keep them flying. Therefore, the net growth in the single-engine piston category is expected to come largely from the introduction of new products from Cessna and Piper, and from full production being achieved by Cirrus and Lancair in the out years of the forecast.

Growth in the multi-engine piston aircraft fleet is expected to remain flat over the 13-year forecast period, totaling approximately 18,750. Attrition for the multi-engine aircraft is forecast to equal production.

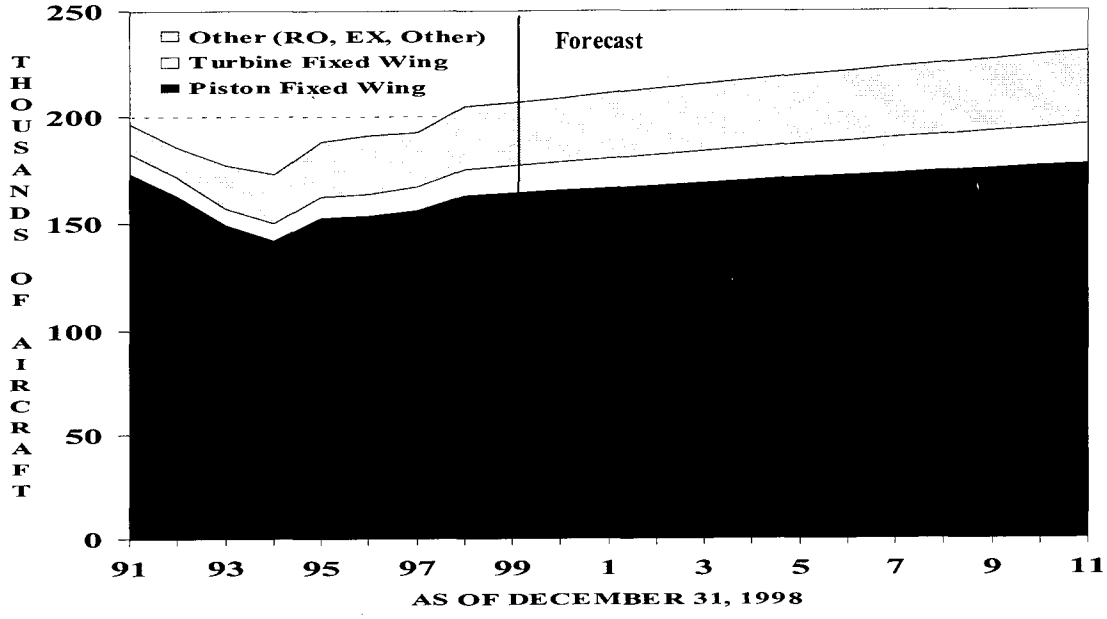
The turbine-powered fleet is expected to increase at an average annual rate of 3.2 percent over the forecast period. Turbojet aircraft are forecast to increase by 4.9 percent annually, from 6,066 in 1998 to 11,295 in 2011. These forecasts are based on the assumption that the turbojet fleet will increase by approximately 420 aircraft annually—the addition of 450 new aircraft and the attrition of 30 units per year.

Several factors are responsible for the improved market for business jets. These include a strong U.S. and worldwide economy; the success and rapid growth the fractional ownership market, new product offerings that have stimulated buyer interests; and a shift from commercial air travel to corporate/business air travel by many business travelers and corporations.

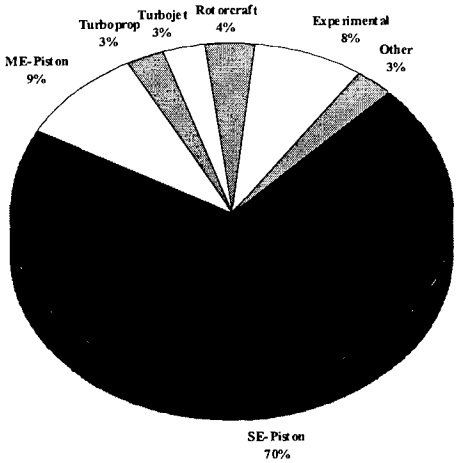
The number of turboprop aircraft is expected to grow from 6,174 in 1998 to 7,240 in 2011, an average annual growth rate of 1.2 percent. These forecasts assume that the turboprop fleet grows by approximately 90 aircraft per year. This is based on the assumption that approximately 150 new turboprop aircraft will enter the U.S. fleet annually while the turboprop fleet shrinks by approximately 60 units annually through attrition. This results in a net increase of approximately 90 aircraft per year.

The rotorcraft fleet is forecast to grow 1.5 percent annually over the 13-year forecast period, from 7,426 in 1998 to 9,040 in 2011. The turbine fleet is projected to grow at an annual rate of 1.6 percent, while the smaller piston fleet size is expected to grow at an annual rate of 1.4 percent. Detailed discussion

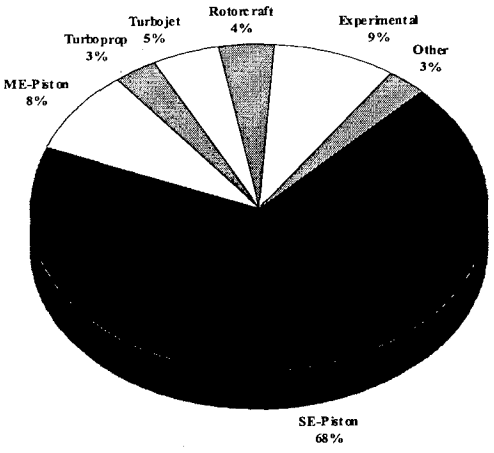
ACTIVE GENERAL AVIATION AND AIR TAXI AIRCRAFT



PERCENT BY AIRCRAFT TYPE



1998



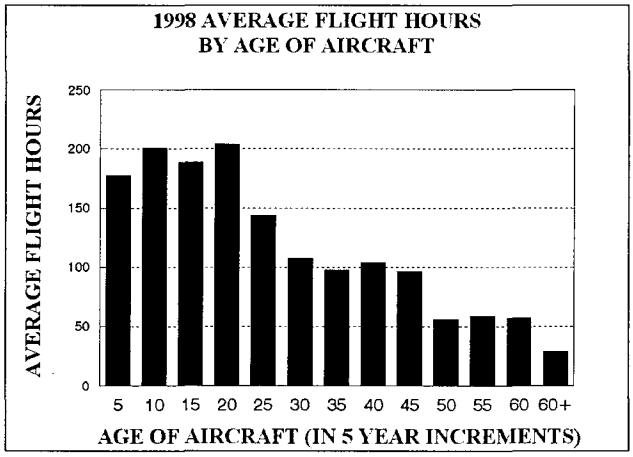
2011

of rotorcraft forecasts is presented in Chapter VI.

The number of experimental aircraft is projected to increase from 16,502 in 1998 to 19,910 in 2011, an average annual growth rate of 1.5 percent. Gliders and lighter-than-air aircraft are forecast to increase by 1.0 percent annually, growing from 5,580 in 1998 to 6,360 aircraft in 2011.

AIRCRAFT UTILIZATION

It is assumed that the aging of the general aviation fleet is one of the main determinants of declining utilization of general aviation aircraft. GAMA estimates that the average age of the general aviation fixed-wing fleet was 27 years in 1998, with piston aircraft accounting for the majority of the aging fleet. Data from the 1998 General Aviation Survey shows that aircraft utilization peaks at 204 hours between 16 and 20 years and then declines substantially after an aircraft reaches 20 years of age. The aging of the fleet appears to be one of the main causes of declining utilization of general aviation aircraft during the early and mid-1990s.



While part of the decline in utilization can be attributed to the aging of the general aviation fleet, U.S. economic slowdowns and/or recessions, such as those which occurred in 1990-91 and 1992 can also impact utilization. An expanding U.S. economy and increased consumer confidence have prevailed since that time and appear to have stabilized or pushed utilization rates up. New ownership strategies, and other approaches to make flying more affordable should also be positive forces on utilization rates during the forecast period.

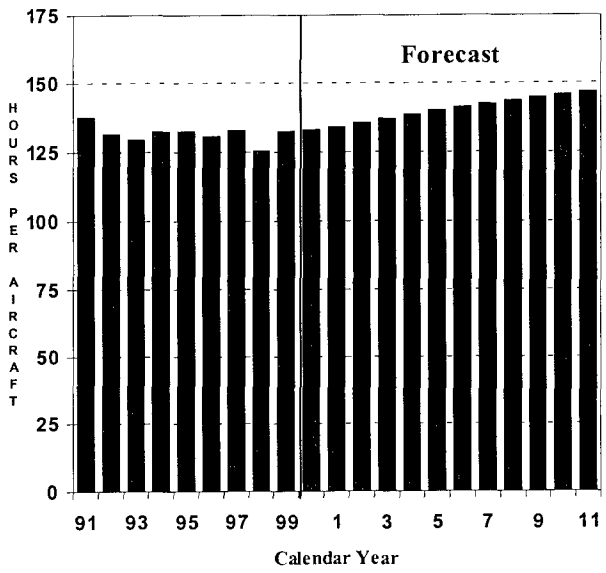
In 1999, the utilization rate for single engine piston aircraft is estimated to be approximately 130 hours per aircraft. [6] Starting at this base, utilization rates for single-engine piston aircraft are projected to increase to 145 hours in 2011, for an average annual increase of 0.9 percent. Growth in the single-engine piston utilization rate is expected to be caused by two factors. First, utilization rates tend to be higher for newer aircraft and with approximately 1,000 new aircraft expected to enter the fleet annually; utilization rates should increase for this fact alone. A second factor is the expected large increases in the number of student pilots and the number of aircraft that will be required for flight training. The single-engine piston aircraft used for instructional flying tend to have higher utilization rates than those of other aircraft in the same category—375 hours compared to 130 hours. Increased instructional flying will be one of factors pushing up single engine piston utilization rates over the forecast period.

In 1999, multi-engine piston aircraft utilization rates are estimated to be approximately

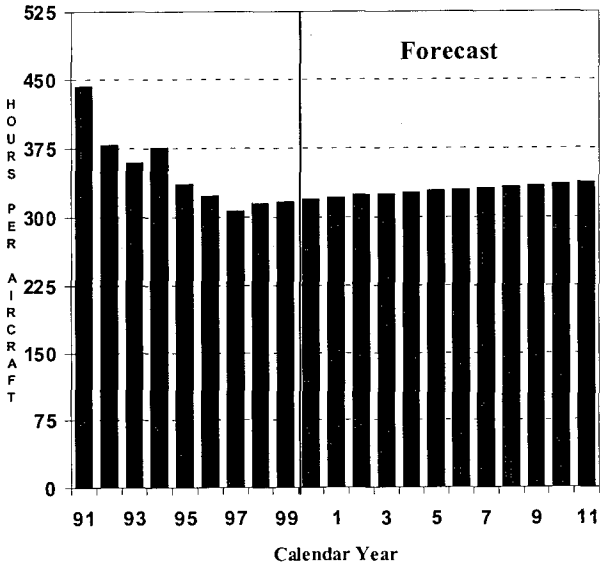
[6] The utilization rate calculated for single engine piston aircraft estimated from the 1998 Survey (117 hours) is a significant decrease compared to calculated rates for previous years—130 in 1995, 128 in 1996, and 131 in 1997. The 1998 GA Survey estimate was not accepted for purposes of this forecast. Instead, the 1999 base year utilization rate for single engine piston aircraft has been derived by averaging data for the 1995 to 1997 sample periods.

GENERAL AVIATION AIRCRAFT UTILIZATION: AVERAGE HOURS PER AIRCRAFT

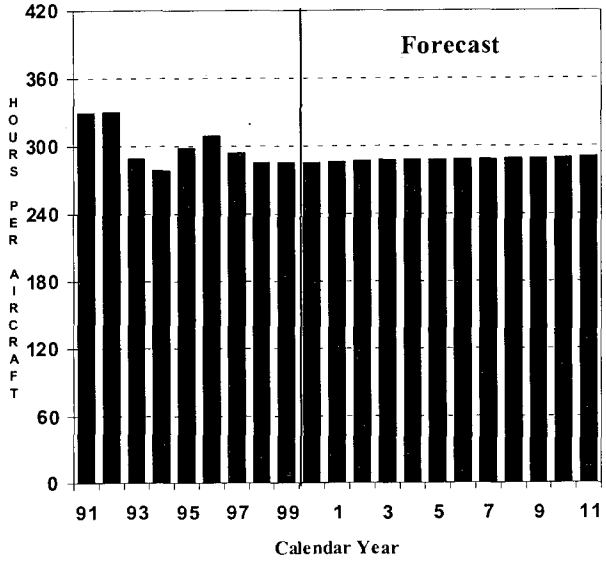
PISTON FIXED WING



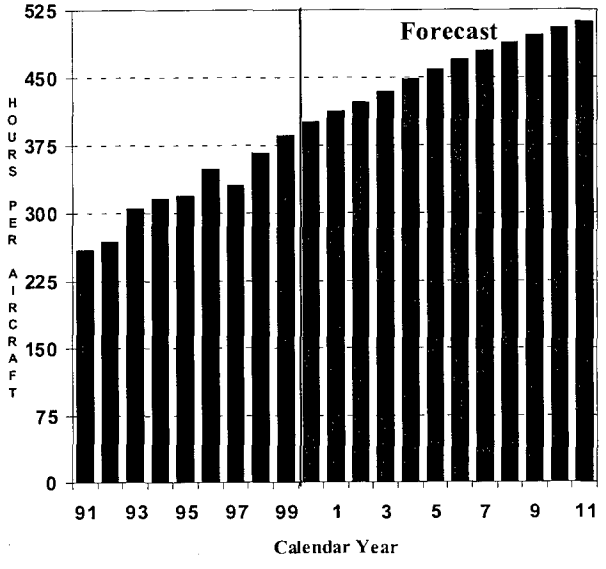
ROTORCRAFT



TURBOPROP



TURBOJET



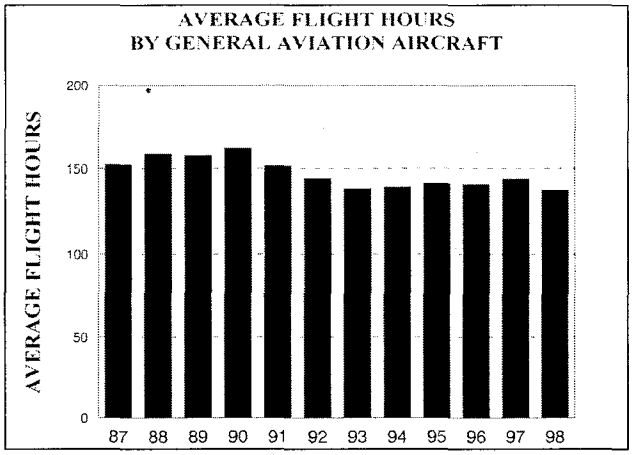
152 hours per aircraft. [7] The utilization of multi-engine piston aircraft is forecast to grow at an average annual rate of 0.3 percent over the forecast period, reaching 159 hours in 2011.

In the turbine fixed-wing fleet, utilization rates for turboprops was down from 294.5 hours in 1997 to 285.9 hours in 1998. Utilization is expected to increase only slightly over the forecast period, reaching an average of 290.8 hours per aircraft in 2011. On the other hand, turbojet utilization was up 10.9 percent, from an average of 330.8 hours per aircraft in 1997 to 367.0 hours in 1998. Over the forecast period, turbojet utilization is projected to grow at an average annual rate of 2.6 percent.

The increase in utilization rates for turbojets is largely attributable to the increased number of aircraft being operated by fractional ownership providers. While the average corporate jet utilization is approximately 330 hours per year, it is estimated that utilization for fractional ownership aircraft is between 900 and 1,200 hours annually. In 1999, AvDataInc estimated that at least 329 business jet aircraft were operating under fractional ownership, which is approximately 5 percent of the active turbojet fleet. It is estimated that about 80 aircraft per year will be added to the fractional ownership fleet through 2004. If this occurs, the fractional ownership fleet will increase to 8.5 percent of the turbojet fleet by 2004. The increase in the percentage of turbojet aircraft operated by fractional ownership providers will push the average utilization up to 512 hours in 2011.

[7] The utilization rate calculated for multi-engine piston aircraft estimated from the 1998 Survey (191 hours) is a significant increase compared to calculated rates for previous years—154 in 1995, 154 in 1996, and 150 in 1997. The 1998 GA Survey estimate was not accepted for purpose of this forecast. Instead, the 1999 base year utilization rate for multi-engine piston aircraft has been derived by averaging data for the 1995 to 1997 sample periods.

Rotorcraft utilization rates are expected to increase at an average annual rate of 1.0 percent over the 13-year forecast period, Utilization rates for experimental and "other" aircraft are expected to grow by 0.5 and 0.3 percent, respectively, over the same period.



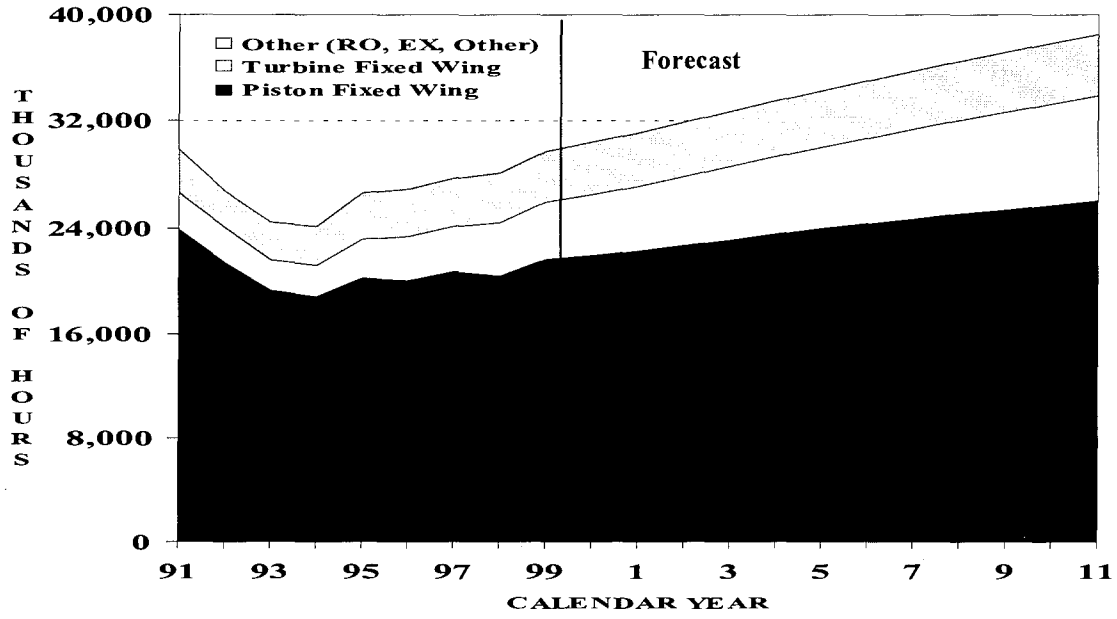
HOURS FLOWN

Although the active general aviation fleet is forecast to increase by 0.9 percent annually over the forecast period, the projected annual increase in hours flown is 2.5 percent. General aviation hours flown is projected to increase from 28.1 million in 1999[8] to 38.8 million in 2011.

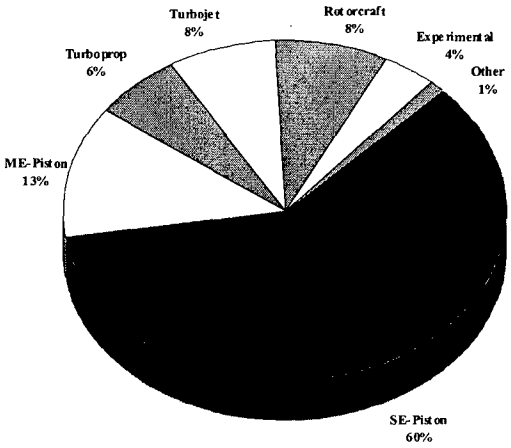
Hours flown for single-engine piston aircraft are forecast to increase from 18.9 million in 1999 to 23.0 million in 2011, for an average annual increase of 1.7 percent. This is significantly less than the 2.9 percent suggested by the Light General Aviation at the September FAA/TRB Workshop. The higher growth rate formulated by the Workshop panel was based on the assumption that student pilots would grow at an average annual rate of 8.0 percent during the 1999 to 2004 period. Based on actual results for 1999, student pilots were up only 4.0 percent.

[8] 1999 hours flown is estimated as the product of 1999 utilization rates described in footnotes 5 and 6 and the number of active aircraft for 1999.

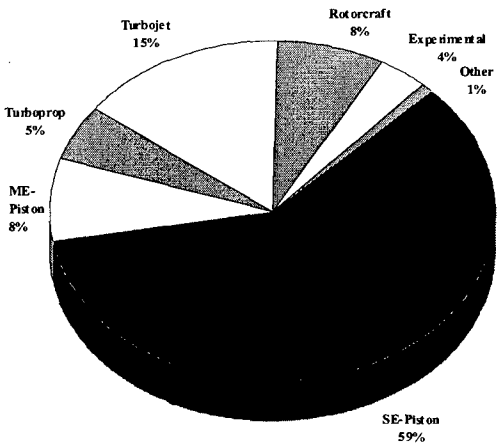
ACTIVE GENERAL AVIATION AND AIR TAXI HOURS FLOWN



PERCENT BY AIRCRAFT TYPE



1998



2011

Therefore, we have adjusted the panel's projected rates of growth for student pilots and single-engine piston utilization accordingly.

Multi-engine piston aircraft hours increase from 2.9 million in 1999 to 3.0 million in 2011, a rate of 0.3 percent annually.

Turboprop aircraft hours flown are projected to increase from 1.8 million in 1998 to 2.1 million in 2011, an annual growth rate of 1.2 percent. Turbojet hours are expected to increase from 2.2 million in 1998 to 5.8. million in 2011, an average annual increase of 7.6 percent.

Rotorcraft hours flown is forecast to increase at an annual rate of 2.5 percent over the 13-year forecast period, from 2.3 to 3.2 million. During the same period, experimental aircraft hours flown are forecast to increase at an annual rate of 1.9 percent, reaching 1.4 million in 2011. Hours flown by gliders and lighter-than-air aircraft are projected to increase by 1.3 percent annually.

PILOT POPULATION

The total pilot population is projected to increase from 640,113 in 1999 to 824,490 by 2011, an annual increase of 2.1 percent over the 12-year forecast period. The pilot category showing the largest increase over the forecast period are student pilots (up 3.4 percent) followed by airline transport pilots, up 3.1 percent annually. Private and commercial pilots are both forecast to increase by 1.4 percent annually over the 12-year forecast period.

While some of the growth of the student pilot population is in response to U.S. economic growth, much of the assumed growth is expected to result from industry-wide programs which are specifically designed to recruit new pilots to general aviation. The growth in numbers of student pilots and certificates issued over the past five years suggest that the programs are having an impact. The growth in student pilots also assumes growth in pilot training and flight schools which, in turn, implies future growth in the industry. Increased student starts are expected to lead to larger numbers of pilots in other categories, over the course of the forecast period.

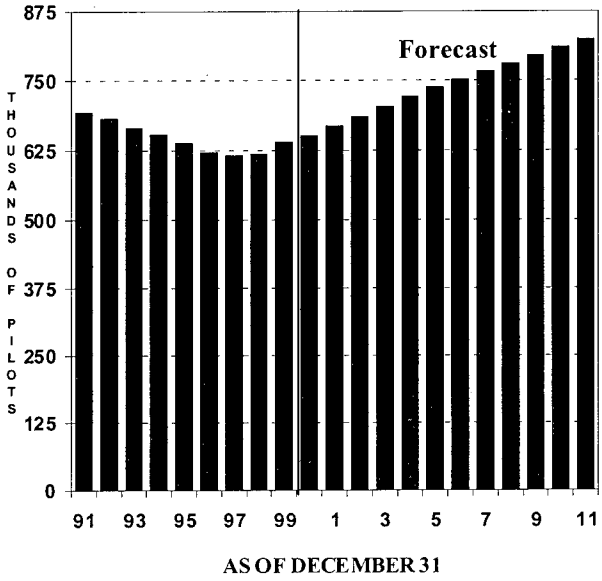
The FAA/TRB panel on Light General Aircraft suggested that the student pilot population would grow by 8 percent annually during the years 1999-2004. While the student pilot forecasts have been revised upward from last year's, the forecast assumes that pilots will increase at a more moderate rate of 4.0 percent per year (the estimated rate of growth in 1999) through 2004, and at an average rate of 3.4 percent over the period 1999-2011. While the projected growth is lower than that suggested by the FAA/TRB panel, it is significantly higher than that forecast last year (1.1 percent annual growth). Higher projected rates for student pilots also result in higher rates for other pilot categories. There is a high correlation between the number of student pilots who move on to the higher pilot classification of private and commercial pilots

Growth rates for the other pilot categories over the 12-year forecast period are: recreational, up 1.2 percent; helicopter, up 2.1 percent; and glider, up 0.4 percent.

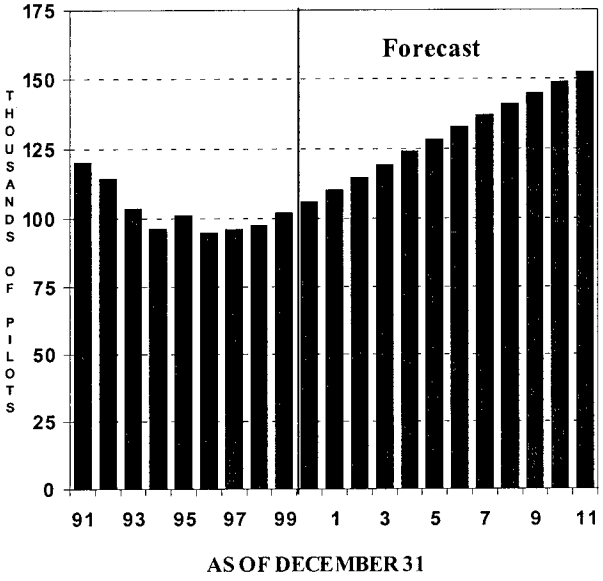
The number of instrument rated pilots is expected to increase from 308,951 in 1999, to 378,400 in 2011, a 1.7 percent average annual rate of growth. In 1999, 48.3 percent of all active pilots were instrument rated. By 2011, the percentage of instrument rated pilots is projected to decline to 45.9 percent. This is largely the result of the student pilot population growing at rates almost double that of the total pilot population--49.5 compared to 25.5 percent. Student pilots do not require an instrument rating.

ACTIVE PILOT TRENDS AND FORECASTS

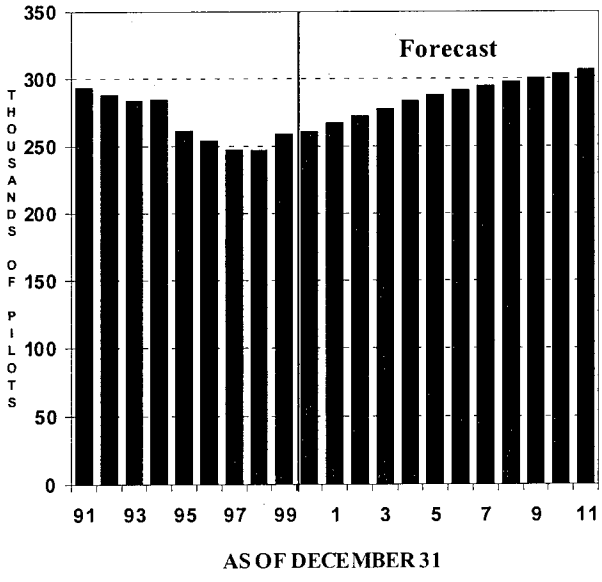
TOTAL



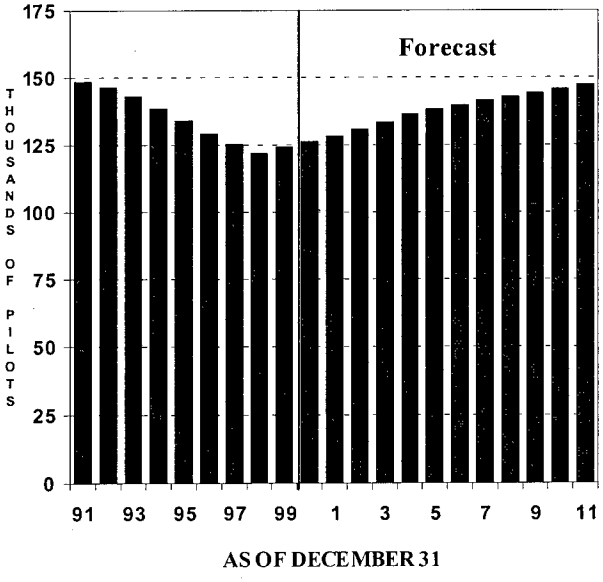
STUDENT



PRIVATE



COMMERCIAL



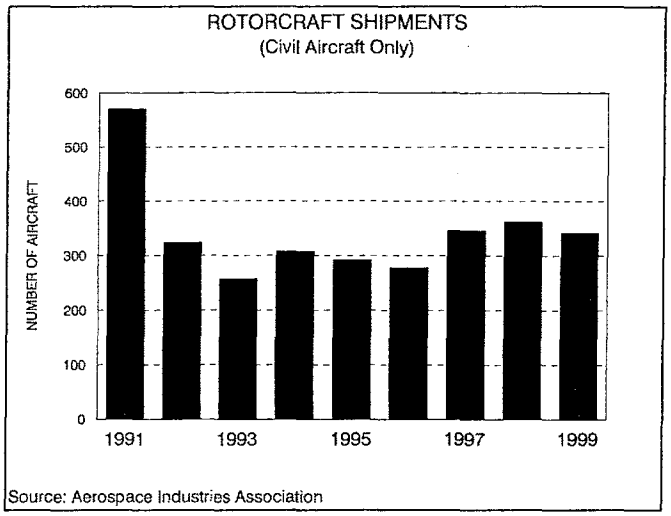
CHAPTER VI

HELICOPTERS

CHAPTER VI

HELICOPTERS

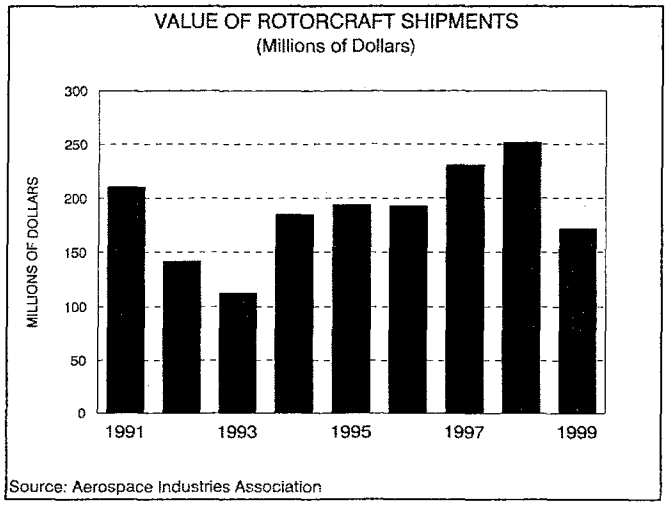
Helicopters participate in a wide and diverse range of aviation activities, all of which are important and contribute to the nation's economy. These activities include sightseeing; agricultural application; law enforcement; fire fighting; personal transportation; emergency medical services; transporting personnel and supplies to offshore oil rigs; traffic reporting; electronic news gathering; corporate or business transportation; and heavy lift for the oil, utility, and lumber industries.



REVIEW OF 1998-99

SHIPMENTS

Preliminary data for calendar year 1999 reported by the Aerospace Industries Association (AIA) indicate that shipments of new U.S. civil helicopters will total 342 units. Compared to the 363 units shipped in 1998, this represents a decrease of 5.8 percent. The market for civil helicopters in 1999 was approximately two-thirds of the level in 1991.

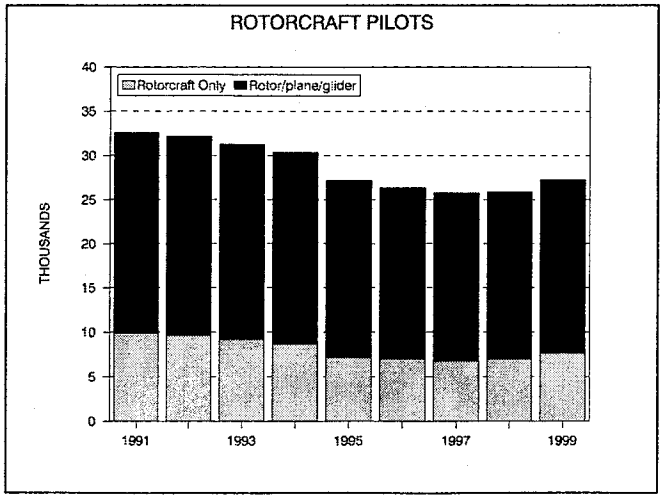


The value of the helicopter shipments totaled $172 million in 1999, a decrease of 31.7 percent over billings of $252 million in 1998. According to AIA, this large decline is attributable primarily to the decline in shipments of high cost units such as the Sikorsky S-76. The average value per helicopter shipped decreased from $694,000 in 1998 to $503,000 in 1999.

The AIA's *1999 Year-End Review and Forecast* projects an increase in the market for helicopters in 2000. Civil helicopter shipments are forecast to total 365 units in 2000 (up 6.7 percent). The sales value of these aircraft is expected to total $223 million in 2000, an increase of 29.7 percent.

PILOTS

The total rotorcraft pilot population includes pilots who are certificated to operate only rotorcraft (helicopters and gyrocopters) and those that may operate a rotorcraft and an airplane and/or a glider. The total number of rotorcraft pilots increased from 25,848 in 1998 to 27,339 in 1999, an increase of 5.8 percent.



The number of pilots who are certificated to fly only rotorcraft also increased—from 6,964 in 1998 to 7,728 in 1999, an increase of 11.0 percent.

1998 GENERAL AVIATION AND AIR TAXI ACTIVITY SURVEY

The historical rotorcraft active fleet and hours flown discussed in this chapter are derived from the General Aviation and Air Taxi Activity Survey. This survey is conducted annually by the FAA's Statistics and Forecast Branch. The fleet and hours flown data are estimated using a sample from the FAA Aircraft Registry. As in any sample survey, variability can be caused by traditional sampling error and by nonsampling errors. With small groups such as rotorcraft, the estimates are heavily influenced not only by the number of respondents, but also by who responds. For example, if a large operator with high utilization rates for a particular aircraft type chooses to respond one year but not the next, the effect would be to reduce the activity estimates for that particular aircraft type in the second year. This would happen even if that operator had no change in activity.

Representatives from the helicopter industry have expressed the view that the General Aviation Survey underestimates the size of the helicopter fleet. Their estimates of the fleet are provided in the following section.

The active rotorcraft fleet and hours flown by aircraft type are detailed for the period 1992 to 1998 in Chapter V, Tables V-1 and V-2. The 1998 survey results for active rotorcraft and hours flown are also listed in Chapter X, Table 30. The 1998 survey results for active rotorcraft are reported as December 31, 1998 in the tables.

The 1998 survey results for rotorcraft hours flown are reported as calendar year 1998.

FLEET AND HOURS FLOWN

Based on the 1998 Survey, there were 7,426 active civil rotorcraft in the United States, a 9.4 percent increase over the 6,785 aircraft reported for 1997. In 1998, the number of active turbine rotorcraft (4,881) was up by 7.8 percent over the previous year. There were 2,545 active piston rotorcraft, a 12.7 percent increase over the 1997 aircraft count of 2,259.

The Vertical Flight Panel of the FAA/TRB 11th International Workshop on Future Aviation Activities (held in September 1999) expressed the view that the active helicopter fleet is greater than the Survey estimates. The panel believes that the 1999 active fleet totals 11,100 helicopters. Based on original equipment manufacturers' (OEM's) estimates, they believe that the 1999 active U.S. turbine fleet totals 6,600 helicopters. The panel estimates the 1999 active U.S. piston fleet at 4,500 helicopters. However, the panel's estimate of active helicopters exceeds the 1998 population size (active plus inactive) of 9,055 rotorcraft in the FAA Aircraft Registry.

According to the 1998 Survey, rotorcraft flew an estimated 2.3 million hours in 1998. This represented a 12.4 percent increase over 1997. Turbine rotorcraft hours (1.9 million), which account for the vast majority (81.6 percent) of total rotorcraft hours, increased 9.9 percent in 1998. Hours flown by piston rotorcraft totaled 0.4 million, an increase of 25.0 percent.

In 1998, the rotorcraft fleet flew an average of 315.4 hours per active aircraft. Turbine rotorcraft averaged 391.7 hours per aircraft, while piston rotorcraft averaged 169.0 hours. The data indicate an increase in the average utilization of the helicopter fleet of 8 hours or 2.7 percent. Turbine average utilization increased 1.9 percent, while piston average utilization increased 11.0 percent. The year-to-year fluctuations in these rates may be caused by the size, or type, of businesses of the helicopter owners/operators responding to the survey in any particular year.

PRIMARY USE OF AIRCRAFT

When measured by hours flown, air taxi was the leading application (30.5 percent) for rotorcraft, followed by public use at 23.6 percent. Aerial observation (pipeline patrol, traffic reporting, search and rescue, etc., but not owned or leased by a government agency) and instructional use each accounted for 7.1 percent. For piston powered rotorcraft, the leading uses were instructional flying and aerial application, which equaled almost half of all piston hours flown in 1998. The top uses for turbine rotorcraft were air taxi and public use, accounting for nearly two-thirds of the turbine hours flown.

In terms of the number of active helicopters in 1998, the top primary use categories were public use (23.2 percent), personal use (14.7 percent), and air taxi (13.9 percent). The leading uses for piston rotorcraft were personal use (29.2 percent), instructional (20.4 percent), and aerial application (14.2 percent). The leading uses for turbine helicopters were public use (31.5 percent) and air taxi (21.0 percent).

FUEL CONSUMED

In 1998, fuel consumed by rotorcraft was estimated to be 63.3 million gallons, an increase of 15.9 percent from the 1997 level. The consumption of jet fuel increased to 56.8 million gallons in 1998 compared to 49.4 million in 1997. The use of aviation gasoline increased

(25.0 percent), due largely to the increased number of active piston rotorcraft and hours flown.

FUTURE ISSUES

Issues facing the rotorcraft industry include availability of infrastructure, improved safety image, price to performance ratio, the maturing of the offshore oil and airmedical markets, and environmental impact. Expanding infrastructure faces resistance because of safety and environmental concerns. Even with falling prices and improved operating performance, the demand for rotorcraft could be dampened by the lack of adequate facilities. Helicopters are seen as an option to transporting passengers or cargo from the airport into the city or to the business site; however, operators often find themselves unable to convince communities that a heliport can be a good neighbor.

TECHNOLOGY

Technological advances may stimulate helicopter usage. The Global Positioning System (GPS) and other free flight enabling technologies offer the promise of freeing all aircraft, including helicopters, to use efficient direct routing to destinations. These technologies may also enable helicopters to fly routes less noticeable to persons on the ground, increasing community acceptance and further enhancing the utility of helicopter operations.

Another major technological advance is the civil tilt-rotor. The tilt-rotor combines the vertical takeoff and landing capabilities of a helicopter with the speed and range of a turboprop aircraft. In the out-years, the tilt-rotor is expected to stimulate new demand and potentially capture market share from small fixed-wing turboprop, particularly in the corporate/executive market. The extent to which the potential of this technology can be realized will depend in large part on improvements in airspace management and landside infrastructure.

The first civilian version of the tilt-rotor, the Bell Agusta BA609, is being developed under a joint venture between Bell Helicopter Textron and Agusta. This version is scheduled to make its first flight in 2000 and be delivered in 2002. Other technological advances in helicopter production worth noting include substitution of lightweight composite materials for metal construction, rotor technologies with fewer operating parts, advanced avionics, and improvements in direct operating cost.

AGGRESSIVE NEW PRODUCT DEVELOPMENT

The mid 1990's witnessed a worldwide resurgence in commercial helicopter start-ups, following a number of years in which a flat market dampened rotorcraft manufacturers' interest in new product development. Rational capital replacement decisions are influenced by marginal price and performance. Among the new models that have led or will lead to early replacement of older light aircraft are the light single engine Bell B407 and Eurocopter EC 120 and the light twin engine Bell B427 and Eurocopter EC 135 models.

Of particular interest to the FAA and the North American helicopter community are the Sikorsky S-92 Helibus and the Bell Agusta BA609 tilt-rotor. The S-92 Helibus is an advanced technology medium lift helicopter with a 19 to 22 passenger capacity. It is based in large part on components of the military H-60

Black Hawk. One of its primary markets is expected to be the offshore oil service market. Other potential markets for the S-92 Helibus include air taxi, airmedical, priority freight service, and other commercial applications. Keys to the success of the S-92 will be its cost effectiveness and productivity, which prospective customers have identified as their greatest needs in increasingly highly elastic markets for their services. Its success will also depend on the company's strategy of integrating a number of international partners to share the risks, and facilitate entry into overseas markets. Certification of the S-92 is projected by Sikorsky for 2001.

The BA609 is a 6 to 9 passenger capacity tilt-rotor aircraft. This aircraft will have twice the speed and range of conventional helicopters. Targeted niche markets for the BA609 tilt-rotor will include those currently served by both helicopters and small fixed-wing aircraft, frequently in combination. In the course of market research, some operators of corporate helicopters and fixed-wing turboprops raised the possibility of replacing both with an appropriate tilt-rotor for certain applications. Interest was also reported in the airmedical and offshore service markets, both of which use a combination of fixed-wing and rotary-wing aircraft for many missions.

While the corporate market is less price sensitive than others, the BA609, like the S-92, will have to achieve its target economics to succeed. At the same time, military applications for both of these civil designs are likely, and any domestic or international military interest would certainly improve the viability of these programs. In any case, certification and introduction of these rotorcraft early in the next decade would impact the forecast both qualitatively, as older aircraft are replaced, and quantitatively, since their economics and performance would tend to stimulate demand.

MARKET FACTORS

Factors positively affecting the demand for helicopters include economic growth, the aging of the fleet, and the availability of new models. New models stimulate demand due to improvements in performance and cost of operation. Factors that may negatively impact demand include softness in oil price expectations and limitations relating to supporting infrastructure.

According to the Vertical Flight Panel, strong growth is expected in the next several years for the corporate/private fleet and the law enforcement fleet. The airmedical market for helicopters is maturing. In the near term, this helicopter fleet is expected to decline in major metropolitan areas as hospital management is increasingly aware and concerned about cost. However, this decline may be offset by growth in locations outside of major cities.

The softness in oil prices has had an impact on helicopter activity in the Gulf of Mexico. Based on data collected by the Helicopter Safety Advisory Conference (HSAC), the total helicopter fleet in the Gulf increased by 17.8 percent in 1997 to 636 helicopters. By the end of 1998, however, the helicopter fleet declined slightly to 628 helicopters. Despite the increase in oil prices in 1999 the fleet has continued to decline, as reflected in a September fleet count of 599 helicopters.

Government regulation and harmonization initiatives may also influence market demand. Aviation regulations may help enlarge or reduce the market for aircraft services, depending on whether particular regulations permit or prohibit operations for which a market demand exists. Harmonization is the process of reducing substantive differences between U.S. regulations and those of other nations. Harmonization of aircraft certification requirements helps open

international markets to aircraft manufacturers located in the participating nations.

One notice of proposed rulemaking (NPRM) of significance is the Flight Plan Requirements for Helicopter Operations under Instrument Flight Rules (IFR). This NPRM is intended to improve the safety of helicopter operations in marginal weather by facilitating helicopter utilization of the IFR system. In addition this would open up new markets, improve operational cost efficiency, and reduce noise.

Other regulations might restrict noise levels or introduce user fees. These increase the cost of operating rotorcraft. Regulations might stimulate earlier replacement of nonconforming aircraft, but the effect on the U.S. fleet is expected to be minimal.

Another development in aviation is fractional ownership. Several companies have expressed interest in offering fractional ownership of helicopters. Both Bell and Sikorsky are experimenting with test programs. For a variety of reasons, including speed and operating range, fractional ownership of helicopters will have to be configured differently than it is for business jets. It is yet to be seen whether it can capture the attention of potential users, as the programs have in the corporate jet market.

HELICOPTER FORECASTS

The forecasts of the rotorcraft fleet and flight hours discussed in this section are presented in tabular form in Chapter X, Table 30. Many of the assumptions used to develop the forecasts were derived from discussions with industry experts and from reports developed by the Vertical Flight Panel at the September FAA/TRB Workshop.

The rotorcraft forecasts for active fleet, utilization rates, hours flown, and fuel consumed use the 1998 data obtained from the General Aviation Survey as the base year. Therefore, the forecast period for these four activity measures extends from 1999 through 2011. References to the average annual growth rates for the forecast period include 13 years (1998 to 2011). Forecasts for certificated pilots are based on 1999 data, obtained from the official airmen certification records maintained at the FAA Aeronautical Center in Oklahoma City. References to average annual growth rates for pilots include 12 years (1999 to 2011).

ACTIVE FLEET

The active rotorcraft fleet is expected to total 9,040 in 2011. Compared to the 7,426 active aircraft in 1998, this represents an average annual increase of 1.5 percent in the active rotorcraft fleet during the 13-year forecast period.

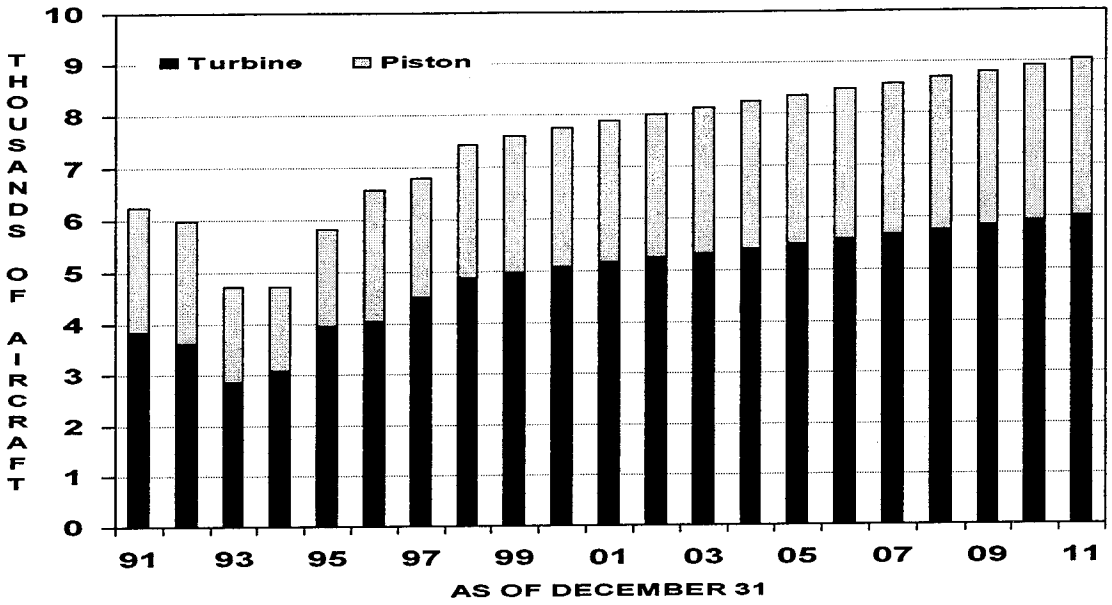
The number of turbine powered rotorcraft is expected to total 6,010 by 2011. This is an increase of 1,129 rotorcraft over the level in 1998. Turbine powered rotorcraft are expected to account for 66.5 percent of the rotorcraft fleet in 2011, up from 65.7 percent in 1998.

The number of piston powered rotorcraft is expected to increase to 3,030 by 2011. This is an increase of 485 helicopters over the level in 1998. Piston helicopters are expected to account for 33.5 percent of the fleet in 2011.

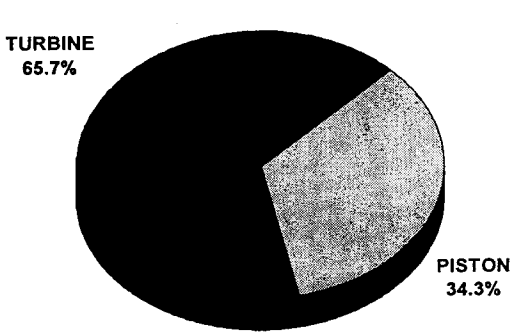
UTILIZATION

The annual utilization rate for turbine powered helicopters is expected to increase from 391.7 hours in 1998 to 439.3 hours in 2011, an

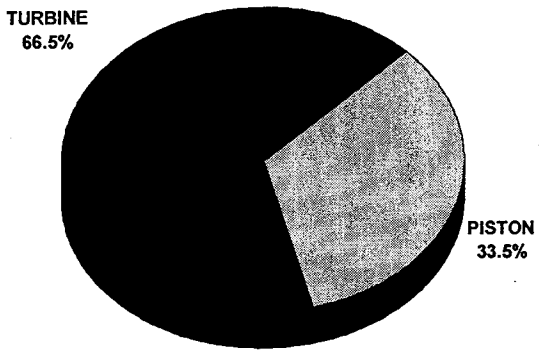
ACTIVE ROTORCRAFT



PERCENT BY AIRCRAFT TYPE

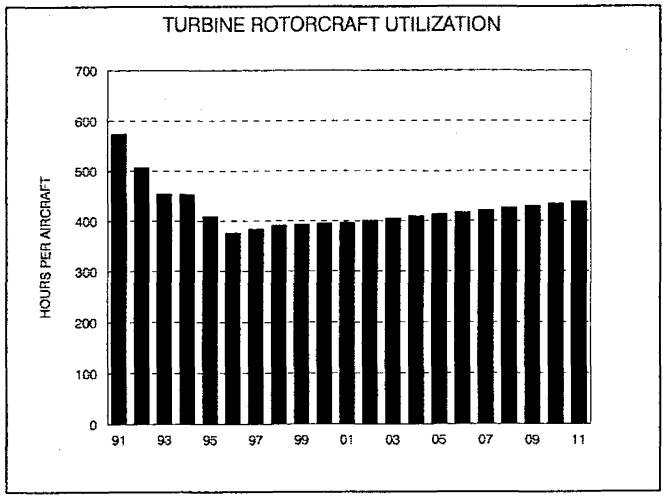


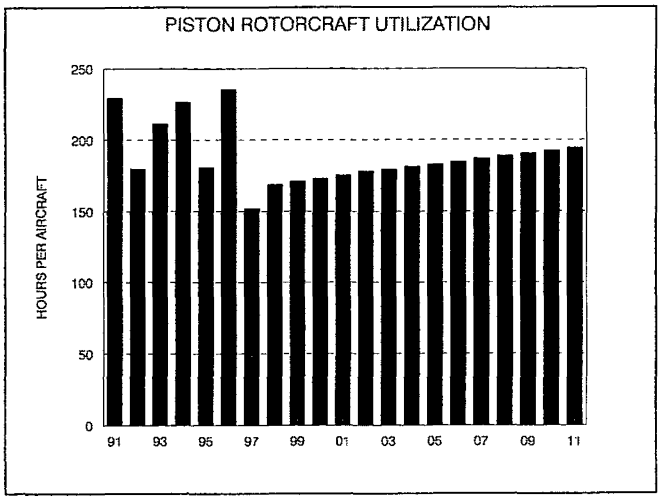
1998



2011

average annual increase of 0.9 percent. Average annual hours for the piston fleet are expected to increase from 169.0 hours in 1998 to 194.7 hours in 2011, a 1.1 percent annual rate. These rates reflect input obtained from helicopter industry representatives. Rising cost pressures and increasing professionalism in the management of commercial helicopter operators, are expected to result in the increased utilization rates for rotorcraft.





FLIGHT HOURS

Growth in the total active fleet, combined with increased utilization rates, are forecast to result in an increase in rotorcraft flight hours from 2.3 million in 1998 to 3.2 million in 2011. This represents an average annual growth rate of 2.5 percent.

The growth in the flight hours for turbine powered rotorcraft are projected to increase by approximately 38.1 percent during the forecast period, reaching 2.6 million by 2011. This represents an average annual growth rate of 2.5 percent over the 13-year forecast period. Flight hours for the piston powered portion of the rotorcraft fleet are expected to increase from 430,000 hours in 1998 to 590,000 hours in 2011, an average annual increase of 2.5 percent.

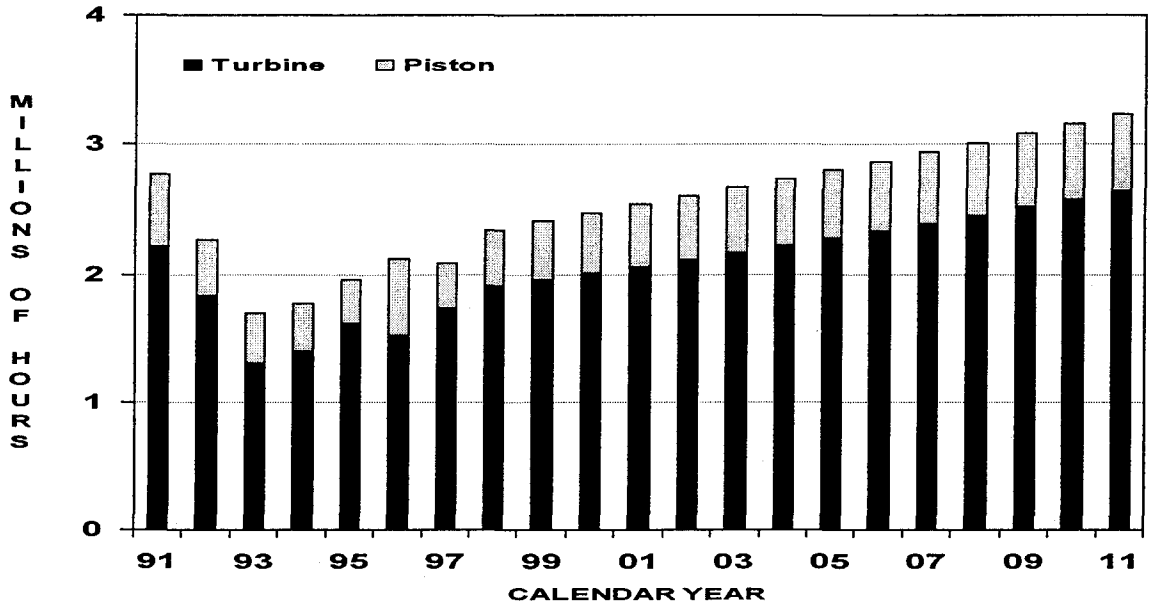
HELICOPTER PILOTS

The number of rotorcraft only pilots is expected to increase at an annual rate of 2.0 percent over the 12-year period (1999 to 2011). The number will rise from 7,728 to 9,745. This is below the 2.1 percent annual rate of increase expected for the pilot population, overall.

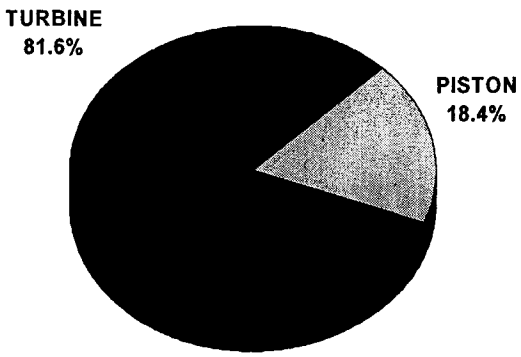
FUEL CONSUMED

In 1998, fuel consumption by rotorcraft was estimated to have totaled 63.3 million gallons, 6.5 million gallons by piston powered helicopters and 56.8 million gallons by turbine powered helicopters. By 2011, fuel consumption by rotorcraft is projected to total 87.2 million gallons, 37.8 percent higher than the 1998 level. This represents an average annual growth in fuel consumed of 2.5 percent during the forecast period. Fuel consumed by turbine powered helicopters is forecast to reach 78.3 million gallons by 2011, an average annual growth rate of 2.5 percent. Fuel consumed by piston powered helicopters is expected to reach 8.9 million gallons by 2011, an average annual increase of 2.4 percent.

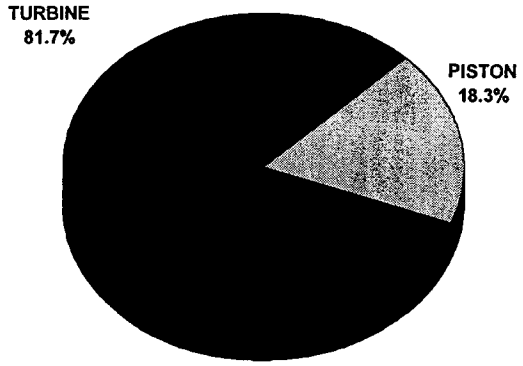
ROTORCRAFT HOURS FLOWN



PERCENT BY AIRCRAFT TYPE



1998



2011

CHAPTER VII

FAA WORKLOAD MEASURES

CHAPTER VII

FAA WORKLOAD MEASURES

The FAA provides the aviation community with three distinct air traffic services: 1) air traffic control tower service at selected airports; 2) traffic surveillance and aircraft separation by air route traffic control centers (ARTCC); and 3) flight planning and pilot briefings at flight service stations (FSS). All four aviation system user groups--air carriers, commuter/air taxi, general aviation, and military--use these FAA operational services to enhance the flow and safety of aviation traffic.

Because the four aviation system user groups differ in the demands they impose on the air traffic system, multiple indicators are used to describe the total FAA operational workload. No single measure typifies past trends or future demand for the services provided by the FAA.

REVIEW OF 1999[1]

During 1999 the number of FAA towered airports increased by one to 288, and the number of contract towered airports increased by five to 166. Since 1990, the number of FAA towered airports declined by 114, and the number of contract towered airports increased by 163.

The removal of the airports from FAA air traffic counts makes comparisons to previous year's activity levels difficult, if not impossible. To overcome these discontinuities, the FAA is reporting air traffic activity at FAA and contract tower facilities on both an individual as well as a combined basis. Activity at FAA air route traffic control centers is not affected by the tower conversions.

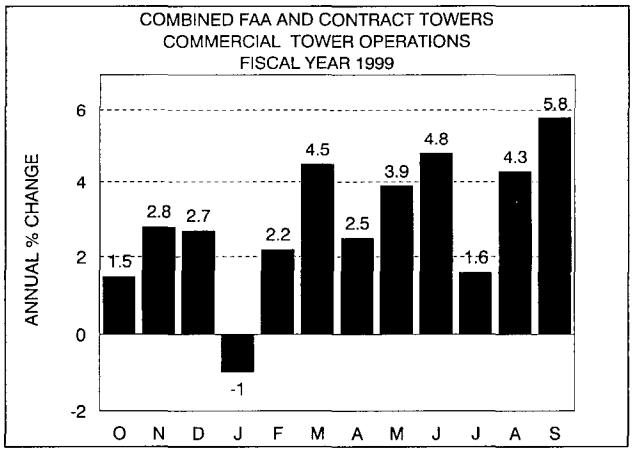
TOWER ACTIVITY

Combined FAA and Contract Towers

Aircraft activity at the 454 FAA and contract towered airports totaled 68.2 million operations, up 4.4 percent from 1998. Since 1989, there has been strong demand by commercial aviation (the sum of air carrier and commuter/air taxi operations) for FAA services. Over the decade, commercial activity is up 21.2 percent. In 1999 commercial activity increased 3.0 percent; air carrier operations were up 2.3 percent, while

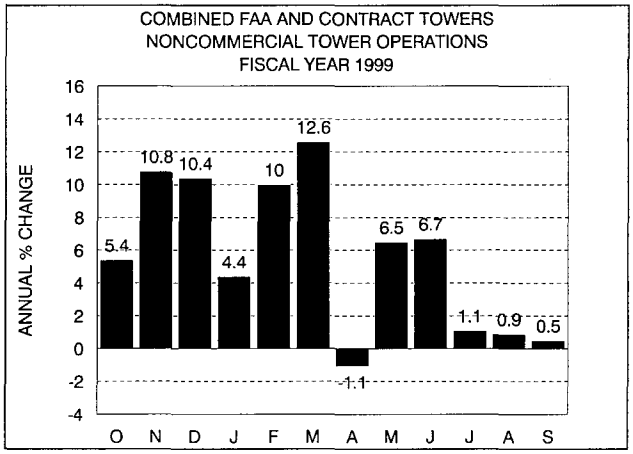
[1] All specified years are fiscal years (October through September 30), unless designated otherwise.

commuter/air taxi operations increased 4.0 percent.



During the past ten years, commuter/air taxi activity at towered airports has grown at an average annual rate of 2.5 percent, from 8.3 million operations in 1989 to 10.6 million in 1999. Much of the growth is the result of commuter code-sharing and schedule tie-in agreements with the larger commercial air carriers. Growth in recent years has also come from air carrier restructuring, and the transfer of low density, short-haul markets to commuters.

Noncommercial activity (the sum of general aviation and military operations) increased 5.3 percent in 1999 due to significant increases in both general aviation and military activity. General aviation operations increased 5.2 percent, while military activity increased 6.1 percent.



Both general aviation itinerant (up 4.3 percent) and local operations (up 6.5 percent) increased in 1999, reflecting expanded student activity and corporate/business flying. Military itinerant operations were up 6.5 percent while local military activity increased 5.7 percent.

FAA Towers

On September 30, 1999, there were 288 FAA towered airports. Aircraft operations at these airports totaled 55.1 million, an increase of 3.9 percent from 1998. All four users of the system increased their activity during the year. General aviation and commuter/air taxi were both up 4.4 percent, air carrier operations increased 2.3 percent, and military activity expanded 7.5 percent.

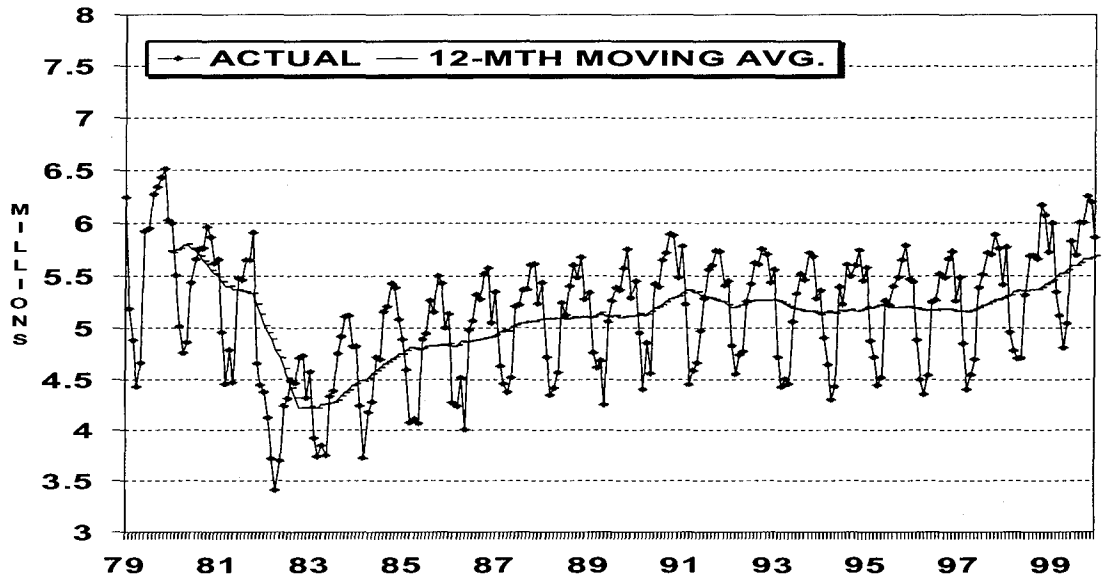
Contract Towers

On September 30, 1999, there were 166 contract towers funded by the FAA. Aircraft activity totaled 13.1 million operations, up 6.6 percent from 1998. Commercial activity increased 1.4 percent, while noncommercial activity expanded 7.3 percent. In 1999 air carrier activity increased 1.5 percent, while commuter/air taxi, general aviation, and military operations increased 1.1, 7.7, and 2.2 percent, respectively. General aviation continues to dominate activity at FAA contract towers, accounting for 83.3 percent of total operations.

Monthly operations counts for the 288 FAA towered airports and the 166 contract towers, by user group, can be found on the internet at: http://www.apo.data.faa.gov/.

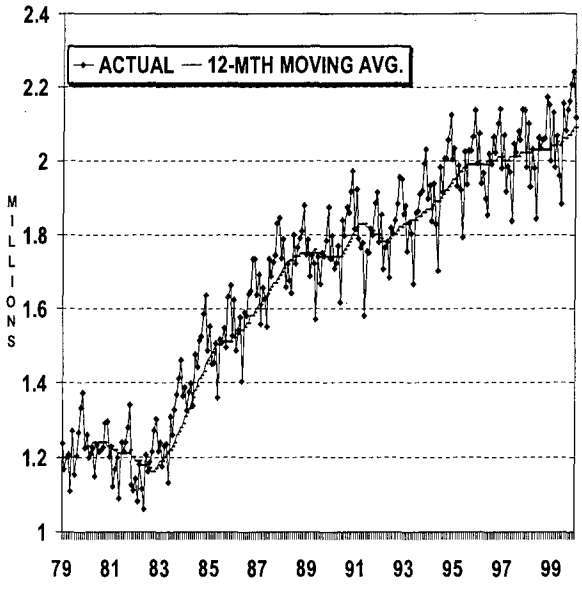
COMBINED FAA AND CONTRACT TOWERS: AIRPORT OPERATIONS

TOTAL OPERATIONS



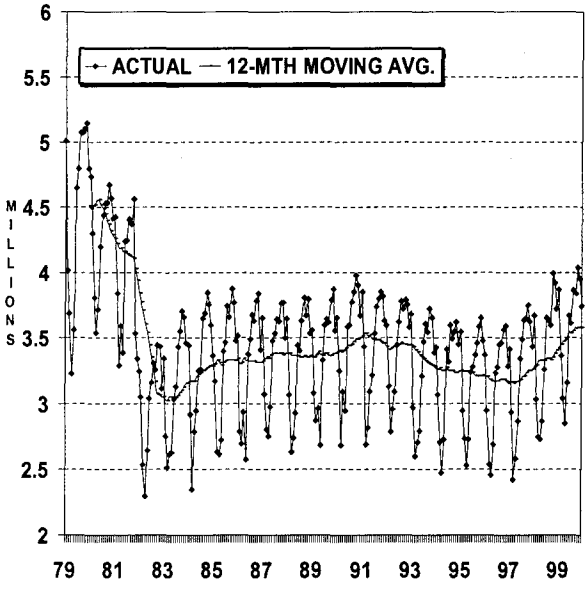
FISCAL YEAR BY MONTH

COMMERCIAL OPERATIONS



FISCAL YEAR BY MONTH

NONCOMMERCIAL OPERATIONS

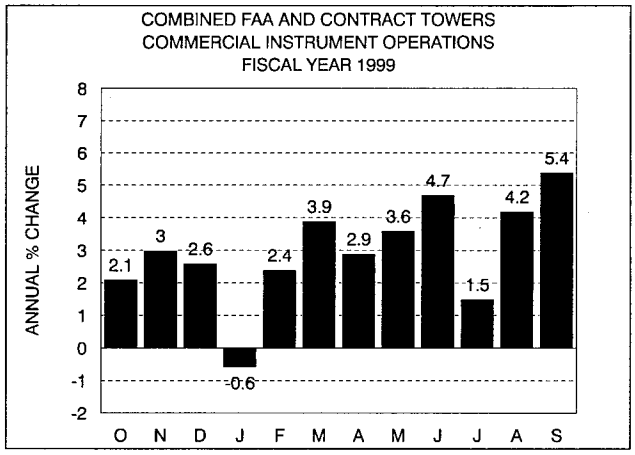


FISCAL YEAR BY MONTH

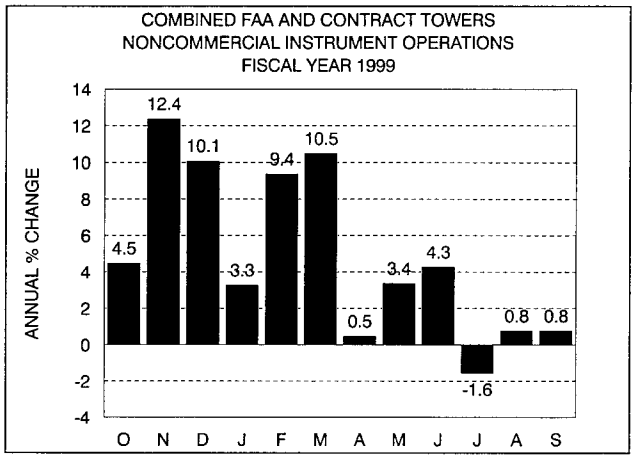
INSTRUMENT OPERATIONS

Combined FAA and Contract Towers

Instrument operations handled at combined FAA and contract towers totaled 51.8 million, up 3.7 percent from the 1998 activity level. In 1999, FAA towers accounted for over 98.6 percent of combined total instrument operations.



Commercial instrument operations increased 3.0 percent. Air carrier activity was up 2.8 percent, while commuter/air taxi instrument operations increased 3.3 percent. Since 1990, both commuter/air taxi and air carrier operations have shown relatively strong growth, increasing 22.1 and 12.9 percent, respectively.



Noncommercial instrument operations increased to 24.4 million--up 4.5 percent. General aviation operations expanded 4.9 percent, and in 1999 accounted for over 40 percent of total instrument operations. Military operations increased 2.6 percent, and accounted for only 6.8 percent of the total.

Most of the increase in general aviation activity since 1982--over 50 percent--can be attributed to the formation of radar service areas at 150 locations throughout the United States. Currently, there are 27 terminal radar service areas, 32 class B (terminal control areas) and 91 Class C (airport radar service areas).

FAA Towers

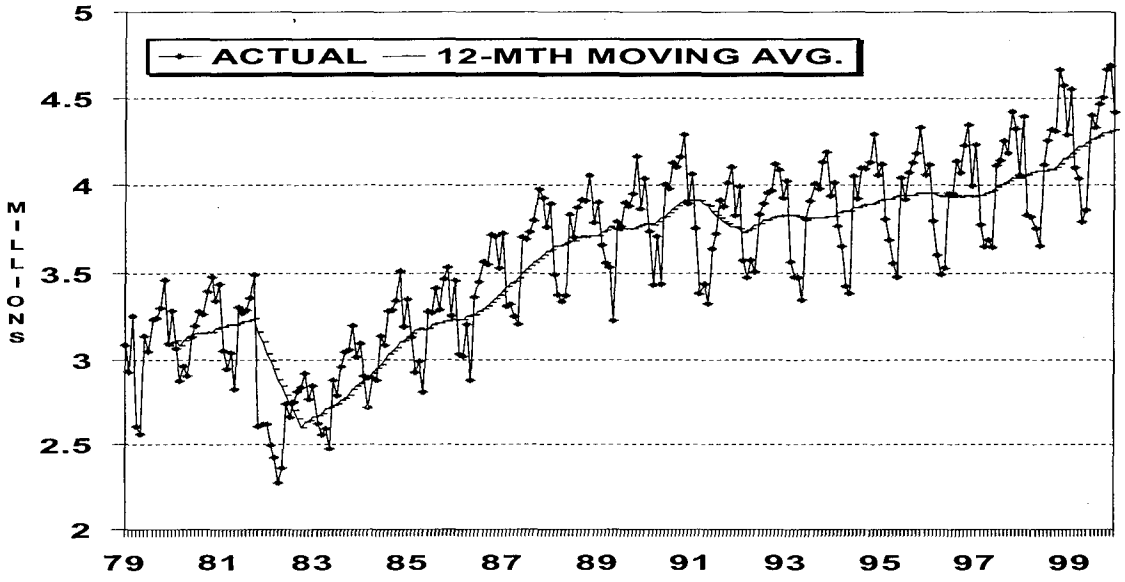
Instrument operations at the 288 FAA towered airports totaled 51.1 million, an increase of 3.7 percent. Commercial activity was up 3.0 percent, while noncommercial operations increased 4.5 percent. In 1999, instrument operations at FAA towers increased for all four users of the system. Air carriers, commuter/air taxi, general aviation and the military increased 2.8, 3.2, 4.9, and 2.6 percent respectively.

Contract Towers

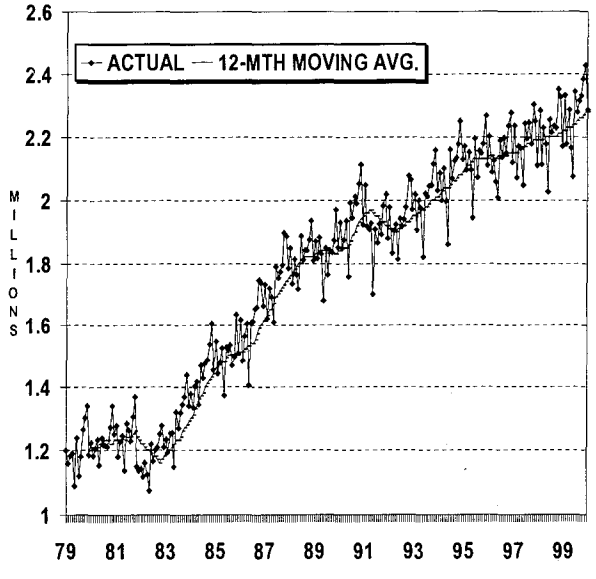
Instrument operations at the 166 FAA contract towered airports totaled 719,700, up 1.7 percent from 1998. Commercial activity increased 2.0 percent, while noncommercial activity expanded 1.3 percent. In 1999, air carrier instrument operations at FAA contract towers declined 4.6 percent, while commuter/air taxi and military operations increased 4.1 and 4.2 percent, respectively. General aviation instrument operations expanded 0.6 percent.

COMBINED FAA AND CONTRACT TOWERS: INSTRUMENT OPERATIONS

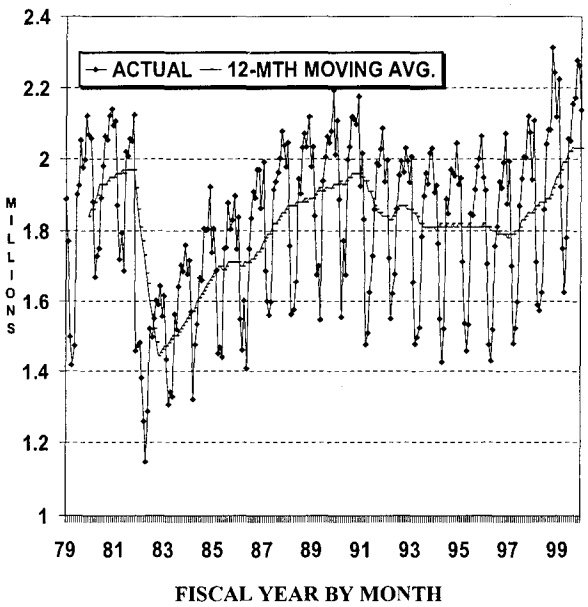
TOTAL OPERATIONS



COMMERCIAL OPERATIONS

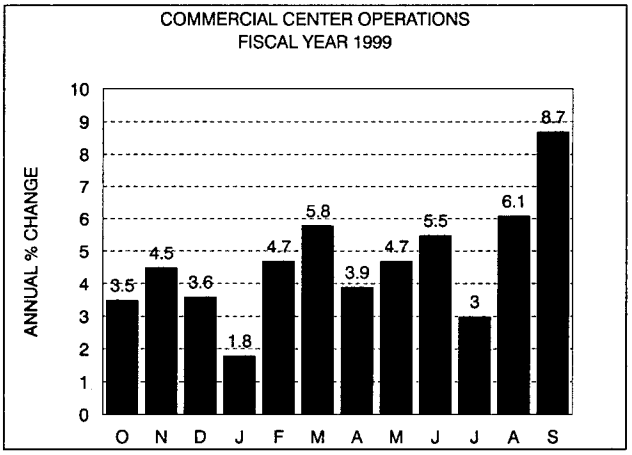


NONCOMMERCIAL OPERATIONS

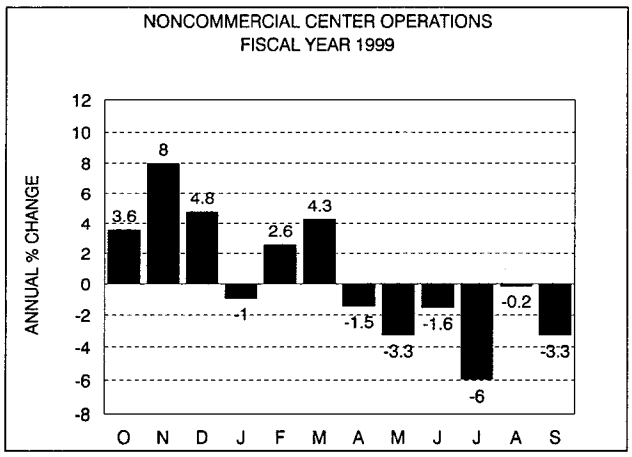


CENTER ACTIVITY

In 1999, the number of aircraft flying under Instrument Flight Rules (IFR) handled by FAA ARTCCs totaled 44.7 million, an increase of 3.4 percent over 1998 activity counts. The increase at the ARTCCs in the last 5 years (up 15.6 percent) can be attributed to the growth in both commercial aviation activity (up 20.8 percent), and general aviation activity (up 16.4 percent). The number of commercial aircraft handled at the Centers (31.8 million) increased 4.7 percent in 1999. The number of air carrier aircraft handled totaled 24.0 million (up 3.5 percent), while the number of commuter/air taxi aircraft handled totaled 7.7 million (up 8.3 percent).



The number of noncommercial aircraft handled (12.9 million) was up 0.4 percent. The number of general aviation aircraft handled totaled 8.8 million (up 1.9 percent), while military activity totaled 4.1 million (down 2.9 percent).



FLIGHT SERVICE STATION ACTIVITY

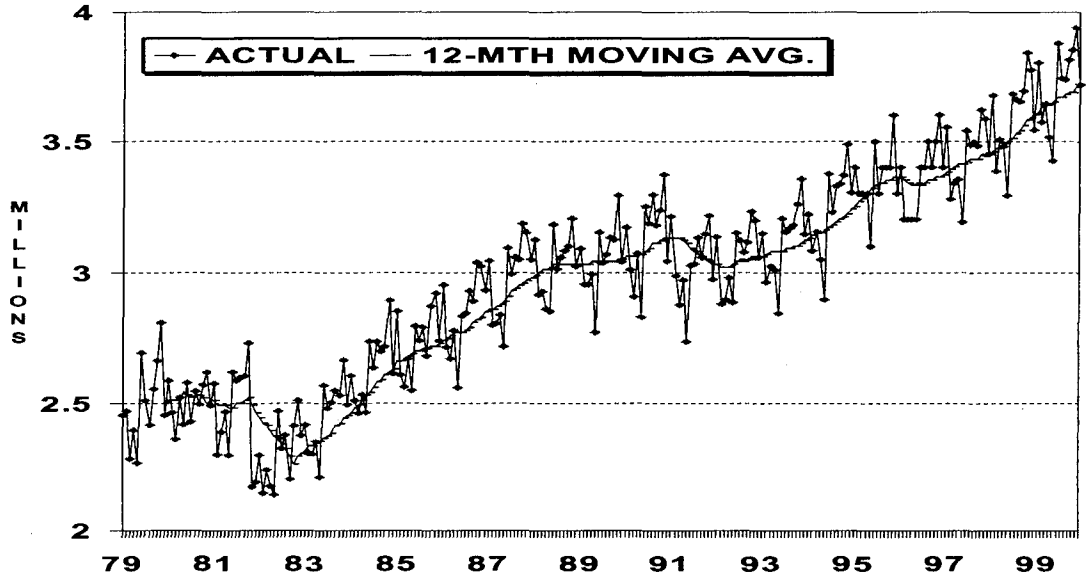
Total flight services, encompassing pilot briefings, flight plans filed, and aircraft contacts recorded by FSSs totaled 32.4 million in 1999, down 4.4 percent from 1998 activity levels. The number of aircraft contacted dropped 4.3 percent to 3.3 million. The number of pilot briefings declined by 5.0 percent to 8.3 million in 1999. The number of flight plans originated declined to 6.3 million, down 3.7 percent.

The FAA also provides automated flight services, which supplement FSS activity. The Direct User Access Terminal System (DUATS) provides an alternative to the FSS for obtaining pilot briefing information and filing flight plans. Use of this service was introduced in February 1990. In 1999, the number of flight plans filed through DUATS totaled just under 723,800, a decline of 17.8 percent from 1998 activity.

The decline in both FSS and DUATs flight plans appear to be inconsistent with the large increases in general aviation activity recorded at FAA and contract towered airports. One possible explanation for the decline is that pilots can file flight plans outside the FSS system. In addition to DUATs, alternative sources include private weather briefings and flight planning

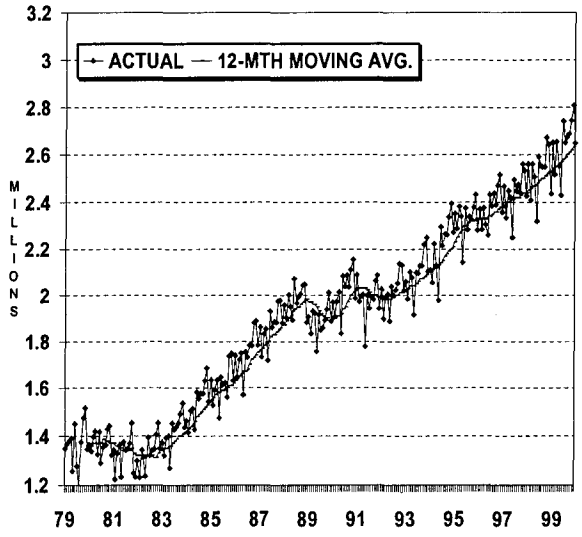
FAA AIR ROUTE TRAFFIC CONTROL CENTERS: IFR AIRCRAFT HANDLED

TOTAL AIRCRAFT HANDLED



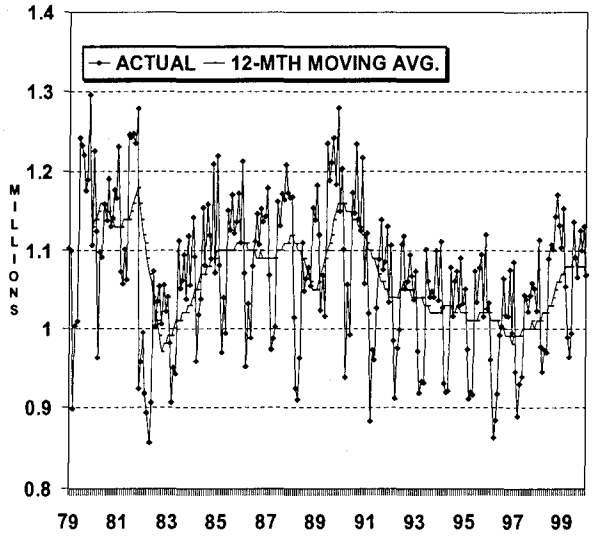
FISCAL YEAR BY MONTH

COMMERCIAL OPERATIONS



FISCAL YEAR BY MONTH

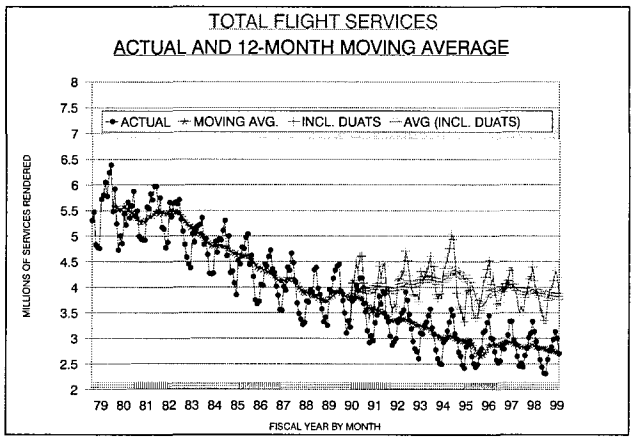
NONCOMMERCIAL OPERATIONS



FISCAL YEAR BY MONTH

services provided by Compuserve, Kavoris, Jepessen, and Pan Am Weather Systems.

Additionally, AFSSs are no longer counting prestored flight plans in their workload. An example of the magnitude of this change concerns the Cleveland AFSS, who previously counted prestored flight flights of air taxi operators transporting canceled checks between Federal Reserve Banks. With the elimination of these prestored flight plans from their activity counts, the number of flight plans for Cleveland declined from 325,863 in 1997 to 89,713 in 1999, a decline of 72.0 percent over the 2-year period. A large percentage of this decline could be accounted for by the change in the counting procedures. Clearly, this change in procedure could affect the total recorded counts for other FSSs.



The number of DUAT transactions increased 7.5 percent in 1999, from 5.5 million in 1998 to 6.0 million. When these DUAT services are included with traditional FSS services, total flight services decreased from 46.8 million in 1998 to 45.8 million in 1999, a decline of 2.1 percent.

FORECAST ASSUMPTIONS

Forecast growth in FAA workload measures includes not only the demand imposed on the existing National Airspace System, but also aviation activity at new locations not previously provided with FAA services. Workload forecasts are presented for combined FAA and contract towers, and separately for FAA facilities and contract towers.

NUMBER OF FAA FACILITIES

There were 288 FAA towered airports on September 30, 1999. There are 150 radar service areas--27 terminal radar service areas, 32 class B (terminal control areas), and 91 class C (airport radar service areas). The number of FSSs and AFSSs totaled 73 on September 30, 1999: 61 AFSSs and 12 Alaskan rotational FSSs.

In 2000, 22 FAA towers will be converted to contract tower status, which will reduce the number of FAA towered airports to 266. The number of contract tower airports will increase from 166 to 188. It is assumed that during the 12-year forecast period, the number of FAA and contract towers will remain at the 2000 levels.

The FAA Reauthorization Bill that is now being considered would initiate a contract tower cost-sharing program. Specifically, if an airport does not qualify for the FAA contract tower program, it could qualify for cost-sharing with the Federal Government if the ratio of its benefits to costs is at least .50 (Senate Bill) or .85 (House Bill). This program could affect the total number of contract towers over the 12-year forecast period and, of course, the level of projected activity. However, because of the uncertainty of the program, these potential changes have not been included in our forecasts.

COMMERCIAL AVIATION: RISKS AND UNCERTAINTIES

Although growth in demand for commercial aviation services is based upon continued growth in the U. S. economy, lower industry operating costs, lower fares, lower fuel costs, and financial stability, there is uncertainty associated with these forecasts. A number of economic events could alter the short- and long-term environment, and cause demand to differ substantially from the projections presented in this report. Also, structural changes in the inudstry could change the mix of operations at FAA facilities.

The introduction of state-of-the-art jet aircraft into the regional/commuter fleet could significantly alter the route system of the industry. These new aircraft will enable regional/commuters to greatly expand the number of markets they serve. Should the number of route transfers or new markets greatly exceed current expectations, commuter/air tax operations at FAA facilities could be higher than currently forecast. Conversely, air carrier operations would be lower. Another factor to consider is the commuter rule established in 1996. The rule could reduce the number of small regional commuters operating aircraft under 19 seats and, therefore, reduce commuter/air taxi activity.

Further, the U.S. airline industry could be entering a new era of consolidation with proposed alliances between Northwest and Continental, United and Delta, and American and US Airways. Clearly, these alliances could alter the structure of the industry and have a far-reaching affect on operations at FAA facilities.

WORKLOAD FORECASTS

METHODOLOGY

The workload measures for airports with air traffic control towers are the number aircraft operations (sum of landings and takeoffs) and instrument operations. The workload measure for ARTCCs is the number of aircraft handled (sum of departures, landings, and overflights for aircraft operating under instrument flight rules). For flight service stations, the workload measures are flight plans filed, pilot briefings, and aircraft contacts. The workload measures are developed by user category for all three components of the air traffic control system.

Projections of total operations for commercial air carriers and commuter/air taxis at airports with air traffic control towers are based upon enplanements, and assumptions regarding average seats per aircraft, and load factors. Specifically, if the forecast of enplanements is divided by the average number of seats per aircraft times the load factor, an estimate of the average number of departures in the system is derived. For the air carriers, estimates are made for both international and domestic departures. An estimate of total operations for the air carrier and commuter/air taxis is derived by doubling the number of departures. Forecasts of general aviation airport operations are developed from projections of general aviation hours flown and the general aviation fleet.

Forecasts of instrument operations for airports with air traffic control towers, and the workload measures for ARTCCs and flight service stations are derived from the forecasts of airport operations by user category. Military operations are held constant throughout the forecast period. This approach was taken since significant changes in military aviation activity are

generally due to preparation for or the carrying out of military actions abroad, which are unpredictable.

TOWER ACTIVITY

Combined FAA and Contract Towers

During the 12-year forecast period, operations at FAA and contract towered airports are projected to increase by 2.0 percent annually. In absolute numbers, these combined towered operations are projected to total 86.9 million in 2011. The mix of aircraft using combined FAA and contract towered airports is expected to change over forecast period.

Air carrier and commuter/air taxi activity are forecast to grow at relatively faster rates than general aviation. Air carrier operations share of the combined towered airport activity is expected to increase from 21.4 percent in 1999 to 23.5 percent in 2011. The commuter/air taxi share is expected to increase from 15.5 percent in 1999 to 16.5 percent in 2011, while the general aviation share is expected to decline from 58.8 percent to 56.6 percent.

Commuter/air taxi activity has historically exceeded that of the larger commercial air carriers. However, with the greater use of regional jets and larger turboprops, longer passenger trips, and higher load factors, commuter/air taxi activity is projected to grow at rates less than that forecast for the larger commercial air carriers.

The forecast activity levels and average annual growth rates for each aviation user group from 1999 to 2011 are: air carrier, from 14.6 to 20.4 million operations (2.8 percent annual growth); commuter/air taxi, from 10.6 to 14.4 million operations (2.6 percent annual growth); and general aviation, from 40.0 to 49.2 million operations (1.7 percent annual growth).

Itinerant general aviation operations are forecast to increase from 23.0 to 28.4 million operations (25.1 percent over the period), and local general aviation operations from 17.0 to 20.8 million operations (23.3 percent over the period). Total military operations are projected to remain at 3.0 million throughout the forecast period.

Commercial aircraft activity at combined towered airports is expected to grow at an average annual rate of 2.7 percent during the 12-year forecast period, increasing from 25.2 to 34.8 million. Noncommercial activity is forecast to increase from 43.0 million in 1999 to 52.1 million in 2011, an average annual increase of 1.6 percent.

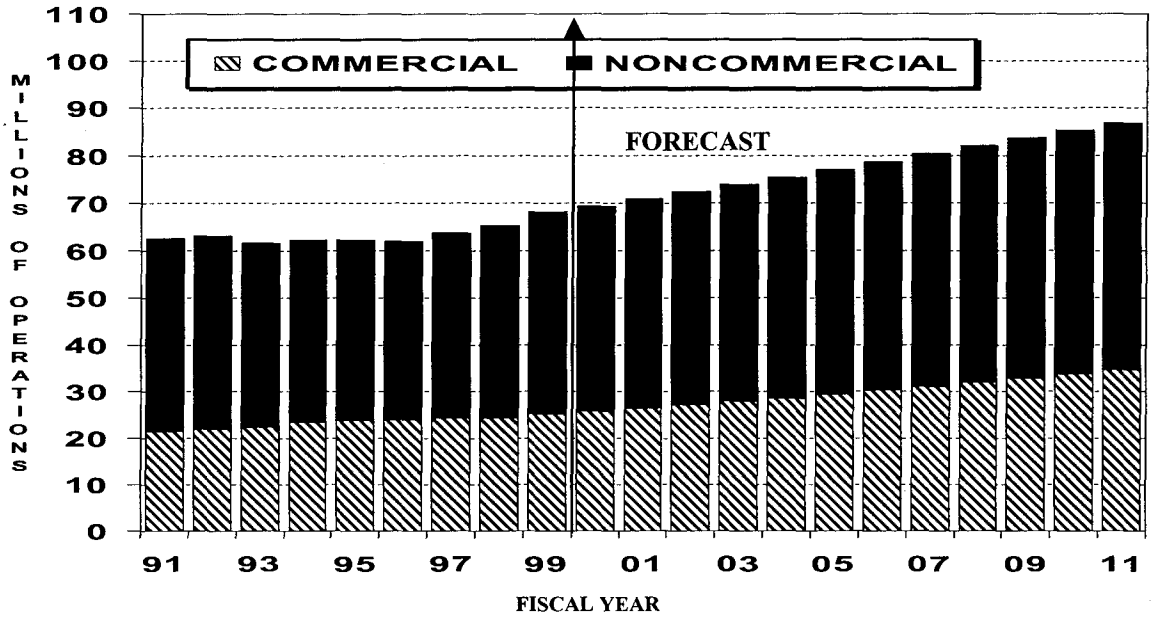
Forecasts for individual airports are contained in the FAA's Terminal Area Forecast and are available at the following website: http://www.apo.data.faa.gov/.

FAA Towers

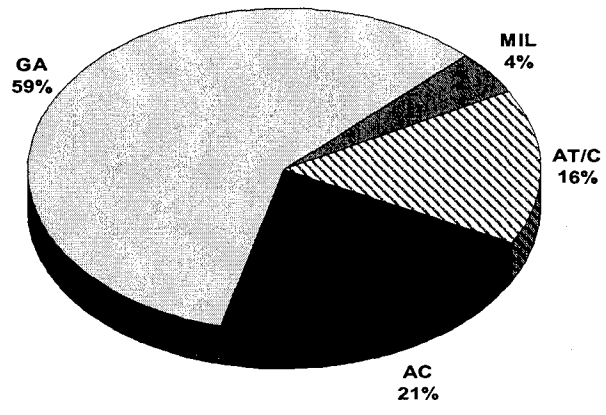
In 1999, operations at the 288 FAA towered airports totaled 55.1 million. For the 12-year forecast period, operations at FAA towered airports are forecast to increase 1.9 percent a year. In absolute numbers, towered operations are projected to total 68.7 million in 2011.

Commercial aircraft activity at FAA towered airports is expected to grow at an average annual rate of 2.7 percent during the 12-year forecast period, from 23.7 to 32.5 million. Noncommercial activity is expected to increase from its current level of 31.3 million to 36.1 million in 2011.

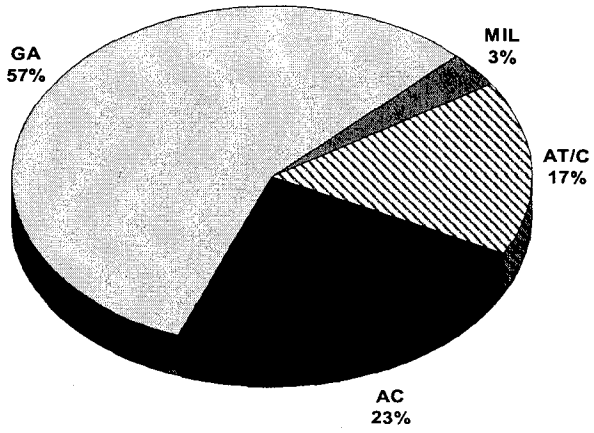
AIRCRAFT OPERATIONS AT AIRPORTS WITH FAA AND CONTRACT TRAFFIC CONTROL SERVICE



DISTRIBUTION OF WORKLOAD BY USER GROUP



1999



2011

Contract Towers

In 1999, operations at the 166 contract towered airports totaled 13.1 million. For the 12-year forecast period, operations at contract towered airports are forecast to increase 2.8 percent a year. In absolute numbers, contract towered operations are projected to total 18.2 million in 2011.

Commercial aircraft activity at contract towered airports is expected to grow at an average annual rate of 3.9 percent during the 12-year forecast period, increasing from 1.4 million to 2.2 million. Noncommercial activity is forecast to increase from 11.7 million in 1999 to 16.0 million in 2011, an average annual increase of 2.7 percent.

INSTRUMENT OPERATIONS

Combined FAA and Contract Towers

During the forecast period, combined instrument operations are expected to increase at an average annual rate of 2.2 percent, growing from a total of 51.8 million operations in 1999 to 67.6 million operations in 2011. In 2011, FAA towers will account for about 98.4 percent of combined instrument operations.

The mix of instrument operations is expected to change during the forecast period. By 2011, 32.8 percent of all instrument operations are expected to be performed by air carrier aircraft, up from 30.5 percent in 1999. Commuter/air taxi share of the total will increase from 22.3 percent in 1999 to 23.3 percent in 2011, while general aviation's share over the period declines from 40.3 percent to 38.7 percent.

The projected activity levels and average annual growth rates for each user group from 1999 to 2011 are: air carrier, from 15.8 to 22.2 million operations (2.8 percent annual growth); commuter/air taxi, from 11.6 to 15.7 million operations (2.6 percent annual growth); and general aviation, from 20.9 to 26.2 million operations (1.9 percent annual growth). Military activity is projected to remain at its current level of 3.5 million.

During the 12-year forecast period, commercial activity is expected to increase at an average rate of 2.7 percent annually, from 27.4 to 37.9 million. Noncommercial activity is forecast to increase from 24.4 million in 1999 to 29.7 million in 2011, an average annual growth rate of 1.7 percent.

FAA Towers

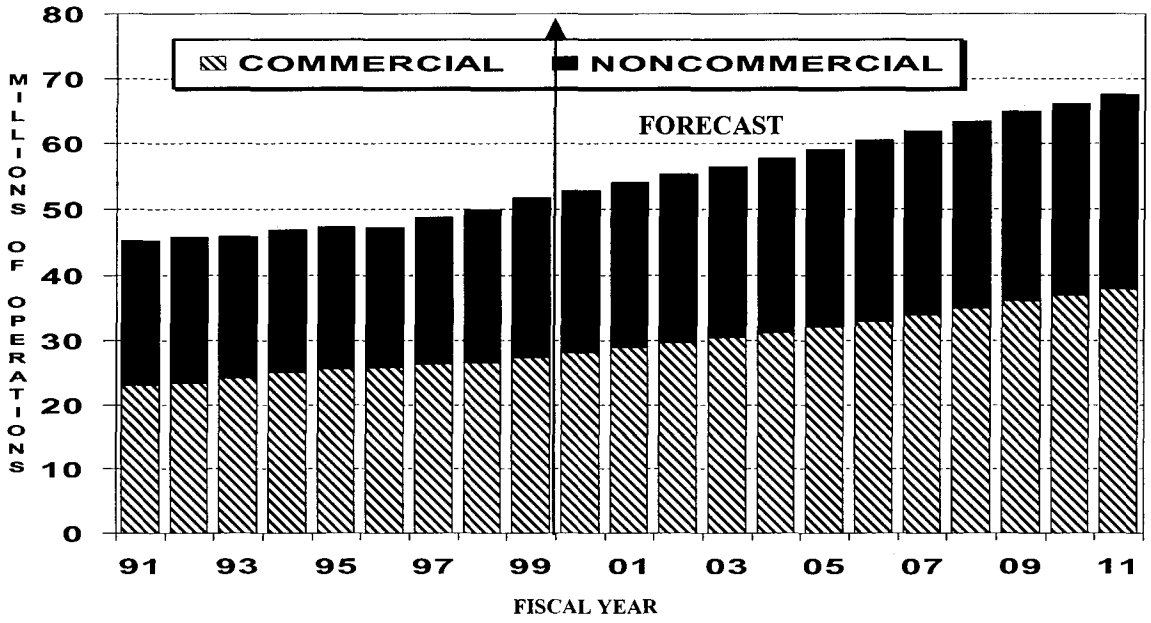
For the 12-year forecast period, instrument operations at FAA towered airports are forecast to increase 2.2 percent a year. In absolute numbers, FAA towered instrument operations are projected to total 66.6 million in 2011.

Commercial instrument operations at FAA towered airports are expected to grow at an average annual rate of 2.7 percent during the 12-year forecast period, from 27.0 to 37.3 million. Noncommercial activity is expected to increase from 24.1 million in 1999 to 29.3 million in 2011, up 1.7 percent a year.

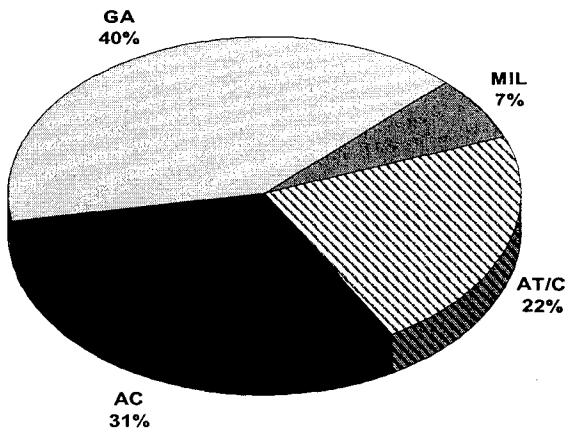
Contract Towers

For the 12-year forecast period, instrument operations at contract towered airports are forecast to increase 3.1 percent a year. In absolute numbers, contract towered operations are projected to total 1.0 million in 2011.

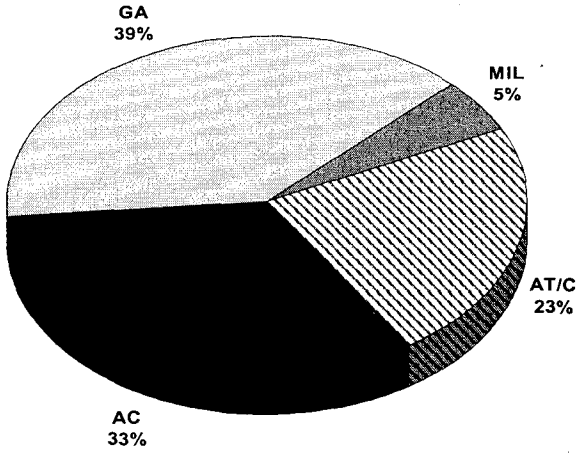
INSTRUMENT OPERATIONS AT AIRPORTS WITH FAA AND CONTRACT TRAFFIC CONTROL SERVICE



DISTRIBUTION OF WORKLOAD BY USER GROUP



1999



2011

Commercial instrument operations at contract towered airports are expected to grow at an average annual rate of 4.0 percent during the 12-year forecast period, increasing from 407,500 to 656,100. Noncommercial activity is forecast to increase from 312,200 in 1999 to 381,500 in 2011, growing at an average annual rate of 1.7 percent.

CENTER ACTIVITY

During the 12-year forecast period, the number of aircraft handled at centers is forecast to increase 2.4 percent annually, expanding from 44.7 million aircraft handled in 1999 to 59.4 million in 2011.

The commercial aircraft activities' share of center workload is forecast to increase from 71.2 percent in 1999 to 74.3 percent in 2011. Between 1999 and the year 2011, the air carrier share is forecast to increase from 53.8 to 56.7 percent, while the commuter/air taxi share increases from 17.3 to 17.7 percent.

The projected activity levels and average annual growth rates for each user group from 1999 to 2011 are: air carrier, from 24.0 million to 33.7 million (2.8 percent annual growth) commuter/air taxi, from 7.7 million to 10.5 million (2.6 percent annual growth); and general aviation, from 8.8 million to 11.2 million (2.0 percent annual growth). Military activity is expected to remain at 4.1 million throughout the forecast period.

Commercial activity is expected to grow at an average annual rate of 2.8 percent during the forecast period, increasing from 31.8 million to 44.2 million. Noncommercial activity is forecast to increase 1.4 percent annually, increasing from 12.9 million in 1999 to 15.3 million in 2011.

FLIGHT SERVICE STATION ACTIVITY

The introduction of new technology for flight service applications has significantly changed the operating environment of the flight service system. Viewed in the larger context of the total National Airspace System, the recent declining trend in non-automated flight services do not necessarily indicate declining demand for total flight planning services. Rather, they may indicate that demand is being met through increased use of automation and new system capabilities resulting in increased efficiency and productivity.

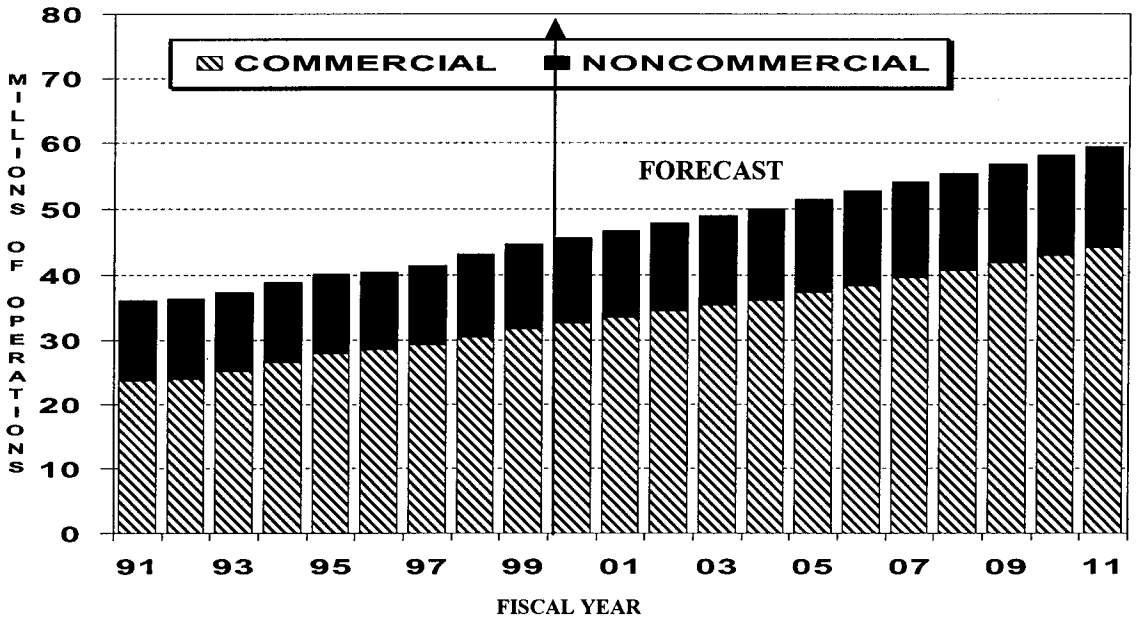
Non-automated Service

Total traditional (non-automated) flight services originating at FAA flight service stations are projected to decline throughout the forecast period. In absolute numbers, the number of total flight services is expected to decline to 32.3 million in 2000 (down 0.3 percent), and remain relatively stable at just under 32.2 million in 2001. By the end of the forecast period, total flight services provided by the FAA flight service stations are projected to total 31.4 million (an average annual decline of 0.3 percent).

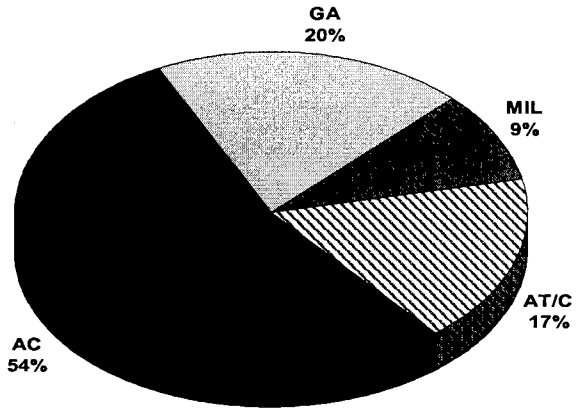
The number of pilot briefings is forecast to decline to 8.2 million in 2000, and total 8.1 million in 2001. Pilot briefings are projected to decline slowly throughout the remainder of the forecast period, declining to just under 7.6 million in 2011, an average annual rate of decline of 0.7 percent.

FSS flight plans originated at flight service stations are projected to total 6.3 million in 2000 and 6.4 million in 2001. During the balance of the forecast period, flight plans originated through FAA flight service stations are expected

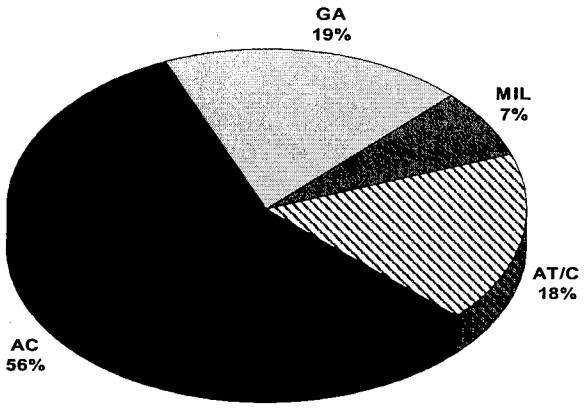
IFR AIRCRAFT HANDLED AT FAA AIR ROUTE TRAFFIC CONTROL CENTERS



DISTRIBUTION OF WORKLOAD BY USER GROUP

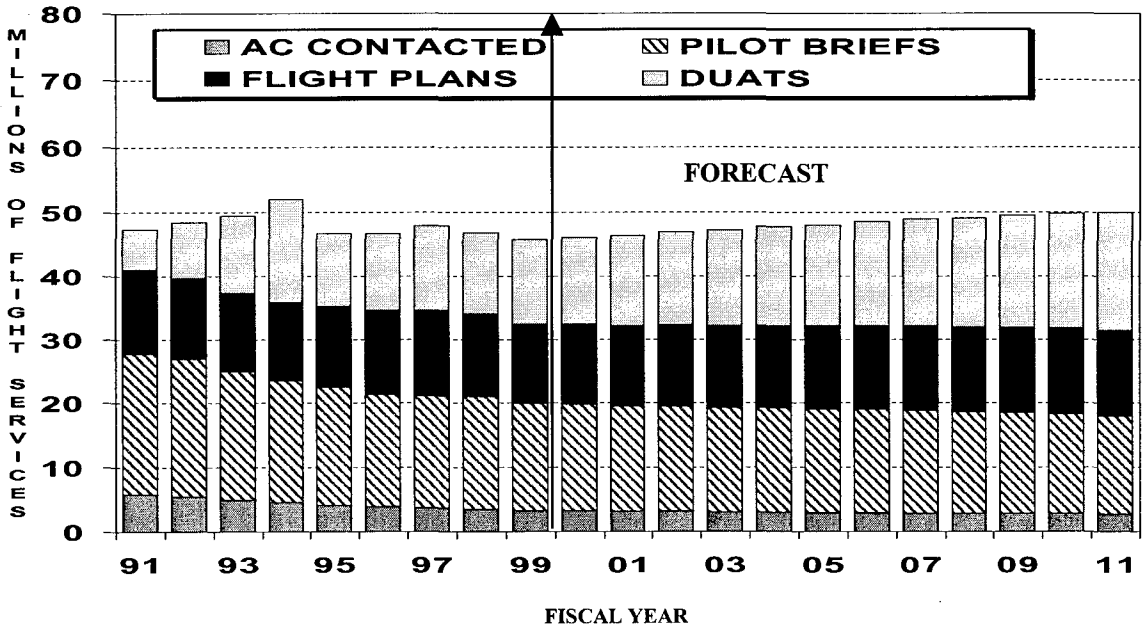


1999

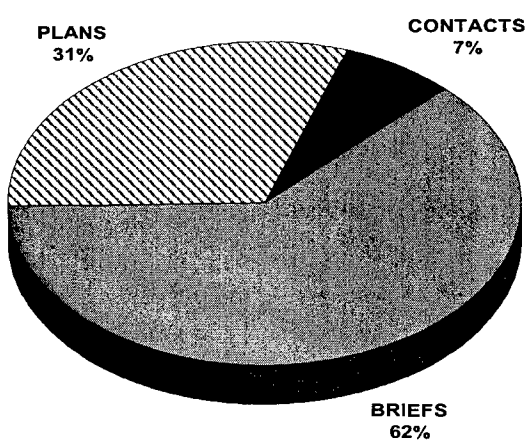


2011

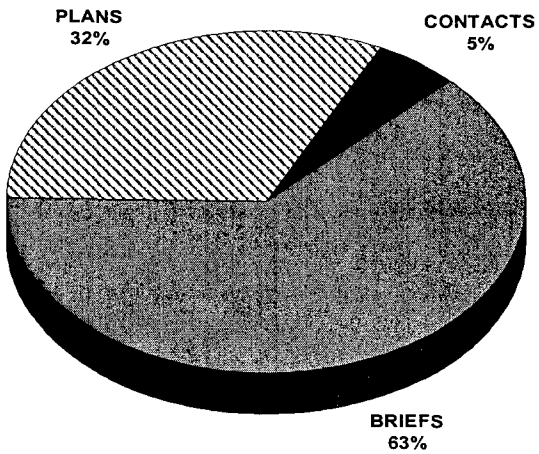
FLIGHT SERVICES ORIGINATED AT FAA FLIGHT SERVICE STATIONS



DISTRIBUTION OF WORKLOAD BY USER GROUP



1999



2011

to increase slowly. By the year 2011, total flight plans originated are projected to total 6.8 million, a 0.6 percent average annual increase.

The number of aircraft contacted is forecast to decline to 3.3 million (down 1.7 percent) in 2000, and to 3.2 million (down 1.7 percent) in 2001. Thereafter, the number of aircraft contacted is expected to decline to 2.7 million in 2011, a 1.7 percent average annual decline.

Automated Service

Several factors resulting from automation will tend to dampen the growth in FSS workload measures, as currently defined. First, pilots can now obtain weather briefings through the Telephone Information Briefing System (TIBS), which does not require contact with a flight service specialist, and is not, therefore, included in the FSS pilot briefings count.

Second, private weather briefing vendors, participating in memorandums of agreement with the FAA, can also provide weather briefings and file flight plans for their customers without going through an FSS. Third, starting February 1990, DUATS became operational. Using DUATS, pilots with access to a computer, modem, and telephone can directly access a national weather data base for weather briefings and flight plan filing without ever going through an FSS.

This automated access may be through the pilot's own computer or through those of fixed-based operators offering the service to their customers. None of the flight planning services provided through the above sources are included in the FSS workload measures.

During 1999, there were a total of 6.0 million DUATS transactions. If each transaction involves a weather briefing, this represents 6.0 million pilot briefs. In addition, approximately 724,000 flight plans were filed through the DUATS system. Using the weighted total flight services formula (two times the sum of pilot briefs and flight plans filed), this translates into approximately 13.4 million total flight services that are not included in the FAA flight service station workload measure.

DUATS transactions are projected to increase from 6.0 million in 1999 to 6.1 million in 2000 (up 2.3 percent). In 2001, DUATS transactions are projected to total 6.3 million, a 3.7 percent increase over the 2000 level. During the period 1999 through 2011, DUATS transactions are forecast to increase at an average annual rate of 2.6 percent, reaching just under 8.1 million in 2011.

For the entire forecast period, flight plans filed through DUATS are expected to increase from approximately 724,000 to just under 1.2 million in 2011, a 4.2 percent average annual increase. By the year 2011, total services provided through DUATS are projected to account for 18.6 million flight services, or 37.3 percent of total system services.

Total Flight Services

The decline in activity at FAA flight service stations since the mid 1980s is the result of the process of FSS consolidation, and the growing acceptance and utilization of DUATS services.

Total flight services, including non-automated and automated services, are expected to total 46.0 million in 2000, up 0.6 percent from 1999. By 2011, total flight services are forecast to reach just over 50.0 million, an average annual increase of 0.7 percent over the 1999 level.

CHAPTER VIII

FORECAST ACCURACY

CHAPTER VIII

FORECAST ACCURACY

The Federal Aviation Administration (FAA) has developed econometric forecast models and established a forecast process that attempts to anticipate changes that may affect the future direction of the aviation industry. Using this forecast process, the FAA annually provides 12-year forecasts of aviation demand and activity measures, that are, in turn, used for aviation-related personnel and facility planning. The FAA frequently sponsors workshops to critique techniques and practices currently used by the FAA and other aviation forecasters, and to examine the outlook for the aviation industry and its prospects for future growth. The workshops focus on the forecasting process and ways to improve the reliability and utility of forecasting results.

Tables VIII-1 and VIII-2 provide some measure of the accuracy of FAA projections of aviation demand and workloads at FAA facilities. The tables compare forecasts for both the short-term and the long-term periods. The short-term period, 1 to 5 years, is the critical period for personnel planning; the long-term period, 10 years out, is important for facility planning. The two key FAA forecasts are domestic revenue passenger miles (RPMs) and aircraft handled at FAA en route centers, the former used as one of the predictors of the latter.

For short-term trends, forecast errors normally tend to be modest: the 1999 domestic RPM forecast was 1.7 percent lower than the actual results for the year--473.1 billion compared to a forecast of 464.9 billion. Over the last 7 years, the average absolute one-year RPM forecast error is 1.9 percent. The average one-year forecast error is 0.7 percent for the 7 years --5 of the forecast years were underestimated and 2 of the forecast years were overestimated.

The forecast for aircraft handled in 1999 was 44.2 million forecast compared with an actual of 44.7 million--1.1 percent lower than forecast. Over the past 7 years, the average absolute one-year forecast error for aircraft handled is 1.4 percent. The average one-year forecast error is 0.9 percent for the 7 years--5 of the forecast years being underestimated and 2 of the forecast years being overestimated. This shows that the forecast errors are randomly distributed.

The 10-year out forecast errors tend to be larger because of unanticipated external events that have long-term impacts on the aviation system. Contributing external factors to RPMs include the Gulf War and the concomitant rise in fuel prices, the outbreaks of terrorism in 1986 and 1991, the Southeast Asian financial crisis in 1997-98, and the Northwest Airline pilot strike in 1998. These events, plus the failure of

TABLE VIII-1

DOMESTIC REVENUE PASSENGER MILES (RPM) FORECAST EVALUATION

Year Being Forecast	Actual RPMs (Billions)	Forecast RPMs (Billions) Published -- Years Earlier					
		1 Year	2 Years	3 Years	4 Years	5 Years	10 Years
1993	348.6	355.5	358.8	366.3	389.9	413.6	368.5
1994	371.4	358.6	375.1	375.3	383.1	407.1	397.5
1995	392.6	391.5	374.0	393.9	391.1	404.6	438.7
1996	418.9	405.3	412.2	389.0	411.6	409.1	472.0
1997	440.9	439.5	426.4	432.8	405.7	428.1	514.9
1998	451.5	460.8	459.3	448.6	451.4	422.0	517.9
1999	473.1	464.9	477.8	477.9	465.2	469.5	507.3
2000		***492.0***	478.8	495.5	497.3	482.4	506.0
2001			***509.7***	493.2	514.8	517.5	500.6
2002				***527.0***	514.4	536.5	513.4
2003					***544.9***	536.5	504.1
2004						***568.4***	558.7
2005							574.6
2009							***706.9***

Year Being Forecast	Forecast RPMs Percent Error Published--Years Earlier					
	1 Year	2 Years	3 Years	4 Years	5 Years	10 Years
1993	2.0	2.9	5.1	11.8	18.6	5.7
1994	(3.4)	1.0	1.1	3.2	9.6	7.0
1995	(0.3)	(4.7)	0.3	(0.4)	3.1	11.7
1996	(3.2)	(1.6)	(7.1)	(1.7)	(2.3)	12.7
1997	(0.3)	(3.3)	(1.8)	(8.0)	(2.9)	16.8
1998	2.1	1.7	(0.6)	(0.0)	(6.5)	14.7
1999	(1.7)	1.0	1.0	(1.7)	(0.8)	7.2

Note on how to read this table: In 1998 we forecast 464.9 billion RPMs would occur in 1999. In fact 473.1 billion RPMs were recorded, meaning the forecast was 1.7 percent lower than actual.

The 1999 forecast is shown in bold italics.

TABLE VIII-2

FAA ARTCC AIRCRAFT HANDLED FORECAST EVALUATION

Year Being Forecast	Actual Activity (Millions)	Forecast Activity Level (Millions) Published -- Years Earlier					
		1 Year	2 Years	3 Years	4 Years	5 Years	10 Years
1993	37.4	37.5	38.3	40.6	41.0	41.6	40.7
1994	38.8	37.9	38.4	39.4	41.5	41.9	43.6
1995	40.1	39.8	38.6	39.3	40.3	42.7	43.6
1996	40.4	41.1	40.7	39.4	40.0	41.1	44.0
1997	41.4	40.9	42.2	41.5	40.3	40.7	46.0
1998	43.2	42.0	41.8	43.4	42.4	41.1	46.1
1999	44.7	44.2	42.6	42.5	44.4	43.4	46.0
2000		***45.7***	45.2	43.2	43.5	45.3	47.1
2001			***46.8***	46.2	44.2	44.4	46.6
2002				***48.0***	47.3	45.2	45.1
2003					***49.0***	48.4	45.0
2004						***50.1***	47.3
2005							49.3
2009							***56.7***

Year Being Forecast	Forecast Activity Percent Error Published--Years Earlier					
	1 Year	2 Years	3 Years	4 Years	5 Years	10 Years
1993	0.3	2.4	8.6	9.6	11.2	8.8
1994	(2.3)	(1.0)	1.5	7.0	8.0	12.4
1995	(0.7)	(3.7)	(2.0)	0.5	6.5	8.7
1996	1.7	0.7	(2.5)	(1.0)	1.7	8.9
1997	(1.2)	1.9	0.2	(2.7)	(1.7)	11.1
1998	(2.8)	(3.2)	0.5	(1.9)	(4.9)	6.7
1999	(1.1)	(4.7)	(4.9)	(0.7)	(2.9)	2.9

Note on how to read this table: In 1998 we forecast 44.2 million aircraft would be handled in 1999. In fact 44.7 million aircraft were recorded, meaning the forecast was 1.1 percent lower than actual.

The 2000 forecast is shown in bold italics.

general aviation to respond to the economic recovery of the 1980s and early 1990s, affect the number of aircraft handled. Further, the FAA does not use cyclical economic projections in preparing its long-term forecasts. As a result, the 1990/1991 economic recession was not considered in any of the forecasts prepared prior to 1990. Over the 7 years, 1993 through 1999, the average 10-year forecast error for domestic RPMs is 10.8 percent and 8.5 percent for aircraft handled.

THE FAA AVIATION FORECASTING PROCESS

INTRODUCTION

The FAA's forecasting process is a continuous and interactive one that involves the FAA Statistics and Forecast Branch, other FAA offices and services, other Government agencies, and aviation industry groups. In addition, the process uses various economic and aviation databases, econometric models and equations, and other analytical techniques.

Forecasting aviation activity is an essential component of the FAA's planning process. The forecasts are used to determine staffing levels and capital expenditures that will be needed to accommodate growth of aviation activity while maintaining a safe and efficient environment. The forecasts are also used for short-term budget preparation, cost-benefit analyses, regulatory analyses, and safety analyses. The relative importance of the forecasting function in the planning process can be gauged by examining the major changes being made to the airspace infrastructure through the Capital Investment Plan out to the year 2010. These changes are being made, in large part, to accommodate the projected growth in air traffic.

To improve the air traffic control and air navigation systems, the FAA is installing new aircraft landing systems, developing new radar and communication systems, and upgrading the weather services it provides to aircraft operators. Because of the sizable investments being made in the National Airspace System, it is essential that the FAA develop and use the most accurate and reliable forecasts possible. Thus, the periodic review and evaluation of the forecasting procedures, models, forecast assumptions, and forecast results constitute essential parts of the process.

The FAA must consider over 100 variables when producing a set of national forecasts. (The number does not include derived subtotals and totals.) Of these, three economic independent variables are obtained from sources external to the FAA. Consequently, the FAA has no control over these truly exogenous variables. There are 12 quantifiable air carrier forecast assumptions and 3 quantifiable regional/ commuter carrier forecast assumptions. These forecast assumptions are made by the FAA analysts who develop the forecast. There are 83 aviation variables that are not FAA workload measures, but influence the workload measures in one way or another. Finally, there are 30 aviation variables that are workload measures used by the FAA for policy and planning considerations and for personnel and investment planning.

The table at the end of this chapter contains a list of the variables, the sources of the historical data, and their relationship to the forecast process. Forecasts of the economic variables are developed outside the FAA. All other forecasts are developed by the FAA.

Research undertaken in the early- and mid-1970s indicated that some measures of economic activity (such as gross domestic product or total employment) and some measures of prices (for example, aircraft prices and aviation fuel prices) were useful predictors of aviation activity. Some unique events

(including the failure of U.S. air carriers to follow rational pricing policies; e.g., the destructive fare wars of 1986 and 1992; and the prolonged depressed state of the general aviation manufacturing industry) have altered the relationships between the key aviation variables and the economic variables used previously. It has been difficult, therefore, to produce economic or econometric models that predict aviation activity with the same degree of reliability as the models developed in earlier periods. Thus, for the present, the forecasters must rely to a greater degree on subjective judgment, evaluation, and expertise than was required previously. This is not at all unusual in times when significant structural changes are takes place in a volatile industry.

THE FAA FORECASTING PROCESS

The FAA forecasting process is an interactive system that combines econometric and time-series model results with aviation industry forecasts, expert opinions, and anticipated policy impacts to derive a set of FAA aviation forecasts that are used in the FAA decision making process. The flow diagram on page VIII-6 shows a generalized version of the FAA aviation forecasting process.

The first step in developing the forecasts is to enter the economic and demographic variables into a set of econometric models or equations that represent a simplified version of the real world. The degree of accuracy of the forecasts of aviation activities depends on both the accuracy of the forecasts of the independent variables and the ability of the models to portray activities in the real world.

The mechanical execution of forecast models is only the first step in producing a set of forecasts. In general, these models and equations are simple portrayals of a complex system. They cannot account for a number of political, social, psychological, and economic variables, and for all the interrelated actions and reactions that eventually lead to a particular set of results. Therefore, the initial model results are reviewed, revised, and adjusted to reflect the analysts' best judgment of the impacts of the events occurring, or expected to occur, during the forecast period.

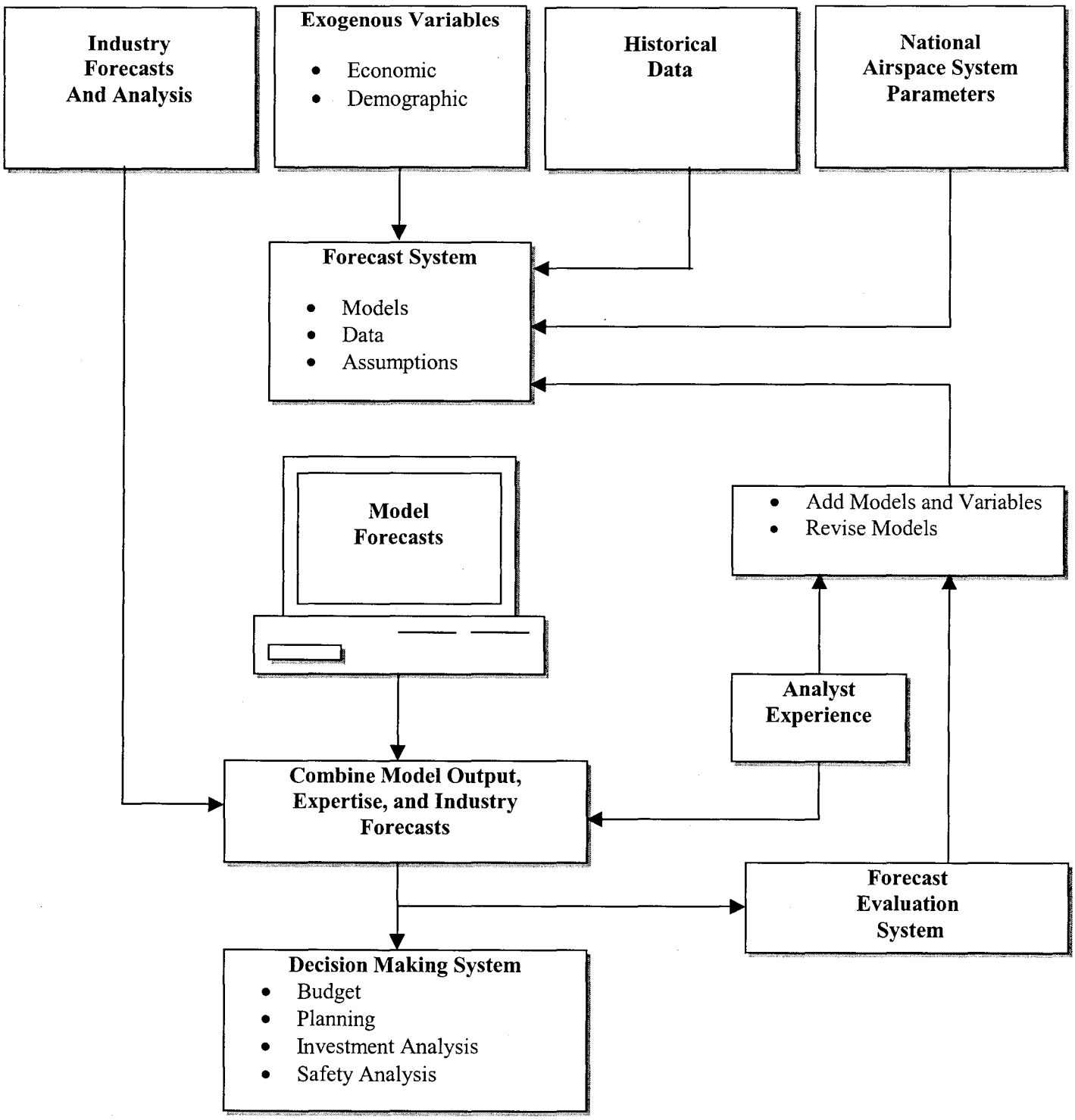
FORECAST EVALUATION

It is important to evaluate the forecast results and to determine the causes of the deviations of the forecast values from the actual values observed in the real world. Large forecast errors can lead to inefficient allocation of resources which, in turn, could lead to capacity constraints and delays or to excess capacity in the National Airspace System. For this reason, the FAA continuously evaluates the forecasting process and its results.

The analysis of the errors generally identifies the causes of the deviations and helps determine the proportion due to improper model specifications, erroneous forecasts of independent variables, erroneous forecast assumptions, or incorrect judgments and opinions. If warranted, the forecast error analysis may lead to a reformulation of the model and to additions or deletions of independent variables, revisions of forecast assumptions, and/or changes in analysts' opinions and judgments about future events.

The evaluation of the forecast process proceeds on several fronts. On a monthly basis, the FAA tracks its short-term forecasts of commercial air carrier traffic (enplanements and RPMs), aircraft operations, instrument operations, IFR aircraft handled, and flight services vis-à-vis the actual counts at the facilities. This tracking system alerts FAA management to unexpected deviations from the trends suggested by the forecasts. Inquiries are then initiated to

FAA FORECASTING SYSTEM



determine the cause(s) of the differences and revised short-term forecasts may be generated, if necessary.

To help the analysts make correct decisions and informed judgments when developing the forecast assumptions, the FAA holds meetings with industry representatives to discuss industry trends, recent developments, and possible future courses of events. Every 2 years, for example, in cooperation with the National Academy of Sciences, Transportation Research Board (TRB), the FAA sponsors an International Workshop on Future Aviation Activities--"Forecast Assumptions Workshop." This "by invitation only" workshop is attended by some 100 industry planners and forecasters representing the airlines, aircraft manufacturers, engine manufacturers, trade associations, academic institutions, and other industry groups.

The participants at the 11th FAA/TRB workshop (September 15-17, 1999) were divided into nine concurrent panels to discuss sectoral trends and problems in the following areas: (1) domestic air carriers, (2) international air carriers, (3) regional and commuter airlines, (4) air cargo, (5) airports and infrastructure, (6) commercial aircraft fleets, (7) light personal and general aviation, (8) business aviation, and (9) vertical flight (rotorcraft).

These subgroups were further instructed to critique the current FAA aviation forecasts for their specific areas. In addition, each group was asked to identify specific assumptions about the short- and long-term future trends of the economic and aviation variables that are important to their segments of the industry, to indicate why these trends are considered important, and to explain why specific trends are anticipated. After discussing the current FAA forecast and the group's assumptions, each group attempts to reach a consensus about the key variables affecting the industry and the most likely future courses of these variables. Finally, the TRB publishes a report of the workshop's findings.

The participants' benefit from the discussions and the FAA analysts have the TRB workshop report as a benchmark to use in preparing forecasts or in evaluating forecasts prepared by other organizations. The FAA incorporates many of the relevant assumptions developed at the 11th FAA/TRB workshop into the FAA forecasting system. The assumptions and forecasts prepared by the three industry panels on general aviation--Light General Aviation, Business Aviation, and Vertical Flight—are used extensively in preparing the general aviation and helicopter forecasts. The 12th International Workshop on Future Aviation Activities is scheduled to be held in Washington, DC during 2001.

Formal and informal meetings with individuals and representatives of specific industry groups are another way the FAA promotes dialogue and discussions with the aviation community and solicits industry input and comments. Meetings are held regularly with the aircraft manufacturers, with members of the Air Transport Association, and with members of the General Aviation Manufacturers Association, National Business Aviation Association, Aircraft Owners and Pilots Association, Helicopter Association International, and other general aviation organizations. In addition, FAA analysts maintain one-on-one contact with industry representatives.

Another intermediate step in the FAA aviation forecast process is the public dissemination of the forecast results, solicitation of industry comments, and critique of the forecasts. One of the main avenues for this purpose are the two Aviation Forecast Conferences that are held annually in March and April. During 1999, the FAA held its 24th Annual Commercial Aviation Forecast Conference (March 24-25, Washington, DC) and its 9th Annual General Aviation Conference April 17-18, Phoenix, AZ). The commercial aviation conference is generally attended by between 500 and 600 participants while the general aviation conference generally attracts between 200 and 250 participants.

Attendees include airline and airport executives, aircraft and engine manufacturers, trade associations, aviation consultants, consumer groups and other industry representatives, and the news media.

For the first time in a decade, the two conferences are being combined to include issues facing both the commercial and general aviation industries. The conference, "Aviation 2000" will be held in Washington, DC on March 7-8, 2000. The resurgence of the general aviation industry warrants discussion of problems and issues that the industry may be facing at an expanded national forum.

To the maximum extent possible, the FAA responds to questions raised about the forecasts both during and after the conference. The commercial conference was expanded to a second day in 1997 to allow more discussion regarding the implications of the FAA forecasts on various segments of the industry.

An important part of the conference is the opportunity for various leaders and experts in the aviation industry to make technical presentations on a variety of topics of interest to the aviation community. The forecast conference establishes an avenue of communication through which the FAA can release its forecast to the aviation community and the general public, and also receive comments, criticisms, and feedback about the forecasts. The FAA also receives valuable information and insights through the papers presented at the forecast conference. These papers are published annually in the conference proceedings and are distributed to all conference attendees, or by request.

The FAA also seeks to improve forecast accuracy and credibility by inviting FAA regional and State participation in the forecast process. For example, facility-level terminal area forecasts, forecasts of aircraft handled at the ARTCCs, and flight service station forecasts are circulated to FAA regions for review and comment. The comments and suggested changes are incorporated in the final facility level reports. In the case of the terminal area forecasts, the FAA regions have the capability to make changes directly on personal computers. However, the final facility-level forecasts derived by this procedure must be consistent with the national forecasts.

Periodically, FAA prepares technical reports that compare the accuracy of the forecasts of key workload measures with the accuracy of forecasts of economic variables prepared by major forecasting services. Based on the results of these studies, the FAA forecasts compare favorably with those produced by these major forecasting services.

TABLE VIII-3

FAA AVIATION FORECAST VARIABLES AND DATA SOURCES

TYPES OF VARIABLES AND VARIABLE NAMES	DATA SOURCES
ECONOMIC	
ECONOMIC ASSUMPTIONS	
Gross Domestic Product (GDP)	OMB, DRI, WEFA
Consumer Price Index (CPI)	OMB, DRI, WEFA
Oil and Gas Deflator	OMB, DRI, WEFA
AIR CARRIER	
FORECAST ASSUMPTIONS	
Domestic Operations	
Average seats per aircraft	BTS/computed
Average passenger trip length	BTS/computed
Revenue per passenger mile (current $)	BTS/computed
Revenue per passenger mile (1999 $)	Computed
Average jet fuel prices (current $)	BTS/computed
Average jet fuel prices (1999 $)	Computed
International Operations (U.S. Carriers)	
(Same as Domestic)	(Same)
SCHEDULED PASSENGER TRAFFIC	
Domestic	
Revenue passenger miles (RPMs)	BTS
Revenue passenger enplanements	BTS
Available seat miles	BTS
Load factors	Computed
International (U.S. Carriers)	
Revenue passenger miles by World Regions	BTS
Revenue passenger enplanements by World Regions	BTS
Available seat miles by World Region	BTS
Load factors	Computed

FAA AVIATION FORECAST VARIABLES AND DATA SOURCES (CONTINUED)

TYPES OF VARIABLES AND VARIABLE NAMES	DATA SOURCES
AIR CARRIER (CONTINUED)	
SCHEDULED PASSENGER TRAFFIC (CONTINUED)	
International (U.S. and Foreign Flag Carriers)	
Passenger enplanements	INS
FLEET	
Large jet aircraft	FAA/AFS-620
HOURS FLOWN BY EQUIPMENT TYPE	
Large jet aircraft	BTS
FUEL CONSUMED	
Jet	
Domestic air carriers	BTS
International air carriers	BTS
General aviation	FAA/APO-110
Aviation Gasoline	FAA/APO-110
REGIONAL/COMMUTER	
FORECAST ASSUMPTIONS	
Average seats per aircraft	BTS/Computed
Average passenger trip length (48 States and Hawaii, Puerto Rico, Virgin Islands)	BTS/Computed
Average load factor	BTS/Computed
PASSENGER TRAFFIC	
Revenue passenger enplanements (48 States and Hawaii, Puerto Rico, Virgin Islands)	BTS
Revenue passenger miles (48 States and Hawaii, Puerto Rico, Virgin Islands)	BTS

FAA AVIATION FORECAST VARIABLES AND DATA SOURCES (CONTINUED)

TYPES OF VARIABLES AND VARIABLE NAMES	DATA SOURCES
REGIONAL/COMMUTER (CONTINUED)	
FLEET	
Aircraft less than 60 seats	FAA
HOURS FLOWN	
Total for all passenger airlines	BTS
GENERAL AVIATION	
FLEET	
Active aircraft by equipment type	FAA/APO-110
NUMBER OF AIRCRAFT BY REGION	
Total aircraft in each of nine FAA Regions	FAA/APO-110
HOURS FLOWN	
Hours flown by equipment type	FAA/APO-110
FUEL CONSUMED	
Fuel consumed by equipment type	FAA/APO-110
PILOTS	
Active pilots by certificate type	FAA/APO-110

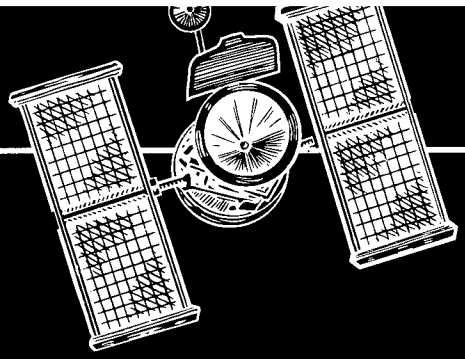
FAA AVIATION FORECAST VARIABLES AND DATA SOURCES (CONTINUED)

TYPES OF VARIABLES AND VARIABLE NAMES	DATA SOURCES
FAA WORKLOAD MEASURES	
FAA TOWERS	
Number of FAA Towers	FAA/APO-130
Number of Contract Towers	FAA/ATR-107
Aircraft Operations:	
Itinerant and local operations by aviation category	FAA/APO-130
Instrument operations by aviation category	FAA/APO-130
Non-IFR Instrument Operations:	
Terminal control areas	FAA/APO-130
Expanded radar service areas	FAA/APO-130
AIR ROUTE TRAFFIC CONTROL CENTERS	
IFR departures by aviation category	FAA/APO-130
IFR overs by aviation category	FAA/APO-130
FLIGHT SERVICE STATIONS	
IFR-DVFR flight plans originated	FAA/APO-130
VFR flight plans originated	FAA/APO-130
Pilot briefings	FAA/APO-130
Aircraft contacted by aviation category	FAA/APO-130
IFR-DVFR aircraft contacted	FAA/APO-130
VFR aircraft contacted	FAA/APO-130

FAA AVIATION FORECAST VARIABLES AND DATA SOURCES (CONTINUED)

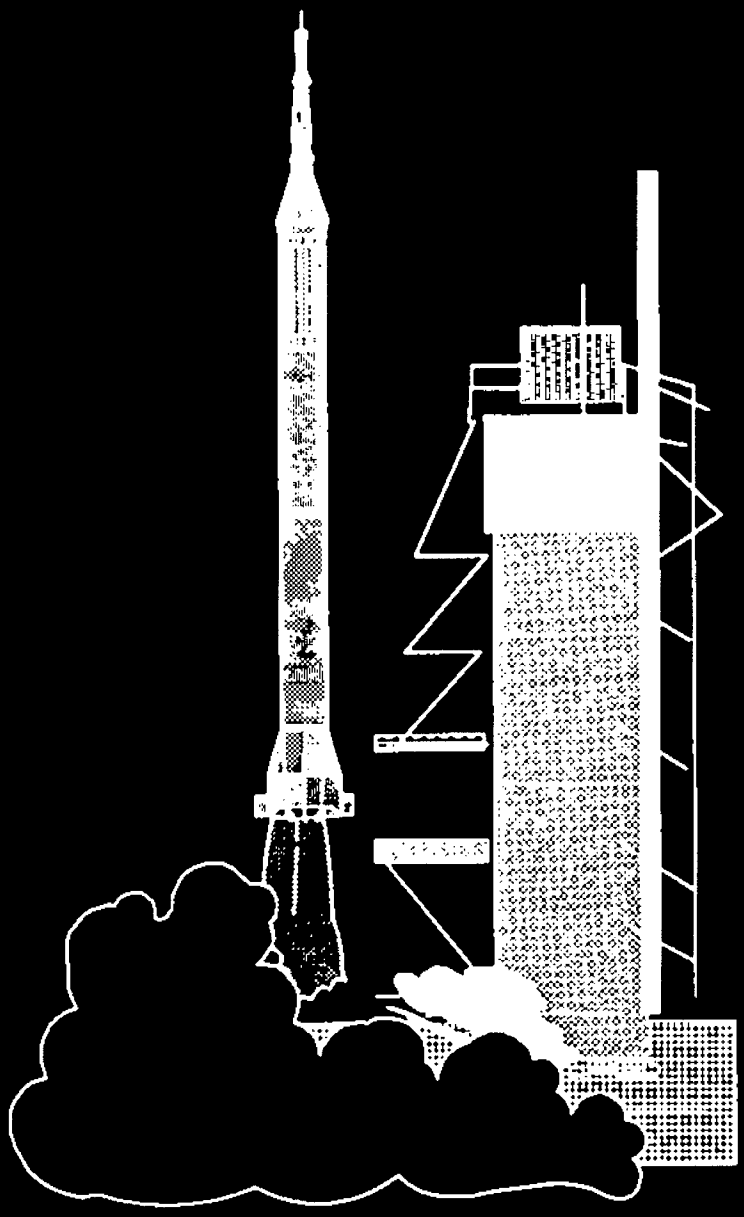
TYPES OF VARIABLES AND VARIABLE NAMES	DATA SOURCES
TERMINAL AREA FORECASTS (3,410 Towered and Nontowered Airports)	
ENPLANEMENTS	
U. S. Flag Carrier	BTS
Foreign Flag Carrier	INS/BTS
Regional/Commuter	BTS
Air Taxi	FAA/VNTSC
OPERATIONS	
Towered Airports:	
Aircraft operations by aviation segment	FAA/APO-130
Scheduled commuter	OAG
Nontowered Airports	FAA/NFDC
Scheduled commuter	OAG

OMB--Office of Management and Budget
DRI--DRI/McGraw-Hill, Inc.
WEFA—WEFA, Inc.
BTS--Bureau of Transportation Statistics, Department of Transportation
AFS-620--Operations Systems Branch, FAA
APO-110--Statistics and Forecast Branch, FAA
APO-130--Information Systems Branch, FAA
INS--Immigration and Naturalization Service, Department of Justice
VNTSC--Volpe National Transportation Systems Center, Research and Special Programs Administration, Department of Transportation
NFDC--National Flight Data Center, FAA
OAG--North American Official Airline Guide



CHAPTER IX

COMMERCIAL SPACE TRANSPORTATION



CHAPTER IX

COMMERCIAL SPACE TRANSPORTATION

The Federal Aviation Administration's Associate Administrator for Commercial Space Transportation (AST) licenses and regulates U.S. commercial space launch activity as authorized by Executive Order 12465, *Commercial Expendable Launch Vehicle Activities*, and the *Commercial Space Launch Act of 1984*, as amended. AST's mission is to license and regulate commercial launch operations to ensure public health and safety and the safety of property, and to protect national security and foreign policy interests of the United States during commercial launch operations. The *Commercial Space Launch Act of 1984* and the *1996 National Space Policy* also direct the Federal Aviation Administration to encourage, facilitate, and promote commercial launches.

INTRODUCTION TO COMMERCIAL SPACE TRANSPORTATION

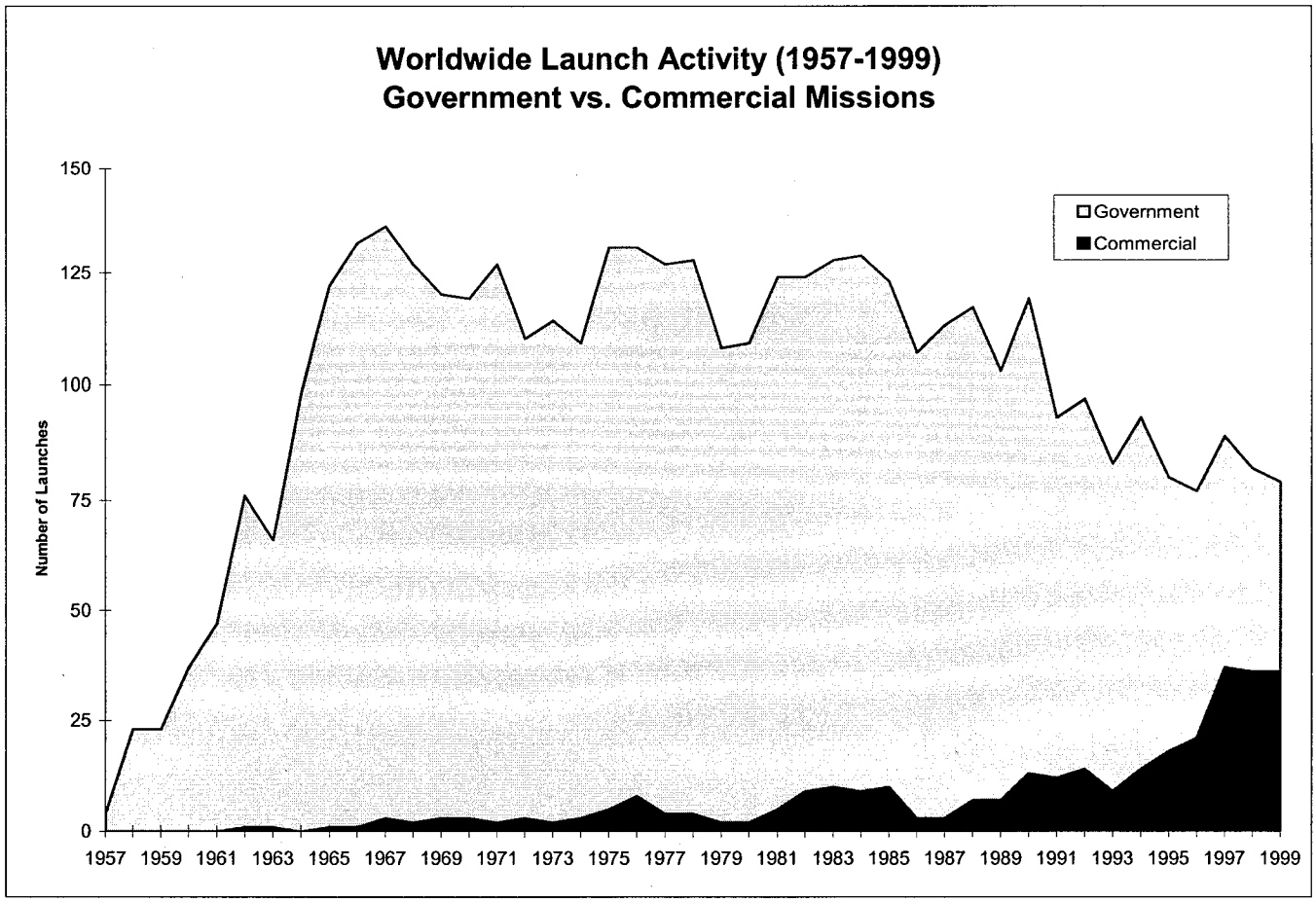
WHAT IS COMMERCIAL SPACE TRANSPORTATION?

The term "commercial space transportation" refers to the launch (or reentry) of an object into (or from) space by a private sector, non-governmental entity. Within the United States, commercial space launches are conducted by corporations such as Boeing, Lockheed Martin, and Orbital Sciences using expendable launch vehicles (ELVs)[1] to place spacecraft into orbit. Worldwide, commercial launch services are offered by companies from six countries—the United States, Europe, Russia, China, Japan, and Ukraine.

A "commercial launch" may carry a commercial, civil, or military payload into space, but is considered commercial because the launch service is commercially procured by the payload owner. For example, some U.S. Government payloads are commercially procured by the Government while others are launched by the U.S. Air Force or the National Aeronautics and Space Administration (NASA) using the same rockets. The FAA licenses those launches within the United States that are commercially procured, including those for U.S. and foreign governments.

The FAA also regulates and licenses non-commercial launches conducted by private citizens within the United States, providing an exception for amateur rocket launch activities.

[1] Expendable launch vehicles are used only once, with stages falling back to Earth or remaining in orbit after use.



COMMERCIAL USE OF SPACE

The use of space and the launching of objects into space originated as government endeavors for both civil and military purposes and has remained dominated by governments until only recently. As shown in the figure above, launches of satellites for commercial or quasi-commercial purposes began shortly after government launches in the early 1960s; however, they remained relatively few in comparison to those conducted for government purposes. Many of the early 'commercial' satellites launched were telecommunications spacecraft located in geostationary orbit[2] (GEO) for video broadcasting and international telephony under the auspices of international governmental treaty organizations, such as Intelsat, the International Telecommunications Satellite Organization (formed in 1971).

Commercial launch activity has steadily increased since the early 1980s, and now represents over 45 percent of launches conducted worldwide annually, ending the domination of space by government activities (see "Worldwide Launch Activity," table above). Until the last couple of years, commercial spacecraft were almost exclusively telecommunications satellites located in geostationary orbit. In 1997, however, full-scale deployment began of the first of several communications constellations consisting of multiple spacecraft in low Earth orbit (LEO).[3]

While there were 18 launches to GEO in 1999, there were an additional 18 launches to LEO for

[2] A spacecraft in geostationary orbit remains over the same spot on Earth, orbiting once every 24 hours, as does the Earth itself. GEO is a circular orbit at an altitude of 22,300 miles with a low inclination (i.e. over the equator).

[3] Satellites in LEO do not remain above a fixed point on Earth, orbiting every 90 minutes to 12 hours, depending on their altitude. Non-geostationary orbits (NGSO) include medium Earth orbit (MEO) and elliptical orbits.

the Iridium, Globalstar, and ORBCOMM global satellite communications systems, commercial remote sensing spacecraft to image the Earth from space, and scientific experiments.

U.S. COMMERCIAL LAUNCH SERVICES

Up until the early 1980s, commercial spacecraft were launched on rockets owned and operated by the U.S. Government, including the Space Shuttle, with no other nations taking part in the launching of satellites for commercial entities. With the entry of the European Ariane launch vehicle on the market in 1983, a competitive commercial market for launch services began. There are now over 15 launch vehicles offering commercial launch services worldwide (see "Commercial Launch Vehicles" below).

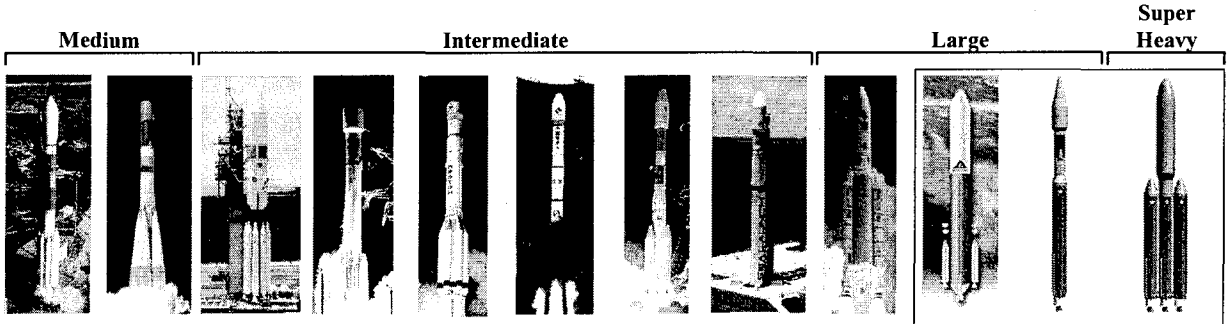
The U.S. Government and industry began to transition from government operation of expendable launch vehicles—such as Atlas, Delta, and Titan—to commercial operation following the passage of the *Commercial Space Launch Act of 1984*. The *Commercial Space Launch Act* authorized the Department of Transportation to regulate and license commercial launch activities. Commercial launches licensed by the Department of Transportation (now by the FAA) did not begin until 1989, however, as a result of the decision by the U.S. Government to stop launching commercial payloads on the Space Shuttle following the *Challenger* explosion in 1986.

U.S. expendable launch vehicles vary in size from small to intermediate class and are able to loft all but the very largest commercial spacecraft. Three U.S. companies are licensed by the FAA to conduct launches of ELVs:

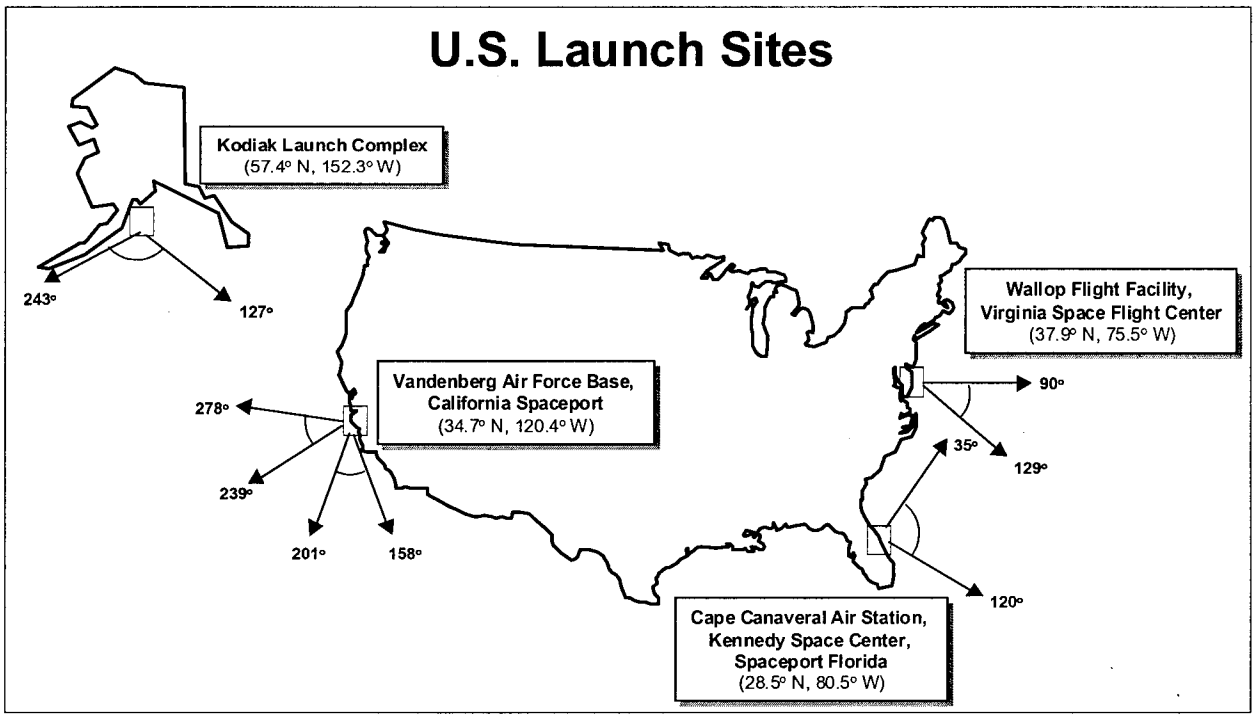
- Lockheed Martin
  - Atlas 1, 2, and 3 (intermediate class)
  - Athena 1 and 2 (small class)
- Boeing
  - Delta 2 (medium class)
  - Delta 3 (intermediate class)
- Orbital Sciences
  - Pegasus and Taurus (small class)

U.S. commercial launches to GEO are launched from the Cape Canaveral Air Station (CCAS) in Florida. Launches to LEO take place from the Cape, Vandenberg Air Force Base (VAFB) in California, or the Wallops Flight Facility in Virginia depending on the inclination of their

Commercial Launch Vehicles (Worldwide)



Vehicle	Delta 2	Soyuz	Delta 3	Atlas 2/3	Proton	Long March	Ariane 4	Sea Launch	Ariane 5	Delta 4	Atlas 5	EELV Heavy
Company	Boeing	Starsem	Boeing	ILS	ILS	CALT	Arianespace	Boeing/	Arianespace	Boeing	ILS	Boeing/
		CSDB/Ariane		LockMart	Khrun/LM			Yuzh/Energia			LockMart	LockMart
Country	U.S.	Russia/France	U.S.	U.S.	Russia/U.S.	China	Europe	U.S./Ukr/Rus	Europe	U.S.	U.S.	U.S.
1st Coml Launch	1989	1999	1999	1990	1996	1990	1988	1999	1999	2001	2001	2003



intended orbit (see figure "U.S. Launch Sites" above). The FAA has issued four launch site operator licenses to state-run organizations to operate commercial launch sites, or spaceports. They are:

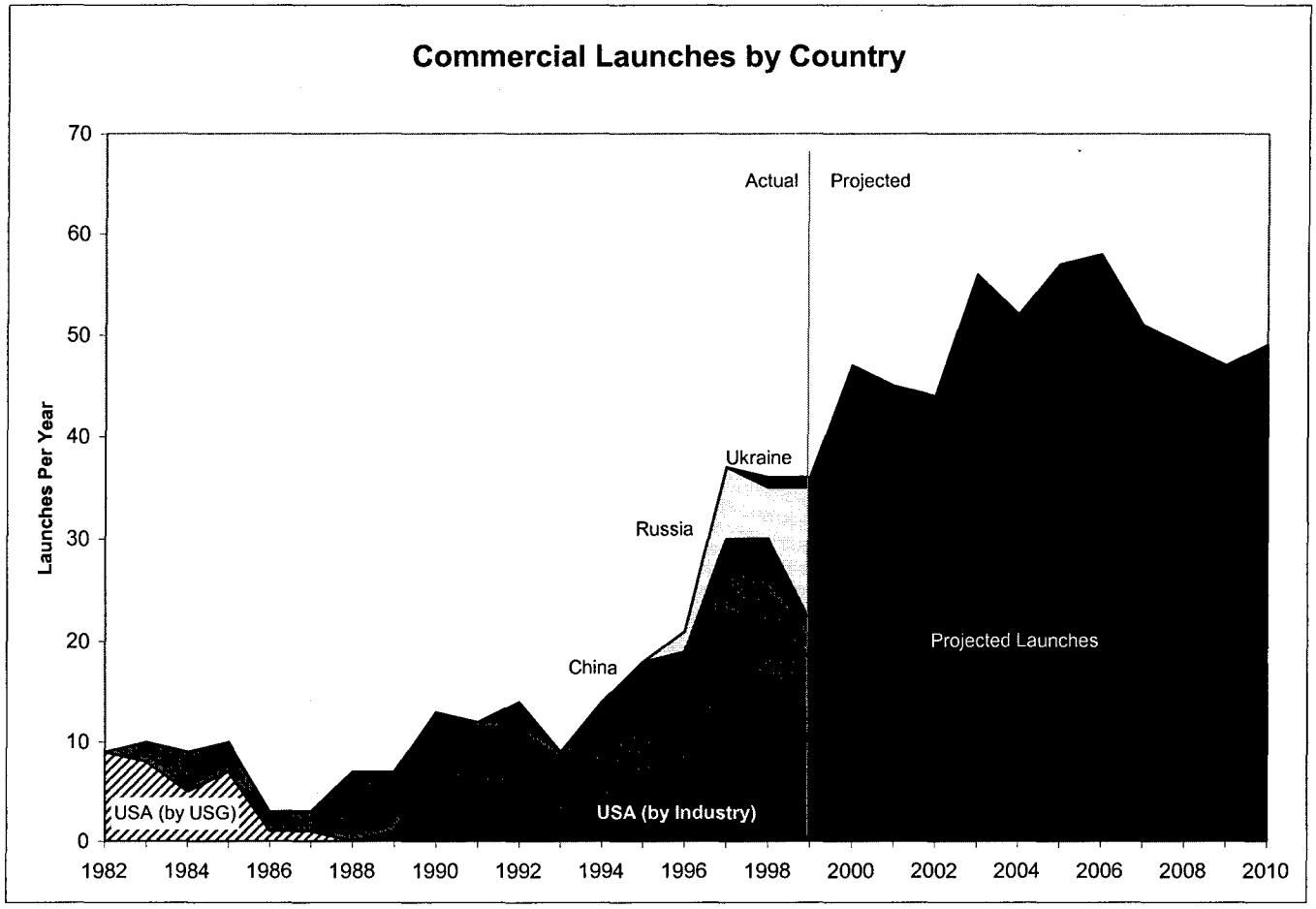
- Spaceport Florida, at Cape Canaveral Air Station, Florida,
- California Spaceport, at Vandenberg Air Force Base, California,
- Virginia Space Flight Center, at Wallop's Island, Virginia, and
- Kodiak Launch Complex, Kodiak Island, Alaska, the first spaceport not located on a federal range.

REVIEW OF 1999

Worldwide commercial launch activity kept pace with the past two years with commercial launch services providers conducting 36 launches, or 46 percent of the 79 orbital launches conducted in 1999. Despite the continued robustness of the overall market, the number of U.S. commercial launches fell in 1999, from 22 FAA-licensed launches in 1998 to 17 in 1999. Of the 17 FAA-licensed launches, 14 were conducted for commercial or international customers, two were conducted for U.S. Government agencies, and one was a demonstration launch carrying a mass simulator instead of a functioning spacecraft.

Two of the launches—the demonstration launch and a launch for a commercial customer—were conducted by Sea Launch, a joint venture between Boeing from the United States, Energia from Russia, Yuzhnoye from Ukraine, and Kvaerner from Norway. Sea Launch consists of a Zenit-3SL launched from a converted oil drilling platform in the middle of the Pacific Ocean on the equator. The first launch of Sea Launch was conducted on March 27, 1999 carrying the DemoSat demonstration payload. The second, and first commercial launch, was of a Hughes-built DirecTV satellite on October 9.

The remaining 15 FAA-licensed launches were conducted from U.S. launch sites and accounted for 48 percent of the United States' 31 launches, including government launches of the Space Shuttle and other civil and military payloads.



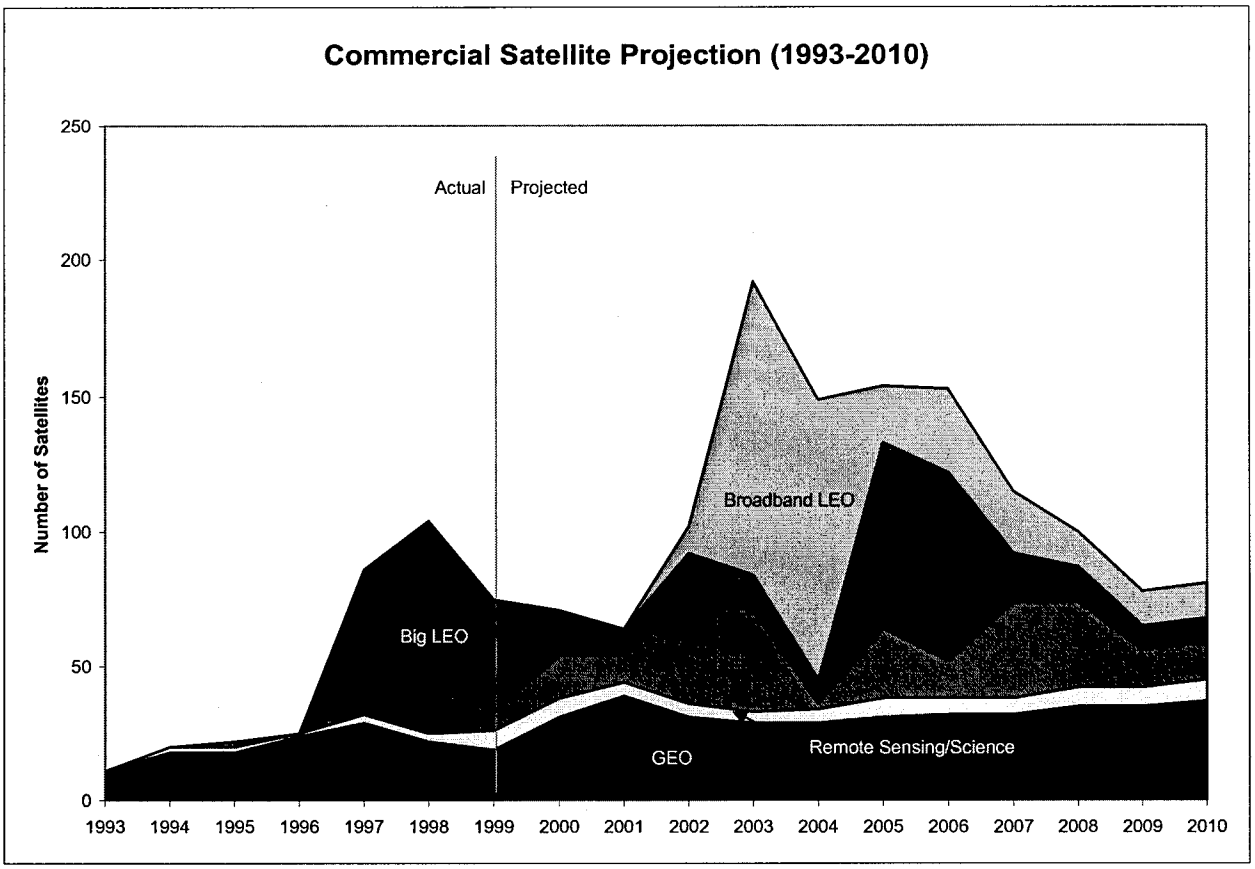
In addition to the 13 commercial launches conducted by U.S. commercial launch providers and the one commercial launch by Sea Launch, there were 22 commercial launches conducted by foreign launch providers. Russian launch providers conducted 13 commercial launches, Europe's Arianespace conducted 8 launches, and China conducted one commercial launch.

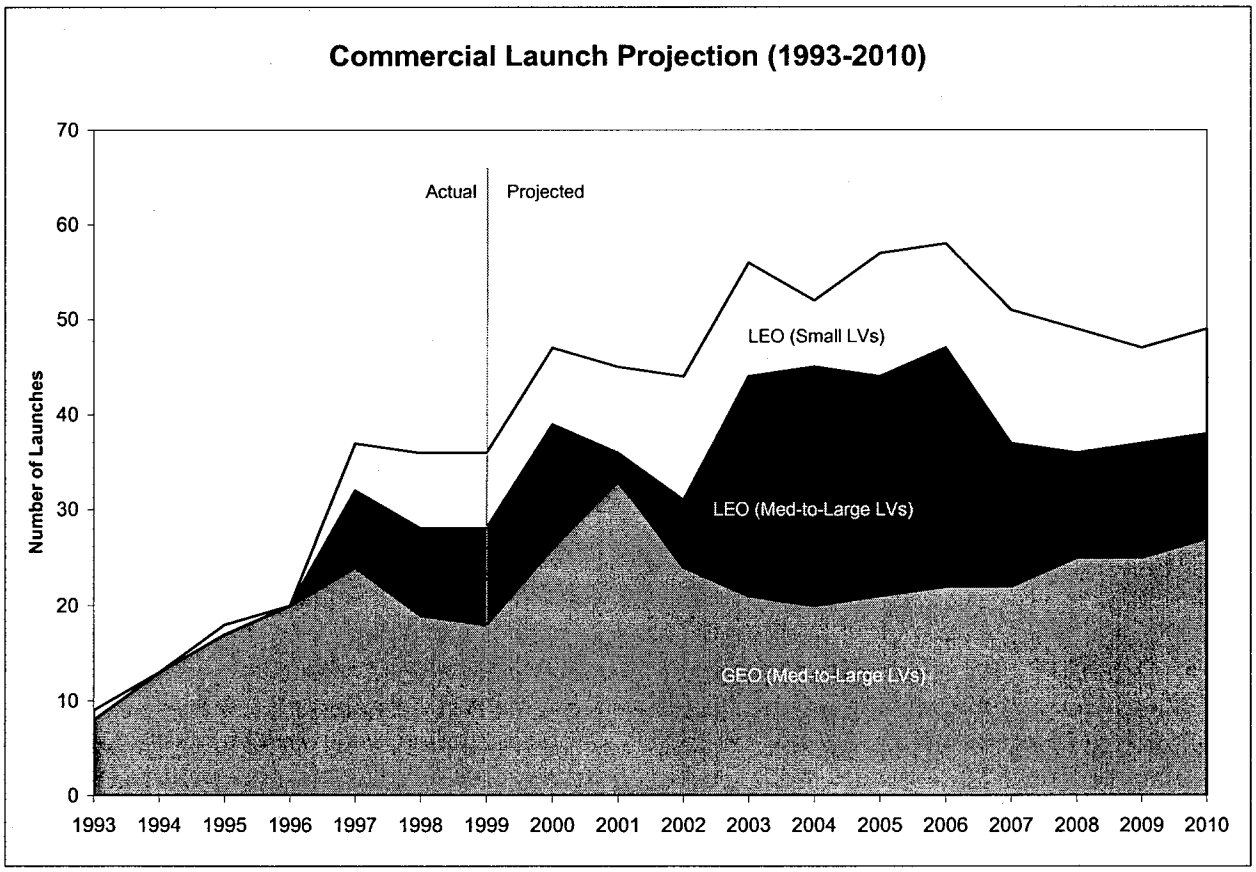
COMMERCIAL SPACE TRANSPORTATION FORECASTS

In May 1999, the FAA and the Commercial Space Transportation Advisory Committee (COMSTAC) prepared projections of global demand for commercial space launch services for the period 1999 to 2010. The results, published jointly in the *1999 Commercial Space Transportation Forecasts*, incorporate the ***COMSTAC 1999 Commercial GSO Spacecraft Mission Model***, which projects demand for commercial satellites that operate in geosynchronous orbit (GSO) and the FAA's ***1999 LEO Commercial Market Projections***, which projects commercial launch demand for all space systems in non-geosynchronous orbits (NGSO), such as low Earth orbit (LEO), medium Earth orbit (MEO), and elliptical orbits.

Together, the COMSTAC and FAA forecasts project that an average of 51 commercial space launches worldwide will occur annually through 2010. This is an increase of over 40 percent from the 36 commercial launches conducted worldwide in 1999.

Specifically, the forecasts project that on average the following type and number of launches will be conducted each year: 40 launches of medium-to-heavy launch vehicles (25 to GSO and 15 to LEO), and 11 launches of small launch vehicles to LEO.


Commercial Satellite Projection (1993-2010)
Number of Satellites
250
200
150
100
50
0
Actual
Projected
Broadband LEO
Big LEO
GEO
Remote Sensing/Science
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010


Commercial Launch Projection (1993-2010)
Number of Launches
70
60
50
40
30
20
10
0
Actual
Projected
LEO (Small LVs)
LEO (Med-to-Large LVs)
GEO (Med-to-Large LVs)
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010

GENERAL TRENDS

The commercial space transportation market is driven largely by the demand for launches of telecommunications satellites, and therefore, developments in the industry over the next five years will parallel developments in satellite systems, including:

- Continued strong demand for launch of GEO communications satellite systems with a cyclical downturn in demand in the 2002 timeframe.

- Highly cyclical demand for deployment of LEO satellite systems with a near-term reduction in launches due to completion of the first wave of global mobile telephony systems.

- An introduction of new larger launch vehicles to meet the demand for launches of heavier GEO spacecraft, including introduction of new U.S. vehicles, Delta 4 and Atlas 5.

- Continued international competition for launch services by Europe, Russia, and China.

- Continued development of technologies and demonstrators for Reusable Launch Vehicles (RLVs).

CHAPTER X

YEAR-BY-YEAR DATA FOR FAA AVIATION FORECASTS

CHAPTER X

YEAR-BY-YEAR DATA FOR FAA AVIATION FORECASTS

FISCAL YEARS 2000 – 2011

Chapter X provides detailed historical data and forecasts for aviation activity and FAA workload measures. The following should be noted:

- **Table 11**: Contains the unduplicated passenger traffic reported by U.S. scheduled air carriers on DOT Form 41 and commuter carriers on DOT Form 298-C.

- **Table 12**: Includes the following traffic, which is also reported as regionals/commuter traffic in Table 24.

FISCAL YEAR	ENPLANEMENTS (Millions)	RPMS (Millions)
1990	4.7	985
1991	6.7	1,315
1992	10.2	1,953
1993	12.8	2,601
1994	16.1	3,396
1995	21.0	4,426
1996	26.3	5,808
1997	26.2	5,930
1998	30.3	7,198
1999E	37.3	9,519

- **Table 24**: Includes traffic for those air carriers and regionals/commuters reporting on both DOT Forms 41 and 298-C (forecasts and historical data include Alaska and foreign territory traffic).

- **Table 25**: Has been revised and now includes all regional aircraft (turboprops and jets) up to 70 seats.

- **Table 30**: Includes the rotorcraft fleet and hours flown shown in Tables 26 and 27.

TABLE 1

U.S. SHORT-TERM ECONOMIC FORECASTS

ECONOMIC VARIABLE	FISCAL YEAR 2000				FISCAL YEAR 2001			
	1ST. QTR.	2ND. QTR.	3RD QTR.	4TH. QTR.	1ST. QTR.	2ND. QTR.	3RD QTR.	4TH. QTR.
REAL GDP								
(1996 Chained $, Billions)								
DRI/McGRAW-HILL	9,009.7	9,056.6	9,137.5	9,214.8	9,292.2	9,370.7	9,431.3	9,481.8
WEFA, INC.	8,990.6	9,012.9	9,095.2	9,166.9	9,234.7	9,311.8	9,384.9	9,484.1
OMB	8,986.5	9,035.9	9,107.1	9,179.4	9,245.3	9,304.7	9,364.6	9,422.7
OIL AND GAS PRICE INDEX								
(1996 EQUALS 100)								
DRI/McGRAW-HILL	106.2	107.8	105.0	102.3	100.1	99.2	99.0	98.9
WEFA, INC.	107.1	101.3	99.5	97.8	96.3	95.7	95.1	95.1
OMB	118.7	122.2	110.0	101.0	94.8	94.9	95.4	95.8
CONSUMER PRICE INDEX								
(1982-84 EQUALS 100)								
DRI/McGRAW-HILL	165.0	166.0	166.6	167.3	168.0	168.9	169.9	170.9
WEFA, INC.	165.2	166.0	166.7	167.6	168.5	169.4	170.2	171.2
OMB	165.1	166.1	167.0	168.0	169.0	170.0	171.1	172.1

Source: DRI/McGraw-Hill, Inc., December 1999; WEFA, Inc., December 1999; and Office of Management and Budget, November 1999.

TABLE 2

U.S. LONG-TERM ECONOMIC FORECASTS

FISCAL YEAR	GROSS DOMESTIC PRODUCT (Billions 1996$)	CONSUMER PRICE INDEX (1982-84=100)	OIL AND GAS PRICE INDEX (1996 = 100)
Historical			
1994	7,263.5	144.7	91.7
1995	7,495.9	148.8	95.2
1996	7,733.0	153.0	97.5
1997	8,080.1	156.9	100.7
1998	8,420.8	159.1	92.1
1999E	8,768.4	162.2	91.2
Forecast			
2000	9,077.2	166.6	113.0
2001	9,334.3	170.6	95.2
2002	9,569.8	174.9	97.1
2003	9,809.6	179.4	99.1
2004	10,071.9	184.1	101.1
2005	10,374.0	188.9	103.2
2006	10,681.7	193.8	105.4
2007	10,987.8	198.8	107.5
2008	11,287.0	204.0	109.8
2009	11,580.6	209.3	112.0
2010	11,881.5	214.7	114.4
2011	12,190.2	220.3	116.7

Source: 1999-2010; Office of Management and Budget, November 30, 1999. Extrapolated to 2011.

TABLE 3

ALTERNATIVE U.S. LONG-TERM ECONOMIC FORECASTS

CALENDAR YEAR	GROSS DOMESTIC PRODUCT (Billions 1996$)			CONSUMER PRICE INDEX (1982-84 = 100)			OIL AND GAS PRICE INDEX (1996 = 100)		
	DRI	WEFA	CONSENSUS	DRI	WEFA	CONSENSUS	DRI	WEFA	CONSENSUS
Historical									
1994	7,337.8	7,337.8	7,337.8	145.7	145.7	145.7	92.8	92.8	92.8
1995	7,537.1	7,537.1	7,537.1	149.8	149.8	149.8	94.2	94.2	94.2
1996	7,813.2	7,813.2	7,813.2	154.2	154.2	154.2	100.0	100.0	100.0
1997	8,165.1	8,165.1	8,165.1	157.6	157.6	157.6	100.0	100.0	100.0
1998	8,516.3	8,516.3	8,516.3	159.7	159.7	159.7	88.5	88.5	88.5
1999E	8,856.0	8,851.2	8,853.6	163.3	163.3	163.3	96.6	96.8	96.7
Forecast									
2000	9,175.3	9,127.4	9,151.4	167.0	167.2	167.1	103.8	98.7	101.3
2001	9,457.9	9,437.2	9,447.6	170.4	170.7	170.6	99.0	95.3	97.1
2002	9,719.2	9,752.7	9,736.0	174.7	174.5	174.6	98.8	95.8	97.3
2003	10,013.1	10,051.3	10,032.2	179.3	178.0	178.6	99.2	97.0	98.1
2004	10,343.9	10,355.2	10,349.5	184.1	181.8	182.9	99.8	98.3	99.0
2005	10,727.7	10,674.5	10,701.1	189.2	185.7	187.4	100.4	99.5	99.9
2006	11,121.0	10,988.8	11,054.9	194.6	189.9	192.2	101.4	101.4	101.4
2007	11,515.1	11,291.4	11,403.3	200.6	194.3	197.4	103.4	103.8	103.6
2008	11,889.5	11,590.6	11,740.0	206.9	198.9	202.9	105.8	106.5	106.1
2009	12,200.5	11,889.3	12,044.9	213.5	203.7	208.6	108.4	109.4	108.9
2010	12,509.0	12,187.7	12,348.3	220.3	208.7	214.5	111.4	112.4	111.9
2011	12,825.2	12,490.8	12,658.0	226.1	213.8	219.9	114.4	115.5	115.0

Source: DRI/McGraw-Hill, December, 1999 and WEFA, Inc., December, 1999.

TABLE 4

INTERNATIONAL GDP FORECASTS

CALENDAR YEAR	GROSS DOMESTIC PRODUCT (In Billions of 1990 U.S. Dollars)				
	CANADA	EUROPE/ AFRICA/ MIDDLE EAST	LATIN AMERICA/ MEXICO	JAPAN/PACIFIC BASIN/CHINA/OTHER ASIA/AUSTRALIA/ N. ZEALAND	WORLD
Historical					
1994	613.2	9,274.6	1,222.3	5,615.5	23,500.1
1995	633.7	9,516.6	1,230.2	5,838.9	24,152.6
1996	644.4	9,752.8	1,274.5	6,189.0	25,022.4
1997	669.9	10,027.3	1,344.4	6,396.7	25,909.0
1998	690.7	10,276.1	1,370.5	6,341.9	26,443.2
1999E	715.1	10,484.0	1,365.6	6,545.4	27,169.4
Forecast					
2000	733.9	10,803.0	1,412.3	6,769.1	28,024.4
2001	754.4	11,127.8	1,473.5	7,049.0	28,990.5
2002	774.7	11,459.9	1,540.8	7,347.5	29,999.0
2003	795.3	11,802.2	1,611.1	7,646.0	31,010.5
2004	816.2	12,155.4	1,685.5	7,957.7	32,056.4
2005	835.2	12,480.7	1,764.8	8,297.7	33,124.0
2006	853.3	12,806.6	1,840.5	8,668.6	34,202.9
2007	872.7	13,147.6	1,917.5	9,066.9	35,336.5
2008	896.2	13,502.4	2,009.7	9,488.0	36,531.0
2009	917.8	13,868.5	2,105.1	9,932.3	37,761.1
2010	939.0	14,247.3	2,202.5	10,394.0	39,023.9
2011	962.4	14,637.9	2,299.9	10,871.5	40,328.2

Source: WEFA, Inc., World Economic Outlook, November 1999.

TABLE 5

INTERNATIONAL EXCHANGE RATE FORECASTS

CALENDAR YEAR	FOREIGN EXCHANGE RATES (US$/Local Currency, Average)				UNITED STATES OECD TRADE-WEIGHTED NOMINAL EXCHANGE RATE (1990 EQUALS 100)
	CANADA	UNITED KINGDOM	WEST/UNITED GERMANY	JAPAN*	
Historical					
1994	0.732	1.533	0.616	9.784	101.7
1995	0.729	1.578	0.698	10.632	96.7
1996	0.733	1.561	0.665	9.193	101.2
1997	0.722	1.638	0.577	8.265	109.1
1998	0.674	1.657	0.568	7.639	115.3
1999E	0.672	1.610	0.560	8.568	113.6
Forecast					
2000	0.688	1.594	0.597	8.738	110.4
2001	0.701	1.608	0.616	9.029	107.1
2002	0.708	1.606	0.618	9.185	106.4
2003	0.712	1.611	0.620	9.293	106.0
2004	0.713	1.614	0.621	9.440	105.5
2005	0.728	1.624	0.624	9.665	105.0
2006	0.740	1.627	0.625	9.857	104.5
2007	0.748	1.629	0.626	9.967	104.0
2008	0.753	1.633	0.628	10.047	103.5
2009	0.757	1.635	0.629	10.129	103.0
2010	0.761	1.639	0.630	10.206	102.5
2011	0.764	1.651	0.635	10.268	102.1

Source: WEFA, Inc., World Economic Outlook, November 1999.
* U.S. $ per 1,000 Yen.

TABLE 6

BASELINE U.S. AIR CARRIER FORECAST ASSUMPTIONS

TOTAL SYSTEM OPERATIONS

FISCAL YEAR	AVERAGE SEATS PER AIRCRAFT (Seats)	AVERAGE PASSENGER TRIP LENGTH (Miles)	REVENUE PER PASSENGER MILE		AVERAGE JET FUEL PRICE	
			CURRENT $ (Cents)	FY 1999 $ (Cents)	CURRENT $ (Cents)	FY 1999 $ (Cents)
Historical*						
1994	163.2	983.8	12.76	14.31	56.5	63.3
1995	160.4	985.4	12.73	13.88	55.6	60.6
1996	158.9	991.9	13.08	13.87	62.5	66.3
1997	159.2	1,007.4	13.00	13.44	67.2	69.4
1998	158.3	1,011.0	13.20	13.46	54.7	55.7
1999E	156.9	1,021.3	12.93	12.93	49.7	49.7
Forecast						
2000	158.0	1,031.1	12.86	12.52	61.5	59.9
2001	158.7	1,040.8	12.76	12.13	51.9	49.3
2002	159.2	1,050.4	12.68	11.76	52.9	49.0
2003	159.9	1,061.0	12.62	11.41	54.0	48.8
2004	160.6	1,069.6	12.90	11.37	55.1	48.5
2005	161.2	1,076.8	13.18	11.32	56.2	48.3
2006	162.1	1,083.9	13.47	11.27	57.4	48.0
2007	163.3	1,091.2	13.76	11.23	58.6	47.8
2008	164.6	1,098.7	14.06	11.18	59.8	47.6
2009	165.9	1,106.4	14.36	11.13	61.0	47.3
2010	167.2	1,114.3	14.67	11.08	62.3	47.1
2011	168.6	1,122.3	14.99	11.03	63.6	46.8

* Source: Form 41, U.S. Department of Transportation.

TABLE 7

BASELINE U.S. AIR CARRIER FORECAST ASSUMPTIONS

DOMESTIC OPERATIONS

FISCAL YEAR	AVERAGE SEATS PER AIRCRAFT (Seats)	AVERAGE PASSENGER TRIP LENGTH (Miles)	REVENUE PER PASSENGER MILE		AVERAGE JET FUEL PRICE	
			CURRENT $ (Cents)	FY 1999 $ (Cents)	CURRENT $ (Cents)	FY 1999 $ (Cents)
Historical*						
1994	146.6	786.7	13.37	14.99	54.7	61.3
1995	143.4	791.0	13.31	14.51	54.1	58.9
1996	141.8	798.6	13.86	14.69	61.2	64.9
1997	142.5	812.0	13.72	14.18	65.7	67.9
1998	142.1	813.5	14.17	14.45	53.5	54.5
1999E	141.3	821.1	13.97	13.97	48.5	48.5
Forecast						
2000	142.4	827.1	13.88	13.52	60.1	58.5
2001	142.8	832.1	13.76	13.08	50.6	48.2
2002	143.0	836.1	13.66	12.67	51.6	47.9
2003	143.1	840.1	13.59	12.29	52.7	47.7
2004	143.2	844.1	13.90	12.25	53.8	47.4
2005	143.3	848.1	14.22	12.21	54.9	47.1
2006	143.8	852.1	14.55	12.18	56.0	46.9
2007	144.7	856.1	14.88	12.14	57.2	46.7
2008	145.7	860.1	15.23	12.11	58.4	46.4
2009	146.7	864.1	15.58	12.07	59.6	46.2
2010	147.7	868.1	15.93	12.04	60.8	46.0
2011	148.7	872.1	16.30	12.00	62.1	45.7

* Source: Form 41, U.S. Department of Transportation.

TABLE 8

BASELINE U.S. AIR CARRIER FORECAST ASSUMPTIONS

INTERNATIONAL OPERATIONS (PART 1)

FISCAL YEAR	AVERAGE SEATS PER AIRCRAFT (Seats)	AVERAGE PASSENGER TRIP LENGTH (Miles)	REVENUE PER PASSENGER MILE		AVERAGE JET FUEL PRICE	
			CURRENT $ (Cents)	FY 1999 $ (Cents)	CURRENT $ (Cents)	FY 1999 $ (Cents)
Historical*						
1994	243.6	2,992.5	11.14	12.49	61.5	68.9
1995	247.6	2,973.0	11.17	12.17	59.8	65.2
1996	248.6	3,017.7	10.92	11.58	66.3	70.3
1997	245.1	3,035.6	11.01	11.39	71.2	73.6
1998	236.2	3,073.9	10.53	10.73	57.9	59.0
1999E	232.4	3,185.7	10.04	10.04	52.9	52.9
Forecast						
2000	233.6	3,212.3	10.04	9.78	65.5	63.8
2001	235.1	3,240.3	10.05	9.55	55.2	52.5
2002	236.8	3,266.4	10.09	9.35	56.3	52.2
2003	238.3	3,273.2	10.14	9.17	57.4	51.9
2004	240.0	3,278.2	10.38	9.14	58.6	51.7
2005	241.5	3,279.5	10.59	9.10	59.8	51.4
2006	243.1	3,282.6	10.81	9.05	61.1	51.1
2007	244.5	3,285.2	11.03	9.00	62.3	50.9
2008	245.9	3,285.3	11.25	8.95	63.6	50.6
2009	247.3	3,285.3	11.49	8.90	64.9	50.3
2010	248.8	3,285.9	11.72	8.86	66.3	50.1
2011	250.2	3,287.4	11.96	8.81	67.6	49.8

* Source: Form 41, U.S. Department of Transportation.

TABLE 9

BASELINE U.S. AIR CARRIER FORECAST ASSUMPTIONS

INTERNATIONAL OPERATIONS (PART 2)

FISCAL YEAR	AVERAGE SEATS PER AIRCRAFT			REVENUE PER PASSENGER MILE					
				ATLANTIC		LATIN AMERICA		PACIFIC	
	ATLANTIC (Seats)	LATIN AMERICA (Seats)	PACIFIC (Seats)	CURRENT $ (Cents)	FY 1999 $ (Cents)	CURRENT $ (Cents)	FY 1999 $ (Cents)	CURRENT $ (Cents)	FY 1999 $ (Cents)
Historical*									
1994	233.3	177.7	320.2	9.29	10.41	14.08	15.78	12.18	13.65
1995	238.2	180.1	322.0	9.88	10.77	13.70	14.93	11.55	12.59
1996	237.5	182.2	326.6	10.25	10.87	13.53	14.34	10.50	11.13
1997	231.9	180.4	329.1	10.31	10.66	14.06	14.53	10.33	10.68
1998	228.4	177.6	318.2	10.13	10.33	13.72	13.99	9.25	9.43
1999E	229.6	176.6	303.8	9.61	9.61	12.76	12.76	9.00	9.00
Forecast									
2000	230.6	177.1	305.0	9.52	9.27	12.71	12.38	9.15	8.91
2001	231.6	177.6	308.0	9.46	9.00	12.63	12.01	9.31	8.85
2002	232.6	178.6	311.0	9.41	8.73	12.56	11.65	9.54	8.85
2003	234.1	179.6	313.0	9.36	8.46	12.49	11.30	9.79	8.85
2004	235.6	180.6	315.0	9.57	8.43	12.77	11.25	10.01	8.82
2005	237.1	181.6	317.0	9.78	8.40	13.05	11.21	10.17	8.73
2006	238.6	182.6	319.0	9.99	8.36	13.34	11.16	10.33	8.65
2007	240.1	183.6	321.0	10.21	8.33	13.63	11.12	10.49	8.56
2008	241.6	184.6	323.0	10.43	8.30	13.92	11.07	10.65	8.47
2009	243.1	185.6	325.0	10.66	8.26	14.23	11.03	10.82	8.39
2010	244.6	186.6	327.0	10.89	8.23	14.54	10.98	10.99	8.30
2011	246.1	187.6	329.0	11.13	8.20	14.86	10.94	11.17	8.22

* Source: Form 41, U.S. Department of Transportation.

TABLE 10

U.S. AND FOREIGN FLAG CARRIERS

TOTAL PASSENGER TRAFFIC TO/FROM THE UNITED STATES

CALENDAR YEAR	TOTAL PASSENGERS BY WORLD TRAVEL AREA (Millions)				
	ATLANTIC	LATIN AMERICA	PACIFIC	U.S./CANADA TRANSBORDER	TOTAL
Historical*					
1994	34.7	30.7	18.8	13.5	97.7
1995	37.0	32.1	20.8	14.8	104.7
1996	39.6	33.6	22.9	17.1	113.2
1997	43.7	35.3	24.5	18.1	121.6
1998	46.6	37.6	23.4	19.1	126.7
1999E	48.9	39.2	24.1	19.8	132.0
Forecast					
2000	51.0	40.9	25.2	20.5	137.6
2001	53.1	42.7	26.4	21.2	143.4
2002	55.4	44.5	28.1	22.0	150.0
2003	58.0	47.6	29.8	22.8	158.2
2004	60.6	50.9	31.6	23.7	166.8
2005	63.2	54.4	33.5	24.6	175.7
2006	65.9	57.8	35.7	25.5	184.9
2007	68.7	61.4	37.9	26.5	194.5
2008	71.7	65.6	40.3	27.5	205.1
2009	74.7	70.0	42.8	28.4	215.9
2010	78.0	74.5	45.5	29.3	227.3
2011	81.3	79.4	48.4	30.3	239.4

* Sources: Atlantic, Pacific, and Latin America, INS Form I-92, U.S. Department of Commerce; U.S./ Canada Transborder, Transport Canada.

TABLE 11

U.S. COMMERCIAL AIR CARRIERS AND REGIONALS/COMMUTERS

TOTAL SCHEDULED U.S. PASSENGER TRAFFIC 1/

FISCAL YEAR	REVENUE PASSENGER ENPLANEMENTS (Millions)			REVENUE PASSENGER MILES (Billions)		
	DOMESTIC	INTERNATIONAL	TOTAL	DOMESTIC	INTERNATIONAL	TOTAL
Historical*						
1994	511.3	46.3	557.6	379.5	138.6	518.1
1995	531.1	48.6	579.7	400.0	144.3	544.3
1996	558.1	50.0	608.1	426.4	150.9	577.3
1997	578.3	52.3	630.6	449.2	158.8	608.0
1998	589.3	53.1	642.4	460.1	163.3	623.4
1999E	611.2	53.3	664.5	482.4	169.7	652.1
Forecast						
2000	632.5	55.6	688.1	502.4	178.7	681.1
2001	652.4	58.1	710.5	521.0	188.3	709.3
2002	672.3	60.9	733.2	539.1	199.0	738.1
2003	692.6	64.7	757.3	557.8	211.9	769.7
2004	719.6	68.7	788.3	582.0	225.3	807.3
2005	749.9	72.8	822.7	609.1	238.7	847.8
2006	781.3	76.9	858.2	637.5	252.5	890.0
2007	812.5	81.2	893.7	665.9	266.8	932.7
2008	844.8	86.0	930.8	695.5	282.4	977.9
2009	877.4	91.0	968.4	725.6	298.8	1,024.4
2010	910.4	96.2	1,006.6	756.4	316.0	1,072.4
2011	944.7	101.7	1,046.4	788.4	334.3	1,122.7

* Source: Forms 41 and 298-C, U.S. Department of Transportation.
1/ Sum of Table's 12 and 24 less duplicated traffic.

TABLE 12

U. S. COMMERCIAL AIR CARRIERS

SCHEDULED PASSENGER TRAFFIC

FISCAL YEAR	REVENUE PASSENGER ENPLANEMENTS (Millions)			REVENUE PASSENGER MILES (Billions)		
	DOMESTIC	INTERNATIONAL	TOTAL	DOMESTIC	INTERNATIONAL	TOTAL
Historical*						
1994	472.1	46.3	518.4	371.4	138.6	510.0
1995	496.3	48.6	544.9	392.6	144.3	536.9
1996	524.5	50.0	574.5	418.9	150.9	569.8
1997	543.0	52.3	595.3	440.9	158.8	599.7
1998	555.0	53.1	608.1	451.5	163.3	614.8
1999E	576.1	53.3	629.4	473.1	169.7	642.8
Forecast						
2000	594.8	55.6	650.4	492.0	178.7	670.7
2001	612.5	58.1	670.6	509.7	188.3	698.0
2002	630.3	60.9	691.2	527.0	199.0	726.0
2003	648.6	64.7	713.3	544.9	211.9	756.8
2004	673.3	68.7	742.0	568.4	225.3	793.7
2005	701.0	72.8	773.8	594.5	238.7	833.2
2006	729.8	76.9	806.7	621.9	252.5	874.4
2007	758.3	81.2	839.5	649.2	266.8	916.0
2008	788.0	86.0	874.0	677.8	282.4	960.2
2009	818.1	91.0	909.1	706.9	298.8	1,005.7
2010	848.5	96.2	944.7	736.6	316.0	1,052.6
2011	880.1	101.7	981.8	767.6	334.3	1,101.9

* Source: Form 41, U.S. Department of Transportation.

TABLE 13

U.S. COMMERCIAL AIR CARRIERS

SCHEDULED INTERNATIONAL PASSENGER TRAFFIC

FISCAL YEAR	REVENUE PASSENGER ENPLANEMENTS (MIL)				REVENUE PASSENGER MILES (BIL)			
	ATLANTIC	LATIN AMERICA	PACIFIC	TOTAL	ATLANTIC	LATIN AMERICA	PACIFIC	TOTAL
Historical*								
1994	16.5	16.5	13.4	46.3	64.2	22.0	52.4	138.6
1995	16.2	18.0	14.3	48.6	64.4	24.4	55.5	144.3
1996	15.8	18.9	15.3	50.0	64.9	26.3	59.7	150.9
1997	16.5	20.0	15.8	52.3	68.2	29.5	61.1	158.8
1998	18.0	21.0	14.1	53.1	74.6	32.0	56.7	163.3
1999E	19.1	21.9	12.3	53.3	79.6	34.1	56.1	169.7
Forecast								
2000	20.0	22.9	12.7	55.6	83.8	36.1	58.8	178.7
2001	20.9	23.8	13.3	58.1	87.9	38.0	62.4	188.3
2002	21.8	24.9	14.2	60.9	91.8	40.0	67.2	199.0
2003	22.9	26.6	15.2	64.7	96.7	43.0	72.2	211.9
2004	24.0	28.5	16.3	68.7	101.6	46.2	77.5	225.3
2005	25.0	30.4	17.3	72.8	106.2	49.5	83.0	238.7
2006	26.1	32.3	18.5	76.9	111.1	52.7	88.7	252.5
2007	27.2	34.3	19.7	81.2	116.2	56.2	94.4	266.8
2008	28.4	36.7	20.9	86.0	121.6	60.2	100.6	282.4
2009	29.6	39.1	22.2	91.0	127.2	64.4	107.2	298.8
2010	30.9	41.7	23.6	96.2	133.1	68.8	114.1	316.0
2011	32.2	44.4	25.1	101.7	139.2	73.5	121.6	334.3

Source: Form 41, U.S. Department of Transportation.
Note: Detail may not add to total because of rounding.

TABLE 14

U.S. COMMERCIAL AIR CARRIERS

SCHEDULED PASSENGER CAPACITY, TRAFFIC, AND LOAD FACTORS

FISCAL YEAR	DOMESTIC			INTERNATIONAL		
	ASMs (BIL)	RPMs (BIL)	% LOAD FACTOR	ASMs (BIL)	RPMs (BIL)	% LOAD FACTOR
Historical*						
1994	578.1	371.4	64.2	197.9	138.6	70.0
1995	602.1	392.6	65.2	202.3	144.3	71.4
1996	621.1	418.9	67.4	206.9	150.9	73.0
1997	639.9	440.9	68.9	213.8	158.8	74.3
1998	644.3	451.5	70.1	223.3	163.3	73.1
1999E	677.9	473.1	69.8	229.6	169.7	73.9
Forecast						
2000	709.9	492.0	69.3	241.2	178.7	74.1
2001	740.8	509.7	68.8	253.3	188.3	74.3
2002	771.6	527.0	68.3	267.2	199.0	74.5
2003	797.9	544.9	68.3	284.6	211.9	74.5
2004	823.7	568.4	69.0	302.2	225.3	74.6
2005	855.4	594.5	69.5	320.4	238.7	74.5
2006	888.4	621.9	70.0	339.0	252.5	74.5
2007	927.5	649.2	70.0	358.3	266.8	74.5
2008	968.3	677.8	70.0	379.4	282.4	74.4
2009	1,009.9	706.9	70.0	401.7	298.8	74.4
2010	1,052.3	736.6	70.0	425.0	316.0	74.4
2011	1,096.5	767.6	70.0	449.8	334.3	74.3

Source: Form 41, U.S. Department of Transportation.

TABLE 15

U.S. COMMERCIAL AIR CARRIERS

SCHEDULED PASSENGER CAPACITY, TRAFFIC, AND LOAD FACTORS BY INTERNATIONAL TRAVEL REGIONS

FISCAL YEAR	ATLANTIC			LATIN AMERICA			PACIFIC		
	ASMs (BIL)	RPMs (BIL)	% LOAD FACTOR	ASMs (BIL)	RPMs (BIL)	% LOAD FACTOR	ASMs (BIL)	RPMs (BIL)	% LOAD FACTOR
Historical*									
1994	89.1	64.2	72.1	36.2	22.0	60.9	72.6	52.4	72.1
1995	85.9	64.4	75.0	38.8	24.4	63.0	77.6	55.5	71.5
1996	85.1	64.9	76.3	41.6	26.3	63.3	80.2	59.7	74.5
1997	86.7	68.2	78.7	44.8	29.5	65.7	82.3	61.1	74.3
1998	94.6	74.6	78.9	50.9	32.0	62.9	77.9	56.7	72.8
1999E	102.6	79.6	77.5	51.8	34.1	65.9	75.2	56.1	74.5
Forecast									
2000	107.7	83.8	77.8	54.0	36.1	66.9	79.5	58.8	74.0
2001	112.8	87.9	77.9	56.3	38.0	67.5	84.2	62.4	74.1
2002	117.7	91.8	78.0	59.3	40.0	67.5	90.2	67.2	74.5
2003	124.0	96.7	78.0	63.7	43.0	67.5	96.9	72.2	74.5
2004	130.3	101.6	78.0	67.9	46.2	68.0	104.0	77.5	74.5
2005	136.2	106.2	78.0	72.8	49.5	68.0	111.4	83.0	74.5
2006	142.4	111.1	78.0	77.5	52.7	68.0	119.1	88.7	74.5
2007	149.0	116.2	78.0	82.6	56.2	68.0	126.7	94.4	74.5
2008	155.9	121.6	78.0	88.5	60.2	68.0	135.0	100.6	74.5
2009	163.1	127.2	78.0	94.7	64.4	68.0	143.9	107.2	74.5
2010	170.6	133.1	78.0	101.2	68.8	68.0	153.2	114.1	74.5
2011	178.5	139.2	78.0	108.1	73.5	68.0	163.2	121.6	74.5

Source: Form 41, U.S. Department of Transportation.

TABLE 16

U.S. COMMERCIAL AIR CARRIERS

TOTAL AIR CARGO REVENUE TON MILES

FISCAL YEAR	FREIGHT/EXPRESS RTMS (Millions)			MAIL RTMS (Millions)		
	DOMESTIC	INTERNATIONAL	TOTAL	DOMESTIC	INTERNATIONAL	TOTAL
Historical*						
1994	9,334.5	8,957.2	18,291.7	1,988.8	509.4	2,498.2
1995	10,342.1	10,278.0	20,620.1	2,073.6	533.9	2,607.5
1996	10,655.3	10,874.6	21,529.9	2,126.4	560.6	2,687.0
1997	11,177.9	12,926.4	24,104.3	2,276.2	571.8	2,848.0
1998	11,527.3	13,992.9	25,520.2	2,300.8	529.3	2,830.1
1999E	11,453.3	13,579.4	25,032.7	2,410.2	508.9	2,919.1
Forecast						
2000	12,048.9	14,584.2	26,633.1	2,518.7	523.1	3,041.8
2001	12,663.4	15,751.0	28,414.4	2,627.9	539.9	3,167.8
2002	13,296.6	16,979.6	30,276.2	2,721.0	557.2	3,278.2
2003	13,961.4	18,219.1	32,180.5	2,816.2	575.0	3,391.2
2004	14,785.1	19,494.5	34,279.6	2,920.5	593.5	3,514.0
2005	15,672.2	20,761.5	36,433.7	3,040.5	611.2	3,651.7
2006	16,612.5	22,069.6	38,682.1	3,162.8	629.6	3,792.4
2007	17,593.3	23,437.9	41,031.2	3,284.5	649.1	3,933.6
2008	18,552.6	24,891.1	43,443.7	3,403.4	669.8	4,073.2
2009	19,518.4	26,384.5	45,902.9	3,520.1	691.2	4,211.3
2010	20,533.4	27,914.8	48,448.2	3,639.7	712.7	4,352.4
2011	21,601.8	29,478.0	51,079.8	3,762.6	735.5	4,498.1

* Source: 1994-99, Form 41, U.S. Department of Transportation.
2000-2011, FAA Forecasts.

TABLE 17

U.S. COMMERCIAL AIR CARRIERS

AIR CARGO REVENUE TON MILES: ALL-CARGO CARRIERS

FISCAL YEAR	FREIGHT/EXPRESS RTMS (Millions)			MAIL RTMS (Millions)		
	DOMESTIC	INTERNATIONAL	TOTAL	DOMESTIC	INTERNATIONAL	TOTAL
Historical*						
1994	6,386.3	4,141.1	10,527.4	282.3	43.1	325.4
1995	7,458.9	5,286.6	12,745.5	295.4	46.5	341.9
1996	7,954.6	5,909.6	13,864.2	302.1	39.3	341.4
1997	8,486.0	7,315.8	15,801.8	313.7	44.1	357.8
1998	8,906.5	7,985.3	16,891.8	444.9	40.0	484.9
1999E	8,954.7	7,274.7	16,229.4	691.7	38.5	730.2
Forecast						
2000	9,535.3	7,945.5	17,480.8	734.0	39.5	773.5
2001	10,134.7	8,720.6	18,855.3	777.4	40.8	818.2
2002	10,752.7	9,555.5	20,308.2	817.0	42.1	859.1
2003	11,402.3	10,416.3	21,818.6	858.0	43.5	901.5
2004	12,210.6	11,317.2	23,527.8	902.7	44.9	947.6
2005	13,084.9	12,240.8	25,325.7	953.2	46.2	999.4
2006	14,012.2	13,216.5	27,228.7	1,005.5	47.6	1,053.1
2007	14,980.0	14,248.4	29,228.4	1,058.7	49.1	1,107.8
2008	15,926.3	15,361.6	31,287.9	1,112.1	50.6	1,162.7
2009	16,878.9	16,521.5	33,400.4	1,165.7	52.2	1,217.9
2010	17,880.7	17,726.3	35,607.0	1,221.4	53.9	1,275.3
2011	18,935.9	18,973.7	37,909.6	1,279.3	55.6	1,334.9

* Source: 1994-99, Form 41, U.S. Department of Transportation.
2000-2011, FAA Forecasts.

TABLE 18

U.S. COMMERCIAL AIR CARRIERS

AIR CARGO REVENUE TON MILES: PASSENGER CARRIERS

FISCAL YEAR	FREIGHT/EXPRESS RTMS (Millions)			MAIL RTMS (Millions)		
	DOMESTIC	INTERNATIONAL	TOTAL	DOMESTIC	INTERNATIONAL	TOTAL
Historical*						
1994	2,948.2	4,816.1	7,764.3	1,706.5	466.3	2,172.8
1995	2,883.2	4,991.4	7,874.6	1,778.2	487.4	2,265.6
1996	2,700.7	4,965.0	7,665.7	1,824.3	521.3	2,345.6
1997	2,691.9	5,610.6	8,302.5	1,962.5	527.7	2,490.2
1998	2,620.8	6,007.6	8,628.4	1,855.9	489.3	2,345.2
1999E	2,498.6	6,304.7	8,803.3	1,718.5	470.4	2,188.9
Forecast						
2000	2,513.6	6,638.7	9,152.3	1,784.7	483.6	2,268.3
2001	2,528.7	7,030.4	9,559.1	1,850.5	499.1	2,349.6
2002	2,543.9	7,424.1	9,968.0	1,904.0	515.1	2,419.1
2003	2,559.1	7,802.8	10,361.9	1,958.2	531.5	2,489.7
2004	2,574.5	8,177.3	10,751.8	2,017.8	548.6	2,566.4
2005	2,587.3	8,520.7	11,108.0	2,087.3	565.0	2,652.3
2006	2,600.3	8,853.1	11,453.4	2,157.3	582.0	2,739.3
2007	2,613.3	9,189.5	11,802.8	2,225.8	600.0	2,825.8
2008	2,626.3	9,529.5	12,155.8	2,291.3	619.2	2,910.5
2009	2,639.5	9,863.0	12,502.5	2,354.4	639.0	2,993.4
2010	2,652.7	10,188.5	12,841.2	2,418.3	658.8	3,077.1
2011	2,665.9	10,504.3	13,170.2	2,483.3	679.9	3,163.2

* Source: 1994-99, Form 41, U.S. Department of Transportation.
2000-2011, FAA Forecasts.

TABLE 19

U.S. COMMERCIAL AIR CARRIERS

PASSENGER JET AIRCRAFT

CALENDAR YEAR	LARGE NARROWBODY			LARGE WIDEBODY			REGIONAL JETS	TOTAL
	2 ENGINE	3 ENGINE	4 ENGINE	2 ENGINE	3 ENGINE	4 ENGINE		
Historical								
1994	2,547	562	25	258	244	119	24	3,779
1995	2,715	522	44	248	256	112	35	3,932
1996	2,810	537	47	262	258	143	62	4,119
1997	2,824	532	49	288	243	139	100	4,175
1998	2,949	508	51	309	226	122	203	4,368
1999E	3,125	444	57	360	195	131	343	4,655
Forecast								
2000	3,227	351	57	422	168	130	469	4,824
2001	3,388	302	57	470	143	124	610	5,094
2002	3,539	272	57	500	134	123	765	5,390
2003	3,701	213	59	534	127	124	896	5,654
2004	3,854	178	59	565	118	126	1,026	5,926
2005	3,998	164	61	595	104	130	1,134	6,186
2006	4,174	154	61	622	94	133	1,225	6,463
2007	4,344	145	63	661	86	137	1,300	6,736
2008	4,532	140	63	708	79	139	1,363	7,024
2009	4,723	141	65	760	71	142	1,428	7,330
2010	4,924	141	65	817	58	145	1,487	7,637
2011	5,124	142	67	860	55	152	1,546	7,946

TABLE 20

U.S. COMMERCIAL AIR CARRIERS

CARGO JET AIRCRAFT

CALENDAR YEAR	LARGE NARROWBODY			LARGE WIDEBODY			TOTAL
	2 ENGINE	3 ENGINE	4 ENGINE	2 ENGINE	3 ENGINE	4 ENGINE	
Historical							
1994	130	307	200	12	50	57	756
1995	138	326	200	38	57	65	824
1996	149	319	201	66	72	43	850
1997	160	322	199	86	111	40	918
1998	166	326	197	111	123	44	967
1999E	172	334	180	128	143	56	1,013
Forecast							
2000	175	336	181	145	148	61	1,046
2001	187	338	182	175	152	64	1,098
2002	199	339	183	208	156	65	1,150
2003	212	340	183	241	162	64	1,202
2004	221	341	184	274	168	63	1,251
2005	229	341	185	307	174	62	1,298
2006	238	341	185	345	186	62	1,357
2007	247	341	186	377	197	62	1,410
2008	257	339	187	414	208	62	1,467
2009	268	337	187	450	219	64	1,525
2010	277	335	188	484	230	66	1,580
2011	284	333	188	518	240	68	1,631

TABLE 21

U.S. COMMERCIAL AIR CARRIERS

TOTAL AIRBORNE HOURS 1/

(In Thousands)

FISCAL YEAR	LARGE NARROWBODY			LARGE WIDEBODY			TOTAL
	2 ENGINE	3 ENGINE	4 ENGINE	2 ENGINE	3 ENGINE	4 ENGINE	
Historical							
1994	7,089	1,687	286	960	981	535	11,538
1995	7,649	1,583	312	980	938	558	12,020
1996	8,042	1,504	314	1,021	945	555	12,381
1997	8,430	1,472	293	1,149	940	530	12,814
1998	8,661	1,477	259	1,285	942	511	13,135
1999E	9,049	1,349	258	1,489	905	503	13,553
Forecast							
2000	9,356	1,202	238	1,701	885	563	13,945
2001	9,760	1,126	239	1,935	826	549	14,435
2002	10,167	1,075	240	2,124	812	549	14,967
2003	10,761	995	242	2,403	809	564	15,774
2004	11,206	934	243	2,601	801	586	16,371
2005	11,667	909	246	2,796	778	595	16,991
2006	12,177	891	246	2,998	784	605	17,701
2007	12,671	875	249	3,218	792	617	18,422
2008	13,218	862	250	3,478	804	623	19,235
2009	13,775	860	252	3,751	812	639	20,089
2010	14,355	857	253	4,033	806	654	20,958
2011	14,926	855	255	4,272	826	682	21,816

Source: Form 41, U.S. Department of Transportation.
1/ Includes both passenger (excluding regional jets) and cargo aircraft.

TABLE 22

TOTAL JET FUEL AND AVIATION GASOLINE FUEL CONSUMPTION

U.S. CIVIL AVIATION AIRCRAFT

(Millions of Gallons)

FISCAL YEAR	JET FUEL					AVIATION GASOLINE			TOTAL FUEL CONSUMED
	U.S. AIR CARRIERS 1/			GENERAL AVIATION	TOTAL	AIR CARRIER	GENERAL AVIATION	TOTAL	
	DOMESTIC	INT'L.	TOTAL						
Historical*									
1994	12,202	4,227	16,429	464	16,893	2	266	268	17,161
1995	12,652	4,417	17,069	560	17,629	2	287	289	17,918
1996	13,022	4,557	17,579	608	18,187	2	289	291	18,478
1997	13,429	4,818	18,247	642	18,889	2	292	294	19,183
1998	13,754	5,128	18,882	815	19,697	2	311	313	20,010
1999E	14,243	5,186	19,429	888	20,317	2	313	315	20,632
Forecast									
2000	14,767	5,394	20,161	966	21,127	2	317	319	21,446
2001	15,257	5,608	20,865	1,039	21,904	2	321	323	22,227
2002	15,734	5,857	21,591	1,112	22,703	2	326	328	23,031
2003	16,110	6,177	22,287	1,191	23,478	2	331	333	23,811
2004	16,466	6,494	22,960	1,277	24,237	2	337	339	24,576
2005	16,930	6,817	23,747	1,358	25,105	2	342	344	25,449
2006	17,409	7,141	24,550	1,442	25,992	2	346	348	26,340
2007	17,996	7,473	25,469	1,526	26,995	2	351	353	27,348
2008	18,601	7,835	26,436	1,607	28,043	2	355	357	28,400
2009	19,208	8,213	27,421	1,689	29,110	2	360	362	29,472
2010	19,817	8,604	28,421	1,770	30,191	2	364	366	30,557
2011	20,445	9,015	29,460	1,848	31,308	2	368	370	31,678

* Source: Air carrier jet fuel, Form 41, U.S. Department of Transportation; all others, FAA APO estimates.

1/ Includes both passenger and cargo carriers.

TABLE 23

U.S. REGIONALS/COMMUTERS FORECAST ASSUMPTIONS

FISCAL YEAR	AVERAGE SEATS PER AIRCRAFT			AVERAGE PASSENGER TRIP LENGTH			AVERAGE PASSENGER LOAD FACTOR		
	298-C CARRIERS (Seats)	FORM 41 CARRIERS (Seats)	ALL CARRIERS (Seats)	298-C CARRIERS (Miles)	FORM 41 CARRIERS (Miles)	ALL CARRIERS (Miles)	298-C CARRIERS (Percent)	FORM 41 CARRIERS (Percent)	ALL CARRIERS (Percent)
Historical*									
1994	27.1	35.8	29.1	205.9	210.5	207.2	49.6	52.3	50.4
1995	27.7	36.1	30.3	215.2	211.0	213.6	48.6	50.4	49.3
1996	27.8	35.0	30.5	224.3	220.7	222.7	51.5	53.4	52.3
1997	28.3	37.3	31.4	234.0	226.0	230.6	52.9	54.6	53.6
1998	28.9	40.8	33.2	248.7	237.6	243.5	54.9	58.4	56.5
1999E	31.3	42.8	36.0	265.7	255.2	260.2	55.5	59.7	57.6
Forecast									
2000	32.5	44.0	37.3	275.0	265.5	270.1	56.0	60.5	58.2
2001	33.5	45.0	38.3	282.0	273.0	277.3	56.5	61.0	58.7
2002	34.2	46.0	39.2	287.0	280.0	283.4	57.0	61.3	59.1
2003	34.9	46.5	39.9	291.0	285.0	287.9	57.3	61.6	59.4
2004	35.6	47.0	40.5	295.0	290.0	292.4	57.6	61.9	59.8
2005	36.2	47.5	41.1	299.0	295.0	296.9	57.9	62.2	60.1
2006	36.7	48.0	41.7	303.0	300.0	301.4	58.2	62.4	60.3
2007	37.2	48.5	42.2	307.0	305.0	305.9	58.5	62.6	60.6
2008	37.7	49.0	42.7	311.0	310.0	310.5	58.8	62.8	60.8
2009	38.2	49.5	43.3	315.0	315.0	315.0	59.1	63.0	61.1
2010	38.7	50.0	43.8	319.0	320.0	319.5	59.4	63.2	61.4
2011	39.2	50.5	44.3	323.0	325.0	324.1	59.7	63.4	61.6

* Source: Forms 298-C and 41, U.S. Department of Transportation.

TABLE 24

U.S. REGIONALS/COMMUTERS

SCHEDULED PASSENGER TRAFFIC

(In Millions)

FISCAL YEAR	REVENUE PASSENGERS			REVENUE PASSENGER MILES		
	298-C CARRIERS 1/	FORM 41 CARRIERS 2/	ALL CARRIERS	298-C CARRIERS	FORM 41 CARRIERS	ALL CARRIERS
Historical*						
1994	39.2	16.1	55.3	8,065.3	3,395.8	11,461.1
1995	34.8	21.0	55.8	7,495.2	4,426.4	11,921.6
1996	33.7	26.3	60.0	7,550.0	5,807.1	13,357.1
1997	35.4	26.2	61.6	8,280.8	5,930.3	14,211.1
1998	34.3	30.3	64.6	8,531.5	7,198.8	15,730.3
1999	35.0	37.3	72.3	9,309.8	9,519.2	18,829.0
Forecast						
2000	37.7	40.5	78.2	10,369.4	10,756.5	21,125.9
2001	39.9	43.2	83.1	11,260.8	11,790.3	23,051.1
2002	42.0	45.7	87.6	12,044.8	12,782.0	24,826.8
2003	44.0	48.2	92.2	12,811.3	13,725.6	26,536.9
2004	46.3	50.9	97.2	13,662.6	14,762.5	28,425.1
2005	48.9	54.1	103.0	14,623.5	15,948.0	30,571.5
2006	51.5	57.3	108.8	15,619.3	17,175.0	32,794.3
2007	54.2	60.5	114.6	16,632.6	18,439.1	35,071.7
2008	56.8	63.5	120.3	17,658.0	19,697.4	37,355.4
2009	59.3	66.6	125.9	18,689.9	20,975.9	39,665.7
2010	61.9	69.7	131.7	19,759.8	22,310.1	42,069.9
2011	64.6	72.9	137.5	20,868.1	23,701.0	44,569.0

* Source: Forms 298-C and 41, U.S. Department of Transportation.

1/ Origin and destination passengers.

2/ Enplanements.

TABLE 25

U.S. REGIONALS/COMMUTERS

PASSENGER AIRCRAFT AND FLIGHT HOURS

AS OF JANUARY 1	REGIONAL/COMMUTER AIRCRAFT						FLIGHT HOURS (000)
	LESS THAN 10 SEATS	10 TO 20 SEATS	21 TO 40 SEATS	41 TO 60 SEATS	61 to 70 SEATS	TOTAL	
Historical*							
1994	545	730	644	158	68	2,145	3,778
1995	535	681	661	153	79	2,109	3,817
1996	535	576	737	177	83	2,108	3,683
1997	479	576	707	203	87	2,052	3,685
1998	468	517	716	321	95	2,117	3,590
1999E	459	500	734	443	101	2,237	3,718
Forecast							
2000	448	485	758	545	106	2,342	3,861
2001	436	471	781	641	128	2,457	3,944
2002	425	458	805	721	169	2,578	1,015
2003	415	445	827	800	208	2,695	4,089
2004	404	434	855	869	232	2,794	4,203
2005	394	423	882	923	262	2,884	4,345
2006	384	412	904	967	287	2,954	4,502
2007	375	402	927	994	312	3,010	4,661
2008	365	393	944	1020	332	3,054	4,817
2009	356	383	959	1,045	357	3,100	4,972
2010	347	375	974	1,069	377	3,142	5,137
2011	339	367	990	1,093	397	3,186	5,302

*Source: Fleet; FAA Aircraft Utilization and Propulsion Reliability Report.
Flight Hours; Forms 298-C and 41, U.S. Department of Transportation.

TABLE 26

ACTIVE GENERAL AVIATION AND AIR TAXI AIRCRAFT

AS OF DECEMBER 31	FIXED WING				ROTORCRAFT		EXPERI-MENTAL	OTHER	TOTAL
	PISTON		TURBINE						
	SINGLE ENGINE	MULTI-ENGINE	TURBOPROP	TURBO JET	PISTON	TURBINE			
Historical*									
1994	127,351	14,801	4,092	3,914	1,627	3,101	12,144	5,906	172,936
1995 1/	137,049	15,739	4,995	4,559	1,863	3,967	15,176	4,741	188,089
1996 1/	137,401	16,150	5,716	4,424	2,507	4,063	16,625	4,244	191,129
1997 1/	140,038	16,017	5,619	5,178	2,259	4,526	14,680	4,092	192,414
1998	144,234	18,729	6,174	6,066	2,545	4,881	16,502	5,580	204,710
1999E	145,250	18,750	6,250	6,400	2,610	4,980	16,650	5,640	206,530
Forecast									
2000	146,400	18,750	6,340	6,820	2,665	5,080	16,900	5,700	208,655
2001	147,600	18,750	6,430	7,240	2,715	5,180	17,150	5,760	210,825
2002	148,800	18,750	6,520	7,660	2,755	5,255	17,410	5,820	212,970
2003	150,000	18,750	6,610	8,080	2,800	5,335	17,670	5,880	215,125
2004	151,200	18,750	6,700	8,500	2,825	5,415	17,940	5,940	217,270
2005	152,400	18,750	6,790	8,910	2,855	5,500	18,210	6,000	219,415
2006	153,400	18,750	6,870	9,320	2,885	5,580	18,480	6,060	221,345
2007	154,400	18,750	6,950	9,725	2,910	5,665	18,760	6,120	223,280
2008	155,400	18,750	7,030	10,125	2,940	5,750	19,040	6,180	225,215
2009	156,400	18,750	7,100	10,520	2,970	5,835	19,330	6,240	227,145
2010	157,400	18,750	7,170	10,910	3,000	5,920	19,620	6,300	229,070
2011	158,400	18,750	7,240	11,295	3,030	6,010	19,910	6,360	230,995

* Source: 1994-98, FAA General Aviation and Air Taxi Activity (and Avionics) Surveys.
1/ Estimates have been revised to reflect changes in edit and estimation procedures, and may not be comparable to estimates prior to 1995.
Note: An active aircraft is one that has a current registration and was flown at least one hour during the previous calendar year.

TABLE 27

ACTIVE GENERAL AVIATION AND AIR TAXI HOURS FLOWN

(In Thousands)

CALENDAR YEAR	FIXED WING				ROTORCRAFT		EXPERI-MENTAL	OTHER	TOTAL
	PISTON		TURBINE						
	SINGLE ENGINE	MULTI-ENGINE	TURBOPROP	TURBOJET	PISTON	TURBINE			
Historical*									
1994	16,404	2,419	1,142	1,238	369	1,408	724	388	24,092
1995 1/	17,831	2,420	1,490	1,455	337	1,624	1,194	261	26,612
1996 1/	17,606	2,485	1,768	1,543	591	1,531	1,158	227	26,909
1997 1/	18,345	2,399	1,655	1,713	344	1,740	1,327	192	27,713
1998	16,823	3,578	1,765	2,226	430	1,912	1,071	295	28,100
1999E 2/	18,850	2,860	1,785	2,470	447	1,960	1,085	300	29,757
Forecast									
2000	19,100	2,870	1,810	2,740	462	2,010	1,110	304	30,406
2001	19,410	2,880	1,840	2,990	477	2,060	1,130	308	31,095
2002	19,820	2,890	1,870	3,240	491	2,110	1,155	313	31,889
2003	20,240	2,900	1,900	3,510	503	2,165	1,175	317	32,710
2004	20,650	2,910	1,930	3,810	513	2,220	1,200	321	33,554
2005	21,040	2,920	1,955	4,090	523	2,275	1,225	325	34,353
2006	21,390	2,930	1,980	4,380	534	2,330	1,250	329	35,123
2007	21,750	2,940	2,005	4,670	545	2,390	1,275	333	35,908
2008	22,090	2,950	2,030	4,950	556	2,450	1,300	337	36,663
2009	22,410	2,960	2,055	5,230	567	2,515	1,325	341	37,403
2010	22,710	2,970	2,080	5,510	578	2,575	1,350	345	38,118
2011	23,010	2,980	2,105	5,780	590	2,640	1,375	349	38,829

* Source: 1994-98, FAA General Aviation and Air Taxi Surveys.

1/ Estimates have been revised to reflect changes in edit and estimation procedures, and may not be comparable to estimates prior to 1995.

2/ Single and multi-engine piston hours based on 1999 fleet forecast (Table 26) and average utilization rates for 1995-97.

Note: An active aircraft is one that has a current registration and was flown at least one hour during the previous calendar year.

TABLE 28

ACTIVE PILOTS BY TYPE OF CERTIFICATE

AS OF DECEMBER 31	STUDENTS	RECREA-TIONAL	PRIVATE	COMMERCIAL	AIRLINE TRANSPORT	ROTORCRAFT ONLY	GLIDER ONLY	TOTAL	INSTRUMENT RATED 1/
Historical*									
1994	96,254	241	284,236	138,728	117,434	8,719	8,476	654,088	302,300
1995	101,279	232	261,399	133,980	123,877	7,183	11,234	639,184	298,798
1996	94,947	265	254,002	129,187	127,486	6,961	9,413	622,261	297,895
1997	96,101	284	247,604	125,300	130,858	6,801	9,394	616,342	297,409
1998	97,736	305	247,226	122,053	134,612	6,964	9,402	618,298	300,183
1999	102,000E	343	258,749	124,261	137,642	7,728	9,390	640,113	308,951
Forecast									
2000	106,100	346	260,700	126,200	139,700	7,920	9,430	650,396	315,100
2001	110,300	351	267,400	128,400	144,400	8,120	9,465	668,436	321,400
2002	114,700	355	272,000	130,600	149,500	8,280	9,505	684,940	327,800
2003	119,300	360	277,500	133,300	154,400	8,445	9,540	702,845	333,700
2004	124,000	364	283,700	136,300	159,300	8,600	9,580	721,844	339,700
2005	128,300	369	288,000	138,300	164,000	8,755	9,620	737,344	345,500
2006	132,700	373	291,400	139,900	169,300	8,910	9,660	752,243	351,000
2007	137,000	377	294,600	141,500	174,400	9,070	9,690	766,637	356,600
2008	141,000	382	297,600	142,900	180,000	9,235	9,730	780,847	361,900
2009	145,000	386	300,600	144,300	186,000	9,400	9,775	795,461	367,300
2010	148,800	391	303,600	145,800	192,000	9,570	9,810	809,971	372,800
2011	152,500	395	306,600	147,300	198,100	9,745	9,850	824,490	378,400

* Source: FAA U.S. Civil Airmen Statistics.

1/ Instrument rated pilots should not be added to other categories in deriving total.

E: Estimate

Note: An active pilot is a person with a pilot certificate and a valid medical certificate.

TABLE 29

GENERAL AVIATION AIRCRAFT FUEL CONSUMPTION

(In Millions of Gallons)

CALENDAR YEAR	FIXED WING				ROTORCRAFT		OTHER/ EXPERI-MENTAL	TOTAL FUEL CONSUMED		
	PISTON		TURBINE							
	SINGLE ENGINE	MULTI-ENGINE	TURBO-PROP	TURBO-JET	PISTON	TURBINE		AVGAS	JET FUEL	TOTAL
Historical										
1994	177.2	73.8	92.7	329.9	5.6	41.8	9.6	266.1	464.4	730.5
1995	192.6	73.8	124.4	388.0	5.1	47.4	15.8	287.2	559.9	847.1
1996	188.4	75.9	145.0	419.2	8.9	43.5	15.3	288.5	607.7	896.2
1997	196.3	73.2	135.7	456.9	5.2	49.4	17.5	292.2	642.0	934.1
1998	181.8	109.6	149.1	608.8	6.5	56.8	13.4	311.3	814.7	1,126.0
1999E	201.7	89.8	147.3	682.2	6.8	58.2	14.9	313.2	887.7	1,200.8
Forecast										
2000	204.4	90.1	149.3	756.8	7.0	59.7	15.2	316.7	965.8	1,282.5
2001	207.7	90.4	151.8	825.8	7.2	61.2	15.5	320.8	1,038.8	1,359.6
2002	212.1	90.7	154.3	894.9	7.4	62.7	15.8	326.0	1,111.9	1,437.9
2003	216.6	91.1	156.8	969.5	7.6	64.3	16.1	331.3	1,190.5	1,521.8
2004	221.0	91.4	159.2	1,052.3	7.7	65.9	16.4	336.5	1,277.4	1,613.9
2005	225.1	91.7	161.3	1,129.7	7.9	67.5	16.8	341.5	1,358.4	1,699.9
2006	228.9	92.0	163.4	1,209.8	8.1	69.2	17.1	346.1	1,442.3	1,788.4
2007	232.7	92.3	165.4	1,289.9	8.2	70.9	17.5	350.7	1,526.2	1,876.9
2008	236.4	92.6	167.5	1,367.2	8.4	72.7	17.8	355.2	1,607.4	1,962.6
2009	239.8	92.9	169.5	1,444.5	8.6	74.5	18.2	359.5	1,688.6	2,048.0
2010	243.0	93.3	171.6	1,521.9	8.7	76.4	18.5	363.5	1,769.9	2,133.3
2011	246.2	93.6	173.7	1,596.4	8.9	78.3	18.8	367.5	1,848.4	2,215.9

Source: FAA APO Estimates.
Note: Detail may not add to total because of independent rounding.

TABLE 30

ACTIVE ROTORCRAFT FLEET AND HOURS FLOWN

CALENDAR YEAR	ACTIVE FLEET			HOURS FLOWN (Thousands)		
	PISTON	TURBINE	TOTAL	PISTON	TURBINE	TOTAL
Historical*						
1994	1,627	3,101	4,728	369	1,408	1,777
1995 1/	1,863	3,967	5,830	337	1,624	1,961
1996 1/	2,507	4,063	6,570	591	1,531	2,122
1997 1/	2,259	4,526	6,785	344	1,740	2,084
1998	2,545	4,881	7,426	430	1,912	2,342
1999E	2,610	4,980	7,590	447	1,960	2,407
Forecast						
2000	2,665	5,080	7,745	462	2,010	2,472
2001	2,715	5,180	7,895	477	2,060	2,537
2002	2,755	5,255	8,010	491	2,110	2,601
2003	2,800	5,335	8,135	503	2,165	2,668
2004	2,825	5,415	8,240	513	2,220	2,733
2005	2,855	5,500	8,355	523	2,275	2,798
2006	2,885	5,580	8,465	534	2,330	2,864
2007	2,910	5,665	8,575	545	2,390	2,935
2008	2,940	5,750	8,690	556	2,450	3,006
2009	2,970	5,835	8,805	567	2,515	3,082
2010	3,000	5,920	8,920	578	2,575	3,153
2011	3,030	6,010	9,040	590	2,640	3,230

* Source: 1994-1998, FAA General Aviation and Air Taxi Activity (and Avionics) Surveys.
1/ Estimates have been revised to reflect changes in edit and estimation procedures, and may not be comparable to estimates prior to 1995.
Notes: An active aircraft is one that has a current registration and was flown at least one hour during the previous calendar year.

TABLE 31

TOTAL COMBINED AIRCRAFT OPERATIONS AT AIRPORTS

WITH FAA AND CONTRACT TRAFFIC CONTROL SERVICE

(In Thousands)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL	NUMBER OF TOWERS**	
						FAA	CONTRACT
Historical*							
1994	13,168.5	10,175.5	36,253.7	2,585.0	62,182.7	402	33
1995	13,647.4	10,234.2	35,926.6	2,612.3	62,420.5	326	95
1996	13,893.3	10,170.4	35,298.3	2,546.9	61,908.9	318	128
1997	14,256.7	10,052.7	36,833.3	2,523.6	63,666.3	288	160
1998	14,258.0	10,172.2	38,046.1	2,781.4	65,257.7	287	161
1999E	14,582.3	10,576.0	40,042.5	2,950.9	68,151.7	288	166
Forecast							
2000	14,961.4	10,861.6	40,688.4	2,950.9	69,462.3	266	188
2001	15,425.2	11,078.8	41,426.0	2,950.9	70,880.9	266	188
2002	15,934.2	11,289.3	42,218.7	2,950.9	72,393.1	266	188
2003	16,332.7	11,560.2	43,026.3	2,950.9	73,870.1	266	188
2004	16,724.7	11,860.7	43,806.6	2,950.9	75,342.9	266	188
2005	17,226.4	12,240.4	44,600.9	2,950.9	77,018.6	266	188
2006	17,691.5	12,632.0	45,409.7	2,950.9	78,684.1	266	188
2007	18,222.2	13,011.0	46,233.4	2,950.9	80,417.5	266	188
2008	18,768.9	13,362.3	47,025.7	2,950.9	82,107.8	266	188
2009	19,313.2	13,696.3	47,784.5	2,950.9	83,744.9	266	188
2010	19,854.0	14,025.0	48,508.0	2,950.9	85,337.9	266	188
2011	20,429.7	14,361.7	49,193.9	2,950.9	86,936.2	266	188

* Source: FAA Air Traffic Activity.

TABLE 32

COMBINED ITINERANT AIRCRAFT OPERATIONS AT AIRPORTS WITH FAA AND CONTRACT TRAFFIC CONTROL SERVICE

(In Thousands)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL
Historical*					
1994	13,168.5	10,175.5	21,063.2	1,333.0	45,740.2
1995	13,647.4	10,234.2	20,860.4	1,331.6	46,073.6
1996	13,893.3	10,170.4	20,823.0	1,311.4	46,198.1
1997	14,256.7	10,052.7	21,669.1	1,276.5	47,255.0
1998	14,258.0	10,172.2	22,086.6	1,354.4	47,871.2
1999E	14,582.3	10,576.0	23,043.6	1,441.9	49,643.8
Forecast					
2000	14,961.4	10,861.6	23,422.6	1,441.9	50,687.5
2001	15,425.2	11,078.8	23,854.6	1,441.9	51,800.5
2002	15,934.2	11,289.3	24,318.6	1,441.9	52,984.0
2003	16,332.7	11,560.2	24,791.4	1,441.9	54,126.2
2004	16,724.7	11,860.7	25,248.8	1,441.9	55,276.1
2005	17,226.4	12,240.4	25,714.6	1,441.9	56,623.3
2006	17,691.5	12,632.0	26,189.0	1,441.9	57,954.4
2007	18,222.2	13,011.0	26,672.3	1,441.9	59,347.4
2008	18,768.9	13,362.3	27,137.8	1,441.9	60,710.9
2009	19,313.2	13,696.3	27,584.2	1,441.9	62,035.6
2010	19,854.0	14,025.0	28,010.5	1,441.9	63,331.4
2011	20,429.7	14,361.7	28,415.3	1,441.9	64,648.6

* Source: FAA Air Traffic Activity.

TABLE 33

COMBINED LOCAL AIRCRAFT OPERATIONS AT AIRPORTS WITH FAA AND CONTRACT TRAFFIC CONTROL SERVICE

(In Thousands)

FISCAL YEAR	GENERAL AVIATION	MILITARY	TOTAL
Historical*			
1994	15,190.5	1,252.0	16,442.5
1995	15,066.2	1,280.7	16,346.9
1996	14,475.3	1,235.5	15,710.8
1997	15,164.2	1,247.1	16,411.3
1998	15,959.5	1,427.0	17,386.5
1999E	16,998.9	1,509.0	18,507.9
Forecast			
2000	17,265.8	1,509.0	18,774.8
2001	17,571.4	1,509.0	19,080.4
2002	17,900.1	1,509.0	19,409.1
2003	18,234.9	1,509.0	19,743.9
2004	18,557.8	1,509.0	20,066.8
2005	18,886.3	1,509.0	20,395.3
2006	19,220.7	1,509.0	20,729.7
2007	19,561.1	1,509.0	21,070.1
2008	19,887.9	1,509.0	21,396.9
2009	20,200.3	1,509.0	21,709.3
2010	20,497.5	1,509.0	22,006.5
2011	20,778.6	1,509.0	22,287.6

* Source: FAA Air Traffic Activity.

TABLE 34

TOTAL AIRCRAFT OPERATIONS

AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE

(In Thousands)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL
Historical*					
1994	13,155.0	10,008.4	34,692.5	2,442.3	60,298.2
1995	13,589.7	9,823.8	32,265.6	2,294.8	57,973.9
1996	13,768.1	9,314.9	29,249.1	2,077.7	54,409.8
1997	14,112.0	8,968.8	28,232.5	1,942.9	53,256.2
1998	14,101.7	8,928.1	27,928.4	2,028.8	52,987.0
1999E	14,423.7	9,318.1	29,146.3	2,182.0	55,070.1
Forecast					
2000	14,731.9	9,401.2	28,139.2	2,091.8	54,364.1
2001	15,188.6	9,589.2	28,651.4	2,091.8	55,521.0
2002	15,689.8	9,771.4	29,201.7	2,091.8	56,754.7
2003	16,082.1	10,005.9	29,762.5	2,091.8	57,942.3
2004	16,468.1	10,266.0	30,304.4	2,091.8	59,130.3
2005	16,962.1	10,594.6	30,856.1	2,091.8	60,504.6
2006	17,420.1	10,933.6	31,417.9	2,091.8	61,863.4
2007	17,942.7	11,261.6	31,990.1	2,091.8	63,286.2
2008	18,481.0	11,565.7	32,540.6	2,091.8	64,679.1
2009	19,016.9	11,854.8	33,068.1	2,091.8	66,031.6
2010	19,549.4	12,139.3	33,571.2	2,091.8	67,351.7
2011	20,116.3	12,430.7	34,048.3	2,091.8	68,687.1

* Source: FAA Air Traffic Activity.

TABLE 35

ITINERANT AIRCRAFT OPERATIONS

AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE

(In Thousands)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL
Historical*					
1994	13,155.0	10,008.4	20,208.4	1,283.4	44,655.2
1995	13,589.7	9,823.8	18,886.4	1,190.5	43,490.4
1996	13,768.1	9,314.9	17,574.5	1,099.2	41,756.7
1997	14,112.0	8,968.8	17,097.3	1,015.4	41,193.5
1998	14,101.7	8,928.1	16,846.2	1,052.3	40,928.3
1999E	14,423.7	9,318.1	17,442.4	1,118.8	42,303.0
Forecast					
2000	14,731.9	9,401.2	16,936.3	1,090.7	42,160.1
2001	15,188.6	9,589.2	17,258.1	1,090.7	43,126.6
2002	15,689.8	9,771.4	17,603.3	1,090.7	44,155.2
2003	16,082.1	10,005.9	17,955.3	1,090.7	45,134.0
2004	16,468.1	10,266.0	18,296.5	1,090.7	46,121.3
2005	16,962.1	10,594.6	18,644.1	1,090.7	47,291.5
2006	17,420.1	10,933.6	18,998.3	1,090.7	48,442.7
2007	17,942.7	11,261.6	19,359.3	1,090.7	49,654.3
2008	18,481.0	11,565.7	19,707.8	1,090.7	50,845.2
2009	19,016.9	11,854.8	20,042.8	1,090.7	52,005.2
2010	19,549.4	12,139.3	20,363.5	1,090.7	53,142.9
2011	20,116.3	12,430.7	20,668.9	1,090.7	54,306.6

* Source: FAA Air Traffic Activity.

TABLE 36

LOCAL AIRCRAFT OPERATIONS

AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE

(In Thousands)

FISCAL YEAR	GENERAL AVIATION	MILITARY	TOTAL
Historical*			
1994	14,484.1	1,158.9	15,643.0
1995	13,379.2	1,104.3	14,483.5
1996	11,674.6	978.5	12,653.1
1997	11,135.2	927.5	12,062.7
1998	11,082.2	976.5	12,058.7
1999E	11,703.9	1,063.2	12,767.1
Forecast			
2000	11,202.9	1,001.1	12,204.0
2001	11,393.3	1,001.1	12,394.4
2002	11,598.4	1,001.1	12,599.5
2003	11,807.2	1,001.1	12,808.3
2004	12,007.9	1,001.1	13,009.0
2005	12,212.0	1,001.1	13,213.1
2006	12,419.6	1,001.1	13,420.7
2007	12,630.8	1,001.1	13,631.9
2008	12,832.8	1,001.1	13,833.9
2009	13,025.3	1,001.1	14,026.4
2010	13,207.7	1,001.1	14,208.8
2011	13,379.4	1,001.1	14,380.5

* Source: FAA Air Traffic Activity.

TABLE 37

TOTAL AIRCRAFT OPERATIONS

AT AIRPORTS WITH CONTRACT TRAFFIC CONTROL SERVICE

(In Thousands)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL
Historical*					
1994	13.5	167.1	1,561.2	142.7	1,884.5
1995	57.7	410.4	3,661.0	317.5	4,446.6
1996	125.2	855.5	6,049.2	469.2	7,499.1
1997	144.7	1,083.9	8,600.8	580.7	10,410.1
1998	156.3	1,244.1	10,117.7	752.6	12,270.7
1999E	158.6	1,257.9	10,896.2	768.9	13,081.6
Forecast					
2000	229.5	1,460.4	12,549.2	859.1	15,098.2
2001	236.6	1,489.6	12,774.6	859.1	15,359.9
2002	244.4	1,517.9	13,017.0	859.1	15,638.4
2003	250.6	1,554.3	13,263.8	859.1	15,927.8
2004	256.6	1,594.7	13,502.2	859.1	16,212.6
2005	264.3	1,645.8	13,744.8	859.1	16,514.0
2006	271.4	1,698.4	13,991.8	859.1	16,820.7
2007	279.5	1,749.4	14,243.3	859.1	17,131.3
2008	287.9	1,796.6	14,485.1	859.1	17,428.7
2009	296.3	1,841.5	14,716.4	859.1	17,713.3
2010	304.6	1,885.7	14,936.8	859.1	17,986.2
2011	313.4	1,931.0	15,145.6	859.1	18,249.1

* Source: FAA Air Traffic Activity.
Note: Detail may not add to total because of rounding.

TABLE 38

ITINERANT AIRCRAFT OPERATIONS

AT AIRPORTS WITH CONTRACT TRAFFIC CONTROL SERVICE

(In Thousands)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL
Historical*					
1994	13.5	167.1	854.8	49.6	1,085.0
1995	57.7	410.4	1,974.0	141.1	2,583.2
1996	125.2	855.5	3,248.5	212.2	4,441.4
1997	144.7	1,083.9	4,571.8	261.1	6,061.5
1998	156.3	1,244.1	5,240.4	302.1	6,942.9
1999E	158.6	1,257.9	5,601.2	323.1	7,340.8
Forecast					
2000	229.5	1,460.4	6,486.3	351.2	8,527.4
2001	236.6	1,489.6	6,596.5	351.2	8,673.9
2002	244.4	1,517.9	6,715.3	351.2	8,828.8
2003	250.6	1,554.3	6,836.1	351.2	8,992.2
2004	256.6	1,594.7	6,952.3	351.2	9,154.8
2005	264.3	1,645.8	7,070.5	351.2	9,331.8
2006	271.4	1,698.4	7,190.7	351.2	9,511.7
2007	279.5	1,749.4	7,313.0	351.2	9,693.1
2008	287.9	1,796.6	7,430.0	351.2	9,865.7
2009	296.3	1,841.5	7,541.4	351.2	10,030.4
2010	304.6	1,885.7	7,647.0	351.2	10,188.5
2011	313.4	1,931.0	7,746.4	351.2	10,342.0

* Source: FAA Air Traffic Activity.

TABLE 39

LOCAL AIRCRAFT OPERATIONS

AT AIRPORTS WITH CONTRACT TRAFFIC CONTROL SERVICE

(In Thousands)

FISCAL YEAR	GENERAL AVIATION	MILITARY	TOTAL
Historical*			
1994	706.4	93.1	799.5
1995	1,687.0	176.4	1,863.4
1996	2,800.7	257.0	3,057.7
1997	4,029.0	319.6	4,348.6
1998	4,877.3	450.5	5,327.8
1999E	5,295.0	445.8	5,740.8
Forecast			
2000	6,062.9	507.9	6,570.8
2001	6,178.1	507.9	6,686.0
2002	6,301.7	507.9	6,809.6
2003	6,427.7	507.9	6,935.6
2004	6,549.9	507.9	7,057.8
2005	6,674.3	507.9	7,182.2
2006	6,801.1	507.9	7,309.0
2007	6,930.3	507.9	7,438.2
2008	7,055.1	507.9	7,563.0
2009	7,175.0	507.9	7,682.9
2010	7,289.8	507.9	7,797.7
2011	7,399.2	507.9	7,907.1

* Source: FAA Air Traffic Activity.

TABLE 40

TOTAL COMBINED INSTRUMENT OPERATIONS

AT AIRPORTS WITH FAA AND CONTRACT TRAFFIC CONTROL SERVICE

(In Thousands)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL
Historical*					
1994	14,271.8	10,838.3	18,116.7	3,670.6	46,897.4
1995	14,653.2	10,950.4	18,216.3	3,570.2	47,390.1
1996	14,871.5	10,932.7	18,085.9	3,327.1	47,217.2
1997	15,388.1	11,020.9	19,087.9	3,282.0	48,778.9
1998	15,405.1	11,220.7	19,931.0	3,423.7	49,980.5
1999E	15,833.1	11,586.7	20,897.8	3,512.3	51,829.9
Forecast					
2000	16,244.8	11,899.6	21,271.7	3,512.3	52,928.4
2001	16,748.3	12,137.6	21,694.3	3,512.3	54,092.5
2002	17,301.1	12,368.2	22,146.7	3,512.3	55,328.3
2003	17,733.6	12,665.0	22,608.6	3,512.3	56,519.5
2004	18,159.2	12,994.3	23,057.7	3,512.3	57,723.5
2005	18,703.9	13,410.0	23,516.0	3,512.3	59,142.2
2006	19,209.0	13,839.2	23,983.3	3,512.3	60,543.8
2007	19,785.2	14,254.4	24,459.9	3,512.3	62,011.8
2008	20,378.7	14,639.3	24,921.9	3,512.3	63,452.2
2009	20,969.7	15,005.3	25,368.0	3,512.3	64,855.3
2010	21,556.9	15,365.4	25,797.1	3,512.3	66,231.7
2011	22,182.1	15,734.1	26,208.0	3,512.3	67,636.5

* Source: FAA Air Traffic Activity.

TABLE 41

INSTRUMENT OPERATIONS

AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE

(In Thousands)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL
Historical*					
1994	14,260.5	10,769.2	18,049.1	3,654.2	46,733.0
1995	14,626.3	10,785.7	18,092.0	3,544.4	47,048.4
1996	14,789.4	10,662.3	17,889.3	3,287.6	46,628.6
1997	15,298.0	10,730.9	18,863.7	3,235.6	48,128.2
1998	15,309.9	10,916.3	19,678.6	3,368.0	49,272.8
1999E	15,742.3	11,270.0	20,643.7	3,454.2	51,110.2
Forecast					
2000	16,123.5	11,528.6	20,986.0	3,449.6	52,087.7
2001	16,623.3	11,759.2	21,405.7	3,449.6	53,237.8
2002	17,171.9	11,982.6	21,855.2	3,449.6	54,459.3
2003	17,601.2	12,270.2	22,314.2	3,449.6	55,635.2
2004	18,023.6	12,589.2	22,760.4	3,449.6	56,822.8
2005	18,564.3	12,992.0	23,215.7	3,449.6	58,221.6
2006	19,065.6	13,407.8	23,680.0	3,449.6	59,603.0
2007	19,637.5	13,810.0	24,153.6	3,449.6	61,050.7
2008	20,226.6	14,182.9	24,612.5	3,449.6	62,471.6
2009	20,813.2	14,537.5	25,055.5	3,449.6	63,855.8
2010	21,396.0	14,886.4	25,481.5	3,449.6	65,213.5
2011	22,016.5	15,243.6	25,889.2	3,449.6	66,598.9

* Source: FAA Air Traffic Activity.

TABLE 42

INSTRUMENT OPERATIONS

AT AIRPORTS WITH CONTRACT TRAFFIC CONTROL SERVICE

(In Thousands)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL
Historical*					
1994	11.3	69.1	67.6	16.4	164.4
1995	26.9	164.7	124.3	25.8	341.7
1996	82.1	270.4	196.6	39.5	588.6
1997	90.1	290.0	224.2	46.4	650.7
1998	95.2	304.4	252.4	55.7	707.7
1999E	90.8	316.7	254.1	58.1	719.7
Forecast					
2000	121.3	371.0	285.7	62.7	840.7
2001	125.0	378.4	288.6	62.7	854.7
2002	129.2	385.6	291.5	62.7	869.0
2003	132.4	394.8	294.4	62.7	884.3
2004	135.6	405.1	297.3	62.7	900.7
2005	139.6	418.0	300.3	62.7	920.6
2006	143.4	431.4	303.3	62.7	940.8
2007	147.7	444.4	306.3	62.7	961.1
2008	152.1	456.4	309.4	62.7	980.6
2009	156.5	467.8	312.5	62.7	999.5
2010	160.9	479.0	315.6	62.7	1,018.2
2011	165.6	490.5	318.8	62.7	1,037.6

* Source: FAA Air Traffic Activity.

TABLE 43

IFR AIRCRAFT HANDLED

AT FAA AIR ROUTE TRAFFIC CONTROL CENTERS

(In Thousands)

FISCAL YEAR	IFR AIRCRAFT HANDLED				
	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL
Historical*					
1994	19,994.1	6,557.7	7,658.8	4,629.2	38,839.8
1995	20,993.1	6,946.3	7,824.3	4,385.4	40,149.1
1996	21,944.5	6,656.1	7,857.1	3,961.6	40,419.3
1997	22,514.7	6,826.7	8,175.0	3,895.4	41,411.8
1998	23,227.0	7,137.1	8,641.1	4,190.7	43,195.9
1999E	24,043.3	7,732.8	8,808.1	4,069.9	44,654.1
Forecast					
2000	24,668.4	7,941.6	8,975.5	4,068.0	45,653.5
2001	25,433.1	8,100.4	9,163.9	4,068.0	46,765.5
2002	26,272.4	8,254.3	9,365.5	4,068.0	47,960.3
2003	26,929.3	8,452.4	9,571.6	4,068.0	49,021.3
2004	27,575.6	8,672.2	9,772.6	4,068.0	50,088.3
2005	28,402.8	8,949.7	9,977.8	4,068.0	51,398.3
2006	29,169.7	9,236.1	10,187.3	4,068.0	52,661.1
2007	30,044.8	9,513.2	10,401.3	4,068.0	54,027.2
2008	30,946.1	9,770.0	10,609.3	4,068.0	55,393.5
2009	31,843.6	10,014.3	10,810.9	4,068.0	56,736.7
2010	32,735.2	10,254.6	11,005.5	4,068.0	58,063.3
2011	33,684.5	10,500.7	11,192.6	4,068.0	59,445.8

* Source: FAA Air Traffic Activity.
Note: Detail may not add to total because of rounding.

TABLE 44

IFR DEPARTURES AND OVERS

AT FAA AIR ROUTE TRAFFIC CONTROL CENTERS

(In Thousands)

FISCAL YEAR	AIR CARRIER		AIR TAXI/COMMUTER		GENERAL AVIATION		MILITARY		TOTAL	
	IFR DEPARTURES	OVERS	IFR DEPARTURES	OVERS	IFR DEPARTURES	OVERS	IFR DEPARTURES	OVERS	IFR DEPARTURES	OVERS
Historical*										
1994	6,706.4	6,581.3	2,983.6	590.5	3,144.9	1,369.0	1,646.1	1,337.0	14,481.0	9,877.8
1995	7,044.6	6,903.9	3,150.3	645.7	3,218.3	1,387.7	1,512.6	1,360.2	14,925.8	10,297.5
1996	7,247.0	7,450.5	3,063.4	529.3	3,198.0	1,461.1	1,329.8	1,302.0	14,838.2	10,742.9
1997	7,301.6	7,911.5	3,127.3	572.1	3,286.5	1,602.0	1,309.9	1,275.6	15,025.3	11,361.2
1998	7,677.1	7,872.8	3,284.7	567.7	3,493.6	1,653.9	1,485.2	1,220.3	15,940.6	11,314.7
1999E	7,834.8	8,373.7	3,513.0	706.8	3,535.4	1,737.3	1,467.4	1,135.1	16,350.6	11,952.9
Forecast										
2000	8,038.5	8,591.4	3,607.9	725.9	3,602.6	1,770.3	1,467.0	1,134.0	16,715.9	12,221.6
2001	8,287.7	8,857.8	3,680.0	740.4	3,678.2	1,807.5	1,467.0	1,134.0	17,112.9	12,539.6
2002	8,561.2	9,150.1	3,749.9	754.5	3,759.1	1,847.2	1,467.0	1,134.0	17,537.3	12,885.8
2003	8,775.2	9,378.8	3,839.9	772.6	3,841.8	1,887.9	1,467.0	1,134.0	17,924.0	13,173.3
2004	8,985.8	9,603.9	3,939.8	792.7	3,922.5	1,927.5	1,467.0	1,134.0	18,315.1	13,458.1
2005	9,255.4	9,892.0	4,065.8	818.0	4,004.9	1,968.0	1,467.0	1,134.0	18,793.1	13,812.1
2006	9,505.3	10,159.1	4,195.9	844.2	4,089.0	2,009.3	1,467.0	1,134.0	19,257.2	14,146.6
2007	9,790.5	10,463.9	4,321.8	869.5	4,174.9	2,051.5	1,467.0	1,134.0	19,754.2	14,518.9
2008	10,084.2	10,777.8	4,438.5	893.0	4,258.4	2,092.6	1,467.0	1,134.0	20,248.1	14,897.4
2009	10,376.6	11,090.3	4,549.5	915.3	4,339.3	2,132.3	1,467.0	1,134.0	20,732.4	15,272.0
2010	10,667.2	11,400.9	4,658.7	937.3	4,417.4	2,170.7	1,467.0	1,134.0	21,210.2	15,642.9
2011	10,976.5	11,731.5	4,770.5	959.8	4,492.5	2,207.6	1,467.0	1,134.0	21,706.5	16,032.9

* Source: FAA Air Traffic Activity.
Note: Totals may not add because of rounding.

TABLE 45

TOTAL FLIGHT SERVICES

AT FAA FLIGHT SERVICE STATIONS

(In Thousands)

FISCAL YEAR	FLIGHT PLANS ORIGINATED	PILOT BRIEFS	AIRCRAFT CONTACTED	TOTAL FLIGHT SERVICES	FLIGHT SERVICES INCLUDING DUATS
Historical*					
1994	6,178	9,465	4,635	35,921	52,105
1995	6,328	9,162	4,240	35,220	46,740
1996	6,629	8,692	3,904	34,546	46,606
1997	6,725	8,724	3,704	34,602	48,010
1998	6,493	8,727	3,476	33,916	46,774
1999E	6,252	8,293	3,325	32,415	45,785
Forecast					
2000	6,333	8,196	3,269	32,327	46,043
2001	6,384	8,114	3,214	32,210	46,450
2002	6,435	8,079	3,159	32,187	46,883
2003	6,479	8,064	3,106	32,192	47,330
2004	6,519	8,045	3,053	32,181	47,765
2005	6,557	8,015	3,001	32,145	48,159
2006	6,594	7,978	2,950	32,094	48,542
2007	6,634	7,926	2,900	32,020	48,902
2008	6,664	7,857	2,850	31,892	49,226
2009	6,695	7,780	2,802	31,752	49,524
2010	6,725	7,692	2,754	31,588	49,796
2011	6,750	7,588	2,707	31,383	50,027

* Source: FAA Air Traffic Activity.

Notes: Total flight services is equal to the sum of flight plans originated and pilot briefs, multiplied by two, plus the number of aircraft contacted.

TABLE 46

FLIGHT PLANS ORIGINATED

AT FAA FLIGHT SERVICE STATIONS

(In Thousands)

FISCAL YEAR	FLIGHT PLANS ORIGINATED		
	IFR-DVFR	VFR	TOTAL
Historical*			
1994	4,717	1,461	6,178
1995	4,909	1,419	6,328
1996	5,247	1,382	6,629
1997	5,367	1,358	6,725
1998	5,227	1,266	6,493
1999E	5,018	1,234	6,252
Forecast			
2000	5,139	1,194	6,333
2001	5,225	1,159	6,384
2002	5,298	1,137	6,435
2003	5,362	1,117	6,479
2004	5,421	1,098	6,519
2005	5,477	1,080	6,557
2006	5,530	1,064	6,594
2007	5,585	1,049	6,634
2008	5,631	1,033	6,664
2009	5,676	1,019	6,695
2010	5,719	1,006	6,725
2011	5,756	994	6,750

* Source: FAA Air Traffic Activity.

Notes: Detail may not add to total because of rounding.

TABLE 47

AIRCRAFT CONTACTED

AT FAA FLIGHT SERVICE STATIONS

(In Thousands)

FISCAL YEAR	USER CATEGORY				FLIGHT RULES		
	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	IFR-DVFR	VFR	TOTAL
Historical*							
1994	177	706	3,509	243	1,391	3,244	4,635
1995	161	653	3,206	220	1,317	2,923	4,240
1996	141	596	2,971	196	1,164	2,740	3,904
1997	138	588	2,804	174	1,133	2,572	3,704
1998	150	570	2,600	156	1,138	2,338	3,476
1999E	136	515	2,524	150	1,044	2,282	3,325
Forecast							
2000	127	522	2,473	147	1,029	2,240	3,269
2001	124	512	2,433	145	1,002	2,212	3,214
2002	122	505	2,391	141	979	2,180	3,159
2003	120	493	2,355	138	958	2,148	3,106
2004	118	484	2,316	135	936	2,117	3,053
2005	113	475	2,281	132	915	2,086	3,001
2006	110	466	2,245	129	895	2,055	2,950
2007	109	457	2,209	125	875	2,025	2,900
2008	107	448	2,173	122	854	1,996	2,850
2009	105	440	2,138	119	839	1,963	2,802
2010	103	432	2,103	116	834	1,920	2,754
2011	102	423	2,069	113	818	1,889	2,707

* Source: FAA Air Traffic Activity.

Notes: Detail may not add to total because of rounding.

TABLE 48

AUTOMATED FLIGHT SERVICES

DUATS TRANSACTIONS

(In Thousands)

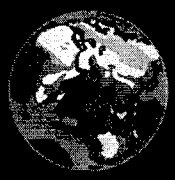
FISCAL YEAR	DUATS FLIGHT PLANS	DUATS TRANSACTIONS	TOTAL DUATS
Historical*			
1994	750	7,342	16,184
1995	840	4,920	11,520
1996	911	5,119	12,060
1997	857	5,847	13,408
1998	881	5,548	12,858
1999E	724	5,961	13,370
Forecast			
2000	762	6,096	13,716
2001	800	6,320	14,240
2002	835	6,513	14,696
2003	870	6,699	15,138
2004	906	6,886	15,584
2005	942	7,065	16,014
2006	979	7,245	16,448
2007	1,017	7,424	16,882
2008	1,057	7,610	17,334
2009	1,097	7,789	17,772
2010	1,138	7,966	18,208
2011	1,180	8,142	18,644

* Source: FAA Air Traffic Activity. DUATS began in 1990.

Notes: Total DUATS services are equal to the sum of flight plans originated and transactions multiplied by two.

A Special Report

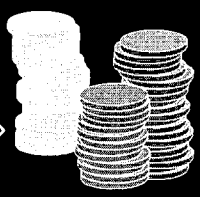
AVIATION SCENARIOS OF THE FUTURE



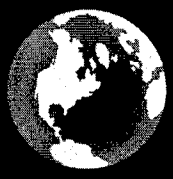
Global Climate Change

Aging America

Global Prosperity



Western Hemisphere



AVIATION SCENARIOS OF THE FUTURE: A SPECIAL REPORT

The aerospace forecasts in this document represent a baseline projection of the future based on current trends and conditions, anticipated changes, and common sense. One thing is certain. The future will not unfold exactly as predicted here. Trends and conditions will change, and events will send aerospace in unanticipated directions.

To plan effectively, aerospace leaders need to choose strategies that work well in a range of possible futures. A safety strategy that is effective whether the economy is strong or weak may be better than a strategy that is relevant only in a strong economy. Plans and strategies should address key contingencies. For example, how should aviation safety programs change to assure safety if carriers experience increased financial difficulty due to a slow economy?

To provide information resources in identifying and planning for contingencies, the Department of Transportation brought together leaders from throughout the transportation community and the Department. Led by a multi-modal staff core group and The Futures Group/Deloitte Consulting, they identified some 250 factors ("drivers") that will affect the world 30 years hence. They used them to develop and explore 4 scenarios of the world of 2028. FAA then convened a group of aerospace and FAA leaders to "live in" the 4 future scenarios, describe their impacts on aerospace, and consider strategies.

The 4 scenarios explored below address a broad range of possible futures. The economy is weak in some scenarios, and strong in others. Globalization has continued in some, but in others has given way to American, European, and Asian trade blocs. The Federal Government is strong in some scenarios, but reduced in others, with power devolved to States, localities, the private sector, and/or international entities. There is strong demand for transportation innovation in some scenarios, but in others demand is vague and unfocused; "Not In My Back Yard" (NIMBY) is the order of the day.

Each of the 4 scenarios could come to pass. If globalization and the strong economy continue, the results could be GLOBAL PROSPERITY, where giant multinational corporations solve many problems and decentralized government facilitates commerce. Europe may, however, become a strong trade block competing with the United States. If disputes over bioengineered crops and subsidies escalate and the United States pulls back from a global orientation, the result could be that a strong WESTERN HEMISPHERE trading bloc (North and South America) faces a unified Europe and a resurgent Asia. Some people suggest that the Baby Boom generation may continue to control the political agenda in an AGING AMERICA that meets Boomer needs at the expense of the economy. Finally, GLOBAL CLIMATE CHANGE could lead to a world where addressing causes and adverse effects of global warming, including violent storms and flooding, top the world's agenda. The discussion below expands on each of the 4 scenario "worlds" and their potential impact on aerospace and on this forecast.

GLOBAL PROSPERITY

The *Global Prosperity* World is characterized by strong *U.S. Economic Vitality*, increasing *Globalization*, restrained *Role of Government*, and conflicted *Demand for Change in Transportation*. In the future history for this world commerce rules and private industry has replaced government's role in many traditional areas. Transportation systems are built by consortia that also set system standards. This is a fast-paced world of networked global economies and opportunistic, no-holds-barred intense competition. Government at all levels mainly supports commerce. In this world, the economic rising tides raise almost all boats, with few remaining unemployed and prosperity benefiting all. Even environmental issues have been partly addressed; hybrid cars reduce emissions, and businesses consider pollution a form of waste. Transportation systems are developed to enhance shipping of goods and services. The trade-off is little or no free time, as the world is working 24 hours a day. Everything is done virtually, from business meetings to shopping to vacations. Time is of the essence in all areas of life. Spending a day on an airplane to get to a business meeting is rarely done, and vacations are shorter, wired, and taken within a few hours of home.

The impacts on aerospace are strong and mostly positive. Aerospace, and especially commercial space transportation, is likely to do better than forecast here, beginning in the later years and beyond 2011. Commercial space transportation accelerates, with more space vehicles, including fully reusable vehicles, and some passenger service on sub-orbital flights to distant places on Earth, and perhaps eventually recreational trips to low-orbit hotels or the moon.

The passenger airlines prosper as well. Changing demographics may change travel patterns. Leisure air travel increases as people with more disposable income seek to get to their leisure destinations rapidly. Business travel will be tempered by vast increases in e-commerce. Air travel is likely to concentrate on passenger movement, not comfort. Quality of service, beyond some minimal level, does not increase market share except for a small segment that can afford it. Frequency will be important to travelers, as will efficient door-to-door movement and minimizing delays at airports. Demand and supply of pilots will be an issue. Airlines will have to self-train additional pilots to meet their needs. Airlines will also need more engineering skills, particularly those associated with monitoring automated systems.

Airline competition will occur among a few international mega-carriers in this scenario. These large airlines will probably control regional service as well. Issues of competition at specific airports and ownership and use of slots are likely to continue. A reduced Federal Government, however, may play a smaller part in fostering competition just as aviation competition pervades the rest of the world.

Air cargo, in this fast-paced world of 2028, will boom. Cargo operates primarily at night now, but will be a 24-hour operation and could affect the airlines' hub-and-spoke systems. Cargo and passenger movements may overlap; the part to fix a machine may come with a technician to install it. Cargo airlines may sell some of their capacity for passenger air travel, particularly certain banks of time. There are vast new infrastructure needs and questions, both in the air and on the ground, associated with next day delivery. Businesses may have to adapt, for example, to fast deliveries at 3 AM. There may be neighborhood drop-off boxes for fast freight, rather than direct door-to-door delivery.

There could be 2 or 3 new types of airlines in 2028. Some will serve mostly business travel, and their aircraft will become smaller. Some will serve leisure travel, with aircraft similar in size to today's. Some airlines will mostly serve cargo, and their aircraft will become larger.

General aviation, particularly business aviation, air taxis, and even personal air transportation, will enjoy boom times. Aircraft may be

affordable causing the general aviation fleet to grow more vigorously than current expectations. A major challenge would be provision of the infrastructure needed to serve that traffic. Another is fuel cost, which is a relatively large portion of the cost of general aviation flying. Will sufficient small general aviation airports continue to exist to serve a major increase in general aviation traffic?

Aircraft manufacturers will do well supplying the expanded aviation system. Indeed, there may be room for a new aircraft manufacturer by 2028; possibly an automobile manufacturer or a regional jet manufacturer moving up in size. It is not clear whether the expanded market would be primarily for larger or smaller aircraft. There could be more of a spread in sizes. Boeing sees aircraft size going down in response to increased frequencies, especially for business travel. Leisure travel, however, remains somewhat less time-sensitive, and may allow fewer, larger aircraft. If enplanements are up and there isn't more capacity at airports, larger aircraft will be a necessity. New, larger aircraft will, of course, place their own strains on airport infrastructure. To reduce boarding times, there may be more doors and even double-decker loading, requiring changes to airport terminals. Customs processing will have to be speeded up, possibly using pre-screening before people reach the customs check-out. New, larger aircraft are also bigger targets for terrorism.

It is not clear whether today's aircraft will still predominate in 2028, or whether new aircraft, more tailored to tomorrow's markets, will have largely replaced the existing fleet. In this scenario, capital is available for a substantial investment. A key is how well today's aircraft fit the needs of the 2028 market. Environmental concerns could also spur turnover.

Airport and airspace infrastructure are crucial to this world of increased aerospace demand. Especially in this scenario, with its reduced Federal role, communities drive airport infrastructure, and not meeting community environmental needs will constrain airports. Noise is an issue, but possibly solvable.

Air traffic control is privatized in this scenario. In Britain, the ATC Corporation, operators, and the government negotiate fees for the next year. If this model were used, there could be premium charges for peak usage or certain services such as operations in adverse weather. Much could depend on the structure of the ATC Corporation (or even competitive Corporations), ownership, and the structure and concentration in the airline industry. Competition in ATC services could be possible and may be desirable.

Regulation and certification may shift from FAA to ICAO/an international organization or the industry itself. FAA's regulatory role could be reduced to liaison with international organizations, some standard setting, accident investigation, and some oversight, for example, approving examiners and designees. FAA and even DOT could be merged into the Department of Commerce or elsewhere.

Commercial space transportation could be an expanded FAA role. The commercial space transportation industry seeks more FAA involvement today, and an accident could strengthen that demand for safety. Regulation could, however, be done by a global body. Another factor is what happens to NASA in this world, with its emphasis on the private sector.

Finally, there may be a Federal role in promoting and funding basic research that has application to aerospace.

WESTERN HEMISPHERE

The *Western Hemisphere* World scenario includes strong *U.S. Economic Vitality*, but decreasing *Globalization*, an activist *Role of Government*, and conflicted *Demand for Change in Transportation*. The future in this world stemmed from the growth of the

European Union (EU) and the trade/banana wars of today. The trade issues led to more tariffs and trade barriers, and eventually to three major trading blocs (Western Hemisphere, EU, and Asia) in the world, with the U.S. expanding NAFTA with Canada and Mexico to the entire Western Hemisphere. The U.S. has grown tired of its role as the global cop, and brought its military forces back home. The Western Hemisphere and EU are the two big global players, and the Western Hemisphere loses its dominance to the EU in setting standards. We have focused our interests on the developing markets, growing labor pool, raw materials and geo-political allies. We have moved from a global focus to a local focus, and more leisurely lifestyles. The power of government is now at the local level instead of the Federal level, and after years of infrastructure building throughout the hemisphere, NIMBY (not in my backyard) is returning. Education is important in this world, and people buy quality over quantity.

Aerospace in this scenario is both healthy and technologically advanced, though not as much so as in the Global Prosperity scenario. There is more international air travel, but it is primarily north-south, within the Western Hemisphere trading bloc. Improvements to aerospace are also meeting resistance in local communities that want new airports, runways, and other facilities located elsewhere.

Space travel will be important in 2028 to orbit satellites, for planetary exploration, and for material processing. There should be passenger travel, some transportation of cargo point-to-point, and maybe space tourism. Commercial space transport could be a serious competitor for aviation, and will have to be accommodated in the aerospace system. The line between air and space travel will be blurred as aircraft fly faster and higher, and changed space propulsion systems allow them to use airports.

Despite competition with space travel (or by co-opting it), passenger airlines should be healthy. Videoconferencing may actually expand face-to-face business travel, much like computers and the "paperless" office. Leisure travel, too, will increase, with a similar (60-40) split between business and leisure travel.

Hubbing may increase, especially north-south, with southern U.S. airports becoming hubs to Latin America. There could also be a big hub in Mexico. Faster, bigger aircraft could cut hubbing somewhat, especially for the longest trips. More traffic will also lead to more direct flights and service to more peripheral locations. Commuter carriers will do well.

Increased air travel demand in Latin America means opportunity for U.S. carriers, either through alliances with increasingly healthy Latin American carriers, or by the U.S. carriers themselves becoming major regional carriers.

Air cargo transport will increase. Just-in-time delivery will vastly expand aviation small package business. In 2028, with more cargo but cargo terrorism, there may be fully automated cargo flights. Security will be an increasing concern for all of aerospace. Another change will be more integration of freight transportation networks across air, rail, and truck.

General aviation should do well in this world of 2028, but not without problems. General aviation for fun, to personal destinations, for leisure, and for business all will probably increase with smaller, more numerous airports. Less expensive, faster, simpler-to-operate general aviation aircraft will help. They may make possible something like "Hertz Rent-a-Plane", maybe even including the pilot.

Many general aviation airports of 30 years ago, however, will be gone. A key will be protecting those airports and time and access for general aviation pilots. It will be easy to build new general aviation airports, but they will be far away from almost everything. While business jets will have access to the largest metropolitan areas, personal and leisure flights may well be pushed out to increasingly remote locations. Another option may be to change general aviation propulsion and dynamics – moving to

helicopters and tiltrotors that need less surface space. If so, the airspace system will need to adapt to these new aircraft, especially over cities. The best testing grounds for these changes may well be mid-sized cities where airports are closer and the system is less complex. General aviation, however, and especially business aviation, will need access to the largest metropolitan areas.

Aircraft manufacturers will build a wide variety of aircraft, from a new generation of general aviation aircraft to new, larger, faster aircraft and possibly suborbital aerospace craft. One major thrust in aircraft manufacture may be to reduce the weight of aircraft. Another will be more electronic capabilities. Pilots in 2028 may well be primarily system monitors, and general aviation pilots may be more like car drivers.

There could be some relocation of aircraft manufacture from North to South America, especially for general aviation. Major airframe manufacturers will be less likely to move. The trend to build parts in many places and assemble them in one place should increase. The role of existing aircraft will probably drop a notch; 747's will be used for national transportation, 757's for regional travel, and new large aircraft will be the real long distance aircraft.

Airports, by contrast, are likely to grow up one notch, with small airports becoming medium and medium becoming large. All the forecasts, including the ones contained here, are for big traffic increases for commercial aviation. A key question is how this country will respond to that increase. Another airport issue is handling new, larger aircraft. The federal role in this world will have decreased; indeed, there is question whether there will still be a Federal airport grant program. Decision-making will be increasingly local, and local communities may resist new infrastructure. Even with political will, it may be nearly impossible to obtain large tracts of land for airports in large cities. There will be new airports, but far from city centers. One possibility to serve the central city is increased reliance on vertical flight, but infrastructure to handle it will cost billions of dollars. Security will also be a concern.

In Latin America, there may be much airport development, led largely by the private sector and associated with tourism and resorts. Indeed, one possible future for FAA's Airports people is that they migrate into a technical arm of the Free Trade Association of the Americas (FTAA, the successor to NAFTA), where they work with different countries on improving their airports. FTAA could become the place with the strongest aerospace promotional role.

FAA's air traffic control and safety functions could go in several directions. One vision sees more hemispheric, commercialized, privatized air traffic control (ATC), with safety moving to a hemispheric organization like Eurocontrol. Another vision sees nations wanting significant ATC involvement, leading to every country having its own ATC system it doesn't want to lose. A third vision is that provision of ATC at low levels will be national, but at high altitudes (commercial), regional. Terminal and tower services could be local, subject to minimum national and international standards.

There is a continued need for some government body to provide safety oversight. Whether oversight is done by a regional authority, ICAO, or FAA is open to question. One possibility is regional regulation and possibly surveillance but national enforcement. Security will continue to be national, supplemented by voluntary international standards, and in partnership with state and local governments.

Another Federal role may be basic research. The private sector, in this scenario, will concentrate on investments that pay off quickly and surely. High density airports could be an example. Government would do basic research on technologies but not development of vehicles for the marketplace. That would be private. Government would provide a research environment and some risk indemnification for development. Also, the U.S. may well have lost its preeminence to the Europeans.

Finally, environmental concerns may be mainly local, addressed by metropolitan government and business and with less FAA involvement. Different local standards across the Western Hemisphere will be a problem for airlines.

AGING AMERICA

The *Aging America* World has a weak *U.S. Economic Vitality, Globalization* is decreasing, an activist *Role of Government*, and there is consensus in *Public Demand for Change in Transportation.* Prolonged economic stagnation has resulted from decreasing trade and investment and an increasing entitlement burden as the Baby Boomers retire. U.S. industry has lost its competitive edge; investment is going abroad. This is a world of haves and have-nots, largely based on age. The Boomers have hit retirement relatively well-off and have put social programs in place to protect their interests with generous entitlements and subsidies. This has been at the expense of families and workers, and lines are hardening around the issues. Education is in collapse, and dual-income families have become necessary to survive, with many working two jobs per person, if they can get the jobs. Early U.S. trade barriers erected to shore up a faltering economy has led to countervailing protectionist actions across the globe. Industry is pushing government to rehabilitate both soft and hard infrastructure, which are in great decline, as well as industrial policy to resurrect competitiveness through investment in industrial, agricultural, information, and communication segments.

While worldwide, aerospace does fairly well in this scenario, U.S. aviation and commercial space transportation may not be doing as well. Both face a weak U.S. economy, protectionism, and competitive disadvantage compared to Europe and the rest of the world. Business travel will be down as domestic corporations seek to economize and use e-communications and commerce. Leisure travel by the elderly will be a partial offset. Partnerships among airlines may be part of how U.S. air carriers respond and gain access to the world market. The number of U.S. airlines may shrink. Some major U.S. airlines could be in trouble unless they reduce costs. Non-U.S. carriers, however, may have an advantage due to code sharing arrangements, tariffs, and price structures.

U.S. commercial space transportation should still exist in this scenario, but will not have lived up to the potential shown in other scenarios. Communication is good in this world, and there has been opportunity to launch communication satellites, but there will not be much pressure for hypersonic, sub-orbital passenger transport.

Cargo transport by all modes is flat, but air cargo of small packages should increase as people increasingly shop over the Internet. The structure of commercial air cargo transport may change to emphasize small, local airports that serve local communities across the nation.

General aviation, especially leisure or personal, is greatly diminished in this scenario. Costs are increased and few non-Seniors will be able to afford flying. There will be fewer general aviation pilots. There should also be more charter travel to assist groups of Seniors portal-to-portal from their homes or communities to leisure destinations and back.

Overall, there should be a large worldwide market for commercial aircraft. Manufacturers will be international as they are now. Airbus will be huge. Boeing will no longer be a purely U.S. manufacturer, so ironically, in a world of trade barriers, there may be less air manufacture protectionism than today. The major markets for new aircraft may be Europe and China.

The airplanes manufactured in 2028 will be a lot like today's. Cockpits will be similar, though there may be high definition TV, more automation, and better communication. There will probably not be unmanned aerial vehicles (UAVs) in commercial passenger service, though there may be some cargo UAVs. There

may also be a market for more vertical flight – helicopters and perhaps the Tiltrotor.

There will, then, still be a demand for pilots – but probably not a shortage. Airlines will train their own pilots. The copilot may be something of a "computer whiz" driver. Even the pilot may not do much actual flying of the aircraft except in emergencies. He or she will know enough to control the airplane and land it.

Commercial passenger air travel will favor the needs of seniors and their leisure travel. First Class service may extend throughout the aircraft. Services and accommodations for seniors and others in airports will increase and include more people movers, "slidewalks" (or even moving seating), better signage, and more amenities. The impact of seniors, however, may be lessening by 2028. The leading edge of the Baby Boom will be in its early 80's.

"Hub-and-spoke" travel mainly aids business travel. Leisure travelers may prefer to drive rather than fly 200 miles to a hub. So there may be less hub-and-spoke in this world of 2028. Hubbing will not be totally gone. Indeed, there may be new or expanded hub or spoke connections to leisure centers that serve Seniors, such as some Florida destinations.

Security, and especially cyberterrorism, will be an issue in this world. It will be tried on air traffic control and even in the cockpit, as terrorists try downloading viruses into cockpit computers. There will need to be diagnostics and a quick fix, backed up by the ability to fly the airplane without the electronics, or to "wipe" software clean and quickly give control back to the pilot. There will also be a need for "end-to-end" security, from origin to destination, and not focused on aviation alone. Also, in this world, there may be a push to place security more firmly in Federal hands, for example, through the use of Federal rather than private sector screeners. Air cargo could be another point of greatly increased security vulnerability.

The air traffic control and airport infrastructure will likely be deteriorated in 2028. A weak economy, a general lack of investment, and an overall decline in air transport will lead to this decline in infrastructure. Capacity should be adequate, and some airports could face excess capacity. Congestion should not be a problem.

Air traffic control in 2028 will be in the hands of a Performance-Based Organization (PBO), separate from but controlled by FAA or its successor. How the PBO is structured and controlled, and how its Board of Directors reflects a balanced set of aerospace interests, will have much to do with the PBO's impact on aerospace, and particularly general aviation and commercial space. If the Board is controlled by the airlines, general aviation could be pushed out. If control is in the hands of a few airlines, it could be used for competitive advantage. Even if the PBO works well, it could be dissolved in 2028 in response to deterioration of air travel and aviation infrastructure. The U.S. government could thus retake control of the U.S. air traffic control system, funded by user charges put into a public trust fund.

The actual job of controlling aircraft could be largely a monitoring function. If air traffic control is still done by a PBO, with movement to free flight, fewer flights, and less congestion, there will probably be reduced need for air traffic controllers.

Safety and security could still be FAA roles. The U.S., however, could take a back seat to international organizations such as ICAO and to Europe. If the U.S. fails to keep its standards current, Europe would take the lead in setting standards. The U.S. would give more reliance to European certification, with harmonization meaning accepting European standards. While international organizations in general are weaker in this world, there would still be need for global aviation standards. The U.S. could place greater reliance on ICAO for standards that protect and support U.S. needs. ICAO, in turn, could by 2028 work more with regions such as Europe than with individual countries.

FAA, finally, could have a useful role in research and development, and a revitalized role to promote aerospace in this scenario where the economy is in decline and government action is desired to "jump start" it.

GLOBAL CLIMATE CHANGE

In the *Global Climate Change* world, *U. S. Economic Vitality* is weak, *Globalization* is increasing, the *Role of Government* is activist and the *Demand for Change in Transportation* is in consensus. The doomsayers of the last few decades were right, and this scenario takes their predictions to future extremes. By 2028, there has been thirty years of increasingly severe weather, with the final decade containing catastrophic human and physical destruction. The entire world understands that everyone must change to recover the environment, but disasters are now so frequent that government action to reverse the situation is paramount. Weather implications have eroded revenue at every level, and damage remediation and financial bailouts have financially strapped governments globally. Seventy percent of the world's population lives in coastal areas, and rising ocean levels have inundated low-lying areas with flooding and mudslides. U.S. agriculture is hit hard, but we are still able to feed ourselves. Other countries are not so fortunate. Europe is the moral leader in this world, with the U.S. providing money, technology, and diplomatic muscle. The whole planet knows it is in this together. Power and authority are flowing upward, towards federal and international institutions.

Constrained, expensive transportation in all modes is a key issue in this future. Reducing emissions by fuel economy or new technology drives up costs. Patterns of housing, work, and travel all become more emissions efficient. People live near work and to use personal vehicles for individual trips is a scarce luxury. The Mississippi Valley / Great Lakes basin becomes a haven from the stressed coastal areas. While economic and transportation resources are constrained, leisure time has increased. Still, there is a 24-hour economy in order to be most efficient in using existing assets. There is little money for new capital investment.

Space transportation in this world continues to develop. Satellites are key to several strategies to save the world. Environmental monitoring, increased and improved communications in lieu of travel, and a universal navigation system to improve transportation efficiency all depend on a reliable, safe, cost effective launch and satellite industry. The commercial space transportation sector has continued to expand, but the importance to saving the world and the high cost of failure means that there is still significant government oversight, particularly in the realm of setting technology standards and ensuring global interoperability of systems.

Commercial aviation suffers in this world. Load factors are high, fares are high, seating densities are high, and schedule frequencies are low, making air travel unpleasant yet considered a luxury. The one bright factor is that the drive for reduced emissions has improved both air traffic management and airline scheduling practices, significantly improving schedule reliability. Overall travel decreases as the communications industry steps in to fill the gap. There is still a need, however, for time critical travel; environmental disaster recovery is a big driver. Because not all airlines can cope with lower demand; there are fewer airlines in 2028.

Air cargo has also declined in this scenario. The need for overnight and other quick shipping is lower as cost becomes a bigger factor than time. E-commerce has eliminated the need for most overnight document delivery while personal internet shopping tends to focus on local vendors or slower shipping methods. Competing modes of emission-efficient land and sea based surface travel reduce demand for larger air cargo items. It is possible that lighter-than-air

ships may reappear as an emissions-efficient mode to ship less time sensitive goods. The major remaining advantage of air cargo is its speed; this is continually balanced against the need to fly with fuller loads to be profitable.

Overall aviation demand is reduced, though operations are spread throughout more hours a day as no new airports are built and hub-and-spoke scheduling continues. Many smaller communities lose air service as the population concentrates into mega-cities. Road and public transportation to airports in the cities is also a problem, as local demand increases to the same hub airports we have today. Airport surface operations change to reduce emissions. For example, there is more towing of aircraft and no long taxi queues for departure. Airport authorities gain a role in emissions monitoring, as airlines learn to trade credits for reducing ground pollutants to increase air service.

In this *Global Climate Change* world, older aircraft are retired more quickly than the forecast baseline, without many replacements coming into the fleet. Cockpits have the latest communication, navigation, and surveillance equipment to maximize efficiencies and cope with unpredictable weather. There is a push to bring to market more efficient airfoils, airframes, engines and fuel technologies that have been under development (primarily in Europe), but investment capital to fund the replacement is in short supply. High-speed rail successfully competes for intercity traffic on a few dense routes, but there is little capital for major new investments in rail, either.

Business and corporate aviation has shrunk but still exists; time and flexibility are balanced against costs. This equation frequently favors

business aviation when the motivation is emergency response and disaster recovery. The passengers tend to be technical specialists and the specialized equipment they need, not corporate executives. The pressures to convert general aviation airports to other commercial functions are reduced with the slower economy. Recreational general aviation survives, but fuel for piston aircraft is taxed heavily and so the largest general aviation sector is soaring.

Increased government authority is a given in this *Global Climate Change* world as it rallies to save itself. The key question for evaluating the future of the FAA in this world is the policy choice made – will there be extensive re-regulation of routes, schedules and services, or will the government rely on market responses to new incentives and taxes? The group of experts assembled at FAA felt that market forces could be very responsive if given the proper set of incentives. Under either alternative, FAA will need to focus on the efficiency of aircraft movements. This means completing the transition to Free Flight, and ensuring that air traffic controllers have the tools and expertise to be partners with airline dispatchers and pilots in the efficient movement of aircraft.