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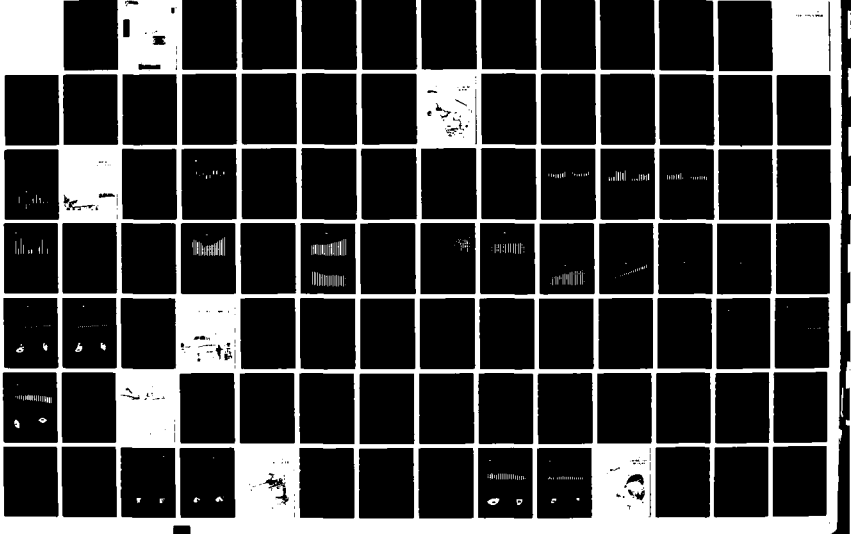

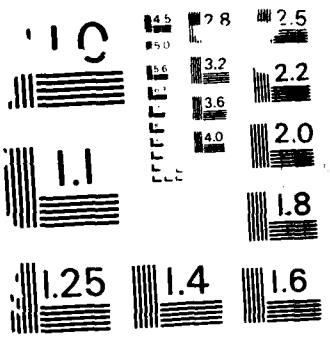

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16. Abstract

This report contains the Fiscal Years 1988-1999 Federal Aviation Administration (FAA) forecasts of aviation activity at FAA facilities. These include airports with FAA control towers, air route traffic control centers, and flight service stations. Detailed forecasts were made for the four major users of the National Aviation System: air carriers, air taxi/commuters, general aviation and the 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, by the aviation industry, and by the general public.

The overall outlook for the forecast period is for continued economic growth, rising real fuel prices, and moderate inflation. Based upon these assumptions, aviation activity by fiscal year 1999 is forecast to increase by 33.4 percent at towered airports, (commuters, 53.4 percent; air carriers, 30.1 percent; general aviation, 32.8 percent; military, 0.0 percent), 33.5 percent at air route traffic control centers, (commuters, 73.6 percent; air carriers, 33.3 percent; general aviation, 29.6 percent; military, 0.0 percent), and 11.7 percent in flight services performed. Hours flown by general aviation are forecast to increase 6.1 percent and helicopter hours flown, 33.3 percent. Scheduled domestic revenue passenger miles (RPM's) are forecast to increase 75.8 percent, with scheduled international RPM's forecast to increase by 81.3 percent, and regionals/commuters RPM's forecast to increase by 16.9 percent.

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PREFACE

The Federal Aviation Administration forecasts of aviation activity and other selected statistics are developed annually for use in the agency's planning and decisionmaking. Aviation activity under the control of FAA towered airports and Air Route Traffic Control Centers, and the services provided by the Flight Service Stations are forecast for several user groups--commercial air carriers, commuters/air taxis, general aviation, and the military.

For the period 1988-1993, FAA aviation forecasts utilized projections of key economic variables provided by the Executive Office of the President, Office of Management and Budget. For the period 1994-1999, FAA aviation forecasts were based on consensus growth rates of key economic variables provided by Data Resources, Inc., Evans Economics, Inc., and Wharton Econometric Forecasting Associates. These projections are combined with projections of aviation variables and professional judgment on the probabilities and consequences of events that affect aviation. The combination is used as input to the econometric models from which the forecasts are generated.

The forecasts developed by these models and presented in this report indicate that aviation activity should continue to grow at about the same rate as the general economy. The projected system demand was not specifically constrained as a result of capacity problems at some major U.S. air terminals. We recognize, however, that scenarios may evolve which could result in some constraints being placed on the system. Of special concern are the indications that the number of general aviation airports may be declining at an accelerating rate. The importance of these airports for feeding the system with both passengers and embryo pilots cannot be overlooked. Also, there is the uncertain impact of growing constraints on the construction of new runways and major new airports because of increased community resistance to aircraft noise. In order for the forecasts of this report to be realized, noise impact and the resultant restrictions on capacity and system growth must be dealt with at an early date. The forecasts assume that these threats to orderly growth are manageable and that there would be only minor perturbations to the long-term growth expected for the industry.

John M. Rodgers
Acting Deputy Director of Aviation
Policy and Plans

ACKNOWLEDGMENTS

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Regionals/Commuters - Charles Moles
General Aviation - James Veatch
Helicopters - Thomas Henry
FAA Workload Measures - Robert Bowles, Charles Moles, and James Veatch
Terminal Area Forecasts - Thomas Henry
Statistical Assistance - Virginia Price and Dyane Green
Text Preparation - Earline Burgess

The guidance and critical reviews produced by the senior staff of the Office of Aviation Policy and Plans are gratefully acknowledged.

TABLE OF CONTENTS

Table of Contents (Continued)

Table of Contents (Continued)

LIST OF FIGURES

List of Figures (Continued)

LIST OF TABLES

List of Tables (Continued)

CHAPTER I

EXECUTIVE SUMMARY

Nearly a decade has passed since Congress deregulated commercial aviation. Air travel demand, spurred on by creative airline pricing, expanded schedule frequencies, and an expanding U.S. economy has surged to new peak levels. The evolution of the industry has had a significant impact on FAA workload and facility planning. The industry is now facing a number of capacity issues. These impact, or have the potential to impact, the future growth of air transportation. Physical airport capacity problems, environmental concerns, and the demand for aviation services in a free market environment must all be taken into consideration in planning for future aviation facilities. When combined with regulatory, financial, operational, and other changes, capacity issues can be expected to have a significant impact on the aviation community over the next decade. These issues can also be expected to have profound long-term implications on the future structure and directions of the industry.

Shipments of all types of general aviation aircraft, which have been cyclical since World War II, increased steadily during the 1970's, reaching a peak of 17,811 units in 1978. However, general aviation aircraft shipments have registered declines in each of the next 9 years. The single engine piston aircraft market is the base on which general aviation activity builds. Three-fourths of the aircraft in the fleet are single engine piston. When the single engine market declines, it signals the slowing of expansion in the general aviation fleet and, consequently, a slowing in the rate of growth of activity at many FAA facilities.

The FAA has embarked on a plan to meet forecast demands for the aviation system as reflected in this document. FAA must do this in a way that conforms with the guiding principles that the FAA will control but not constrain, regulate but not interfere. Although air carriers account for the largest proportion of air passenger traffic, and the FAA recognizes its special responsibility to respond to this priority, it must also respond to the needs of the individual who chooses solo flight. The primary objective is safe and efficient transportation for all people who use and depend upon the National Airspace System.

REVIEW OF 1987

Fiscal year 1987 was a year of spectacular growth for the commercial air carrier industry. In spite of a lack-luster economy, the air carriers experienced double-digit passenger growth, and operations at FAA facilities increased faster than forecast. Major air carrier hub airports saw an increasing share of this activity resulting in significant concerns as to the adequacy of the National Airport and Airspace System. There was an increased emphasis by the industry on development of a hub and spoke marketing strategy with high frequencies in peak hours. Air carrier load factors reached an annual average of 62.2 percent. Service levels deteriorated and new reporting requirements were instituted to provide the travelling public more information about the quality of service being provided by the individual carriers.

U.S. commercial airlines reported operating profits totalling over $2.7 billion in fiscal year 1987. However, there is still some cause for concern about their financial viability. Five carriers' profits totalled $1.7 billion, or over 66 percent of the industry total. Also, in this, the most profitable year in industry history, 20 carriers incurred operating losses. Unfortunately, the industry's net profit totaled only $737 million, due largely to interest payments on long-term debt. The future vitality of the national economy is likely to be the factor which determines the financial future of commercial aviation and its individual carriers.

General aviation aircraft shipments in fiscal year 1987 declined for the ninth consecutive year. However, multi-engine piston and turbine-powered aircraft shipments showed improvement over fiscal year 1986 totals.

All users of the National Airspace System increased their levels of activity at FAA facilities in fiscal year 1987. Total operations at FAA air traffic control towers were up by 3.4 percent, instrument operations were up by 7.2 percent, and aircraft handled at the air route traffic control centers increased by 4.8 percent.

In summary, the impacts of deregulation are continuing to alter the commercial aviation industry. The long expected recovery of the general aviation manufacturing industry has not materialized, but activity measured at FAA facilities continues to exhibit moderate to strong growth.

ECONOMIC FORECASTS

The forecasts contained herein are based on improved models of general aviation and air carrier activities and on forecasts of economic variables contained in the following table.

FAA FORECAST ECONOMIC ASSUMPTIONS

FISCAL YEARS 1988 - 1999

	HISTORICAL			FORECAST			PERCENT AVERAGE ANNUAL GROWTH				
ECONOMIC VARIABLE	1980	1986	1987	1988	1989	1999	80-87	86-87	87-88	88-89	87-99
Gross National Product (Billions 1982$)	3,187.7	3,693.1	3,783.7	3,901.8	4,011.6	5,275.6	2.5	2.5	3.1	2.8	2.8
Consumer Price Index (1967 = 100)	239.8	322.7	331.3	345.7	360.0	554.4	4.7	2.7	4.4	4.1	4.4
Oil & Gas Deflator (1982 = 100)	90.4	82.4	75.8	80.7	83.9	153.2	(2.6)	(8.0)	6.5	4.0	6.3

Source: 1988-93 Executive Office of the President, Office of Management and Budget

1994-99 Consensus growth rate of Data Resources, Inc., Evans Economics, Inc., and Wharton Econometric Forecasting Associates.

A great deal of uncertainty exists concerning the short-term economic outlook. These forecasts assume moderate growth of the economy in 1988 and 1989. The overall outlook for the 12-year forecast period is for moderate to strong economic growth, increasing real fuel prices, and moderate inflation. Projected growth of aviation is consistent with the long-term economic growth forecast. It should be recognized that in any given year there may be some perturbation from the long-term trend because none of the economic models are sufficiently precise to predict interim business cycles.

AVIATION ACTIVITY FORECASTS

Domestic air carrier revenue passenger miles are forecast to increase at an annual growth rate of 4.8 percent during 1987-1999. During the same time period, domestic enplanements are forecast to increase by 4.6 percent annually, a rate somewhat slower than passenger mile growth due to longer passenger trip lengths. Air carrier aircraft operations are forecast to increase at an annual rate of 2.3 percent over the forecast period. The high growth in revenue passenger miles and enplanements relative to operations reflects the baseline air carrier assumptions of higher load factors, larger seating capacity for air carrier aircraft, and longer passenger trip lengths.

In 1988, the regionals/commuters are expected to enplane 29.1 million passengers, 6.4 percent of all fare-paying passengers in scheduled domestic air service. By 1999, these carriers are expected to carry 57.9 million passengers and to account for 7.6 percent of all domestic passenger enplanements. Regionals/commuters are expected to continue the trend toward purchase of small jet aircraft and larger, propeller-driven aircraft.

Nationally, commuter/air taxi aircraft operations are expected to continue to increase at a faster rate than the other user categories--but not at the rates of the last several years. While replacement service in markets abandoned by the larger commercial air carriers may continue to offer some residual potential for growth, increased internal industry competition, spurred on by, and/or augmented by, the development of new hubs with regional feeds through code-sharing agreements, will be the primary source of future growth.

Increased business use of general aviation continues to be reflected in the changing character of the fleet. The more expensive and sophisticated turbine-powered part of the fixed-wing fleet is expected to grow much faster than piston aircraft between 1987-1999. In 1987, there were 10,500 turbine-powered aircraft in the fixed-wing general aviation fleet, and this represented 5.4 percent of the total fixed-wing fleet. By 1999, it is projected that there will be 15,700 turbine-powered aircraft, or 7.8 percent of the total fixed-wing fleet.

FAA WORKLOAD FORECASTS

Aviation activity at FAA facilities is expected to continue the upward growth pattern which began in 1983. The demand for FAA operational services is anticipated to increase over the forecast period as a result of continued strong growth in aviation activity. Total aircraft operations at FAA towered airports are forecast to increase to 81.4 million in 1999, a 2.4 percent annual growth rate over the 61.0 million operations achieved in 1987.

The increased use of avionics by regionals/commuters and general aviation plus further implementation of additional Airport Radar Service Areas will contribute to the high growth expected in instrument operations at FAA towered airports. Instrument operations are forecast to increase from 43.4 million in 1987 to 59.5 million in 1999, a 2.7 percent annual growth rate.

AVIATION ACTIVITY FORECASTS
FISCAL YEARS 1988 - 1999

	HISTORICAL			FORECAST			PERCENT AVERAGE ANNUAL GROWTH				
AVIATION ACTIVITY	1980	1986	1987	1988	1989	1999	80-87	86-87	87-88	88-89	87-99
AIR CARRIER											
Enplanements (Mil)											
Domestic	278.2	385.2	415.0	431.7	450.8	713.7	5.9	7.7	4.0	4.4	4.6
International	24.1	24.6	29.3	29.9	30.9	50.5	2.8	19.1	2.1	3.3	4.6
RPM's (Bil)											
Domestic	203.2	294.4	322.0	333.3	348.0	566.0	6.8	9.4	3.5	4.4	4.8
International	54.2	64.1	75.8	78.0	81.0	137.4	4.9	18.3	2.9	3.9	5.1
COMMUTERS/REGIONALS*											
Enplanements (Mil)	12.9	24.0	27.2	29.1	31.0	57.9	11.2	13.3	7.0	6.6	6.5
RPM's (Bil)	1.6	3.6	4.2	4.7	5.1	11.0	12.3	16.7	10.7	9.1	8.3
FLEET											
Air Carrier	2,394	3,168	3,401	3,528	3,658	4,651	5.1	7.4	3.7	3.7	2.6
Commuter	1,413	1,538	1,604	1,648	1,711	2,252	1.8	4.3	2.7	3.8	2.9
General Aviation (000)	210.3	210.7	220.0	219.0	218.5	220.9	0.6	4.4	(0.5)	(0.2)	0.0
HOURS FLOWN (Mil)											
Air Carrier	6.5	9.3	10.0	10.4	10.9	14.3	6.4	7.5	4.0	4.8	3.0
General Aviation	41.9	34.5	34.5	34.4	34.3	36.6	(2.8)	0.0	(0.3)	(0.3)	0.5

Source: 1980-87 RSPA, FAA DATA
1988-99 FAA Forecast

* Data for Altair, Empire and Air Wisconsin removed from historical series for comparative purposes

FAA WORKLOAD MEASURES

FISCAL YEARS 1988 - 1999

WORKLOAD MEASURES	HISTORICAL			FORECAST			PERCENT AVERAGE ANNUAL GROWTH				
(IN MILLIONS)	1986	1986	1987	1988	1989	1999	86-87	87-88	87-89	89-99	87-99
Aircraft Operations											
Air Carrier	10.1	12.3	13.1	13.6	14.3	17.3	3.8	6.5	3.8	2.9	2.3
Air Taxi & Commuter	4.6	6.9	7.3	7.7	8.1	11.2	6.8	5.8	5.5	5.2	3.6
General Aviation	49.0	37.1	37.8	38.7	39.6	50.2	(1.8)	1.9	2.4	2.3	2.4
Military	2.5	2.6	2.7	2.7	2.7	2.7	1.1	3.8	0.0	0.0	0.0
TOTAL	66.2	59.0	61.0	62.7	64.4	81.4	(1.2)	3.4	2.8	2.7	2.4
Instrument Operations											
Air Carrier	10.6	12.8	13.7	14.3	14.7	18.2	3.9	7.0	4.4	2.8	2.4
Air Taxi & Commuter	4.1	6.6	7.3	7.7	8.1	11.2	8.6	10.6	5.5	5.2	3.6
General Aviation	19.3	16.8	17.9	19.0	20.0	25.7	(1.1)	6.5	6.1	5.3	3.1
Military	4.1	4.3	4.4	4.4	4.4	4.4	1.0	2.3	0.0	0.0	0.0
TOTAL	38.2	40.5	43.4	45.4	47.2	59.5	1.8	7.2	4.6	4.0	2.7
IFR Aircraft Handled											
Air Carrier	13.9	16.0	17.1	17.8	18.3	22.8	3.0	6.9	4.1	2.8	2.4
Air Taxi & Commuter	2.6	5.0	5.3	5.6	5.9	9.2	10.7	6.0	5.7	5.4	4.7
General Aviation	8.9	8.1	8.1	8.3	8.5	10.5	(1.4)	0.0	2.5	2.4	2.2
Military	4.7	5.1	5.3	5.3	5.3	5.3	1.7	3.9	0.0	0.0	0.0
TOTAL	30.1	34.2	35.8	37.0	38.0	47.8	2.5	4.8	3.4	2.7	2.4
Flight Services											
Pilot Briefs	18.3	13.4	12.8	12.7	12.9	13.7	(5.2)	(4.5)	(0.8)	1.6	0.6
Flight Plans Originated	9.0	7.5	7.6	7.8	7.9	9.4	(2.4)	1.3	2.6	1.3	1.8
Aircraft Contacted	9.6	7.2	7.0	6.9	7.0	7.1	(4.6)	(2.8)	(1.4)	1.5	0.1
TOTAL	64.2	49.0	47.7	47.9	48.6	53.3	(4.3)	(2.7)	0.4	1.5	0.9

Source: FY 1980-87 FAA Data

FY 1988-99 FAA Forecasts

The workload at the Air Route Traffic Control Centers is forecast to increase at a 2.4 percent average annual rate between 1987 and 1999. The increased demand will come primarily from commercial air carriers and regionals/commuters. Regional/commuter aircraft handled at the Centers are projected to increase over 70 percent during the next 12 years.

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

CHAPTER II
ECONOMIC ENVIRONMENT

REVIEW OF 1987

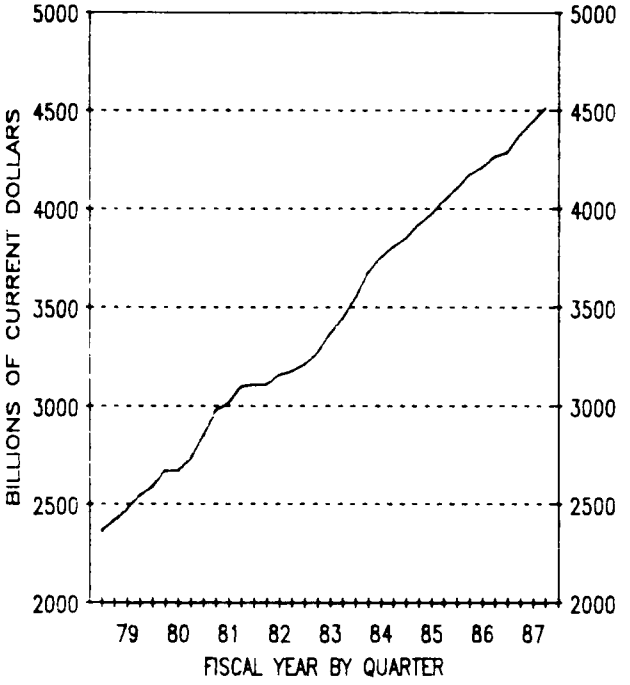
The current economic expansion began in 1983. It is comparable to some of the most robust recoveries of the postwar period, characterized by a favorable mix of rising output, declining inflation, and falling energy prices. In fiscal year 1987, the fifth full year of expansion, gross national product (GNP) rose $219 billion (or 5.2 percent). Gross national product adjusted for price changes rose 2.5 percent. Consumer prices continue to increase at relatively low rates, indicating that inflation is well under control. The consumer price index for all urban consumers rose only 2.7 percent. Increasing supplies of oil, accompanied by reduced demand due to conservation and the development of alternative sources of energy, continue to exert downward pressure on fuel prices. The oil and gas deflator declined 13.7 percent in fiscal year 1986 and 8.0 percent in fiscal year 1987.

The Federal Reserve Board (FRB) took action to slow growth. There was a major decline in the stock market on October 19, 1987. Since the decline, the FRB has worked to limit stock market price change impacts on the banking system, which continues to function effectively and to bolster the economy. The comparison of the performance of the stocks of the Major Air Carriers and the Dow Jones Industrials index over the 52 weeks, including the decline, which appears on page 15, shows the relative impact on the air carrier industry relative to the entire stock market.

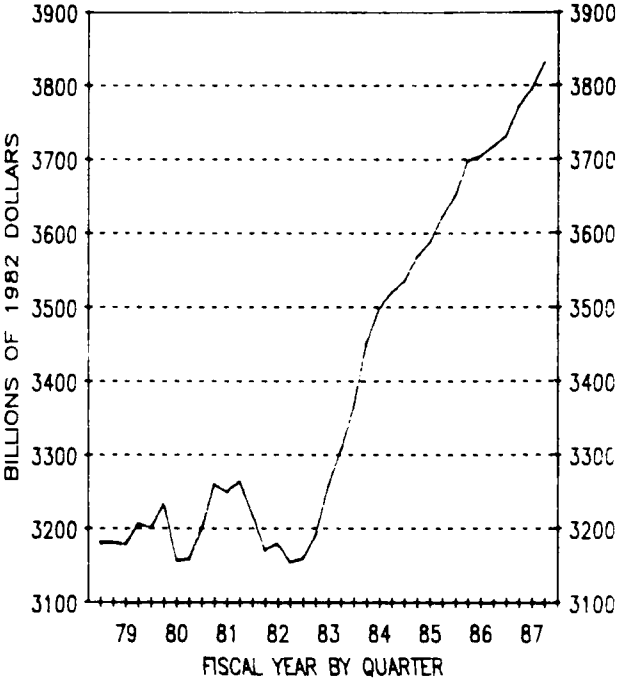
Economic growth is expected to continue through 1988. Gramm-Rudman-Hollings deficit reduction and associated federal spending constraints and tax increases could reduce projected general economic growth. Inflation is expected to remain in the moderate range as fuel prices rise only moderately. Declining fuel prices, low inflation rates, and an expanding economy will all contribute to a continuation of the upturn in aviation activity begun in 1983.

ECONOMIC TRENDS

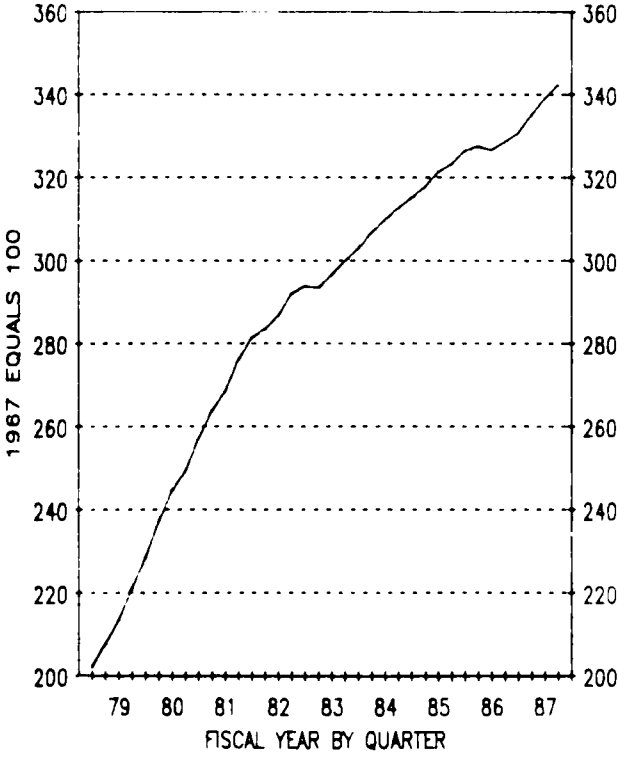
NOMINAL GNP



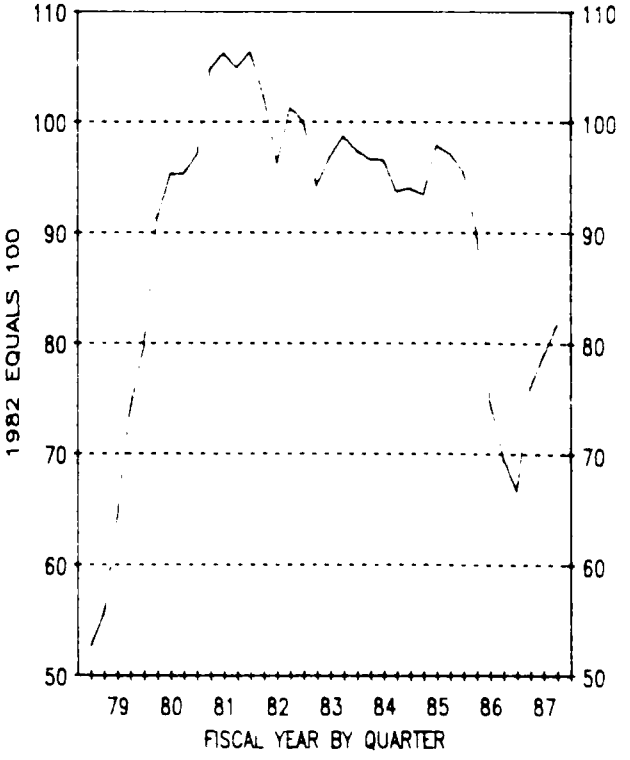
'REAL' GNP

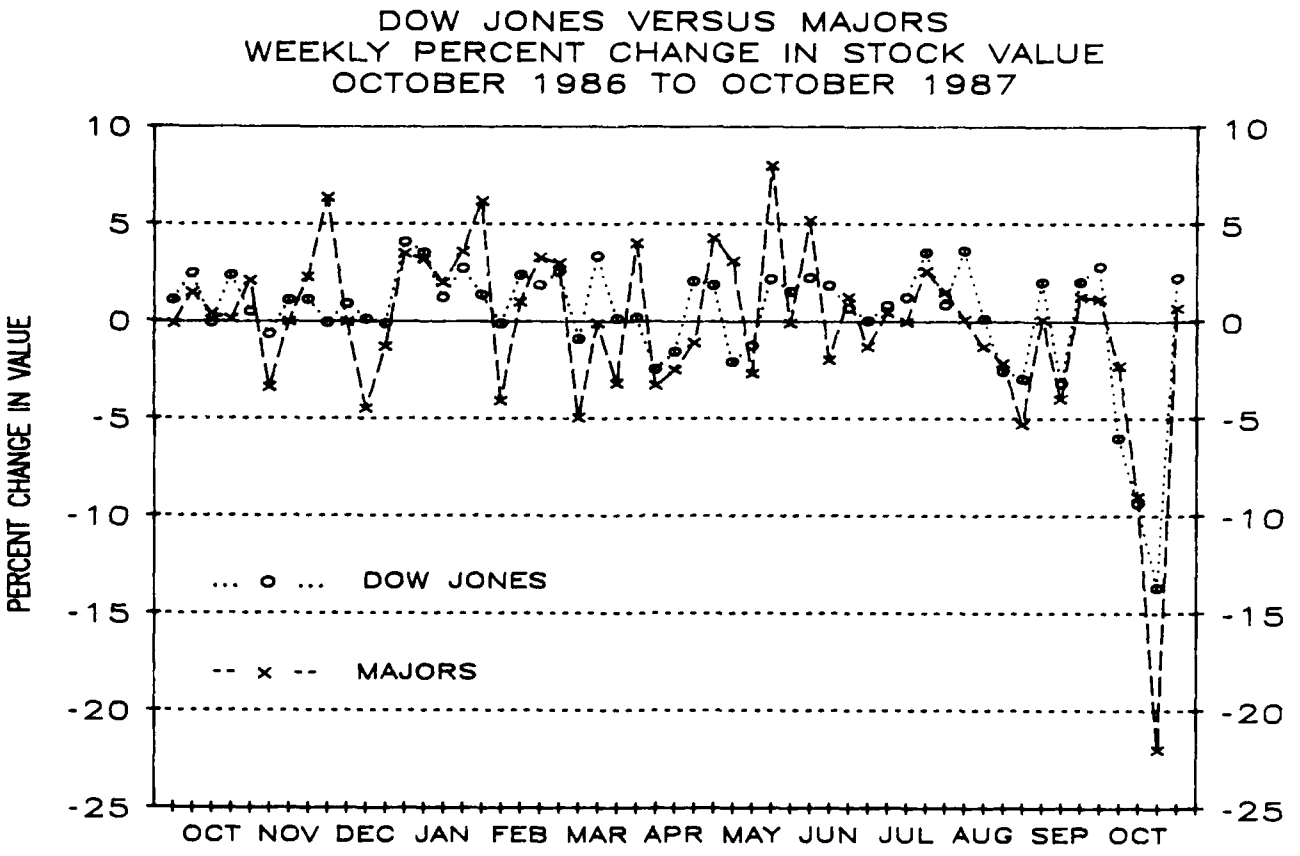


CONSUMER PRICE INDEX



OIL AND GAS DEFLATOR





During 1987 there was a continuing decline of the dollar. The decline of the dollar is expected to impact both international trade and domestic markets. It will be easier for U.S. firms, including the U.S. aircraft and engine industry, to capture export markets. Another consequence is that U.S. consumers will pay higher prices for imports. This should stimulate demand for domestic products and the overall economic activity. Foreign travel will be more expensive because of increased lodging and meal costs, but U.S. carriers will gain a relative airfare advantage over foreign carriers.

FORECAST ASSUMPTIONS

The economic scenario utilized in developing the FAA Baseline Aviation Forecasts for the period 1988-1993 was provided by the Executive Office of the President, Office of Management and Budget (OMB). For the period 1994-1999, the economic scenario utilized consensus growth rates of the economic variables prepared by Data Resources, Inc. (DRI), Evans Economics, Inc. (Evans), and Wharton Econometric Forecasting Associates (WEFA). The data are presented in tabular form in Chapter X. The principal series used in preparing the forecasts are presented here. The U.S. dollar exchange rate index is prepared by DRI. Specific assumptions used in the individual models are discussed in the following pages.

ECONOMIC FORECASTS

Gross National Product

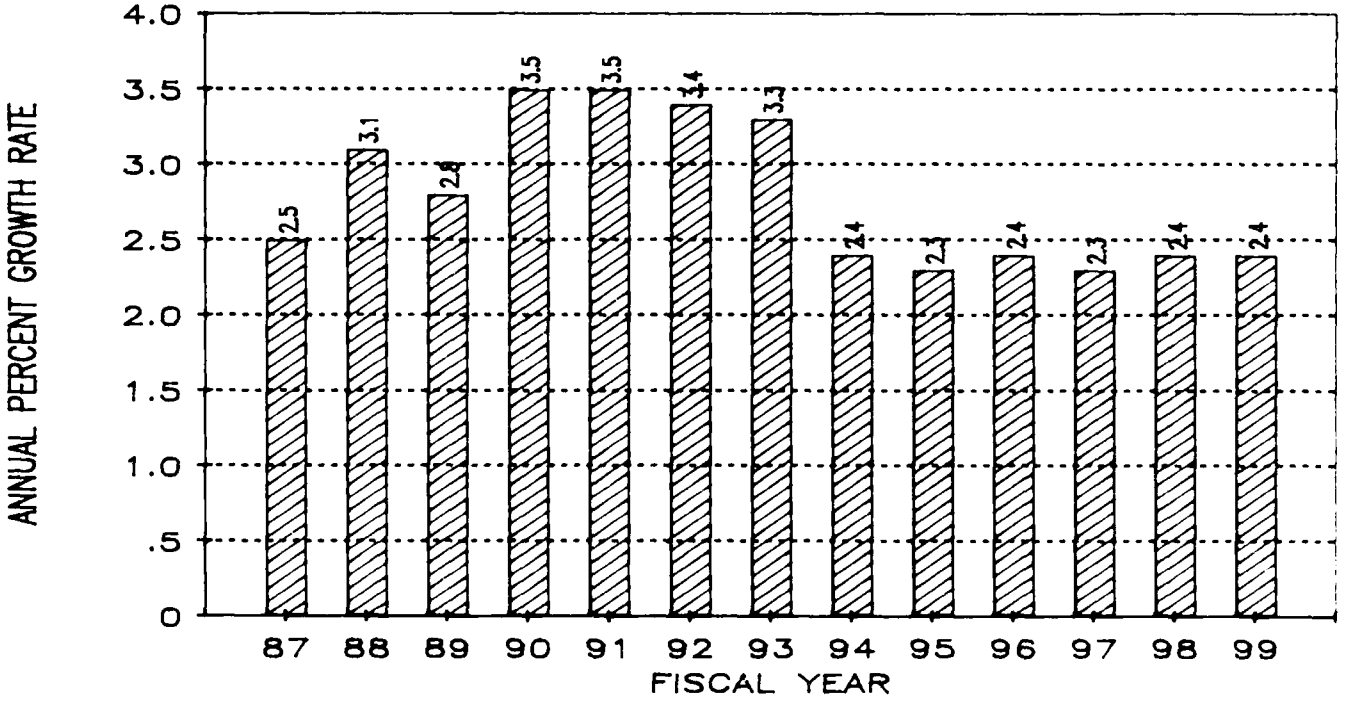
Gross national product, adjusted for price changes, is expected to grow at an annual rate of 2.8 percent throughout the forecast period. However, real gross national product increases by only 3.1 percent in 1988, then declines to 2.8 percent in 1989, and averages 3.3 percent between 1988 and 1993. Economic growth is expected to slow somewhat during the latter half of the forecast period, averaging only 2.4 percent over the 1994 to 1999 time frame.

Consumer Price Index

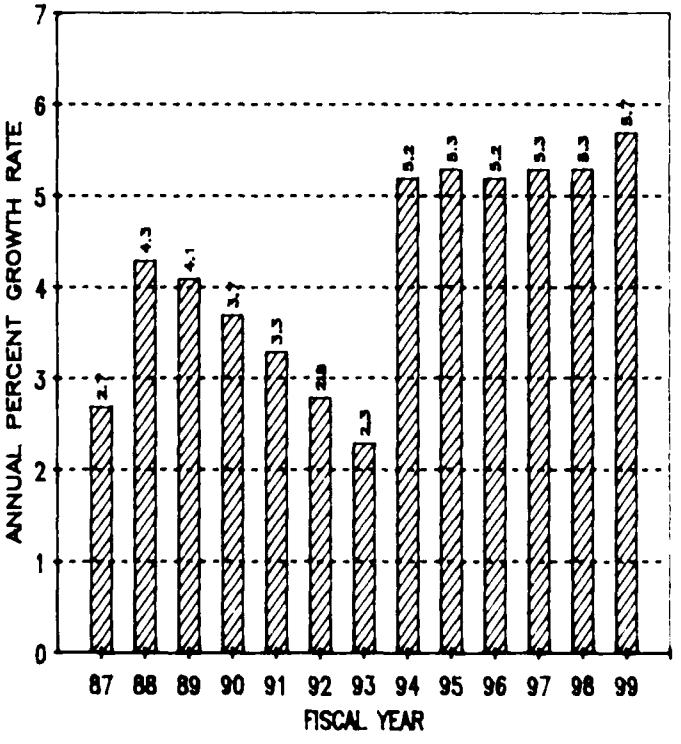
Consumer prices are expected to remain in the moderate range, increasing by an average annual rate of 4.4 percent over the forecast period. Inflation is forecast to increase by 4.5 percent in 1988 and 4.2 percent in 1989, and settle at an average 3.3 percent over the first 6 years of the forecast period. Inflation is expected to increase to an annual rate of 5.4 percent over the latter half of the forecast period.

FORECASTS OF ECONOMIC VARIABLES

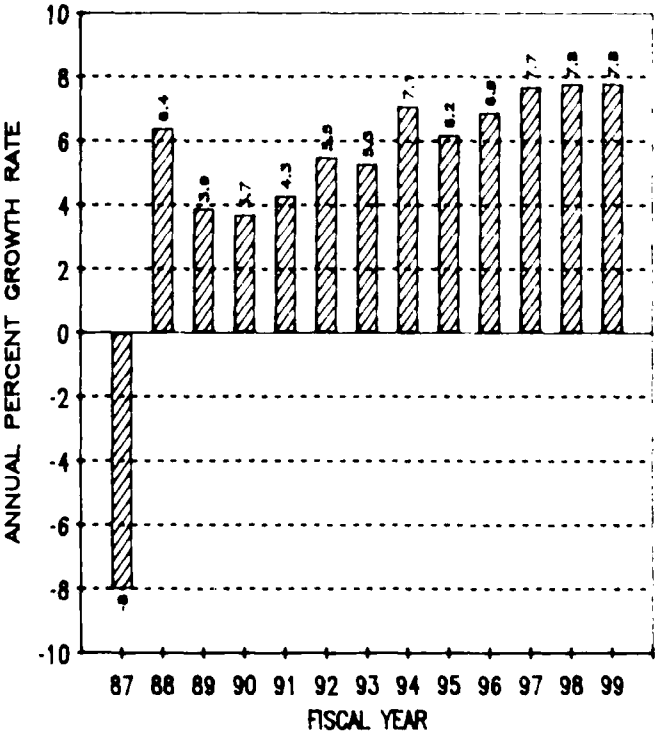
GROSS NATIONAL PRODUCT (1982 DOLLARS)



CONSUMER PRICE INDEX (1967 = 100)



OIL AND GAS DEFLATOR (1982 = 100)

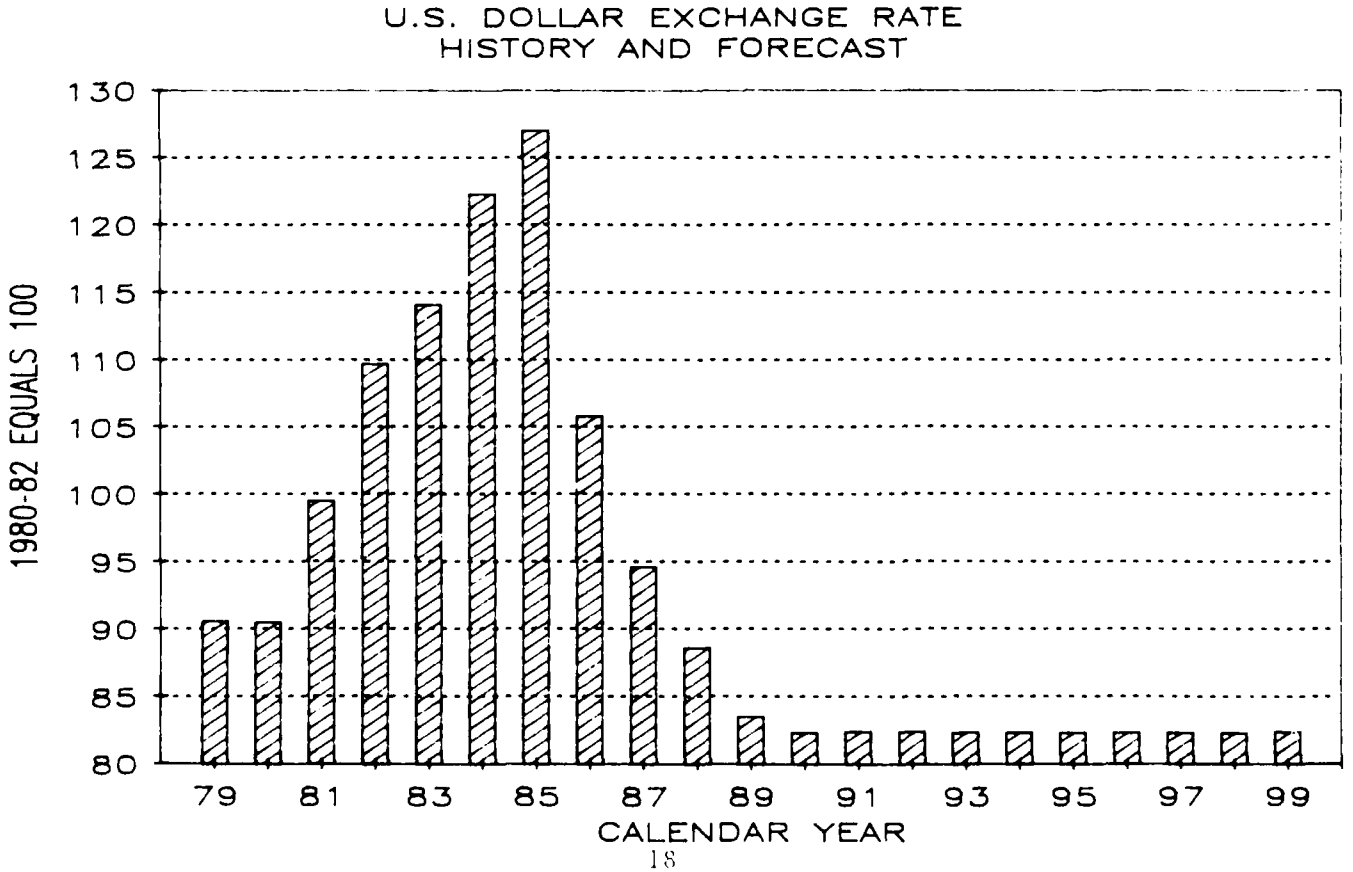


Oil and Gas Deflator

Over the entire forecast period, nominal fuel prices are predicted to increase at an annual rate of 6.0 percent, and real fuel prices (1982 dollars) are expected to increase by approximately 1.6 percent a year. Fuel prices are forecast to increase by 6.4 percent in 1988, and by 3.9 percent in 1989. Over the first 6 years of the forecast period, nominal fuel prices are forecast to decline at an annual rate of 2.4 percent, while real fuel prices are forecast to increase at an annual rate of 0.9 percent a year. The increase in fuel prices is expected to increase over the 1994 to 1999 time period. During this time frame, nominal fuel prices increase at an annual rate of 7.3 percent, while real fuel prices increase at a yearly rate of 1.9 percent.

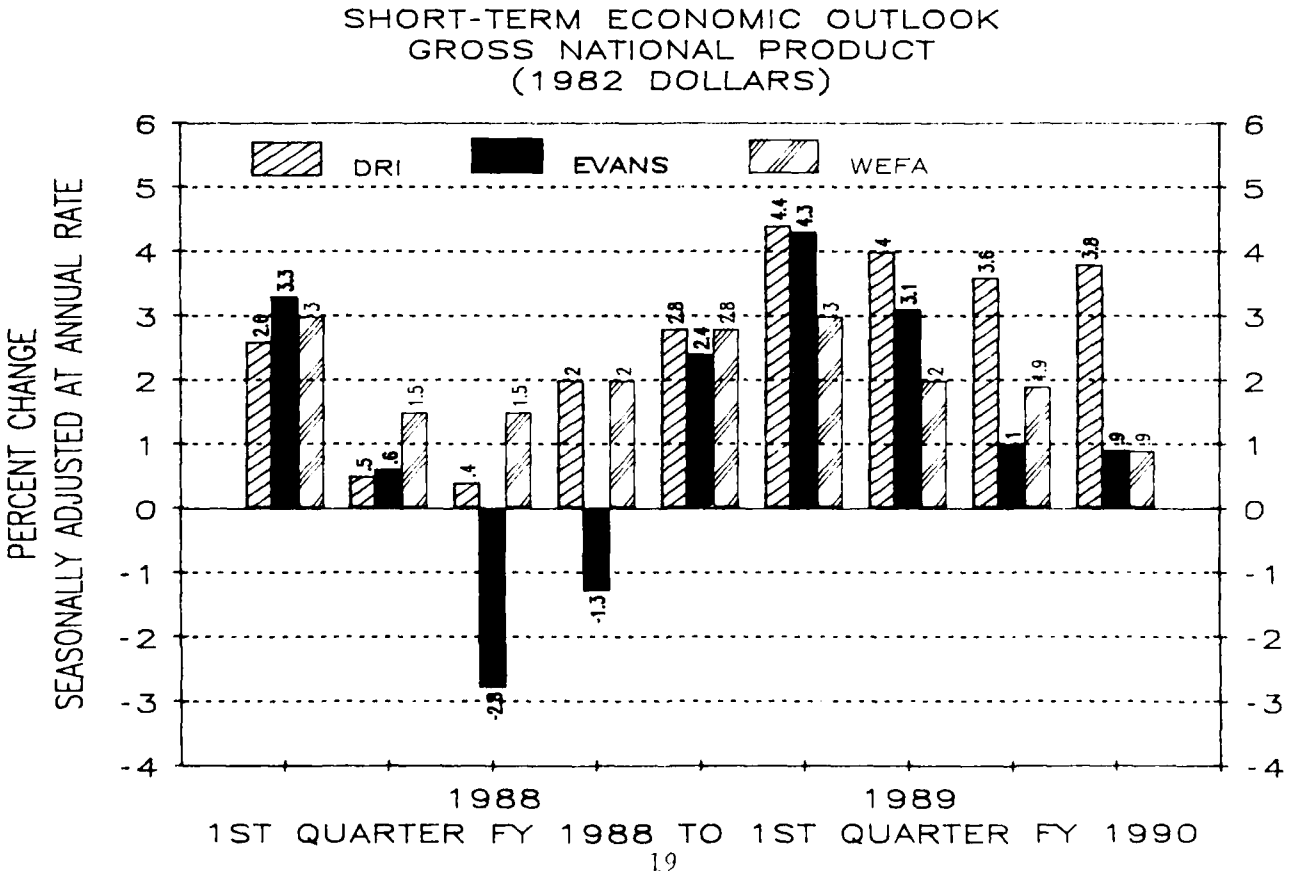
Dollar Exchange Rate

The calendar year forecast of the U.S. dollar exchange rate is for a continuing decline of 6.4 percent in 1988, 5.7 percent in 1989, 1.4 percent in 1990, and to increase by 0.2 percent in 1991. The rate of decline for the whole forecast period is 1.2 percent. The decline over the next 3 years will reduce imports, and foreign purchases, such as foreign travel, will be more expensive.



The Uncertain Short-Term Economic Outlook

The October stock market decline, followed, in turn, by recent wide fluctuations in stock prices, has created a high degree of uncertainity about potential effects on the national economy. This has led to a diverse set of short-term forecasts. Three of the economic forecasting services, DRI (12/87), Evans (12/87), and WEFA (1/88), have substantial differences in their forecasts over the nine quarters starting with the first quarter of fiscal year 1988. It is difficult to sort out the combined impacts of the stock market, balance of trade, and value of the dollar. The services have not yet revised their long-term forecasts to be fully consistent with their short-term forecasts. Evans is predicting a mild recession; in the third and fourth quarters of fiscal year 1988, real GNP declines 2.8 and 1.3 percent. On the other hand, both WEFA and DRI are predicting a slowdown during the second and third quarters of fiscal year 1988. WEFA is forecasting positive growth of 1.5 percent in both the second and third quarters while DRI is predicting positive growth of only 0.5 and 0.4 percent, respectively, during the same time period. There is less difference in the first and second quarters of fiscal year 1989, with Evans predicting positive growth of 2.4 and 4.3 percent, WEFA predicting 2.8 and 3.0 percent and DRI predicting 2.8 and 4.4 percent. With respect to yearly growth rates, OMB is predicting 3.1 percent GNP growth for fiscal year 1988, and 2.8 percent for fiscal year 1989. In contrast, Evans is predicting 1.9 and 1.3 percent, DRI is predicting 2.2 and 2.7 percent, and WEFA is predicting 2.7 and 2.3 percent. It has been necessary to take economic uncertainty into account in preparing estimates of activity at FAA facilities.



CHAPTER III
COMMERCIAL AIR CARRIERS

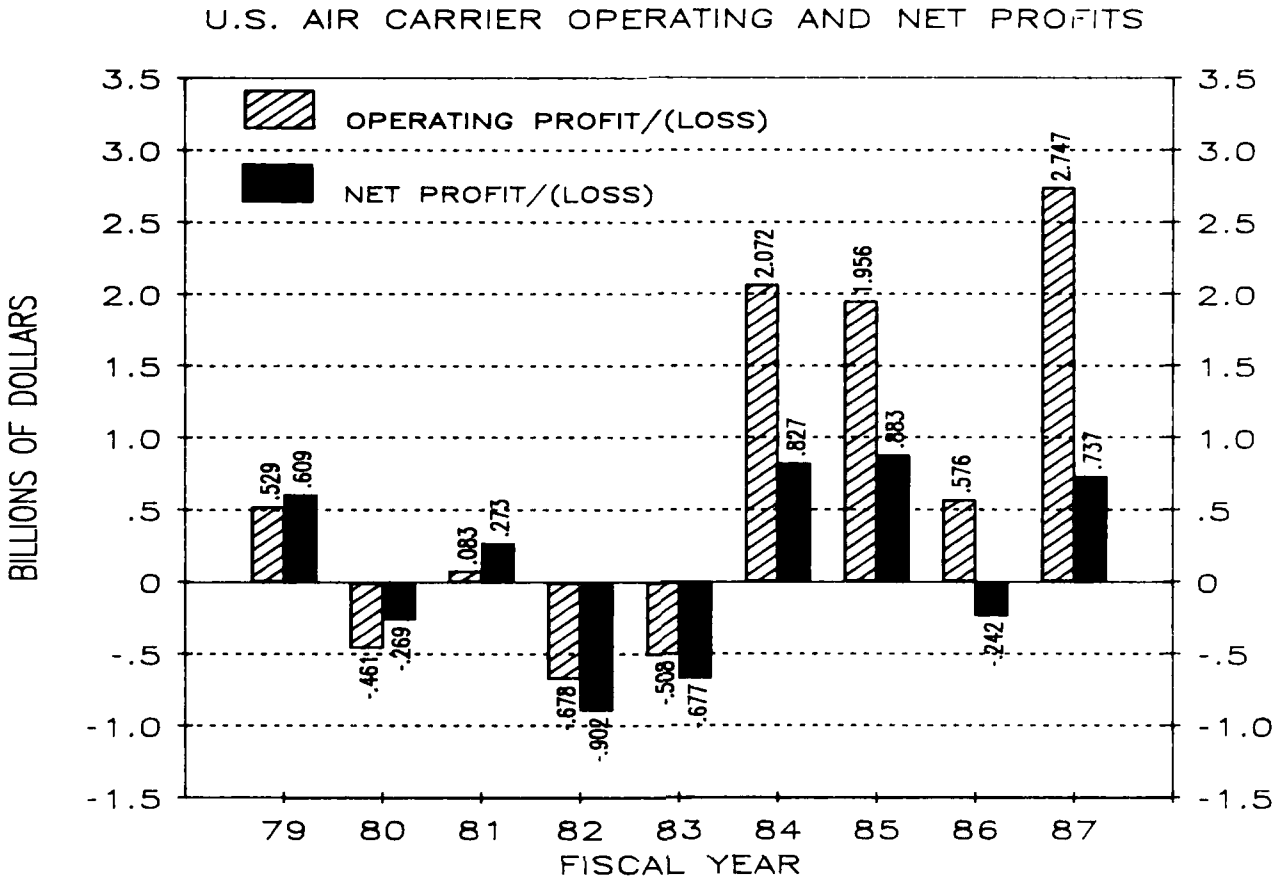
As of December 1987, there were approximately 69 commercial passenger and cargo airlines reporting traffic and financial data on Form 41 to the Research and Special Programs Administration (RSPA), Department of Transportation (DOT). Forty of these carriers provided scheduled passenger air service and they provide the data base for these air carrier forecasts. A list of active and inactive commercial passenger and cargo air carriers may be found in Appendices A and B, beginning on page 175.

REVIEW OF 1987

Financial Results

Financially, fiscal year 1987 was a record year for the U.S. commercial air industry in terms of industry profits and individual carrier results. U.S. commercial air carriers earned an all-time high operating profit of over $2.7 billion, surpassing the previous high of $2.1 billion earned in fiscal year 1984. In fact, 1987 marked the fourth consecutive profitable year for U.S. commercial airlines, a period during which the industry has recorded operating profits totalling almost $7.4 billion. The record financial year in 1987 was largely due to three factors. First, strong passenger demand (up 11.0 percent) was primarily responsible for the 11.9 percent increase in operating revenues in 1987. Second, a 17.9 percent decline in the average price paid for jet fuel ($0.53 versus $0.646 in 1986) is estimated to have reduced operating expenses by almost $1.8 billion, holding the increase in operating expenses to just 7.5 percent. Third, better "yield management" held the decline in passenger yields (down 0.9 percent) to an absolute minimum in fiscal year 1987. Unfortunately, an entirely different picture emerges when the discussion turns to net profit.

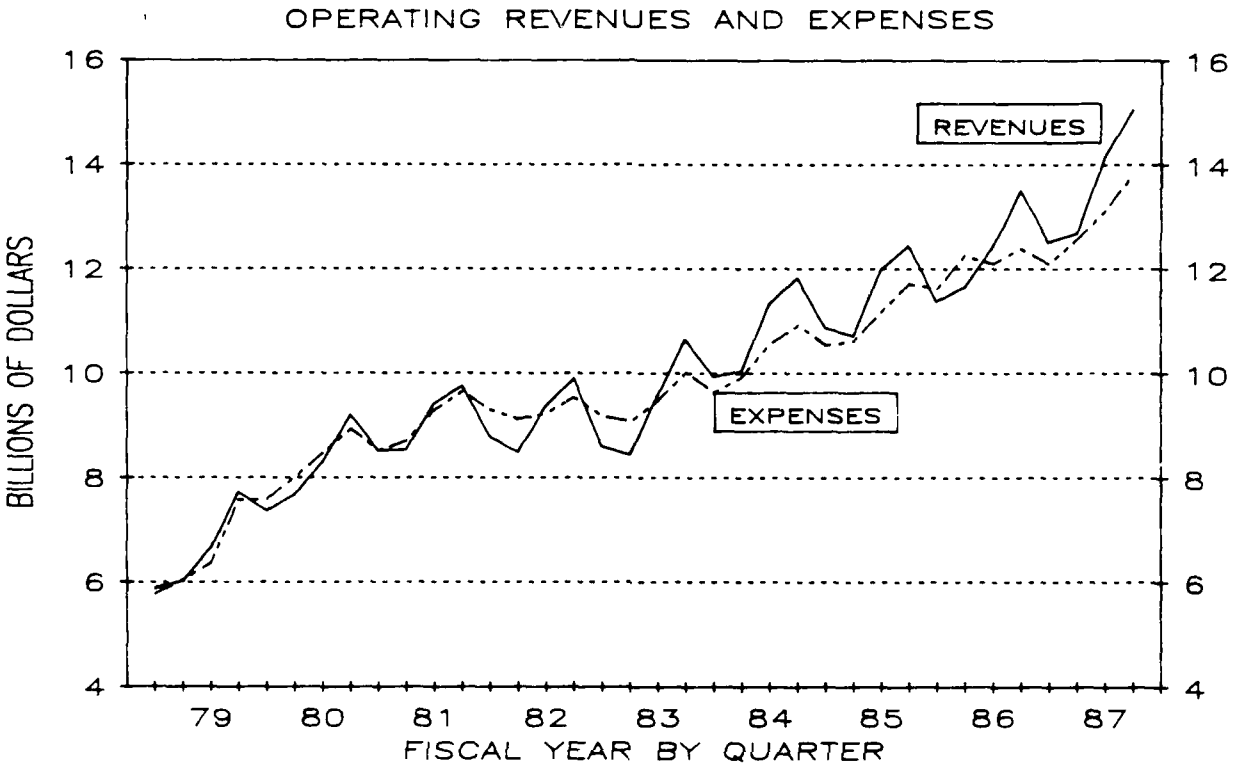
U.S. airlines posted a net profit of only $737 million in fiscal year 1987. This represents a considerable improvement over the net loss of $242 million in fiscal year 1986. Over the past 5 years, the industry has earned net profits totalling only $2.2 billion, $5.2 billion less than the operating profits posted during the same period. The difference in performance at the net level can be attributed directly to the interest that must be paid, in good times or in bad, on the industry's considerable long-term debt. At the end of fiscal year 1987, the industry's long-term debt stood at just over $11 billion.

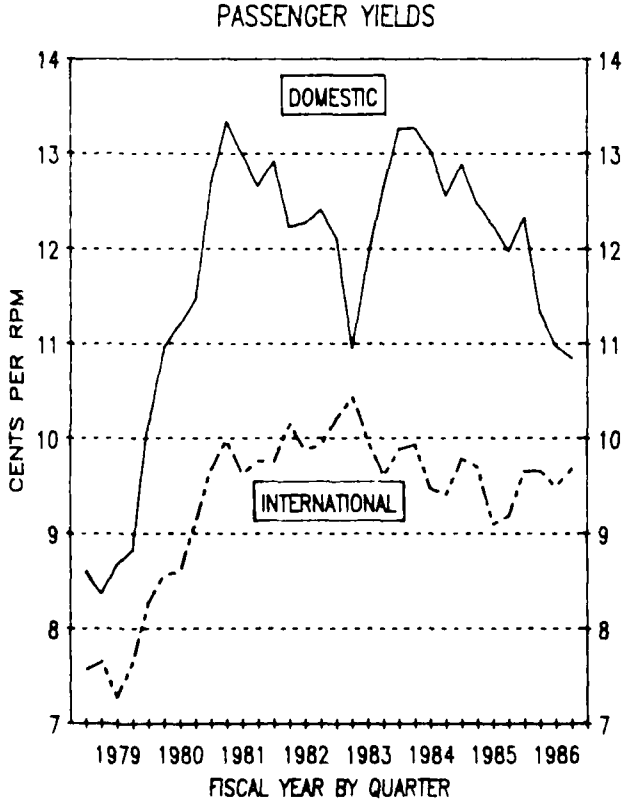


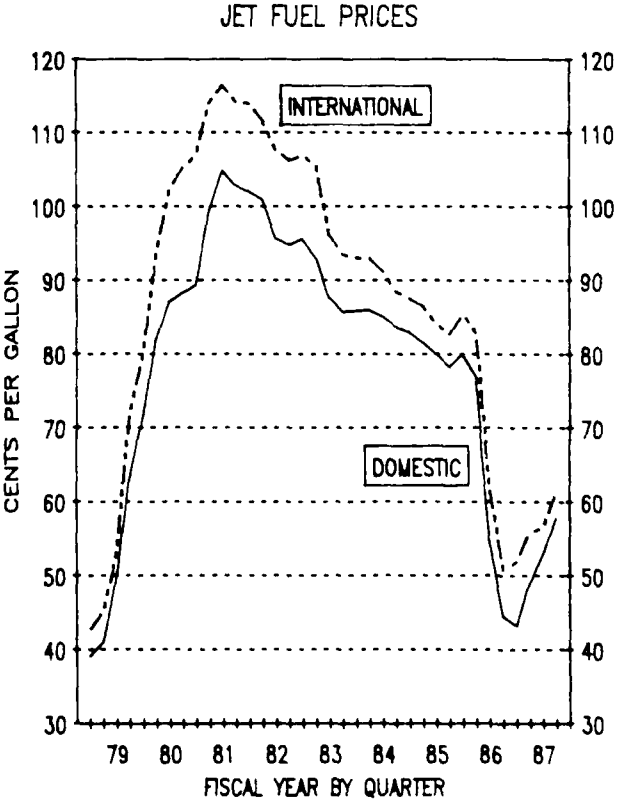
In fiscal year 1987, it cost U.S. commercial air carriers $1.6 billion just to service the interest on the long-term debt. Over the past 4 years interest payments on long-term debt have totalled over $6.1 billion, $0.9 billion more than the gap between the industry's operating and net profit levels over this time period. While the industry's strong traffic growth over the past 3 years (up 32.5 percent) has masked this problem somewhat, it is quite clear that a significant downturn in traffic demand could severely limit the options available for the continued survival of some of the more heavily leveraged airlines.

While the financial results of most U.S. commercial airlines improved significantly in fiscal year 1987, there is still considerable disparity among individual carrier's financial results. In fiscal year 1987, air carrier financial results ranged from American Airline's operating profit of $514.1 million to Pan American's operating loss of $119.6 million. At the profit end of the scale, eight carriers reported operating profits totalling almost $2.3 billion. At the bottom end of the scale, 20 carriers reported operating losses totalling $262 million. Moreover, four carriers accounted for over $200 million of these losses. At the net level, Delta Airlines led all airlines with a net profit of $237.1 million, while the Texas Air Corporation (Continental/Eastern) posted the largest net loss, $266.4 million.

U.S. AIR CARRIER REVENUE AND COST TRENDS







Although lower average jet fuel prices helped ease the pressure on those air carriers with weak balance sheets in fiscal year 1987, there continues to be cause for concern. Jet fuel costs have actually increased 34.2 percent since the end of fiscal year 1986, and the trend appears to be for even higher prices. Should the uncertainty regarding U.S. economic growth in the short-term result in a slowdown in passenger demand, there is always the possibility that one or more of the financially weaker carriers will reduce fares in order to generate cash flow. Whether such a move would precipitate an industry-wide fare war would depend not only on the severity of the slowdown in demand but also on the particular carrier instigating the lower fares. If that carrier is one of the smaller National or Regional airlines, there is a good chance that the larger carriers might decide to weather the downturn without resorting to financially disastrous fare wars. However, if that carrier is an industry price leader, then the odds are fairly good that some, if not all, carriers would be forced to match the lower fares, perhaps setting the stage for an all-out fare war.

Total Scheduled Passenger Traffic and Capacity

Despite sluggish economic growth, scheduled passenger traffic on U.S. commercial air carriers increased for a sixth consecutive year in fiscal year 1987. Revenue passenger miles (RPM's) were up 11.0 percent (397.8 billion) while passenger enplanements grew by 8.4 percent (444.3 million). Over this 6-year growth period, passenger miles and enplanements have increased by 60.2 percent and 55.6 percent, respectively.

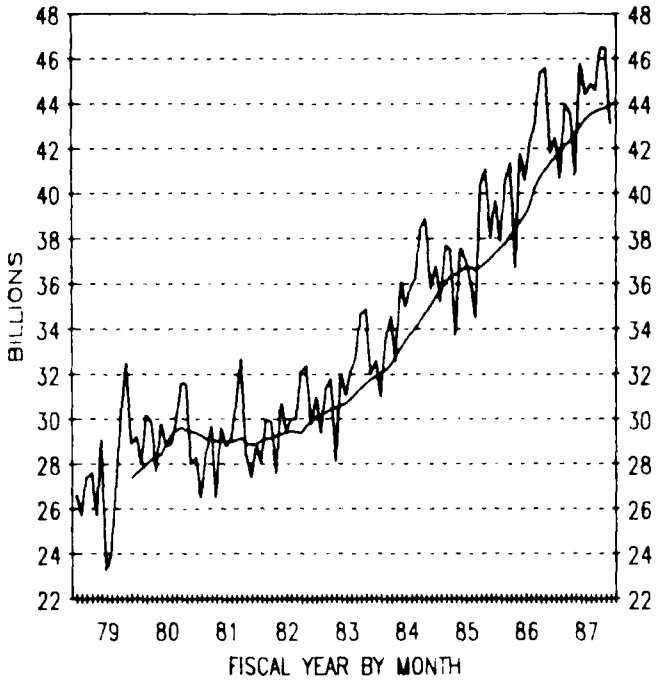
Available seat miles (ASM's) reached 638.7 billion in fiscal year 1987, an increase of 7.0 percent over 1986. Over the past 6 years, scheduled system capacity has grown by 51.0 percent, while the system load factor has increased from 58.7 percent in 1981 to 62.3 percent in 1987. In fact, the 1987 system load factor is the highest recorded since fiscal year 1979 (63.2 percent), the first full year of deregulation.

Scheduled Domestic Passenger Traffic and Capacity

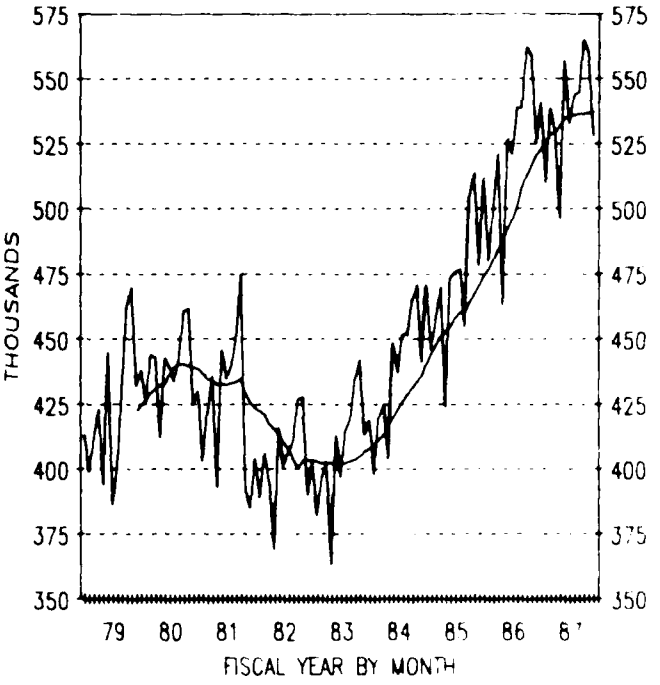
Domestic passenger demand slowed somewhat from the double-digit growth achieved over the past 2 years, but still managed to post healthy gains in 1987. Domestic RPM's grew by 9.4 percent (322.0 billion), while passenger enplanements increased by 7.7 percent (415.0 million). Most of the growth occurred during the first 8 months of the year (up 11.7 and 9.8 percent, respectively), largely due to lower yields (down 5.5 percent) during the first half of the year. Starting in June, however, U.S. airlines were able to push through a series of fuel surcharges and across-the-board fare increases. In spite of these fare increases, both passenger miles and enplanements continued to show strength, growing by 5.4 and 4.1 percent, respectively, during the last 4 months of the fiscal year. While the fare increases did have some impact on domestic passenger demand during the peak summer travel season, the full impact was probably muted somewhat due to the advance purchase requirement provisions of most discount fares. In addition, domestic traffic was inflated somewhat during the 1986 summer period when terrorist activities abroad disrupted travel to European and Middle Eastern countries. This led to a concerted shift in both passenger demand and capacity to domestic markets and other international destinations.

U.S. AIR CARRIER CAPACITY AND TRAFFIC TRENDS
DOMESTIC OPERATIONS

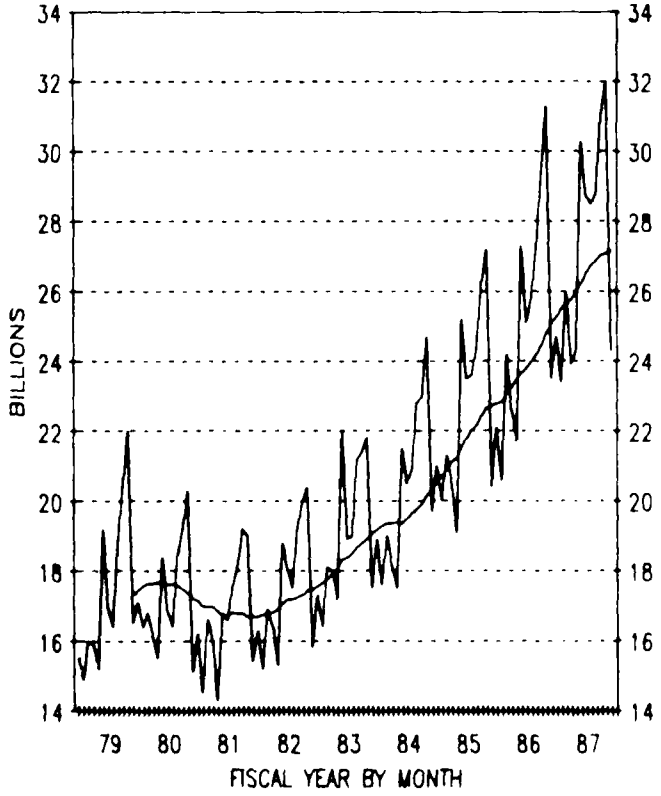
AVAILABLE SEAT MILES



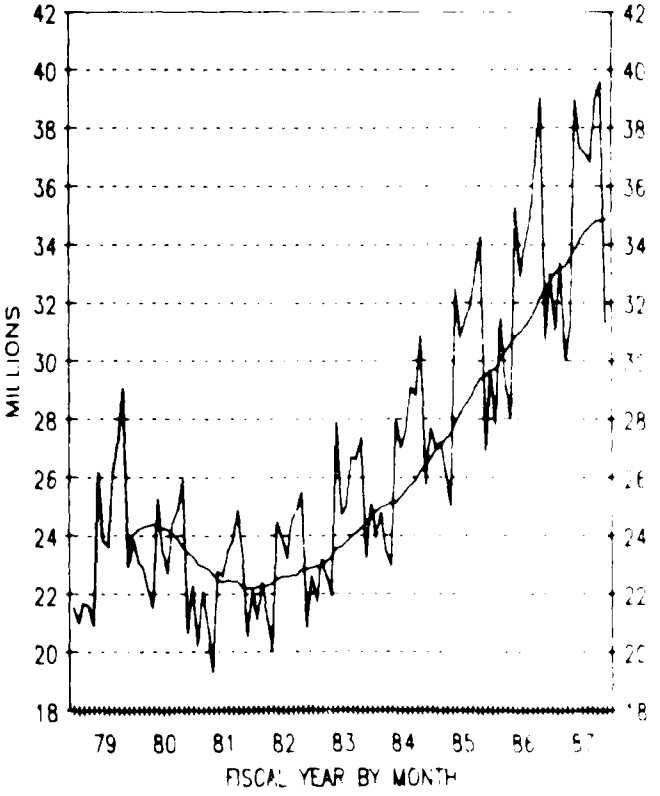
AIRCRAFT DEPARTURES



REVENUE PASSENGER MILES

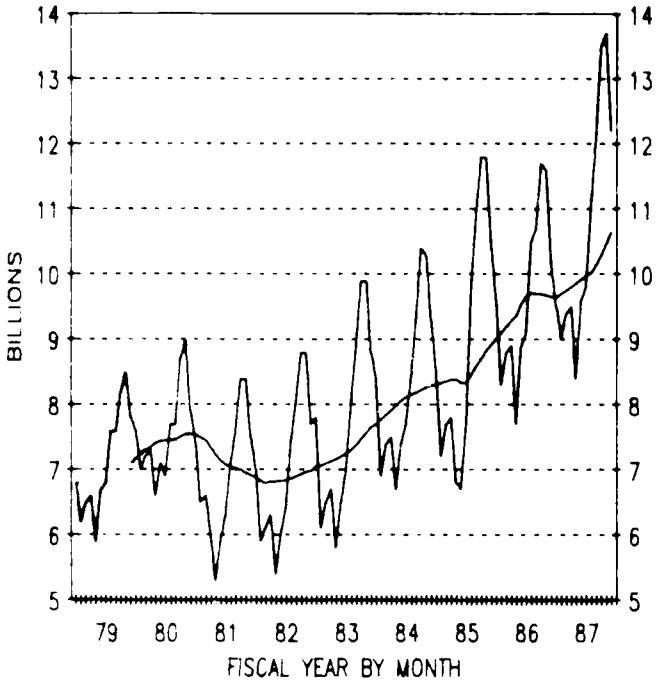


PASSENGER ENPLANEMENTS

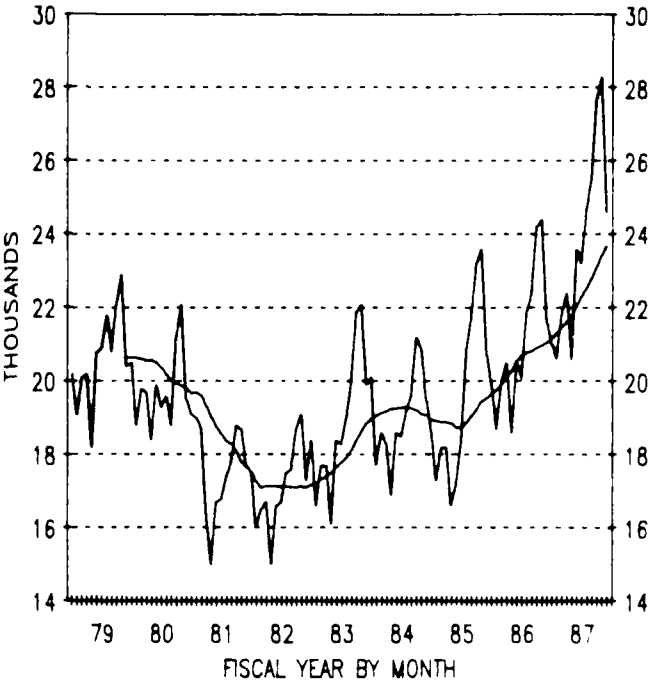


U.S. AIR CARRIER CAPACITY AND TRAFFIC TRENDS
INTERNATIONAL OPERATIONS

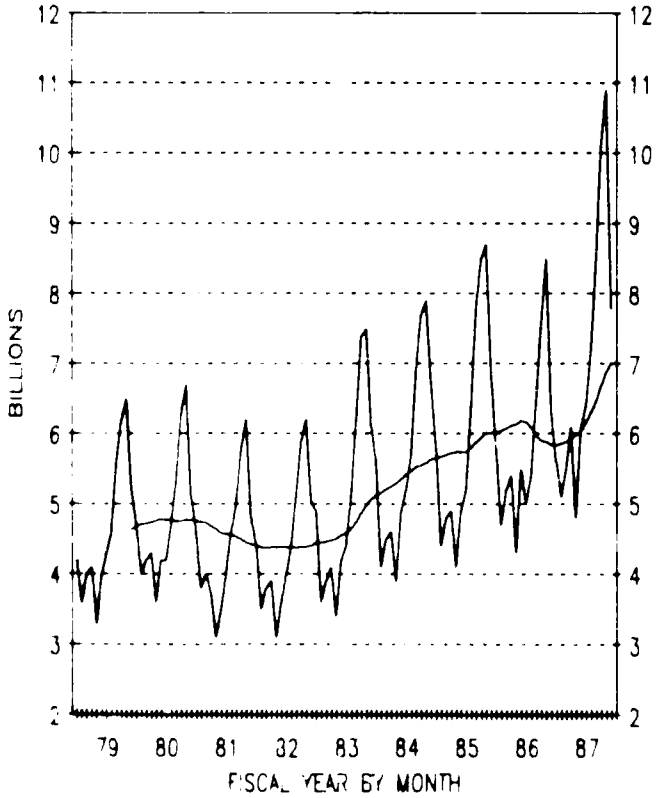
AVAILABLE SEAT MILES



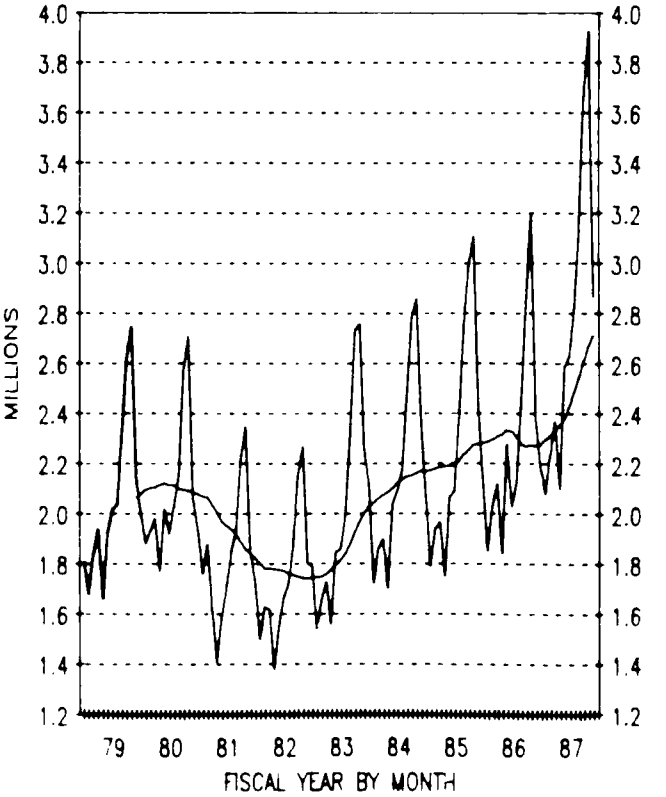
AIRCRAFT DEPARTURES



REVENUE PASSENGER MILES



PASSENGER ENPLANEMENTS



The increases in capacity also slowed somewhat in fiscal year 1987, with domestic ASM's up 6.8 percent (521.6 billion). Capacity increases in the latter third of the year were also distorted by the shift in schedules and aircraft from North Atlantic routes to domestic markets during the summer of 1986. Seat miles were up by 8.6 percent during the first 8 months of fiscal year 1987 but up only 3.5 percent during the last 4 months of the year. Domestic load factors averaged 61.7 percent in fiscal year 1987, 1.5 points above the 1986 load factor.

Scheduled International Passenger Traffic and Capacity

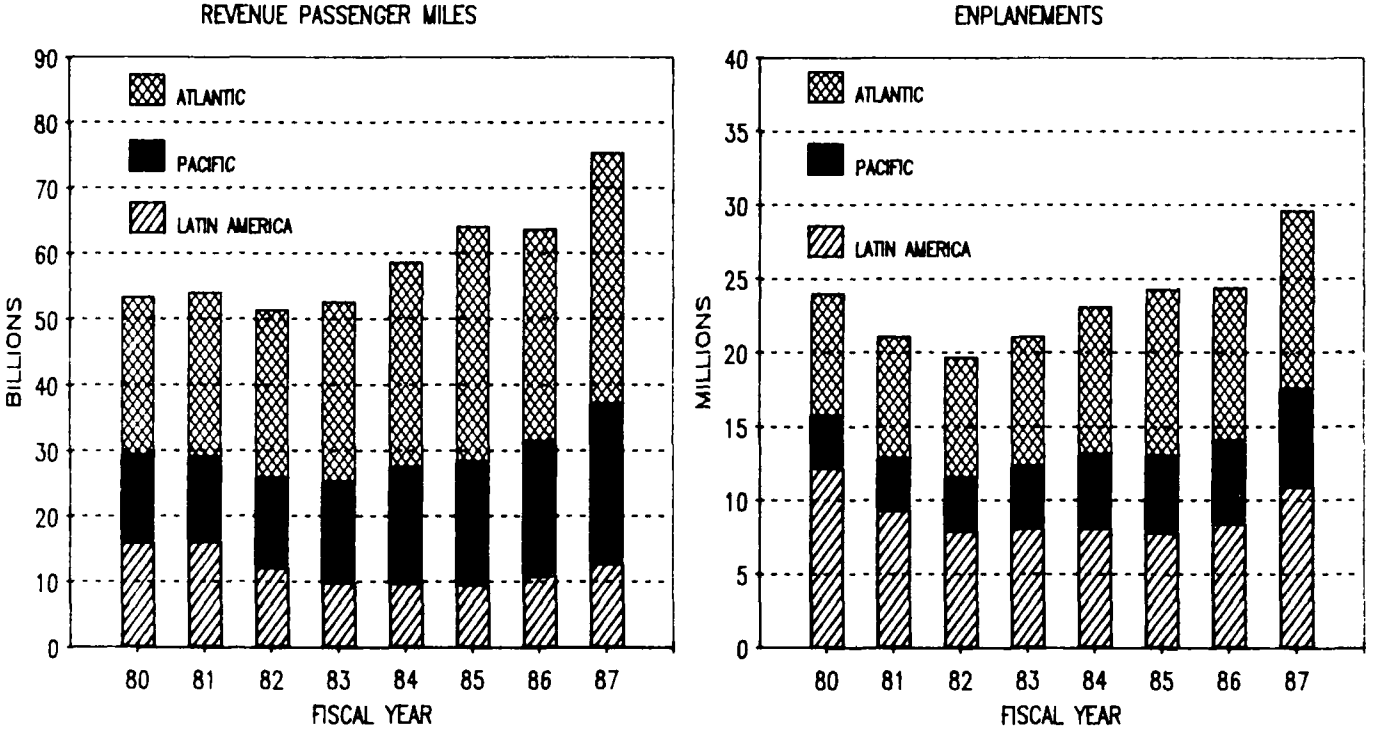
After a disastrous traffic year in fiscal year 1986 (RPM's down 1.1 percent), due largely to terrorist activities abroad, international traffic demand exceeded almost everyone's expectations in fiscal year 1987. Despite a continuing decline of the U.S. dollar relative to other foreign currencies, international RPM's increased by 18.3 percent in fiscal year 1987, totalling 75.8 billion. International passenger enplanements, which had remained flat in 1986, increased by 19.3, reaching a total of 29.3 million. Unlike domestic traffic, most of the increase occurred in the latter half of the year, reflecting the start of terrorist activities in April 1986. International passenger miles and enplanements increased by only 6.0 and 10.1 percent, respectively, during the first half of fiscal year 1987, but by 27.9 and 26.8 percent, respectively, over the last 6 months of the year.

However, the increased traffic demand was not solely the result of pent-up demand for North Atlantic destinations. International traffic established highs in all three international traffic regions. As might be expected, passenger miles were up by 18.1 percent on the Atlantic routes (38.5 billion), down 5.9 percent during the first 6 months of the year, but up 36.0 percent over the latter half of the year. However, passenger miles were also up 16.5 percent on the Latin American routes (12.9 billion) and up 19.5 percent on the Pacific routes (24.2 billion). Passenger enplanements showed similar gains; up 17.9 percent on the Atlantic routes (12.4 million), up 20.2 percent on the Latin American routes (10.3 million), and up 21.3 percent on the Pacific routes (6.6 million). Monthly traffic increases on the Latin American and Pacific routes were fairly evenly distributed throughout the entire year.

International capacity, however, did not increase as rapidly as might be expected, given the capacity shifts that occurred during the summer of 1986. Overall, international ASM's increased by 8.0 percent (117.1 billion) in 1987. With the record traffic gains recorded in 1987, the international load factor averaged 64.8 percent for the year, reaching a high of 78.9 percent in August. Surprisingly, seat miles were up only 1.2 percent on the Atlantic routes (59.0 billion), down 5.1 percent over the first half of the year, but up 6.0 percent over the last 6 months of the year. On the other hand, seat miles on the Latin American routes (21.7 billion) and Pacific routes (36.0 billion) continued to expand rapidly, up 18.0 and 14.3 percent, respectively, in 1987. The load factor on the Atlantic routes returned to historical high levels in 1987, up 9.3 points (65.3 percent). The load factor on the Pacific routes increased 2.9 points (67.3 percent), while the load factor on Latin American routes declined 0.8 points (59.4 percent).

Traffic and capacity statistics for each of the three international regions may be found in Appendix C, page 183.

U. S. COMMERCIAL AIR CARRIERS
TRAFFIC BY INTERNATIONAL REGIONS



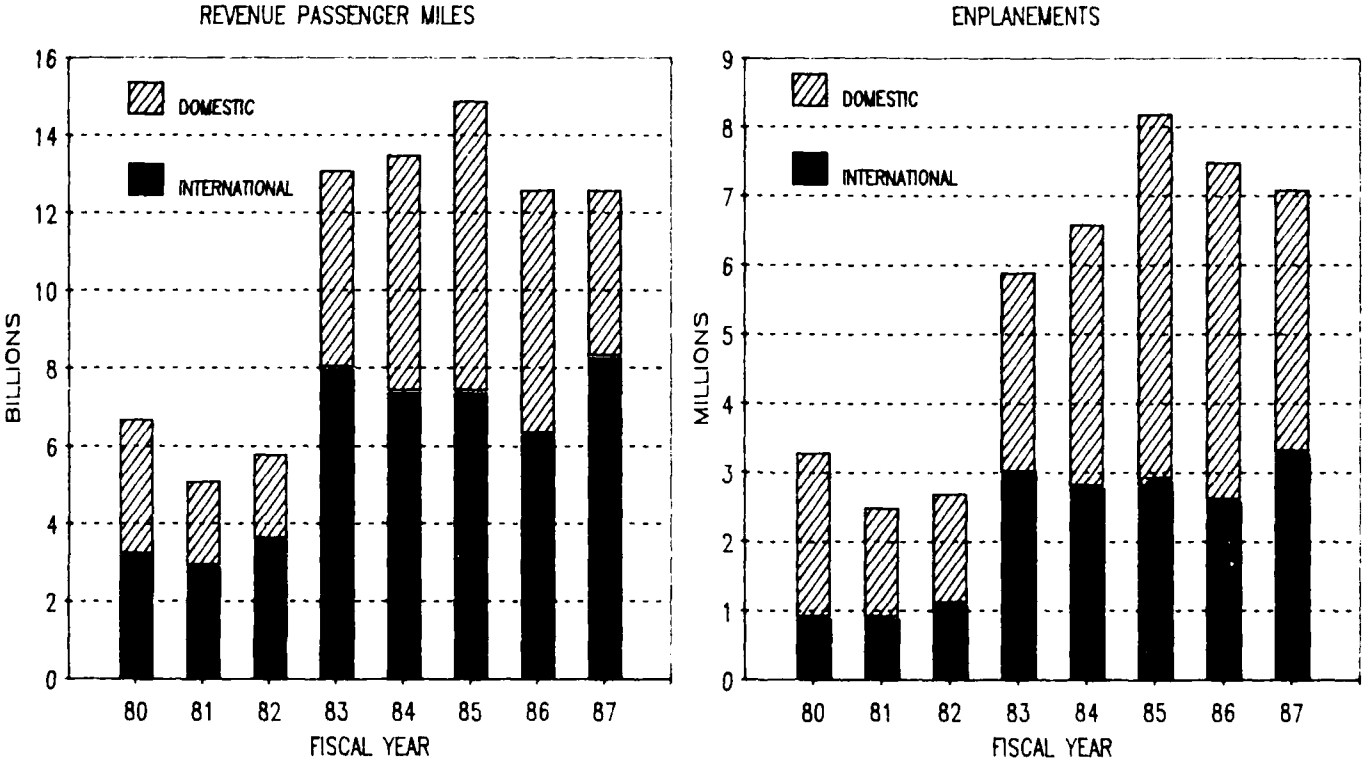
Nonscheduled Traffic and Capacity

The number of nonscheduled (charter) passengers flying on U.S. commercial air carriers totalled only 7.2 million in fiscal year 1987, a decline of 3.8 percent from fiscal year 1986. Domestic passenger enplanements declined by 19.2 percent (3.9 million); however, international enplanements increased by 24.4 percent (3.3 million). Nonscheduled RPM's increased by 1.7 percent in fiscal year 1987, totalling only 12.9 billion. Domestic passenger miles declined by 29.6 percent (4.5 billion), while international passenger miles increased by 33.1 percent (8.4 billion).

Nonscheduled capacity was up 3.5 percent in fiscal year 1987. Domestic seat miles (6.3 billion) fell 25.6 percent, but international seat miles (10.2 billion) were up 36.0 percent. Nonscheduled load factors averaged 78.2 percent in 1987, down 1.4 points from the load factor achieved in 1986. Domestic load factors averaged 71.5 percent (down 4.0 points), while international load factors averaged 82.3 percent (down 1.9 points).

Nonscheduled traffic and capacity statistics may be found in Appendix D, page 185.

U. S. COMMERCIAL AIR CARRIERS
NONSCHEDULED TRAFFIC



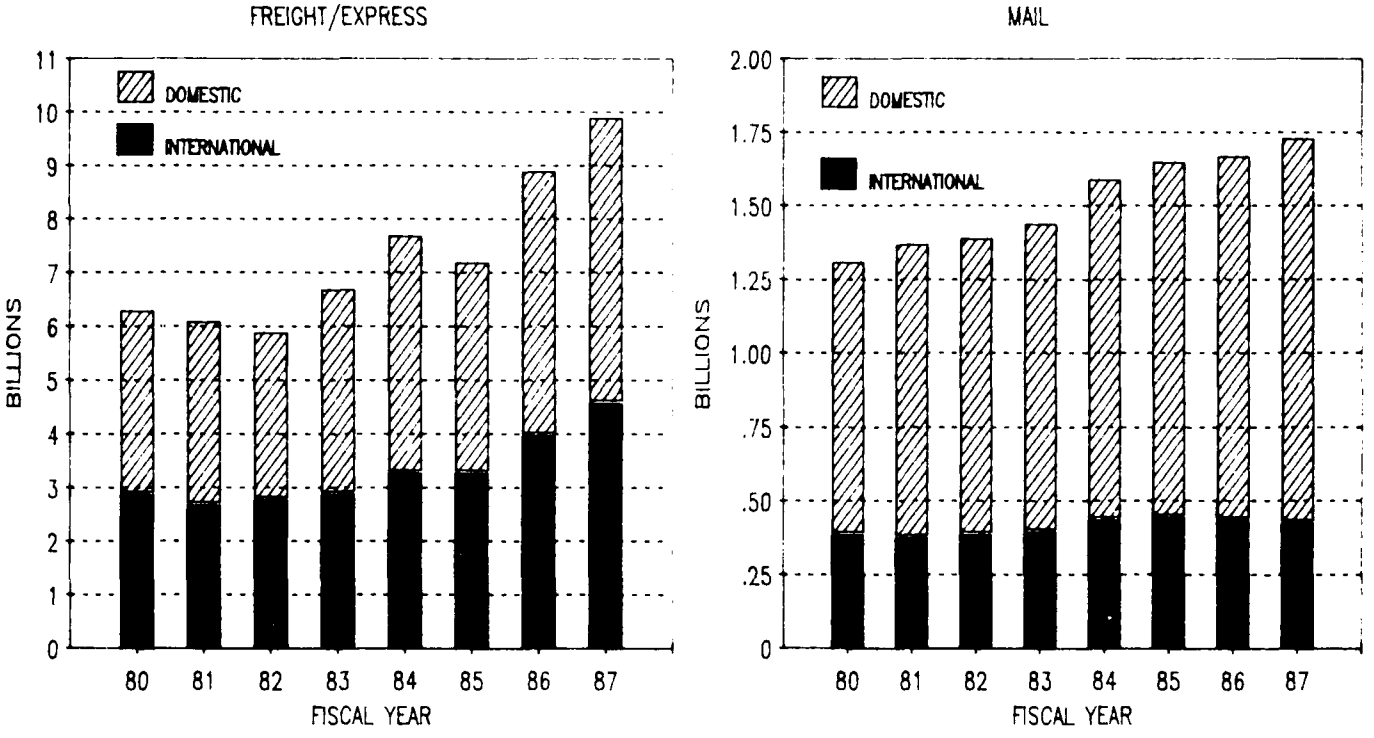
Air Cargo Traffic

The number of air cargo revenue ton miles (RTM's) flown by U.S. air carriers reporting on RSPA Form 41 totalled 11.7 billion in fiscal year 1987, an increase of 11.1 percent over 1986. This included an increase of 12.4 percent in total freight and express ton miles and an increase of 3.7 percent in mail ton miles. Freight and express ton miles were up 9.5 percent in domestic markets (5.3 billion) and up 16.0 percent in international markets (4.6 billion). Mail ton miles increased by 5.3 percent in domestic markets (1.3 billion), but de- clined by 0.8 percent in international markets (0.4 billion).

The real growth area in the air cargo industry, however, continues to be the small package market. In June 1987, there were 17 carriers engaged in the transport of small packages, including eight Majors, five Nationals, and four carriers (Airborne, Emery, Purolator, and the U.S. Postal Service) which are not required to report their traffic to RSPA. As such, the foregoing statistics discussed above do not reflect the total air cargo market. One indication as to the magnitude of the small package market can be ascertained by the shipment data reported on a semi-annual basis to the Air Transport Association of America. According to the data reported for the 12 months ending June 1987, these 17 air carriers transported a total of 254.9 million packages, a 26.2 percent increase over the 12-month period ending June 1986. Small package revenues totalled $4.9 billion over the same 12-month period, a 17.6 percent increase over the revenues of a year earlier.

Domestic and international air cargo statistics may be found in Appendix B, page 187.

U. S. COMMERCIAL AIR CARRIERS
AIR CARGO REVENUE TON MILES



INDUSTRY CONSOLIDATION: YEAR TWO

Industry consolidation, which gained momentum in 1986, continued throughout fiscal year 1987, albeit at a somewhat slower pace. During the 12-month period, there were five announced mergers and one marketing agreement among the major U.S. air carriers. This brought the total number of mergers announced or implemented, over the past 2-year period to 12. The 10 surviving airlines also acquired four smaller commuter airlines to create a total of 14 major airlines. In addition, two scheduled air carriers and four charter carriers ceased operations. In total, during fiscal year 1987, 12 major air carriers, 10 scheduled commuter air carriers, and 10 charter carriers ceased operations or both. At the end of fiscal year 1987, there were 40 commercial air carriers engaged in scheduled passenger service, 2 more than had existed prior to deregulation but 15 less than had existed only 2 years earlier. Of these 40 scheduled airlines, only 10 were carriers that had been in existence prior to deregulation.

Industry Consolidation

Merger activity among U.S. commercial airlines, which began in earnest in 1986, continued into fiscal year 1987 and beyond. Since the end of fiscal year 1986, six additional mergers have been announced, four involving scheduled passenger airlines and two involving air cargo carriers. In addition, six carrier's route systems have been officially integrated into the surviving merger partner's route network and, for all intents and purposes, have ceased to exist. Over the past 2 years, 10 carriers have had their route systems integrated into another carrier's route network. The following is a partial listing of the mergers, acquisitions, and system integrations that have been announced or implemented since the beginning of fiscal year 1987.

- October 1986 — American announces intent to purchase AirCal. (Approved January 1987)

  Alaska agrees to purchase Horizon Air (commuter).

- December 1986 — USAir announces intent to purchase Southwest Pacific. (Approved March 1987)

  New York Air route system integrated with Continental.

  People Express route system integrated with Continental.

- January 1987 — Continental and Presidential agree to a 10-year marketing agreement. Presidential is to provide scheduled passenger service as "Continental Express." (Agreement terminated January 1988)

- March 1987 — USAir announces intent to purchase Piedmont. (Approved October 1987)

  Burlington Air Express announces intent to purchase WCT Air. (Approved July 1987)

  Western route system integrated with Delta.

  AirCal route system integrated with American.

- April 1987 — Emery announces intent to purchase Purolator.

  World agrees to purchase Key (commuter).

- May 1987 — Aloha agrees to purchase Princeville (commuter).

  Midway agrees to purchase Fischer Brothers (commuter).

- August 1987 — TranStar route system integrated with Southwest.

  Jet America system integrated with Alaska.

- November 1987 — Braniff announces intent to purchase Florida Express.

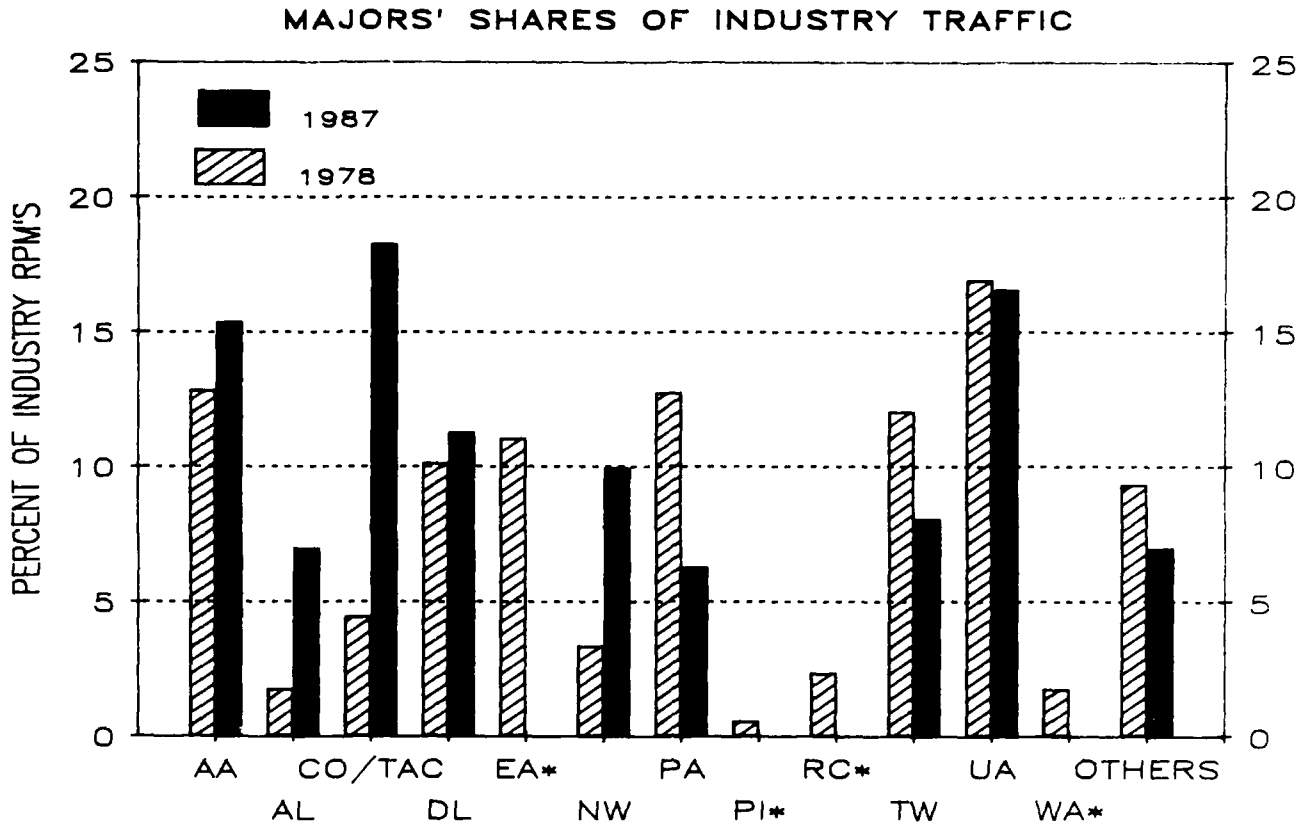
By the end October 1987, all of the announced mergers of 1986 and 1987 involving scheduled U.S. passenger air carriers had received the official approval of DOT. Only two of the announced mergers (Continental/Eastern and USAir/Piedmont) appeared to be in any real danger of being denied approval. In the first merger, Continental was forced to sell some of its landing slots at Washington National and New York LaGuardia airports, ostensibly to maintain competition in the New York to Washington shuttle market, before gaining approval. The DOT Administrative Law Judge also recommended denial of the USAir/Piedmont merger on the grounds that it would restrict competition. His recommendation was, however, overridden and the merger approved. Despite approval of the latter merger, it is felt that the questions raised before, during, and after the merger hearing have sent a clear signal to the industry with regard to competition in future mergers.

Industry Concentration

Since the beginning of fiscal year 1986, 11 mergers and the buyout of 14 smaller commuter airlines have received government approval. These mergers and buyouts were approved despite the expressed fear that several of the mergers might limit competition at several large hub airports. This was particularly the case in the Northwest/Republic and the Trans World/Ozark mergers where the merging carriers were the two largest competitors at the Minneapolis/St. Paul, Detroit, and St. Louis airports. The expressed concern was what impact these mergers might have on flight schedules and fares at the three airports. Now, 1 year later, the answer is in with regard to operations at the three airports.

In fiscal year 1987, air carrier operations increased by 6.3 percent at FAA towered airports. In sharp contrast, operations at all three airports declined in fiscal year 1987. Air carrier operations were down 6.3 percent at St. Louis International, down 5.1 percent at Minneapolis/St. Paul International, and down 0.1 percent at Detroit Metropolitan Wayne Airport. In addition, two other airports impacted by mergers also showed declines in 1987. Air carrier operations at Newark International (Continental/People Express merger) declined by 1.9 percent, while operations at Denver Stapleton (Continental/Frontier merger) declined by 0.1 percent. It does appear, at least with regard to air carrier operations at these five airports, that the critics of industry consolidation do have legitimate concerns.

Critics of industry consolidation have also expressed their concern regarding the control of the industry by a few large carriers. It does appear that control of the industry has become more concentrated in the hands of a few large carriers. In fiscal year 1987, the combined traffic of the four largest carriers (Texas Air Corporation, United, American/AirCal, and Delta/Western) accounted for 60.2 percent of the total scheduled passenger miles. This is about 6 percentage points higher than the combined traffic share of the four largest carriers (United, American, Trans World, Pan American) in FY 86.



As shown above, the concentration of traffic among a few large carriers, has changed the overall structure of the industry. In fiscal year 1987, the Majors accounted for 93.0 percent of scheduled passenger miles (2.4 percentage points more than the combined share that these same carriers achieved in 1978). As discussed in the following chapter, the Majors have associated themselves through code-sharing with regional/commuter airlines which accounted for 89.0 percent of commuter enplanements in 1987. Heavy concentration among a few large carriers/entities could conceivably, over time, result in a less competitive industry. This is especially true today when one considers the uncertainty with regard to U.S. economic growth and traffic demand. A protracted slowdown could force some of the financially weaker carriers into bankruptcy. Should this occur, the critics of industry consolidation and deregulation are certain to step-up their demands for reregulation of the commercial air industry. Just as certain, however, is the opposition to such demands from the proponents of deregulation.

Industry Consolidation: Year Three - A Preview

During the early months of fiscal year 1988, the major players in the merger/consolidation sweepstakes were Braniff Airways, currently the fifteenth largest (0.8 percent of industry RPM's) U.S. commercial airline and Pan American World Airways, the U.S.'s eighth largest (6.3 percent) air carrier. In November, Braniff announced its intent to purchase Florida Express, the nineteenth largest (0.2 percent) U.S. air carrier. Throughout the latter months of fiscal year 1987 and early 1988, a number of companies and individuals, including Braniff, competed for the right to merge with Pan American World Airways. However, a merger with Pan American faces a number of major obstacles, not the least of which is negotiating considerable cost concessions from Pan American's five labor unions.

Perhaps the most important merger/consolidation event of early fiscal year 1988 just might be the announced "marketing merger" between United Airlines and British Airways, setting the stage for what could very well be the next phase in the deregulation/merger/consolidation process. Under the announced agreement, United and British Airways are to begin code-sharing operations in the Seattle-Chicago-London and Denver-Chicago-London markets. In addition, the agreement calls for the two carriers to share facilities at the Seattle/Tacoma, Chicago O'Hare and New York Kennedy airports.

What makes this agreement particularly important is the current movement toward deregulation and merger/consolidation among Europe's 21 national carriers. In December, the European Communities transport ministers agreed to start freeing up European skies, a move which could possibly lead to the creation of trans-national "megacarriers" inside Europe. When this is considered along with the United/British Airways agreement, it opens the possibility of the creation of multinational "megacarriers" throughout the world. The U.S. experience with code-sharing agreements between large air carriers and regionals/commuters has shown that it is almost impossible for the smaller regionals/commuters to compete without some sort of working relationship with a larger airline. In future years, the same could hold true for competition in international markets.

FORECAST ASSUMPTIONS

The baseline forecasts of commercial air carrier traffic and activity over the next 12-year period anticipate that the industry will continue to be affected by the deregulation/consolidation/concentration process. Although it is impossible to foresee all the changes that will occur in the years ahead, it is highly plausible that the merger/consolidation phase begun in fiscal year 1986 could continue well into the next decade. It is also highly probable that a number of smaller Nationals and Regionals, including the few remaining post deregulation low-cost, low-fare carriers, will cease to exist, either through the merger route or through attrition. Because of deregulation, however, it is possible that new low-cost airlines may emerge seeking to establish a market niche for themselves.

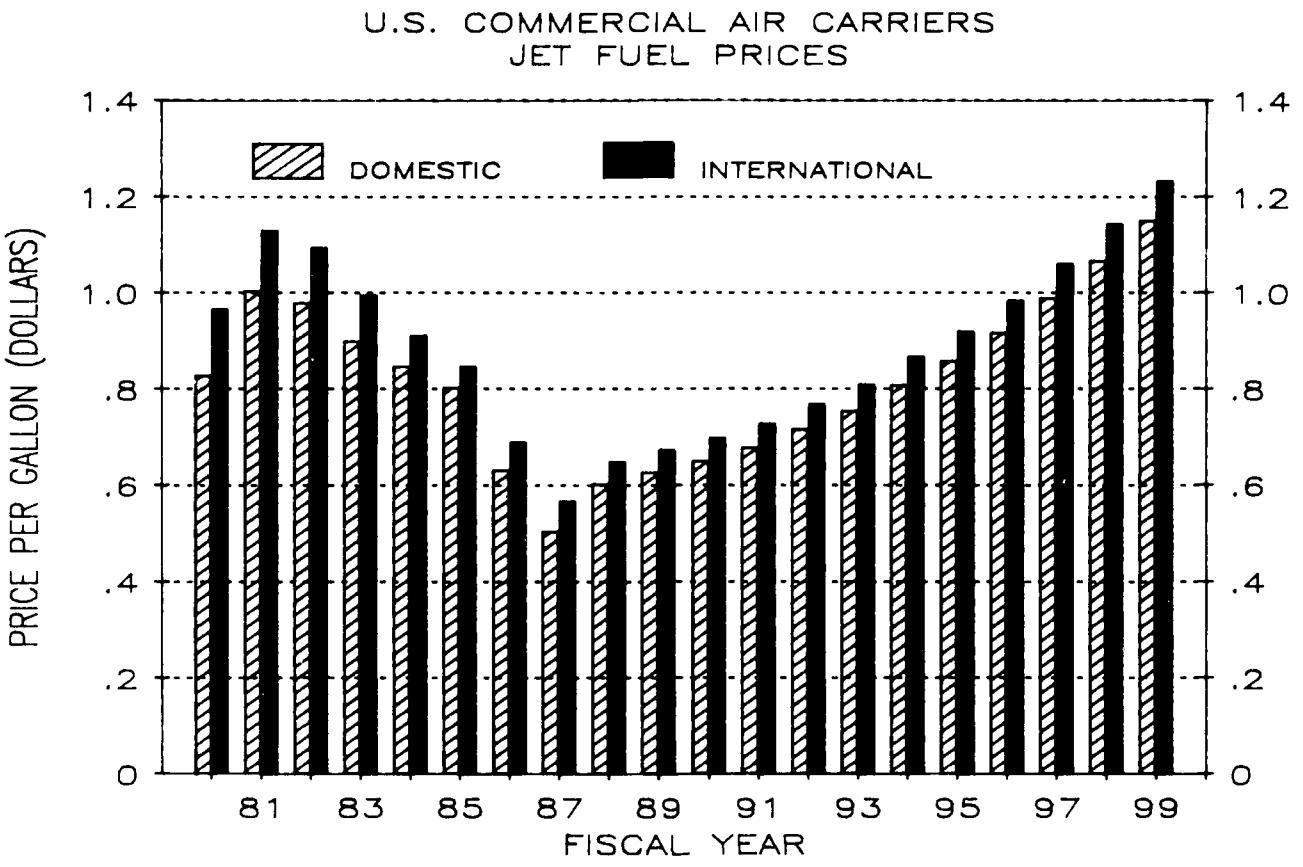
Whether the resultant route systems and service patterns available to the travelling public will reflect a better balance of service in terms of trip frequencies and fares than would have been the case prior to deregulation is still open to question. It is believed, however, that the industry will continue to experiment with methods to stimulate travel markets through the use of innovative discount fares or other travel incentives. In addition, commercial air carriers can also be expected to continue to expand their present hubs and to develop new secondary hubs. This, however, could increase current delay and capacity problems at many large U.S. air carrier airports, and this could, in turn, significantly constrain the growth of air carrier traffic in the future.

Jet Fuel Prices

Jet fuel prices continued their roller coaster ride during 1987. Starting from a base of just over $0.115 cents a gallon in 1973, the price of jet fuel, aided by two worldwide energy crises, rose to a peak of $1.052 domestically and $1.168 internationally in May 1981. Over the next 66 months, the trend in jet fuel prices was generally downward. Between May 1981 and November 1986, the price of domestic jet fuel declined 60.0 percent ($0.422 per gallon), while the price of international jet fuel declined 57.2 percent ($0.499 per gallon). Starting in December 1986, however, jet fuel prices began to move upward. Between November 1986 and September 1987, the price of domestic jet fuel increased 39.4 percent ($0.588 per gallon). During this same time frame, international jet fuel prices increased by 26.2 percent ($0.63 per gallon).

U.S. commercial airlines paid an average of $0.508 per gallon for domestic jet fuel (down 20.0 percent) and $0.567 for international jet fuel (down 17.7 percent) in fiscal year 1987. Declining fuel prices have had a positive impact on the profitability of U.S. air carriers. When jet fuel prices reached their peak in third quarter 1981, fuel costs accounted for 31.2 percent of total air carrier operating costs. In the second quarter of fiscal year 1987, fuel costs accounted for only 14.5 percent of total operating costs. Compared to the average price paid for all jet fuels in fiscal year 1986 ($0.646 versus $0.52 in fiscal year 1987), the 19.5 percent decline in price is estimated to have reduced air carrier operating expenses by over $1.8 billion. However, the trend in jet fuel costs is generally upward and, barring any unforeseen major fuel crisis or major new oil discoveries, fuel costs as a percent of total operating costs should increase gradually over the forecast period.

Domestic jet fuel prices are projected to increase by 19.5 percent in 1988; however, the average 1988 price ($0.607) represents only a 3.2 percent increase over the September 1987 price ($0.588). International jet fuel prices are expected to increase to $0.65 in 1988, a 14.2 percent increase over the average 1987 price but only 3.2 percent above the September 1987 price ($0.63). However, even with such increases, domestic jet fuel prices are not expected to exceed $1 a gallon until 1998; international jet fuel prices not until 1997. Over the entire forecast period, domestic jet fuel prices are forecast to increase at an average annual rate of 7.1 percent, from an average of $0.508 a gallon in 1987 to $1.154 a gallon in 1999. International jet fuel prices are forecast to increase from $0.569 a gallon in 1987 to $1.234 in 1999, an average yearly increase of 6.7 percent.



Passenger Yields

Domestic passenger yields, after declining on a year-over-year basis for 10 consecutive quarters (first quarter FY-85 to second quarter FY-87), registered increases in each of the last two quarters of fiscal year 1987. Basically, domestic yields continued to decline during the first 8 months of the fiscal year, down 7.7 percent during the first quarter and 3.3 percent during the second quarter. Although a number of fare increases were proposed during this period, most were withdrawn when other major carriers did not raise their fares.

Beginning in June, however, U.S. carriers were able to push through a number of fuel surcharges and across-the-board fare increases. Fare increases that were adopted by most U.S. carriers over the last 4 months of fiscal year 1987 are listed on the following page.

- o June 8 — Fuel surcharge of $3 to $8 based on trip distance.
- o August 1 — Fuel surcharge of $2 to $8 based on trip distance
- o August 10 — Across-the-board $2 to $20 based on trip distance.
- o September 8 — Across-the-board $10 to $20 on one-way fares.
- o September 15 — Across-the-board $5 to $15 on one-way fares.

The net effect of these fare increases was, however, muted somewhat by the advance purchase requirements of most discount fares. Nonetheless, domestic passenger yields did increase by 3.2 percent over the last 6 months of fiscal year 1987, up 0.5 percent during the third quarter and 6.0 percent during the fourth quarter. Despite these increases, the average domestic yield declined 0.9 percent in 1987, from 11.33 cents to 11.23 cents. In "real" terms (1967 dollars), the average domestic yield declined 3.4 percent. Over the past 3 years, domestic yields have declined by 13.6 percent, 20.4 percent in "real" dollars.

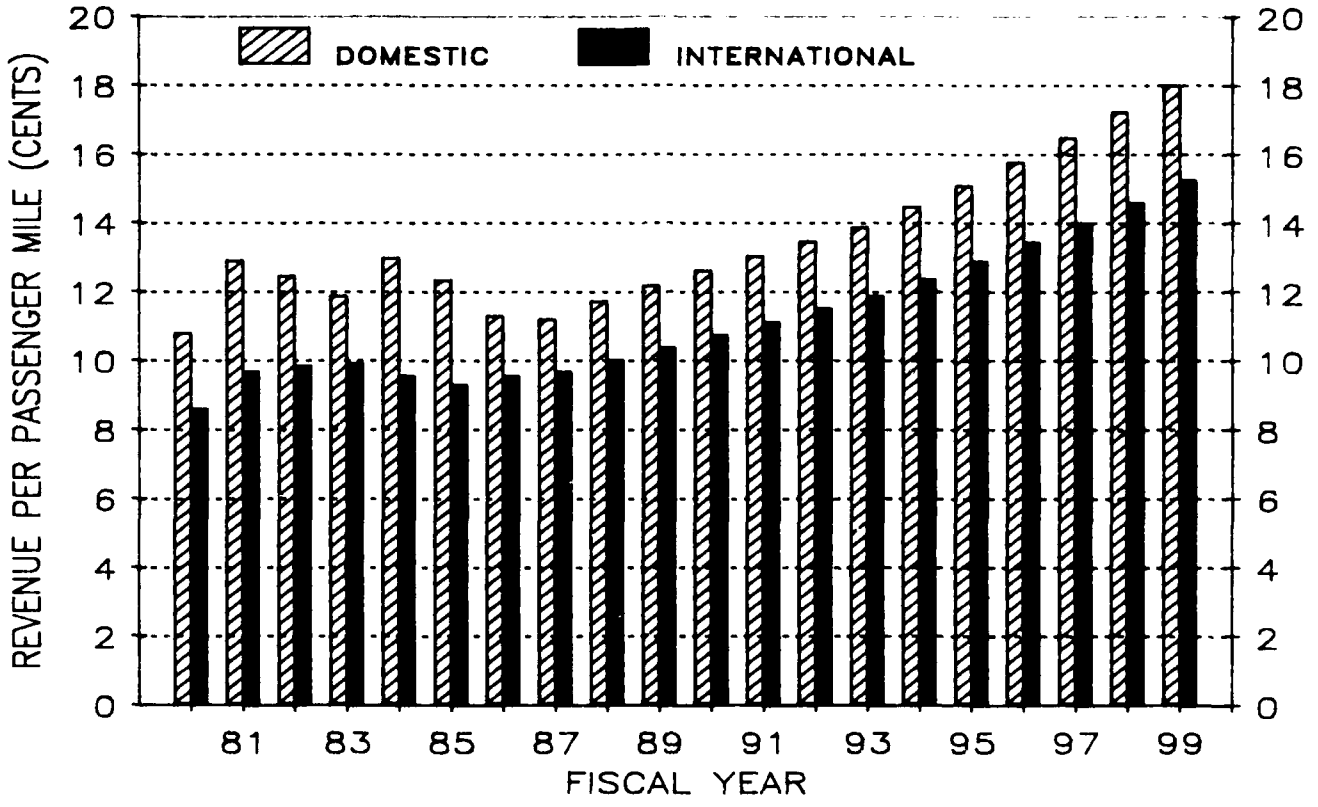
International passenger yields increased by 1.3 percent in fiscal year 1987, down 1.0 percent in "real" dollars. The trend in international yields has, over the past year and a half, been the complete opposite of the domestic yield trend. Beginning in the third quarter of fiscal year 1986, international passenger yields have shown year-over-year increases for five consecutive quarters. In the fourth quarter of fiscal year 1987, however, international yields declined 1.4 percent. The fourth quarter decline is due, in large part, to the tremendous numbers of passengers (up 25.9 percent) transported during the 1987 peak summer season, a large percentage of them travelling on discount fares. Conversely, the increase in yields during much of 1986 was due, in large part, to the severely depressed vacation traffic to European destinations, when a significantly smaller percentage of passengers were traveling on discount fares.

Although international yields increased slightly in fiscal year 1987, yields were a mixed bag in the three international travel regions. Yields remained constant at 8.97 cents on the Atlantic routes. Yields declined 1.2 percent on the Latin American routes, from 11.44 to 11.30 cents. The only increase registered in fiscal year 1987 occurred on the Pacific routes where yields were up 5.2 percent, from 9.69 to 10.19 cents.

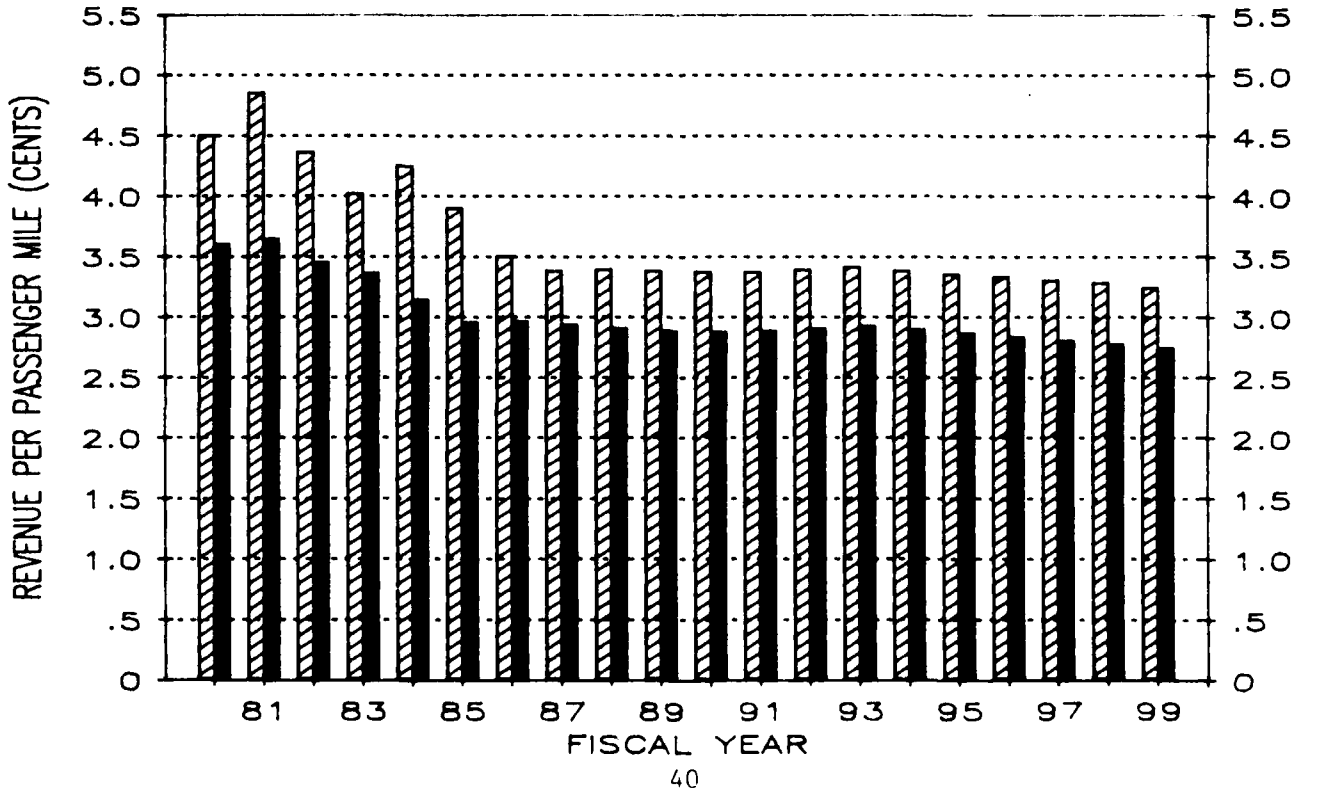
This year's forecast assumes that, despite the uncertain outlook over the next several years, there will be no major fare wars to stimulate traffic demand. This is not meant to imply that discount fares will not be available, only that the industry is not expected to resort to the destructive and uneconomic fare wars so prevalent over the past several years. Discount fares should continue to be available in most, if not all, markets. Moreover, "yield management" can be expected to continue to play a major role in allocating the number of discount seats available on an individual flight basis. The forecast assumes that the carriers will opt for higher profits at the expense of slower traffic growth. Of course, a significant downturn in traffic could force financially weak carriers to cut fares in order to generate cash to maintain operational viability. In the event of such a scenario, both the size of the carrier and the markets that it serves would be the determining factors as to whether the other carriers follow suit.

U.S. COMMERCIAL AIR CARRIERS
PASSENGER YIELDS

CURRENT DOLLARS



1967 DOLLARS



In September 1987, the average yield was almost 10.0 percent higher than a year earlier. Starting at this high fare level and, based on the assumptions discussed above, domestic yields are forecast to increase by 4.7 percent in 1988 and 3.8 percent in 1989. Domestic yields are projected to increase from 11.23 cents in 1987 to 18.02 cents in fiscal year 1999, an average annual rate of 3.9 percent over the 12-year period. In "real" dollars, domestic passenger yields are forecast to increase slightly between 1987 and 1992. Between 1993 and 1999, however, "real" yields are projected to decline by 4.7 percent. Over the 12-year forecast period, domestic "real" yields are expected to decline from 3.39 cents in fiscal year 1987 to 3.25 cents in fiscal year 1999.

International passenger yields averaged 9.76 cents in fiscal year 1987, 2.95 cents in 1967 dollars. International yields are expected to increase to 15.31 cents by 1999, an average annual increase of 3.7 percent. In "real" terms, the international yields are forecast to decline to 2.76 cents by fiscal year 1999, an average decline of 0.6 percent annually.

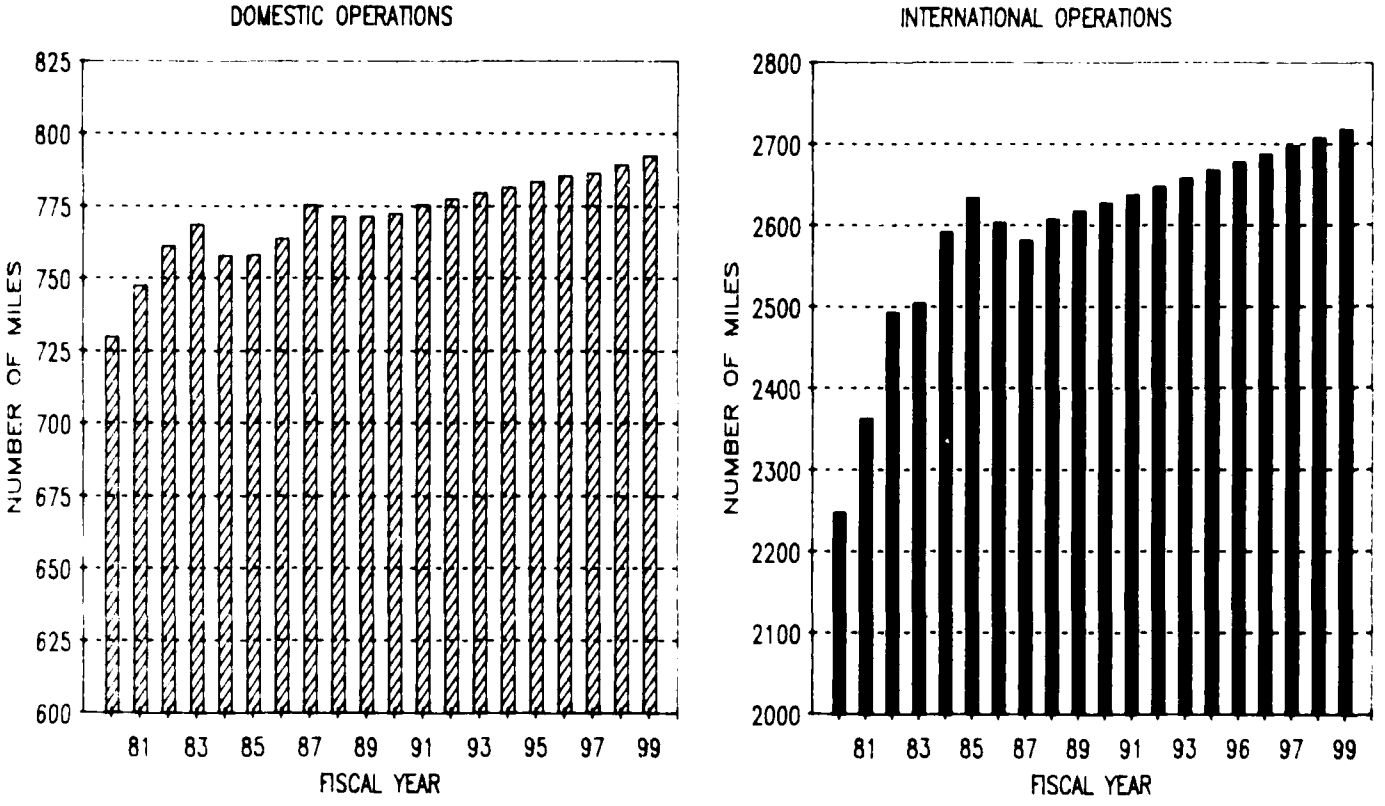
Passenger Trip Length

The average domestic passenger trip length increased by almost 12 miles in fiscal year 1987. Over the past 2 years, the domestic passenger trip length has increased more than 17 miles, growing from 758.6 miles in fiscal year 1985 to 776.0 miles in fiscal year 1987. These increases reflect, in part, that a higher percentage of the air travel over the past 2 years has been for vacation purposes, as opposed to business purposes; and that vacation trips tend to be of greater distances, on the average, than are business trips. This year's forecast assumes, however, that the domestic passenger trip length will decline by almost 4 miles in 1988. This decline reflects the uncertainty with regard to the short term outlook for passenger demand, especially among the longer haul, discretionary vacation traveller.

The domestic passenger trip length is, however, expected to resume its upward trend in 1990, although at a somewhat slower pace than the long-term historical average of 4 to 5 miles a year. The domestic passenger trip length is projected to increase by 1 mile in 1990 and by 3 miles in 1991, and average just over 2 miles annually over the 12-year forecast period. The domestic passenger trip length is forecast to increase from 776 miles in fiscal year 1987 to 793 miles in 1998.

The international passenger trip length has declined by over 52 miles during the past 2 years; by almost 22 miles in fiscal year 1987. All of the decline, however, occurred during the 13-month period between April 1985 and April 1986, a period during which terrorist activity, or the fear thereof, severely impacted traffic demand between the U.S. and European and Middle Eastern destinations. As expected, the strong rebound of U.S. travel to these destinations during the 1987 peak travel season did result in a return to historical trip distances. Between June and September 1987, the average international passenger trip length increased by more than 37 miles. Starting from the higher base established during this period, the international trip length is forecast to increase by 26 miles in 1988 and then increase by 10 miles annually over the remainder of the forecast period. The international passenger trip length is expected to increase from 2,584 miles in 1987 to 2,720 miles in 1998.

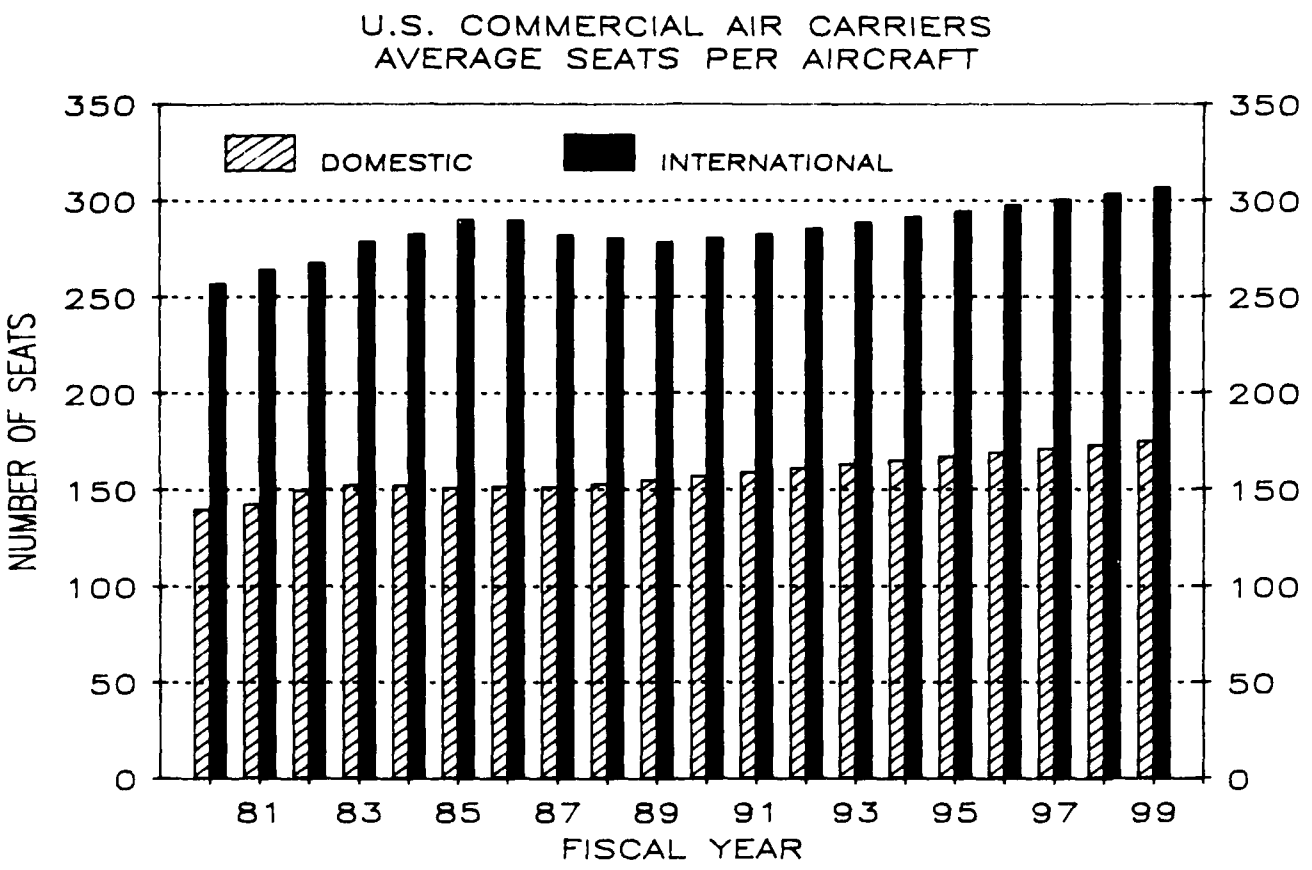
U. S. COMMERCIAL AIR CARRIERS
AVERAGE PASSENGER TRIP LENGTH



It should be noted, however, that there are likely to be large swings around the trend line. The movement in any 1 year will be dependent upon the discount fare policies adopted by U.S. air carriers and by the mix of business versus leisure travelers.

Average Aircraft Size

Between 1978 and 1983, the average seating capacity of an aircraft utilized in domestic service increased by 17 seats (from 136.4 to 153.4 seats). Since 1983, however, the average aircraft size has actually declined by one seat. A number of factors are responsible for this decline in the seating capacity of domestic aircraft. Deregulation, declining fuel prices, and the continued expansion of hub-and-spoke type route systems at large and medium hub airports are, for the most part, responsible for the large increase in the number of small narrowbody aircraft in the U.S. air carrier fleet. The increased emphasis on airport hubbing greatly increased the importance of higher frequencies and the demand for aircraft with smaller seating capacities. Declining fuel costs allowed U.S. airlines to retain a large number of the older, less fuel efficient, Stage-2 aircraft (B-727, DC-9, BAC-111, F-28, etc.) in their fleets. In fact, very few, if any, of these older Stage-2 aircraft were retired from U.S. air carrier fleets over the past 2 years.



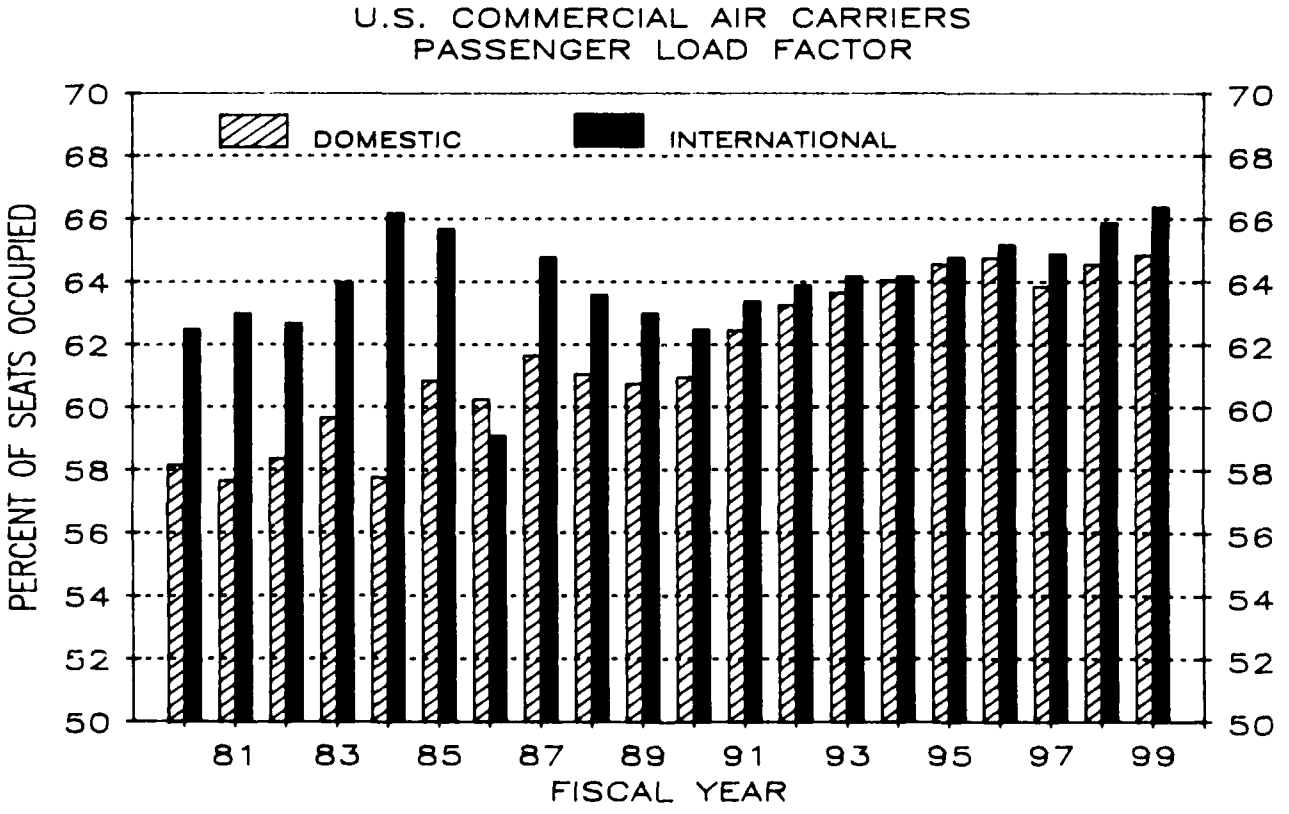
The uncertainty regarding U.S. economic growth and traffic demand in 1988 could result in the sale or grounding of a number of the smaller capacity Stage-2 aircraft. This, added to the fact that the aircraft being delivered to U.S. airlines are generally larger than the ones being replaced, should result in an increase in average aircraft size throughout the forecast period, although at a rate somewhat less than the average long-term historical trend of 3 to 4 seats per year. The forecast assumes that the average seating capacity of aircraft utilized in domestic service will increase by an average of 2 seats annually over the 12-year forecast period. In 1999, the average seating capacity of an aircraft in domestic service is expected to be 176 seats, up from 152 seats in 1987.

The average seating capacity of an aircraft utilized in international service (282.6 seats) declined by almost 8 seats in fiscal year 1987. This, in part, reflects U.S. air carrier scheduling decisions with regard to the depressed traffic levels to European destinations during the latter months of fiscal year 1986 and the early months of fiscal year 1987. It also reflects greater utilization of twin-engined widebody aircraft (B-767 and A-300/310) on many North Atlantic routes. It is expected that U.S. carriers will continue to expand the use of these smaller capacity aircraft over the next few years, especially in view of the projected slowdown in the demand for international

destinations. As such, the average seating capacity of aircraft utilized in international service is expected to continue to decline over the next 2 years, averaging 281 seats on 1988 and 279 seats in 1989. Starting in 1990, however, the average seating capacity of international aircraft is expected to increase by an average of 3 seats annually over the remainder of the forecast period. The forecast assumes that the average aircraft in the international fleet will average 307 seats by the year 1999.

Load Factor

In fiscal year 1987, the domestic load factor increased 1.4 points (61.7 percent), while the international load factor increased 5.6 points (64.8 percent). Based upon projected levels of capacity and traffic, the domestic load factor is expected to decline to 61.1 percent in 1988 and to 60.8 percent in 1989. Thereafter, the domestic load factor is forecast to increase gradually, reaching a high of 64.9 percent in fiscal year 1999. International load factors are forecast to decline slightly over the next 3 years, averaging 63.6 percent in 1988, 63.0 percent in 1989, and 62.5 percent in 1990. Beginning in 1991, international load factors are expected to resume their upward trend, increasing gradually to a high of 66.4 percent in the year 1999.

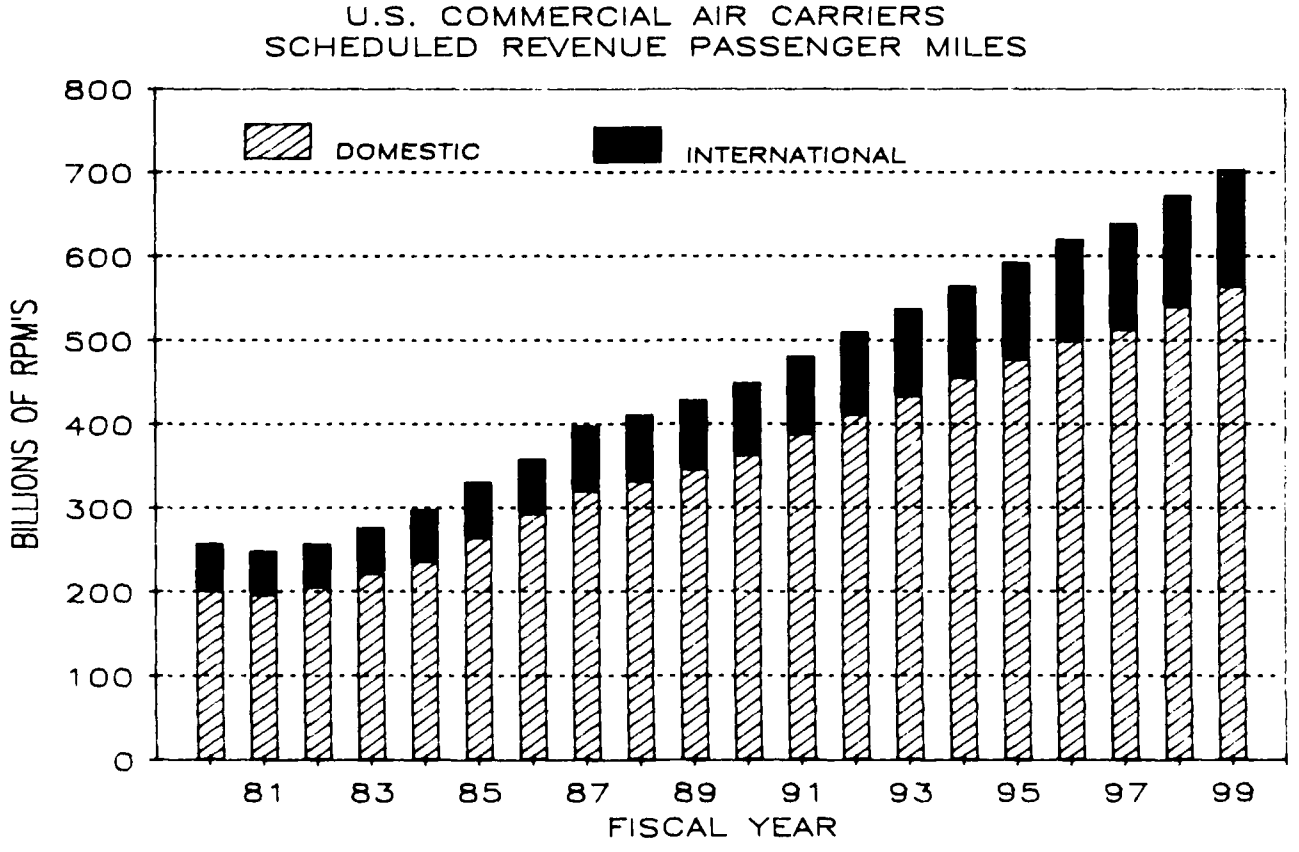


The higher load factors reflected in this year's forecast take into consideration the proficiency levels that U.S. carriers have attained in "yield management" through the use of their computer reservation systems. Heretofore, it has been assumed that 63.0 percent was the absolute high that could be achieved on an average annual basis.

AIR CARRIER FORECASTS

Revenue Passenger Miles

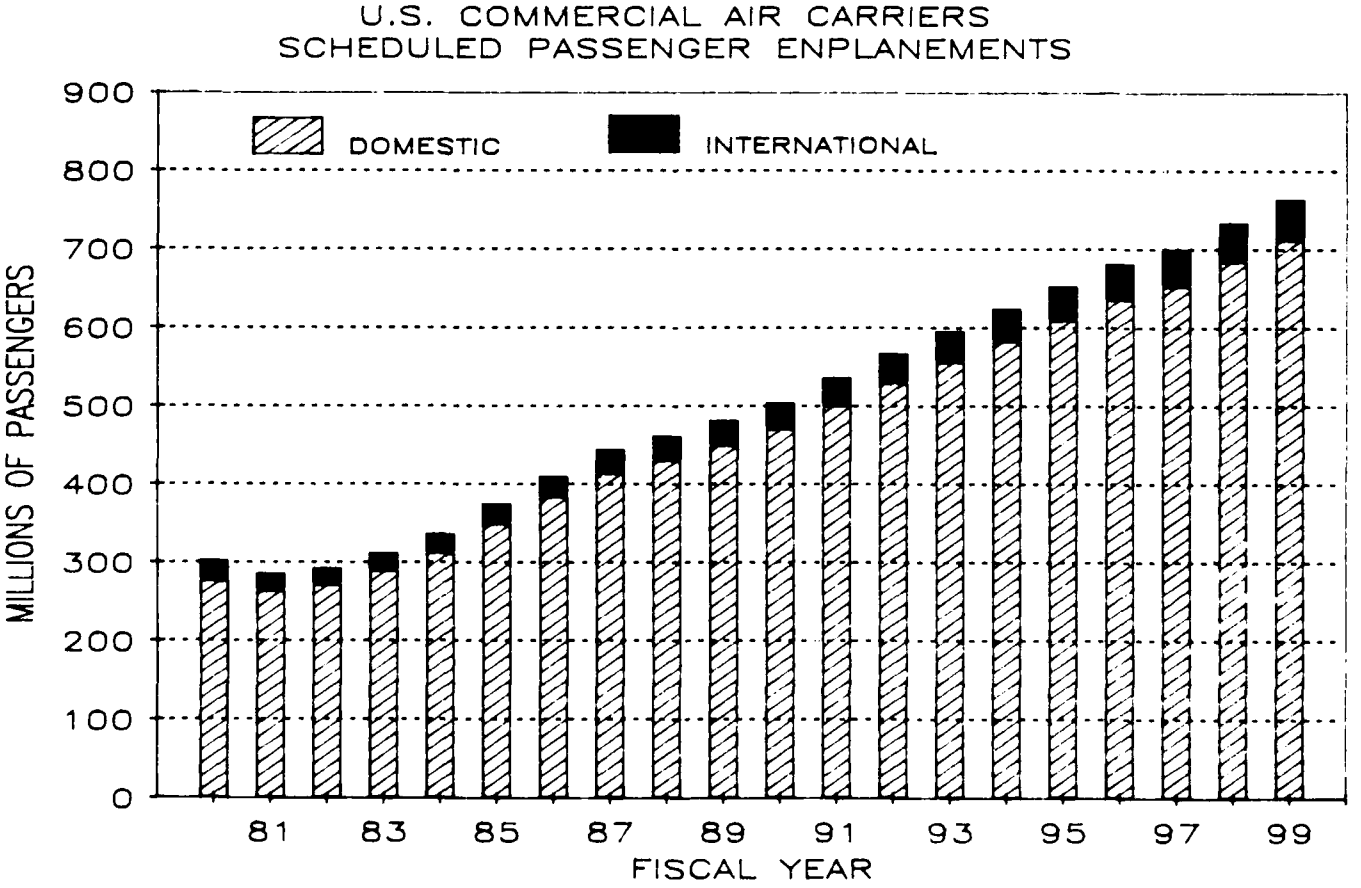
U.S. commercial air carrier revenue passenger miles recorded a total of 397.8 billion in fiscal year 1987, 322.0 billion in domestic markets, and 75.8 billion in international markets. Domestic RPM's are forecast to increase by 3.5 percent (333.3 billion) in 1988 and by 4.4 percent (348.0 billion) in 1989. These smaller than average increases are due, in part, to the uncertainty regarding the U.S. economy and, in part, to increased passenger yields. Over the 12-year forecast period, domestic RPM's are projected to increase at an average annual rate of 4.8 percent, reaching a total of 566.0 billion in fiscal year 1999.



After unprecedented growth in fiscal year 1987, the demand for international travel is expected to weaken somewhat over the next several years. This is due, in large part, to the uncertainty regarding U.S. and world economic growth and to the continued weakening of the U.S. dollar relative to other foreign currencies. The declining U.S. dollar is expected to significantly increase the cost of travelling abroad. As such, international RPM's are forecast to increase by only 2.9 percent in 1988 (78.0 billion) and 3.8 percent (81.0 billion) in 1989. Over the 12-year forecast period, international RPM's are projected to increase by an average annual rate of 5.1 percent, reaching a total of 137.4 billion in the year 1999.

Passenger Enplanements

In fiscal year 1987, U.S. commercial air carriers enplaned a total of 444.3 million passengers. Of this total, 415.0 million were counted as domestic enplanements and 29.3 million as international enplanements. The uncertain U.S. economy is expected to slow the demand for domestic air travel, with domestic enplanements increasing by only 4.0 percent (431.7 million) in 1988 and 4.4 percent (450.8 million) in 1989. Over the 12-year forecast period, domestic enplanements are forecast to increase by an average annual rate of 4.6 percent, totalling 713.7 million in 1999.

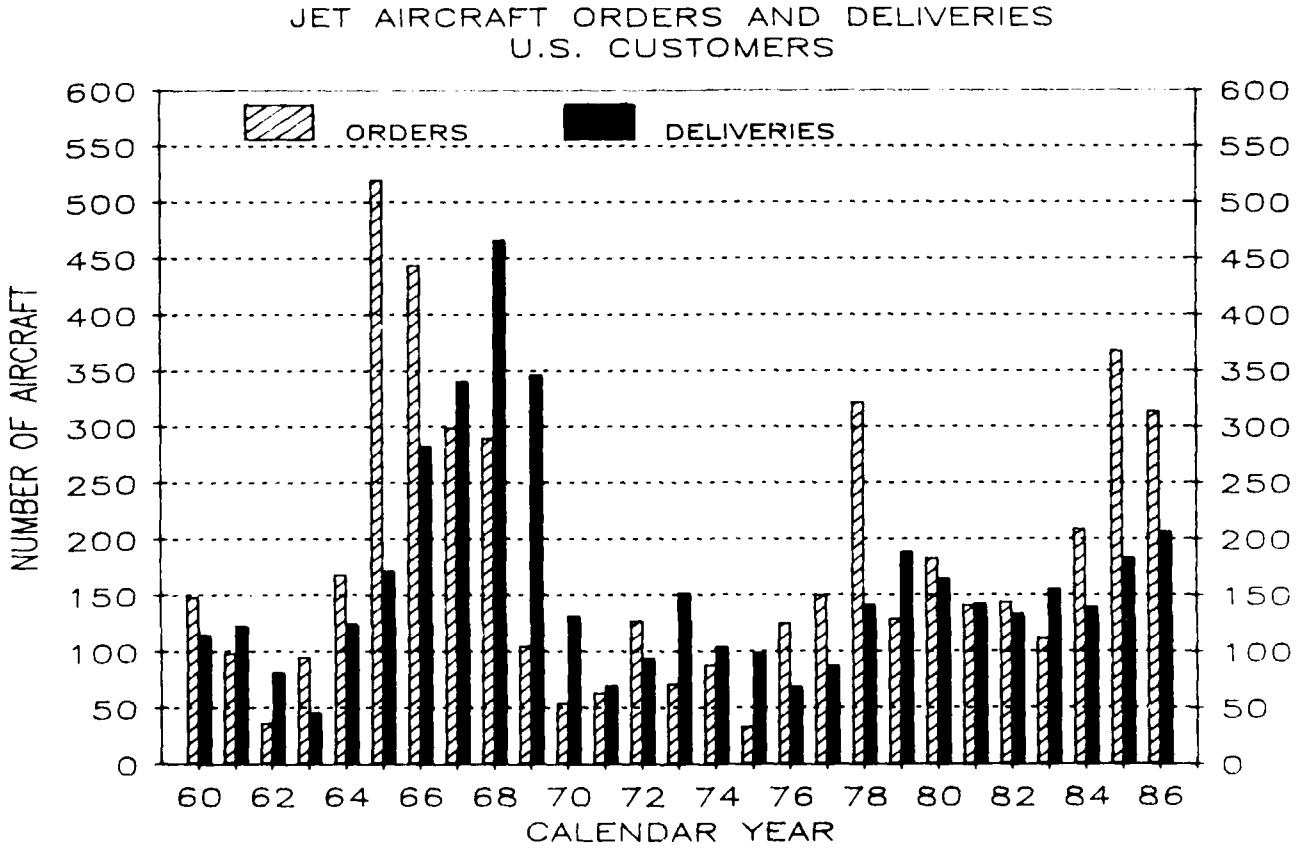


The declining U.S. dollar is expected to significantly dampen the demand for international travel over the next few years. International enplanements are projected to increase by only 2.0 percent (29.9 million) in 1988 and by 3.4 percent (30.9 million) in 1989. However, demand is projected to pick up somewhat beginning in 1990, and the increase in the number of enplanements is expected to average 4.9 percent annually over the 12-year forecast period. International enplanements are expected to total 50.5 million by the year 1999.

Air Carrier Fleet

Over the past 2 years, a total of 1,430 orders for large jet aircraft (larger than 60 seats) were placed with U.S. and foreign aircraft manufacturers; 748 of these orders placed in fiscal year 1987 alone. Of this 2-year total, 997 (69.7 percent) were for two-engine narrowbody (B-737, B-757, MD-80, etc.) aircraft. As of September 30, 1987, aircraft manufacturers had a total backlog of 1,530 aircraft on order. Of this total backlog, 1,116 (72.9 percent) are for two-engine narrowbody aircraft.

Also over the last 2 years, aircraft manufacturers delivered a total of 759 large jet aircraft, 421 aircraft in fiscal year 1987 alone. Of this 2-year total, 569 (75.0 percent) were two-engine narrowbody aircraft. However, the main point to make with regard to aircraft deliveries over the past 2 years is that these aircraft deliveries were net additions to the U.S. air carrier's fleet. Very few of the older Stage-2 aircraft were retired during this time period. This action has, in turn, put extreme pressure on the Air Traffic Control and the National Airspace System.



At the end of fiscal year 1987, there were approximately 1,800 Stage-2 aircraft in the U.S. fleet. Because of the anticipated slowdown in passenger demand, it has been assumed that U.S. carriers will, once again, begin to retire or sell the older Stage-2 aircraft. For purposes of this forecast, a 25-year life cycle has been assumed for most Stage-2 aircraft. The exception is the B-727-200 aircraft which is a candidate for retrofit.

Based upon the backlog of aircraft orders and the projections of air carrier traffic, seat capacity, load factors, and fleet retirements, the U.S. commercial air carrier fleet is projected to increase from a total of 3,401 large jet aircraft in 1987 to a total of 4,651 aircraft in 1999. This amounts to the delivery of almost 240 aircraft annually, and results in the net addition of approximately 104 aircraft (2.6 percent) to the U.S. fleet each year. By far the fastest growth occurs in two-engine narrowbody aircraft category, which is expected to grow by an average of 128 aircraft annually. By 1999, two-engine narrowbody aircraft are expected to total 2,993 units and to account for 64.4 percent of the total fleet, up from 42.9 percent in 1987. This trend reflects the fact that the continued expansion and development of hub airports increase the importance of higher frequencies and the demand for aircraft with smaller capacities.

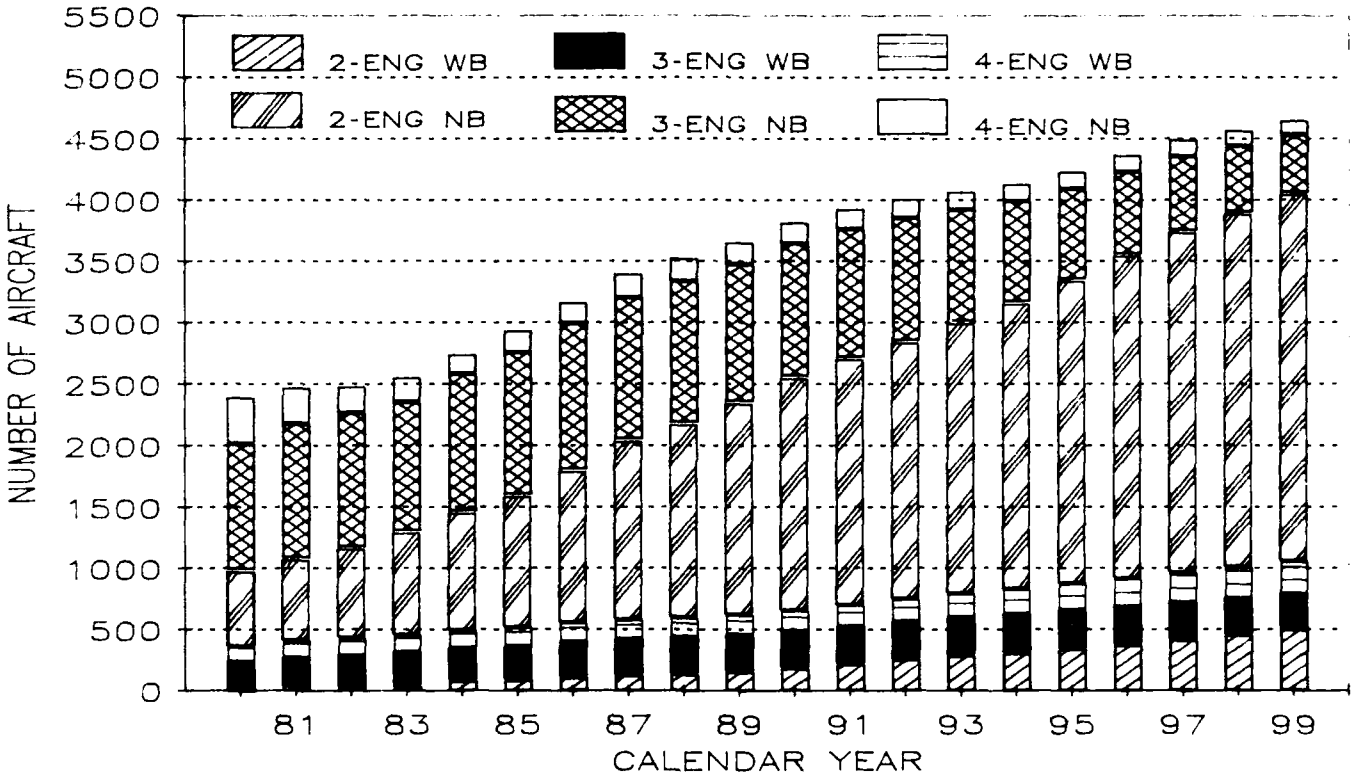
Three-engine narrowbody (B-727) aircraft, the mainstay of the air carrier jet fleet during the 1970's and early 1980's, are expected to decline from 1,160 aircraft in 1987 to only 476 aircraft in 1999. The number of four-engine narrowbody (DC-8 and BA-146) aircraft and three-engine widebody (DC-10, L-1011 and MD-11) aircraft are also expected to decline in absolute numbers over the forecast period.

Widebody aircraft, which accounted for only 17.3 percent of the fleet in 1987, are expected to account for 22.8 percent of the U.S. air carrier large jet fleet in 1999. Two-engine widebody (A-300, A-310, and B-767) aircraft, the fastest growing of the widebody groupings, are expected to increase by an average of almost 31 aircraft annually, from 130 aircraft in 1987 to 501 aircraft in 1999. Four-engine widebody (B-747 and A-340) aircraft are expected to total 268 in 1999, up from 160 aircraft in 1987.

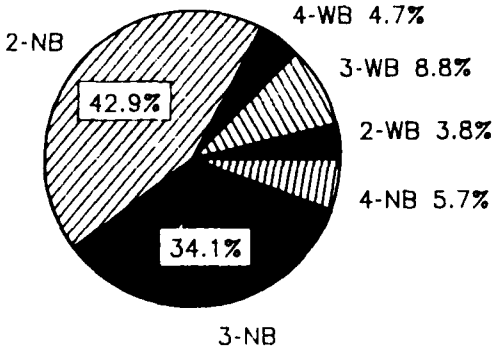
Airborne Hours

U.S. commercial air carriers flew over 10.0 million hours in fiscal year 1987, an increase of 8.0 percent over 1986. Two aircraft categories accounted for the majority of these airborne hours; two-engine narrowbody aircraft for 47.3 percent and three-engine narrowbody aircraft for 29.5 percent. By 1999, the number of airborne hours is forecast to increase to over 14.3 million, an average annual increase of 3.0 percent. Much of this growth is expected to occur prior to 1991, reflecting the increased hubbing activity at large and medium hub airports. The number of air carrier airborne hours is forecast to increase by 4.1 percent in 1988, 4.2 percent in 1989, and 4.0 percent in 1990.

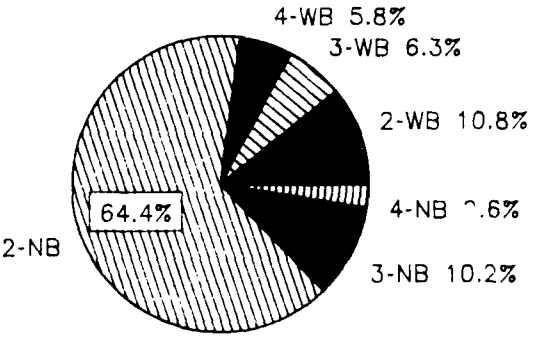
U.S. COMMERCIAL AIR CARRIERS
LARGE JET AIRCRAFT



PERCENT BY AIRCRAFT TYPE

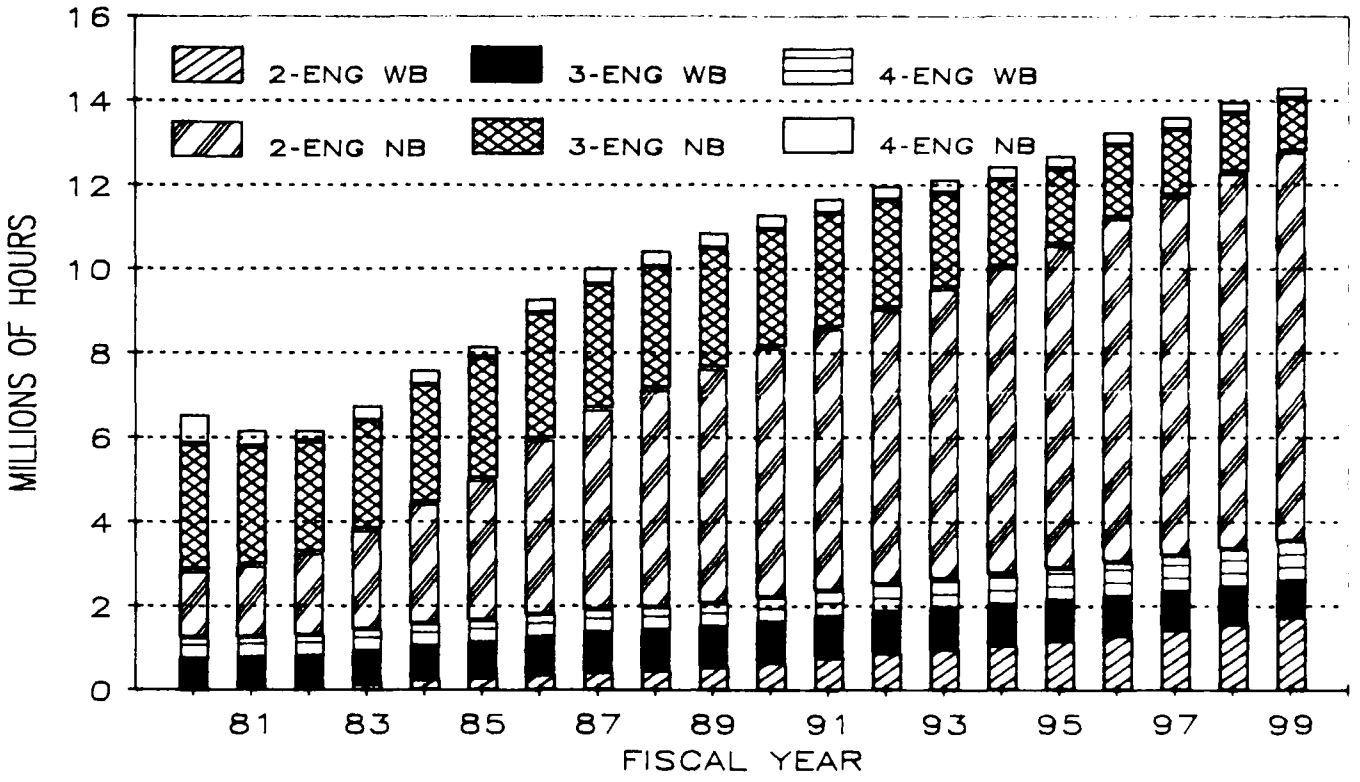


1987

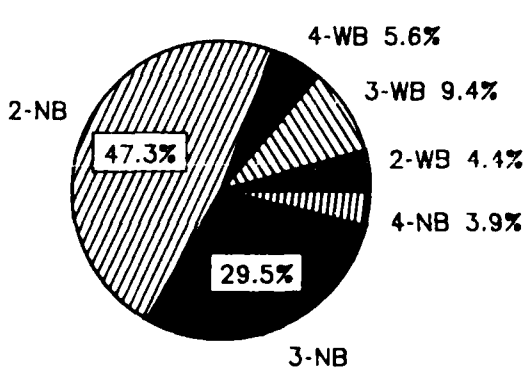


1999

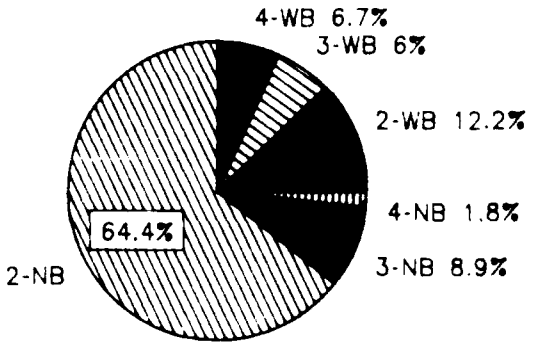
U.S. COMMERCIAL AIR CARRIERS
AIRBORNE HOURS



PERCENT BY AIRCRAFT TYPE



1987



1999

Two-engine narrowbody aircraft are expected to account for 64.4 percent of total airborne hours in 1999, increasing at an annual rate of 5.7 percent over the 12-year forecast period. Airborne hours by two-engine widebody aircraft are expected to grow at an annual rate of almost 12.2 percent over the same time period. The two-engine widebody aircraft are expected to account for 12.2 percent of total airborne hours in 1999, up from only 4.4 percent in 1987. The number of airborne hours flown by three-engine narrowbody aircraft is expected to decline by 57.1 percent between 1987 and 1999, reflecting not only the retirement of the older Stage-2 aircraft but the declining utilization rates of those aircraft still in service.

CHAPTER IV

REGIONALS/COMMUTERS

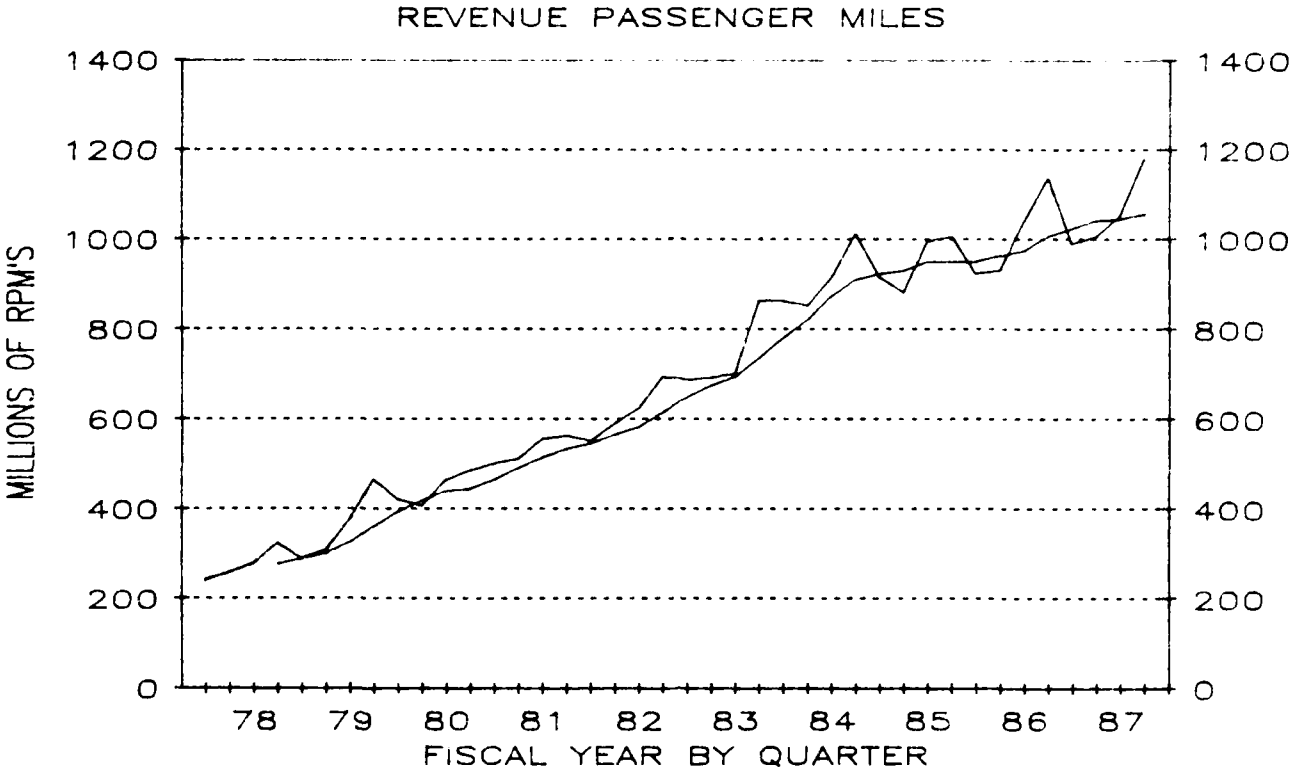
The regional/commuter airline industry, for the purpose of this forecast, is defined as those air carriers which provide regularly scheduled passenger service and whose fleets are composed predominantly of aircraft having 60 seats or less. During 1987, 164 regional/commuter airlines reported traffic data to RSPA (a listing of these airlines is presented in Appendix F). The FAA historical data base includes activity for all regionals/commuters operating in the 48 contiguous States, Hawaii, Puerto Rico, and the U.S. Virgin Islands. Excluded from the data base is activity in Alaska, other U.S. territories, and foreign territories. Additionally, the regional/commuter traffic statistics include duplicated data for selected operators included in the air carrier traffic statistics. The duplication is for those air carriers operating both large jets (over 60 seats) and commuter type aircraft (see technical notes on page 133 for Tables 6 and Table 12). Also, Air Wisconsin is no longer included in the forecast data base because of predominance of large jet aircraft in its fleet, and its change in status to a national air carrier. Thus, the statistics presented below reflect the exclusion of Air Wisconsin traffic statistics from the 1986 and 1987 data for comparative purposes.

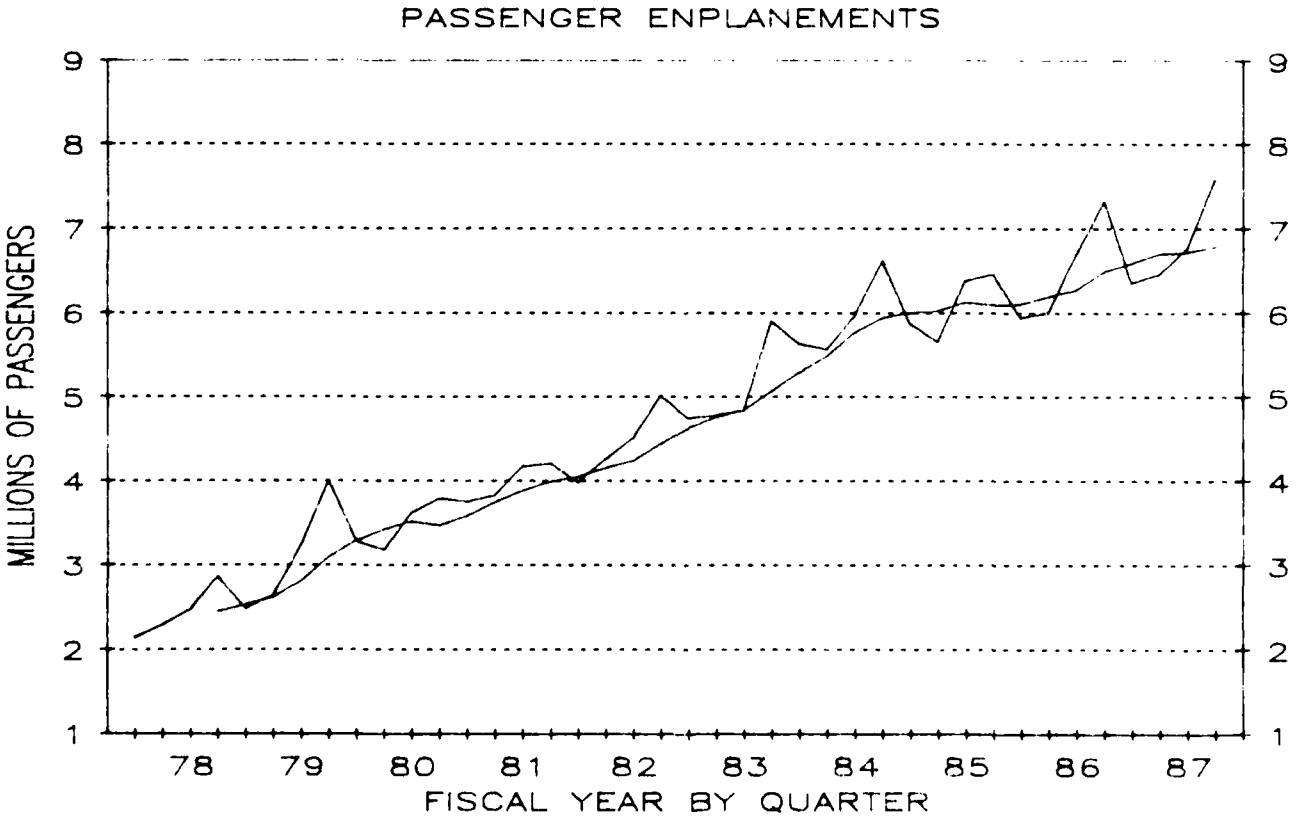
REVIEW OF 1987

Since 1984, the regional/commuter airline industry has been in a period of transition. In 1985, there was a dramatic growth in the number of code-sharing agreements with the major air carriers. This was followed in 1986 by a wave of large jet air carrier acquisitions of, or equity interest in, their regional/commuter code-sharing partners. In 1987, this consolidation process has continued.

In fiscal year 1987, the growth of the regional/commuter airline industry again has out-paced the growth of the larger commercial air carriers. Total revenue passenger enplanements increased by 13.3 percent (27.2 million), while revenue passenger miles increased by 16.1 percent (just over 4.2 billion). For the 48 States, enplanements increased 14.6 percent, and passenger miles increased by 17.2 percent. Traffic in Hawaii, Puerto Rico, and the U.S. Virgin Islands, however, had slower growth with passenger enplanements and passenger miles up by only 3.7 and 2.3 percent, respectively.

REGIONALS/COMMUTERS TRAFFIC TRENDS
ACTUAL AND MOVING AVERAGE





As noted earlier, the regional/commuter traffic data presented in this forecast document do not include traffic in Alaska and foreign territories. During 1987, passenger enplanements for commuter/regional airlines operating in these areas totaled 1.1 million, up 10 percent from 1986. Traffic in Alaska was relatively unchanged--declining only about 0.5 percent. Growth occurred primarily in the Caribbean and Pacific territories.

INDUSTRY COMPOSITION

The regional/commuter airline industry developed and grew in an unregulated environment. This freedom from costly regulatory proceedings allowed the commuter airlines to enter markets, terminate service, and set rates in response to existing market conditions. Given this freedom of entry and exit from the marketplace, there have been over 600 different carriers which have operated as commuter air carriers since formal recognition of the industry in 1969. The primary role of the industry, then and now, is to provide feeder service from small communities to the large hubs served by the larger commercial air carriers.

Probably the most significant factor contributing to the growth of the industry was the conversion to large turbojet aircraft by the large commercial carriers. As the large carriers embarked on programs to rationalize their route structures by concentrating on high density medium- and long-haul markets best suited for jet aircraft, the commuters moved into the abandoned low-density short-haul markets. They generally offered greater scheduled frequency than could be economically provided by large jet aircraft.

While operating in an unregulated environment, commuters were restricted to the use of small general aviation aircraft (most with less than 12 seats). While the industry recorded impressive growth rates year-to-year, the growth was hampered by aircraft size restrictions in terms of its image and quality of service, and the ability to attract surface passengers from automobiles and buses. With the enactment of the Airline Deregulation Act of 1978, the restrictions on aircraft size were relaxed significantly, and this, together with developments which have occurred in the 9 years since deregulation, has dramatically changed the character of the regional/commuter airline industry.

Initially, deregulation accelerated the route rationalization programs of the large jet operators opening up additional new markets for the commuters. This resulted in dramatic growth in traffic and in the number of regional/commuter operators. The most dramatic impacts of deregulation have occurred over the last 2 to 3 years. In the interim, the most significant impacts on the industry were the result of the dramatic increases in fuel costs followed by a severe economic recession. The net effect was a significant drop in the number of regional/commuter operators from a high of about 250 in 1981 to just under 180 in 1984.

AIR CARRIER/COMMUTER AIRLINES

CODE-SHARING AGREEMENTS

AIR CARRIER PROGRAM NAME	DESIGNATED COMMUTER CARRIER	HUBS SERVED
1. ALASKA Airlines	Horizon*	Portland/Seattle
2. AMERICAN Eagle	Air Midwest	Nashville
	AVAir	Charlotte
		Washington
	Chaparral	Dallas/Ft. Worth
	Command	Boston
		New York
	Executive Air Charter	San Juan
	Metro	Dallas/Ft. Worth
	Metro Express II	Dallas/Ft. Worth
	Simmons	Chicago
	Wings West	San Francisco
		Los Angeles
3. BRANIFF	Capitol	Kansas City
	Midcontinent	Kansas City
	Executive Express	Dallas/Ft. Worth
4. CONTINENTAL Commuter	Air New Orleans	New Orleans
	Britt	Chicago
	Colgan	Washington
	PBA	Newark
	Rocky Mountain	Denver
	Trans Colorado	Phoenix
	Mid Pacific	Honolulu
5. DELTA Connection	Atlantic Southeast	Atlanta
		Dallas/Ft. Worth
	Business Express	Boston
		New York
	Comair	Cincinnati
	Sky West	Salt Lake City

AIR CARRIER/COMMUTER AIRLINES

CODE-SHARING AGREEMENTS (CONTINUED)

AIR CARRIER PROGRAM NAME	DESIGNATED COMMUTER CARRIER	HUBS SERVED
6. EASTERN Express	Air Midwest	Kansas City
	Atlantis	Atlanta
		Charlotte
	Bar Harbor	Boston
		Miami
	Eastern Metro Express	Atlanta
	Eastern Metro Express	San Juan
	Precision	Boston
7. MIDWAY Connection	Fischer Brothers	Chicago
	Iowa Airways	Chicago
8. NORTHWEST Airlink	Big Sky	Billings
		Helena
	Express Airlines I	Memphis
	Mesaba	Minneapolis/St. Paul
	Simmons	Detroit
9. PAN AM Express	Ransome	Washington
		New York
10. PIEDMONT Commuter	Brockway	Syracuse
	CCAIR	Charlotte
	Henson	Baltimore
		Raleigh
		Florida
	Jetstream	Baltimore
		Dayton
11. TRANS WORLD Express	Air Midwest	St. Louis
	Resort Air	St. Louis
	Resort Commuter	Los Angeles

AIR CARRIER/COMMUTER AIRLINES

CODE-SHARING AGREEMENTS (CONTINUED)

AIR CARRIER PROGRAM NAME	DESIGNATED COMMUTER CARRIER	HUBS SERVED
12. UNITED	Aspen	Denver
	Westair	San Francisco
		Los Angeles
13. ALLEGHENY Commuter (U.S.AIR)	Air Kentucky	Louisville
		Indianapolis
	Chautauqua	Orlando
		Pittsburgh
	Crown	Pittsburgh
	Pennsylvania	Pittsburgh
		Philadelphia
	Pocono	Philadelphia
	Southern Jersey	Philadelphia
	Suburban	Pittsburgh
		Philadelphia

* Carrier operates both large jet and small commuter aircraft.

Since 1984, the process of industry consolidation has continued but has resulted from factors other than those addressed above. Increasingly, the fate of the regional/commuter industry is tied to the growth of the large scheduled air carriers. The growth of a hub-and-spoke route system, with its emphasis on traffic feed, has dramatically changed the regional/commuter airline industry. With increased competition for market share and control of passenger traffic from origin to destination has placed new demands on the regional/commuter industry's role of feeding traffic to the large hub airports. The result was the development of code-sharing agreements between major air carriers and regionals. While not new, this concept did not become a significant marketing and competitive tool until about 1984. It has since grown steadily.

The significance of code-sharing agreements to the majors is evidenced by the volume of traffic feed generated by the regionals. The benefit to the regional partners is evidenced by their growth and their increasing dominance of the regional/commuter industry. Passenger traffic for the code-sharing regionals has increased from 18.4 million in 1985 to 25.1 million in 1987, a 36.4 percent increase. The increased dominance of the industry by these carriers is illustrated by the fact that their share of total industry enplanements during this period has increased from just over 52 percent to just under 89 percent.

The integration of the regional/commuter airline industry with the large jet operators has since been carried to its fullest extent with selected major partners acquiring equity interest in or total acquisition of their regional code-sharing partners. The code-sharing regionals have effectively become extensions of the large carriers they feed. This has led to increased internal industry competition resulting in a continued decline in the number of operators, with weaker competitors ceasing to operate.

FUTURE INDUSTRY TRENDS

Replacement service no longer appears to be a significant growth factor. Future growth will come from the development of existing markets and, to some extent, from the development of new city-pair combinations. As the integration of the regional/commuter industry with the large commercial operators continues, they will be increasingly impacted by the competitive trends among the larger carriers. This implies that competition among the regionals will increase and the industry will continue to consolidate. With increased consolidation will come an increase in the size of the industry's already dominant carriers. It can be expected that there will be further acquisitions of regionals/commuters by the Majors, and the development of increasingly closer ties with code-sharing regionals/commuters which retain their corporate independence. These ties will include increased financial assistance in aircraft acquisition, administrative services, and market planning. This will bring the participating carriers increasingly under the dominance of their larger partners.

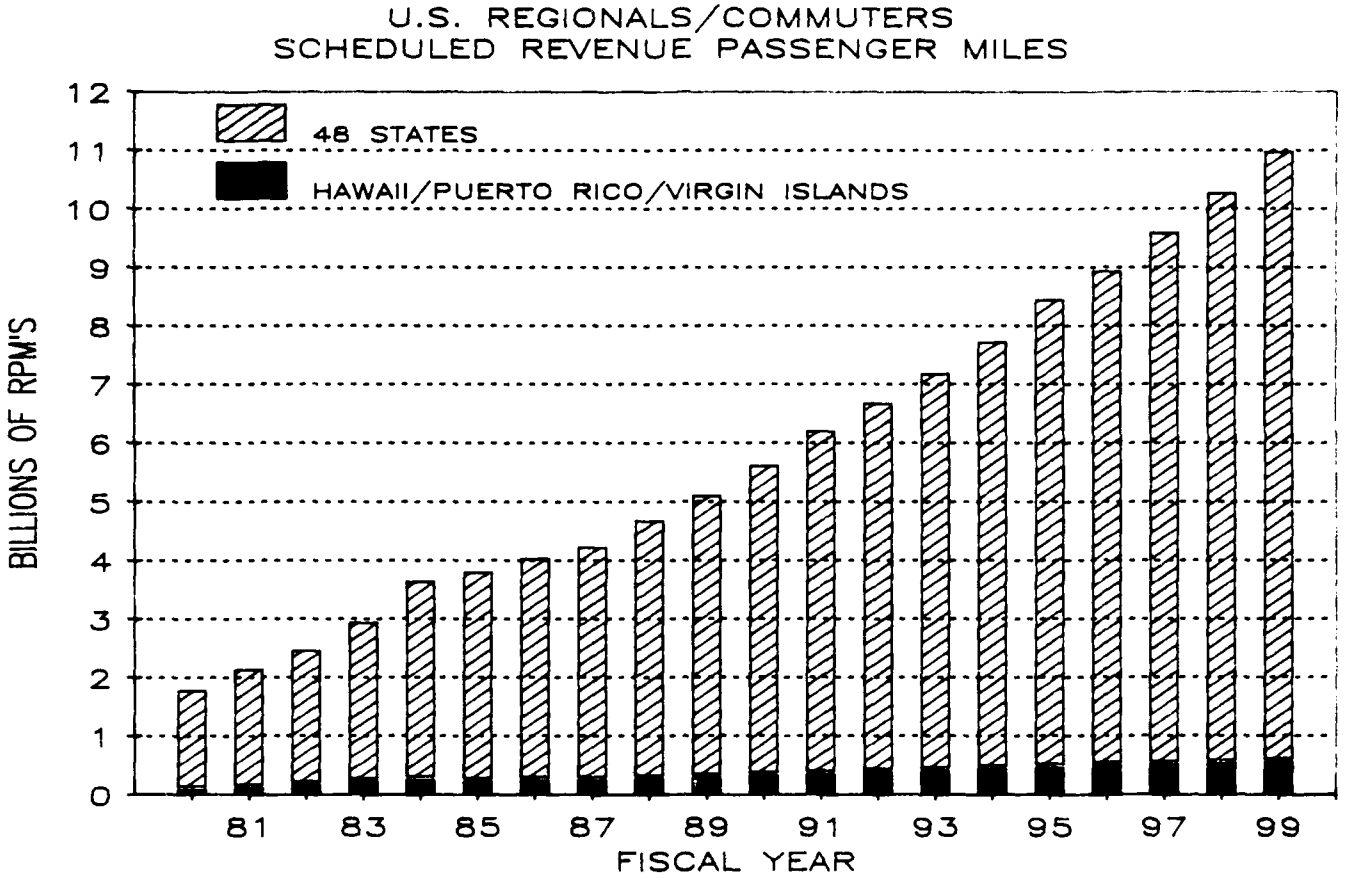
FORECAST ASSUMPTIONS

Industry growth is expected to come from increased demand placed on a stable, mature regional/commuter industry. It is expected that the aircraft fleet will continue to grow over the forecast period, and the average seats per aircraft are expected to increase from 20.1 in 1987 to 29.1 in 1999, an average annual growth of 3.1 percent. The average passenger trip length in the 48 States is projected to increase from 161.3 miles in 1987 to 200 miles in 1999, an average growth rare of 1.8 percent; while the average trip length for Hawaii/Puerto Rico/Virgin Islands is expected to remain constant at 98.0 miles over the forecast period. The average industry load factor is expected to increase slightly from 45.5 percent in 1987 to 46.8 percent in 1999 reflecting continued emphasis on frequency of service. A year-by-year detail of the above assumptions is presented in Table 11.

REGIONALS/COMMUTERS FORECASTS

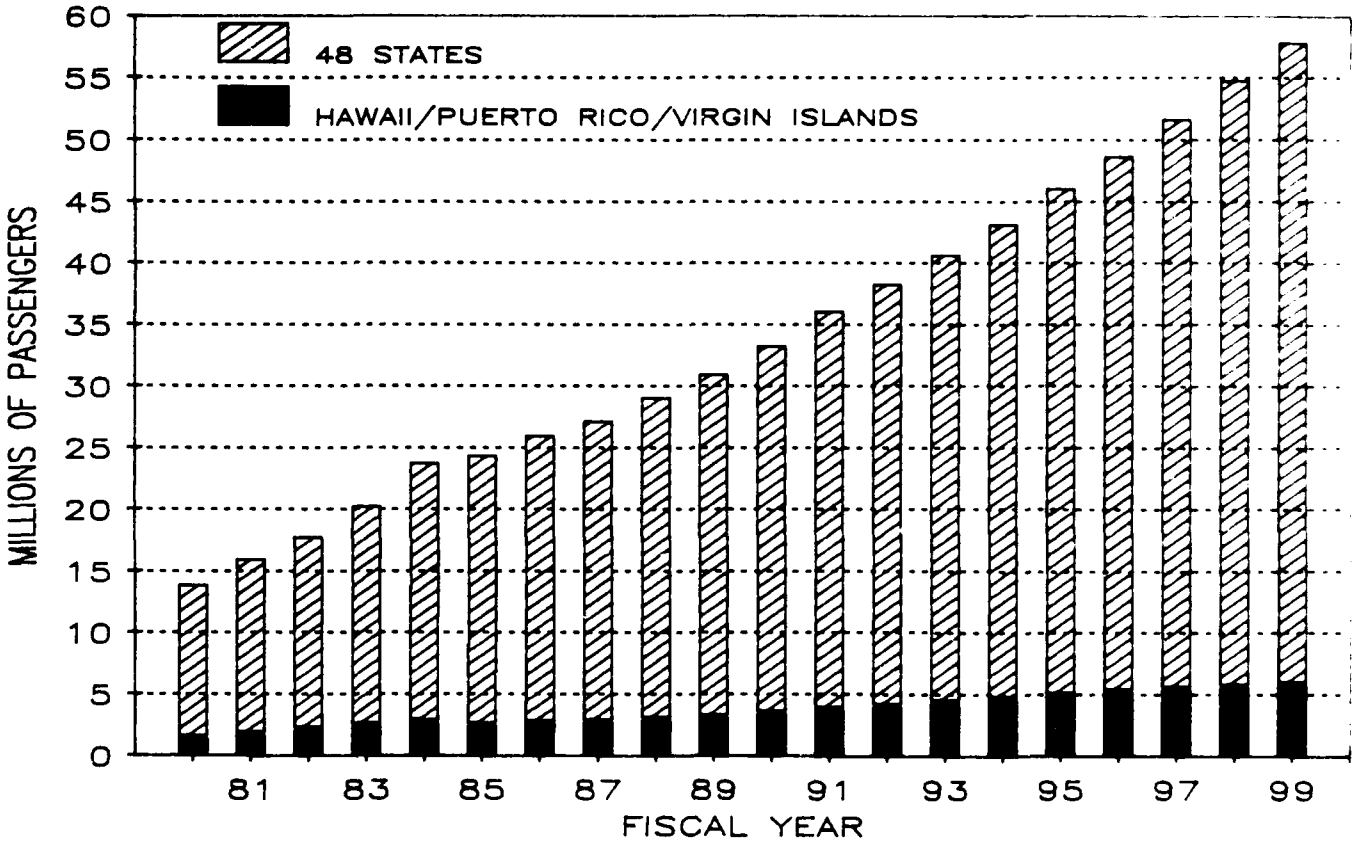
Revenue Passenger Miles

Revenue passenger miles are expected to total 11.0 billion in 1999. Passenger miles are projected to increase 10.7 percent in 1988 and 9.1 percent in 1989, and to average 8.3 percent over the 12-year forecast period. In the 48 contiguous States, revenue passenger miles are forecast to total 10.4 billion in 1999, increasing by 11.0 percent in 1988 and 9.1 percent in 1989, and averaging 8.4 percent between 1987 and 1999. Traffic in Hawaii, Puerto Rico, and the U.S. Virgin Islands is forecast to increase by 6.3 percent in 1988, and 7.8 percent in 1989, and to average 6.4 percent over the entire forecast period, totalling 578.2 million passenger miles in 1999.



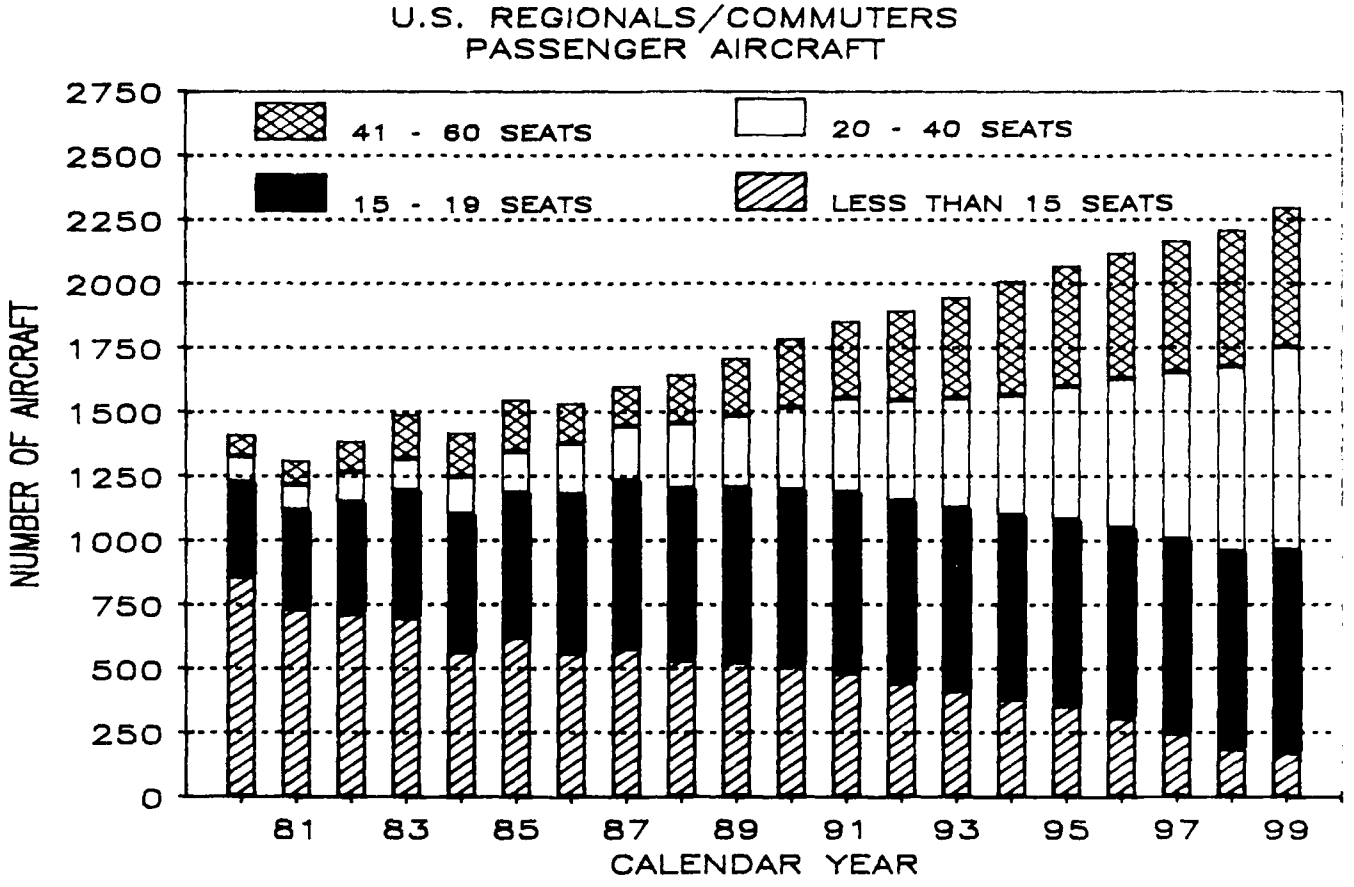
Passenger Enplanements

Passenger enplanements are forecast to reach 57.9 million in 1999, more than double the 1987 enplanements. Overall, passenger enplanements are expected to increase by 7.0 percent in 1988 and 6.5 percent in 1989, and to average 6.5 percent over the forecast period. In the 48 States, passenger enplanements are projected to increase 7.0 percent in 1988 and 6.5 percent in 1989, and to average 6.5 percent between 1987 and 1999, totaling 52 million in 1999. Passenger enplanements in Hawaii, Puerto Rico, and the U.S. Virgin Islands are expected to total 5.9 million in 1999, growing by 7.1 percent in 1988 and 6.7 percent in 1989, and averaging 6.4 percent over the 12-year forecast period.

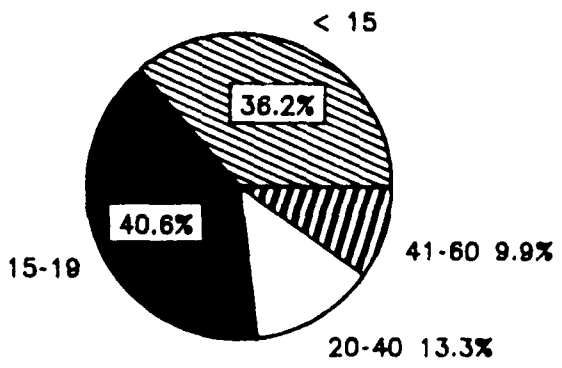


Regional/Commuter Fleet

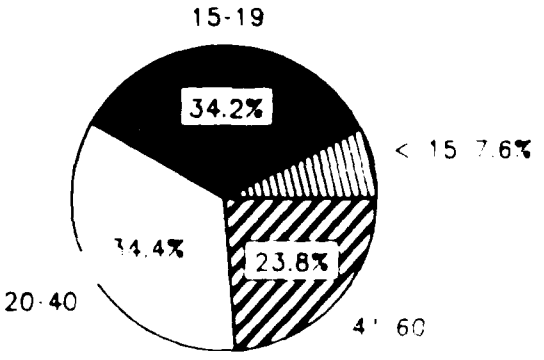
Prior to deregulation, the regional/commuter fleet was composed primarily of small general aviation aircraft, generally seating less than 12 passengers. This was thought to have undermined the image of the industry and inhibited public acceptance. With deregulation and the relaxation of the aircraft size restriction, the door was opened for the development and introduction of a new generation of aircraft designed specifically for use in regional markets. With the introduction of these new aircraft beginning in the early 1980's and with additional new models coming on-line over the next several years, today's fleet is increasingly composed of new state-of-the-art aircraft offering amenities similar to those found on large jet aircraft. This, together with increasing integration of services with the Majors, has dramatically changed the character and public acceptance of the industry. The impact of the introduction of larger new aircraft is reflected in the growth of the average seats per aircraft from 11.9 in 1978 to 20.1 in 1987, an increase of 68.9 percent, while the fleet grew by 53.2 percent during the same period.



PERCENT BY AIRCRAFT SEAT SIZE



1987



1999

Over the forecast period, it is projected that the average seats per aircraft will continue to grow at a slightly faster rate than the growth of the fleet reflecting the continued introduction of larger aircraft. The fleet is projected to grow at an annual rate of 2.9 percent, increasing from 1,604 in 1987 to 2,252 in 1999. During this time, the average seats per aircraft are projected to grow at an annual rate of 3.1 percent, increasing from 20.1 in 1987 to 29.1 in 1999.

In 1980, aircraft with less than 15 seats accounted for 60.9 percent of the total commuter fleet. By 1987, this category's share of the total fleet had declined to just under 36.2 percent. This downward trend is expected to continue throughout the forecast period. The number of aircraft in the "less than 15 seats" category is expected to decline by 70.1 percent between 1987 and 1999, and to account for just under 7.7 percent of the total fleet in 1999.

The "15-19 seats" category represents the largest portion of the fleet, increasing from 25.8 percent in 1980 to 40.7 percent in 1987. While this category will continue to account for the largest portion of the fleet throughout the forecast period, its relative share of the total fleet will decline to just under 35.0 percent in 1999.

The largest growth in the regional/commuter fleet will be in the "20-40 seats" and the "greater than 40 seats" categories. In 1980, these categories accounted for only 7.1 and 6.1 percent of the total fleet, respectively. By 1987, the "20-40 seats" category had increased to 13.3 percent and the "greater than 40 seats" category to 9.8 percent. By 1999, these two categories are expected to account for over 57.3 percent of the total fleet, 32.9 percent in the "20-40 seats" category and 24.4 percent in the "greater than 40 seats" category. During the forecast period, aircraft in the "20-40 seats" category are expected to increase from 213 aircraft in 1987 to 714 in 1999, an average annual increase of 10.9 percent. Aircraft in the "greater than 40 seats" category are expected to increase from 158 aircraft in 1987 to 549 in 1999, an average annual growth of 10.9 percent. This trend toward larger aircraft will increase the average seating capacity per aircraft from 20.1 seats in 1987 to 29.1 seats in 1999.

CHAPTER V

GENERAL AVIATION

The general aviation industry is undergoing deep and broad structural changes. There are indications that the long-term growth of the active fleet and activity will be slowing down. For the past 9 years, general aviation shipments have continuously declined from a peak of 17,811 units in 1978 to 1,495 in 1986. The major independent manufacturers have been taken over by conglomerates. Cessna and Piper have suspended production of most of their piston-engine aircraft. For the foreseeable future, the large general aviation manufacturers will focus on the production of turbine-powered aircraft. Further, a majority of the companies have significantly reduced their work forces and have consolidated plants. The decline in aircraft sales is complemented by decreasing numbers of private pilots. Between 1980 and 1986, the number of private pilots declined from 343,300 to 305,700. Between 1980 and 1985, the number of student pilots declined each year from 210,200 to 146,652. In 1986, however, the number of student pilots increased to 150,273.

Foreign competition, here and abroad, has also created problems for the U. S. manufacturers. Foreign producers are making inroads into domestic markets, while exports experienced a protracted period of decline. Exports fell from 3,995 in 1979 to 354 in 1985, a yearly rate of decline of 33.0 percent. However, after declining for 7 years, exports registered a 24.3 percent increase in 1986 totalling 440 units. The lower value of the U.S. dollar may be partially responsible for finally seeing some recovery in the export market. Ultimately, the shrinking stock of pilots and the slowing in the expansion of the general aviation fleet will reduce the rate of growth of activity at FAA facilities.

General aviation has, to date, failed to respond to the current economic recovery, one of the most robust of the postwar period. Historically, the economic cycle of the general aviation industry has closely paralleled that of the national economy. The theories about the reasons for the decline in sales and pilots are diverse. Some cite high aircraft prices and the availability of low cost alternatives such as ultralights. Others hypothesize that high operating costs and interest rates have been responsible for depressing the industry. Still others allege that the changes in the tax laws and high product liability costs are responsible. To be sure, each one of these factors has had some effect. Numerous studies that have been conducted by the Office of Aviation Policy and Plans, by universities, and by the industry have shown that many of the economic factors cited above have outweighed the positive effects of a growing economy.

Although the economics of the industry are important in affecting people's choices, we cannot overlook the fact that we may also be experiencing a fundamental change in the tastes and preferences of the population. In the long-run, this could be more destabilizing and have a larger adverse impact on general aviation than the negative economic factors that have plagued the industry for the past 9 years. Changing tastes could upset the fundamental economic equations that have held for many years for the industry. If this phenomenon is occurring, then falling prices, operating costs, and real interest rates, accompanied by economic growth, may not be sufficient to revive the market. As a nation becomes wealthier, households can afford to pay the higher prices of specialized items, and a proliferation of varieties generally takes place. This intensifies the competition in specific types of markets. During the recent strong economic recovery, the demand for recreational flying in conventional aircraft has been rapidly declining, while the demand for relatively expensive cars, homes, and boats has been expanding. This lost market may be difficult to recover even if the economic forces shift in favor of aviation.

REVIEW OF 1987

Fleet Composition and Aircraft Shipments

As of January 1, 1987, the general aviation active fleet consisted of 220,044 aircraft, up approximately 4.4 percent from 1986. Active fleet consists of any aircraft flown at least 1 hour during the previous year. Therefore, an aircraft is placed in the active fleet or the inactive fleet when the yearly status is reported by the registered owner in the sample survey of general aviation activity. It should also be noted that historical data are developed by a sample survey and subject to statistical variations. For the period 1980 through 1986, the fleet grew at a relatively constant annual growth rate of only 0.01 percent. In 1987, the single engine and multi-engine piston fleets were up 4.5 percent and 0.4 percent, respectively. From 1980 through 1986, the single engine piston fleet declined from 168,400 to 164,400, and multi-engine piston aircraft dropped from 25,100 to 23,880. For the 1980 through 1987 period, the turbine-powered fleet increased from 6,200 to 10,454, a yearly rate of growth close to 8.0 percent. Also during this period, the rotorcraft fleet grew at an annual rate of 2.0 percent, an increase from 5,800 to 6,943.

Shipments of general aviation aircraft (excluding helicopters, balloons, dirigibles, and gliders) declined approximately 17.6 percent in fiscal year 1987. Single engine piston aircraft deliveries fell 35.7 percent. Shipments of multi-engine piston increased 9.5 percent, turboprop aircraft increased 34.3 percent, and turbojet aircraft increased 24.4 percent.

Hours Flown

Total general aviation hours flown in fiscal year 1987 were 34.5 million, the same as fiscal year 1986. Single engine piston aircraft accounted for 63.7 percent of all hours flown, multi-engine piston aircraft for 14.2 percent, turbine-powered aircraft for 10.7 percent, and rotorcraft for 7.8 percent. Single engine piston aircraft hours flown declined 0.9 percent in 1987, while turbine-powered aircraft hours increased 2.3 percent, and rotorcraft hours increased 3.9 percent. During the period 1980 through 1987, total hours flown

declined at an annual rate of 2.8 percent, single engine piston aircraft hours flown declined at a rate of 4.1 percent, turbine-powered aircraft hours grew at a 1.9 percent rate, and rotorcraft hours flown declined at a rate of 1.9 percent.

In calendar 1986, personal and instructional use accounted for 42.9 percent of all hours flown down from 50.0 in 1970. Between 1970 and 1987, the use of general aviation for business grew at a 1.7 percent annual rate, and personal and instructional use increased at a rate of approximately 0.4 percent a year.

Pilot Population

The declining numbers of private pilots provide further evidence of general aviation's changing characteristics. As of January 1, 1987, the total pilot population was 709,110, down only 430 pilots from 1986. The current level is 14.3 percent below the maximum pilot population of 827,071 reached in 1981. For the period 1980 through 1987, the total active pilot population declined at a yearly rate of 2.0 percent. In 1987, the number of private pilots was down 1.7 percent from 1986. From 1980 through 1986, student pilots dropped from 210,180 to 146,652, a yearly rate of decline of 5.8 percent, but increased 2.4 percent in 1987 to 150,273. The private pilot population fell from 343,276 in 1980 to 305,736 in 1987, a yearly rate of decline of 3.0 percent.

DISCUSSION OF STRUCTURAL CHANGES

An indication that fundamental changes have taken place in the industry is the failure of aircraft shipments to respond to an expanding economy. During previous economic cycles, changes in the general aviation industry have generally paralleled changes in business activity. Empirical results have shown that on the average a 1.0 percent increase in GNP, adjusted for price changes, will increase general aviation unit shipments by about 4.2 percent. However, since the long, precipitous decline of aircraft shipments began in 1979, this expected result has not occurred. For example, in 1979 real GNP increased 2.8 percent, and shipments declined 4.3 percent. Again in 1981, real GNP increased 2.6 percent, while shipments declined 21.0 percent. In 1983, an especially good year for the economy, GNP increased 3.7 percent and unit shipments fell 37.0 percent. In 1984, deliveries dropped 10.0 percent while aggregate output of the economy increased an impressive 6.8 percent. In 1985 sales fell 17.0 percent, while GNP rose 2.7 percent. Although [illegible] shown strong growth, shipments continue to fall below [illegible] relatively long run of declining production and increasing real GNP [illegible] that other variables are outweighing the positive effects of income growth. It would not be expected that this persistent pattern would be due to [illegible] alone. Factors such as the availability of low cost alternatives for recreational flying, changes in tastes and preferences, declining [illegible] private pilots populations, rapidly rising prices and operating costs of conventional aircraft, and continued high real interest rates have all been contributing to the downturn. In the following sections these and other economic forces affecting aircraft sales [illegible] along with an analysis of aircraft prices.

Single Engine Piston Aircraft

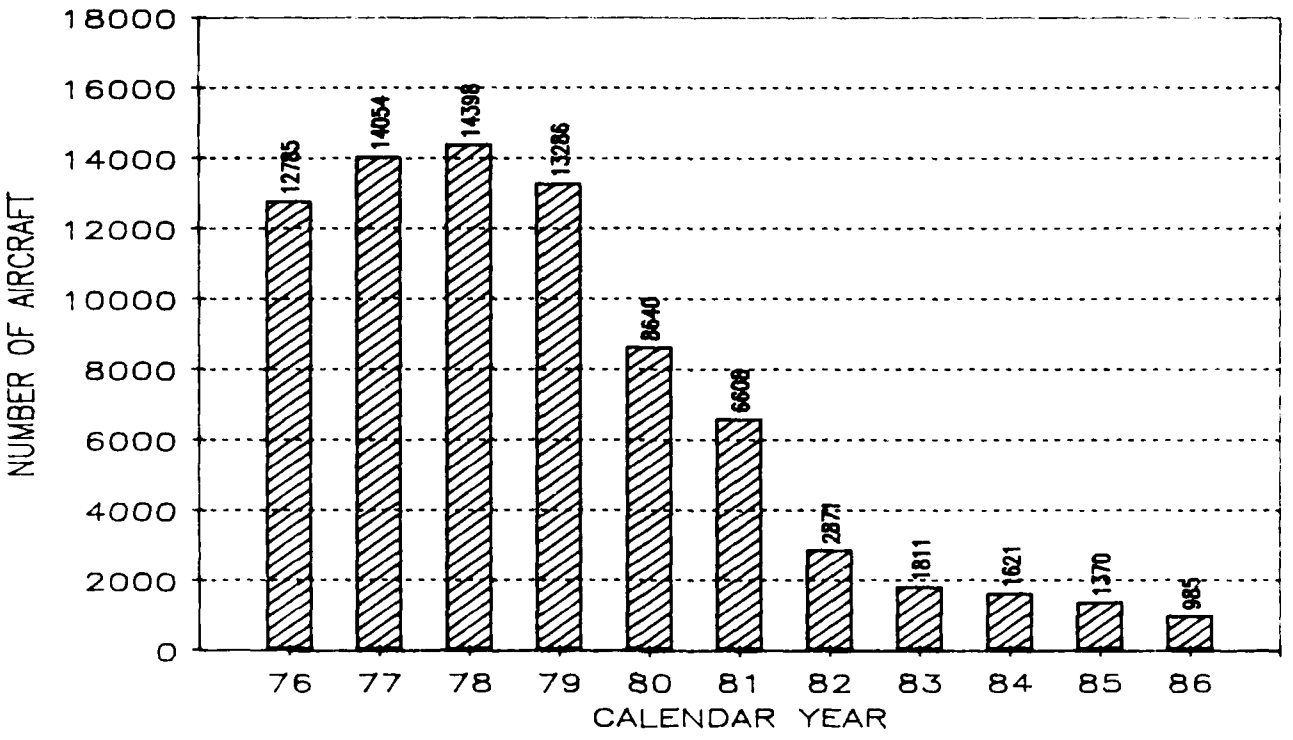
During the 1970's, single engine piston aircraft shipments increased at a steady rate, peaking in 1978 at 14,398 units. From 1978 through 1986, shipments continuously fell to 985 units, a yearly rate of decline of 39.8 percent. From 1978 to 1985, during this period of declining shipments, single engine piston aircraft prices increased at a yearly rate close to 11.0 percent. Real prices grew by a substantial 5.0 percent a year. The largest price increases occurred from 1980 through 1984. Prices during this period increased about 14.0 percent a year. Prices in 1985 increased 4.0 percent over 1984, and prices in 1986 increased approximately 7.0 percent. (The single piston price index has not been updated to 1987 because all of the plane models in the index have stopped production.) Operating and maintenance costs, particularly operating costs, have also been rising faster than the rate of inflation. From 1979 through 1983, fuel prices increased significantly due to the run up in OPEC oil prices in 1979. However, since 1984 prices have begun to decline, but at a relatively slow rate. The failure of general aviation gasoline and jet fuel prices to decline as rapidly as oil prices and the prices paid by commercial air carriers for jet fuel could be due to the desire of fixed base operators to maintain income levels in a shrinking market. Revenue from gasoline markups is generally used to pay for other services provided by the fixed base operator. When the amount of fuel sold decreases, the markup per gallon has to increase to pay these other costs. (See Appendix G, page 193 for the tabular presentation of price and cost indices.)

Multi-Engine Piston Aircraft

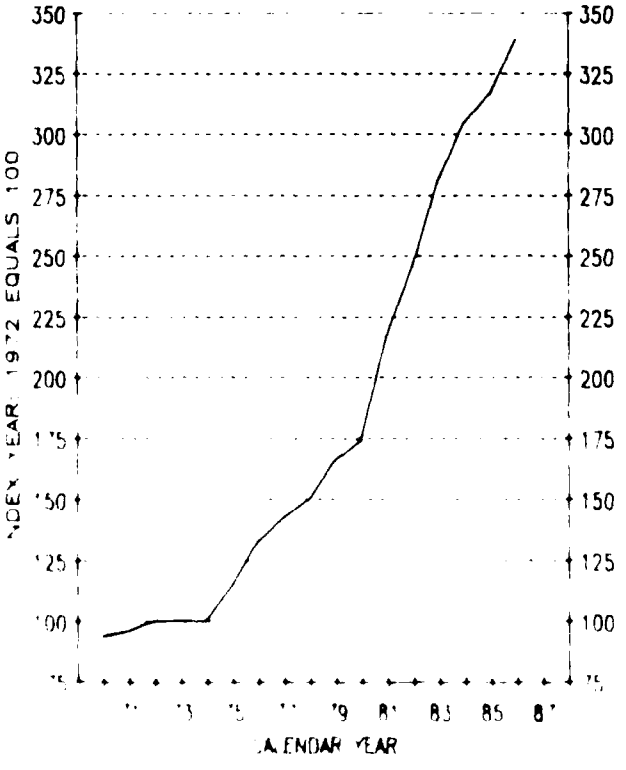
Shipments of multi-engine piston aircraft have followed a pattern similar to those of single engine piston aircraft. Shipments were strong throughout the 1970's, peaking in 1979 at 2,843 units. The average number of units shipped between 1970 and 1979 was 2,020. In 1986, only 138 aircraft were shipped, a decline of 95.1 percent from the peak in 1979. During the period of declining shipments, annual price increases were over 8.7 percent. Prices, adjusted for inflation, increased at a rate close to 2.3 percent. The growth of operating and maintenance costs during the 1970's and 1980's was also significant. For the period 1970 through 1987, operating and maintenance costs increased at a yearly rate of 7.8 percent; real costs increased at an annual rate of about 1.4 percent. The relative importance of operating costs and maintenance costs can be discerned by calculating independent growth rates for these two series. For the period 1970 through 1987, maintenance costs increased at a yearly rate of 7.4 percent, while operating costs predominantly fuel increased at a yearly rate of 8.6 percent. Clearly, the large increases in operating costs relative to maintenance costs are attributable to fuel price increases. (See Appendix G, page 193 for the tabular presentation of price and cost indices.)

SINGLE ENGINE PISTON AIRCRAFT TRENDS

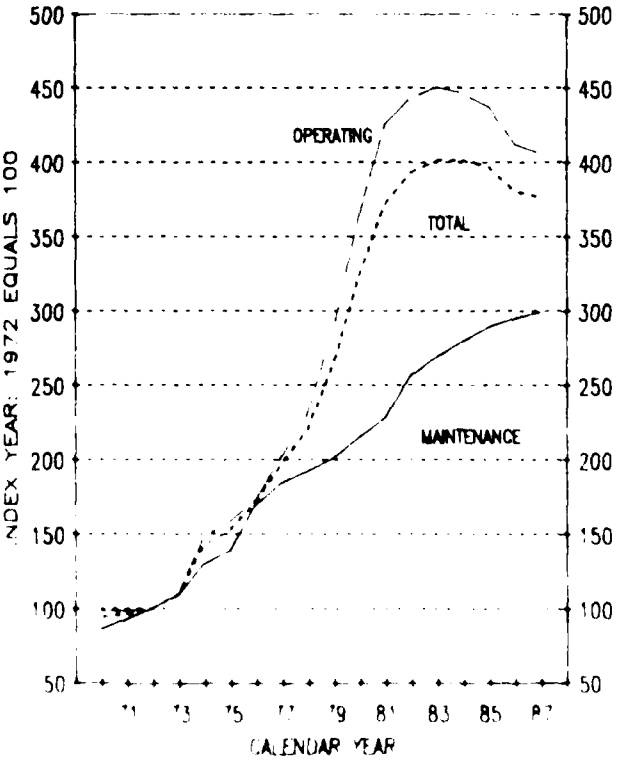
AIRCRAFT SHIPMENTS



AIRCRAFT PRICES

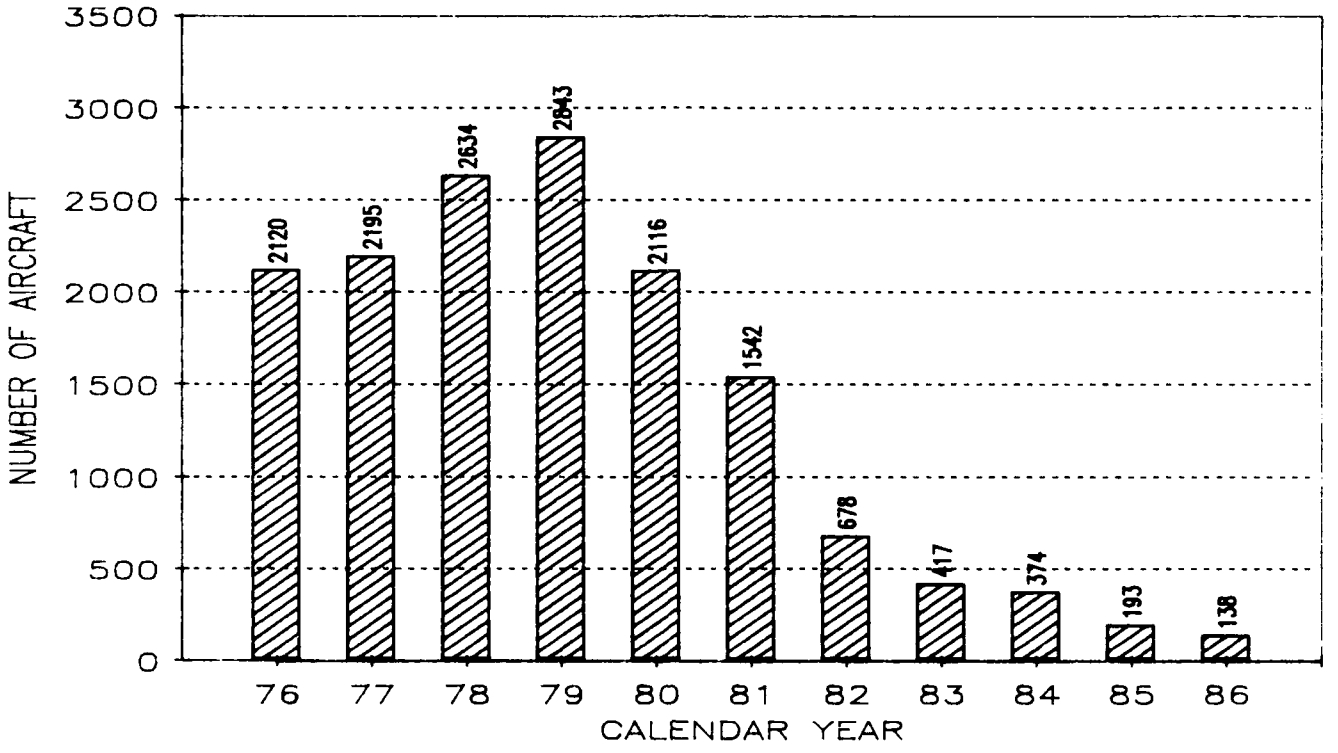


OPERATING AND MAINTENANCE COSTS/HOUR



MULTI-ENGINE PISTON AIRCRAFT TRENDS

AIRCRAFT SHIPMENTS



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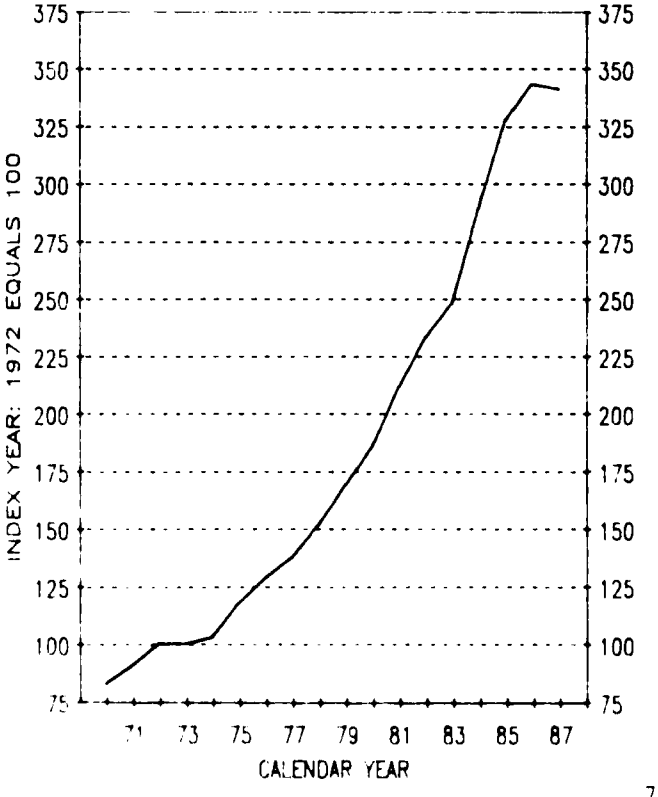
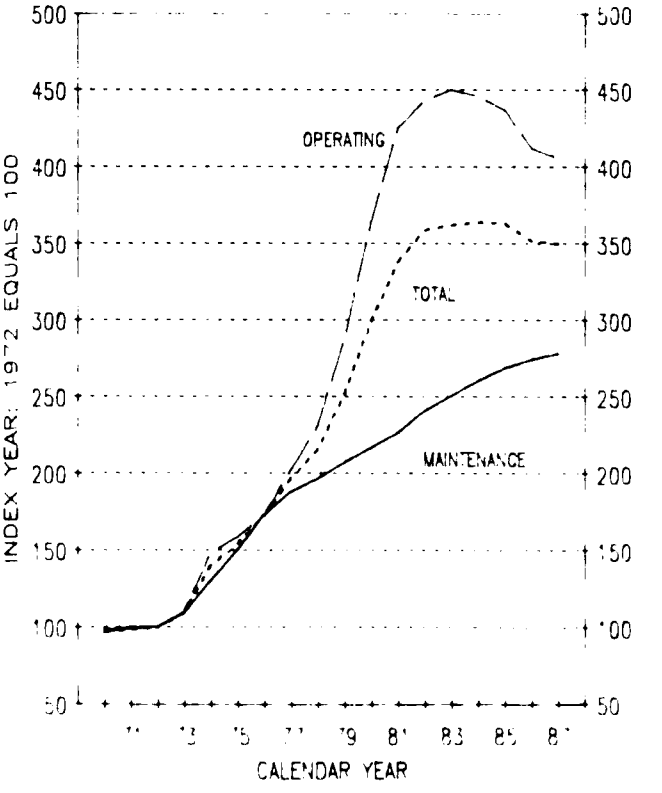


OPERATING AND MAINTENANCE COSTS/HOUR



Turboprop Aircraft

The piston market has not been the only segment of general aviation that has been experiencing a protracted recession. The demand for the larger, more sophisticated aircraft by business, which was expected to be strong throughout the 1980's, has been relatively weak for the past 7 years. The expectations for sustained strong growth were formed during the 1970's when shipments of turboprop aircraft were expanding at an exceptional rate. In 1971, 89 turboprop units were shipped. Shipments continued increasing throughout the 1970's, reaching a maximum of 918 units in 1981. The average yearly growth rate of shipments during this period was 26.0 percent. The rapid decline of shipments began in 1982. Deliveries reached a level of only 250 units in 1986, down 22.0 percent from 1985. Between 1979 and 1987, prices accelerated, increasing at an annual rate of 7.1 percent. Real prices increased at a 1.5 percent yearly rate. Operating and maintenance costs also showed large increases during the latter part of the 1970's and early 1980's. (See Appendix G for the tabular presentation of price and cost indices.)

Turbojet Aircraft

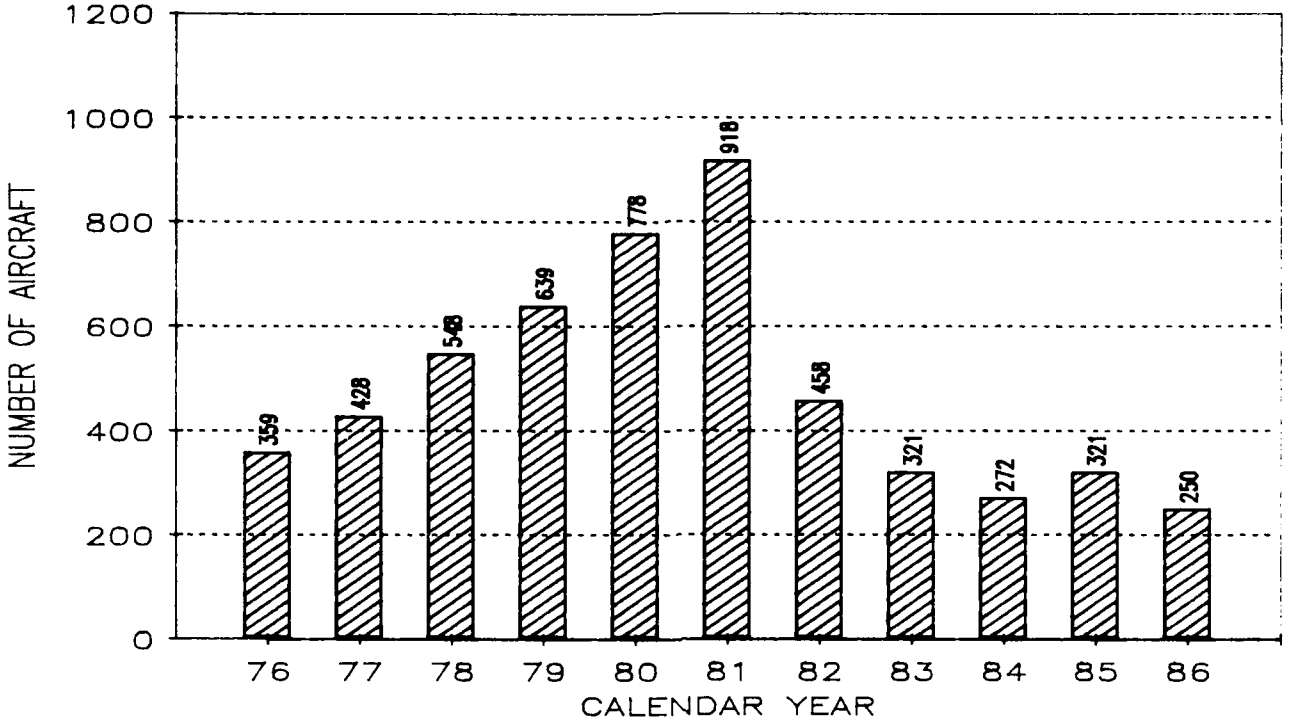
Shipments of turbojet aircraft which were 47 in 1971, reached a maximum of 389 in 1981, and then fell to 122 in 1986. This pattern is similar to that for the turboprop aircraft, rapidly increasing shipments during the 1970's, followed by a steep decline in the 1980's. During the growth period, shipments were increasing at an annual rate of over 24.0 percent. During the period of decline, shipments fell at an annual rate of approximately 26 percent. From 1979 through 1987, prices increased at a yearly rate of 7.9 percent, while real prices increased at a rate of 2.3 percent. Operating and maintenance cost movements paralleled those of the other aircraft previously discussed, increasing during the latter part of the 1970's and early 1980's, and then declining during the past 4 years, but not as fast as the decline in crude oil prices. (See Appendix G for the tabular presentation of price and cost indices.)

Exports

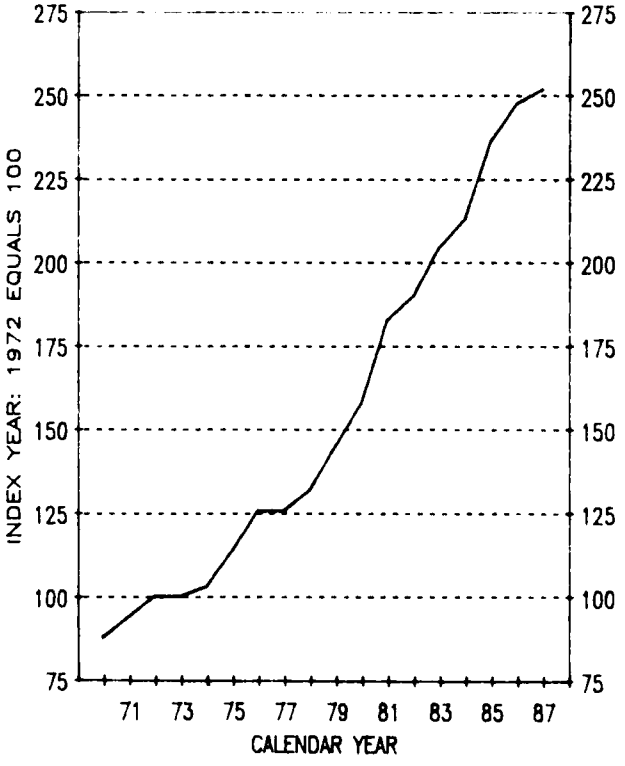
Foreign sales have also weakened during the past several years. Exports dropped from 3,995 units in 1979 to 440 in 1986, a yearly rate of decline of approximately 33.0 percent. Further, net billings from exports declined from $756.4 million in 1980 to $230 million in 1985, but increased 49.4 percent to $343.6 million in 1986. Recent analyses have shown that prices of aircraft, the exchange rate, and world gross national product explain a large percentage of the variability in exports. In addition, the analyses indicated that relatively small increases in prices and the exchange rate will have a large negative impact on the foreign market. The turnaround in exports would seem to be partly related to the continued improvement in exchange rates.

TURBOPROP AIRCRAFT TRENDS

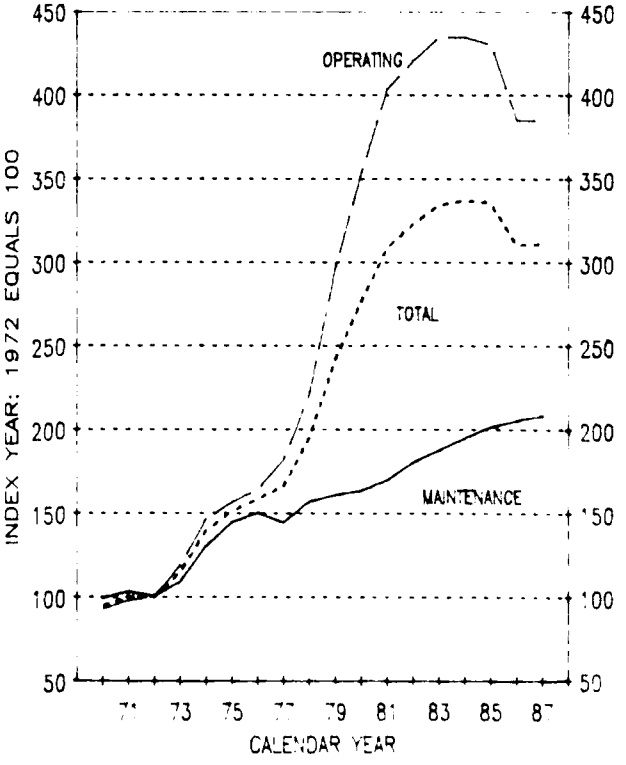
AIRCRAFT SHIPMENTS



AIRCRAFT PRICES

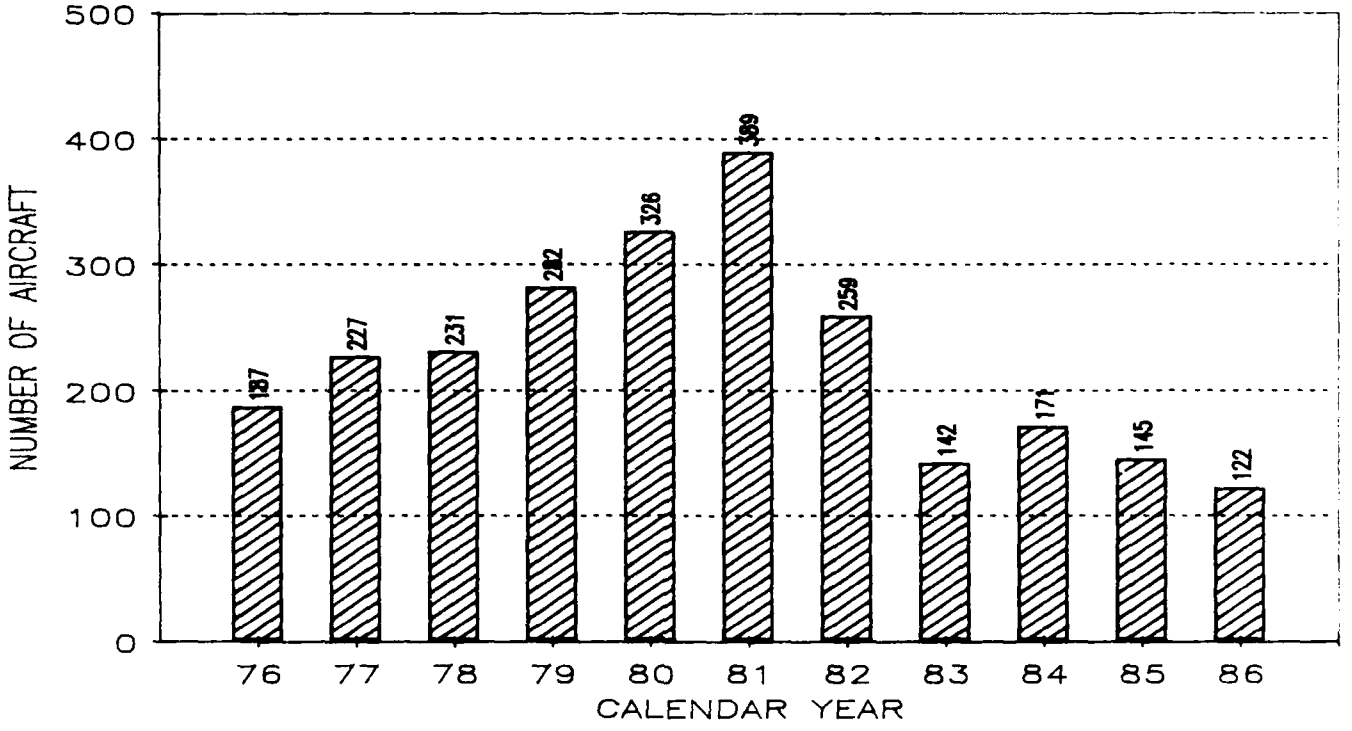


OPERATING AND MAINTENANCE COSTS/HOUR

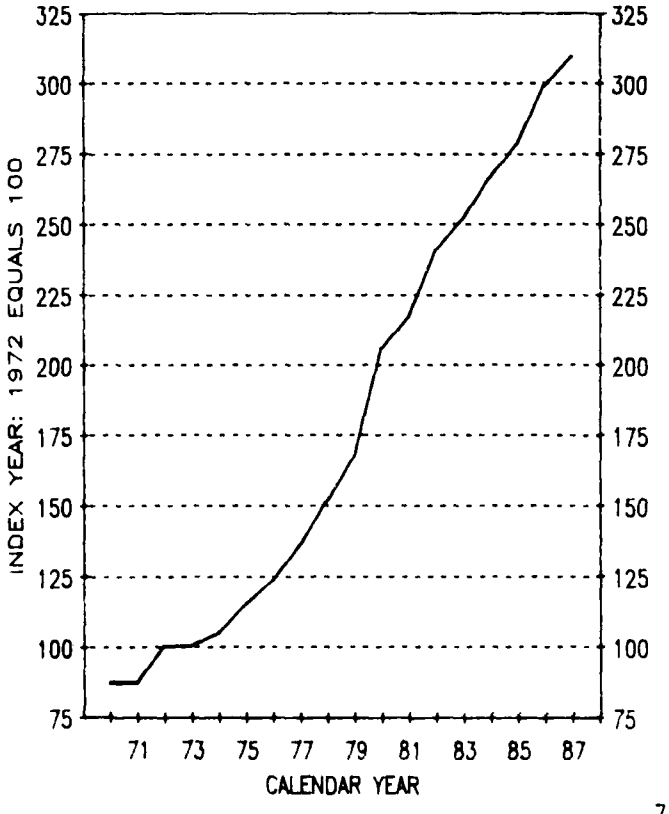


TURBOJET AIRCRAFT TRENDS

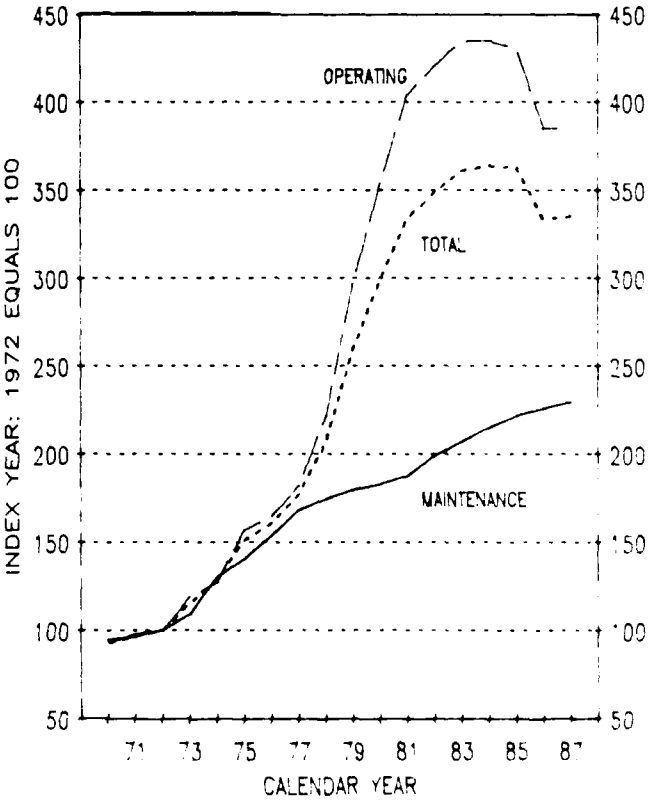
AIRCRAFT SHIPMENTS



AIRCRAFT PRICES



OPERATING AND MAINTENANCE COSTS/HOUR



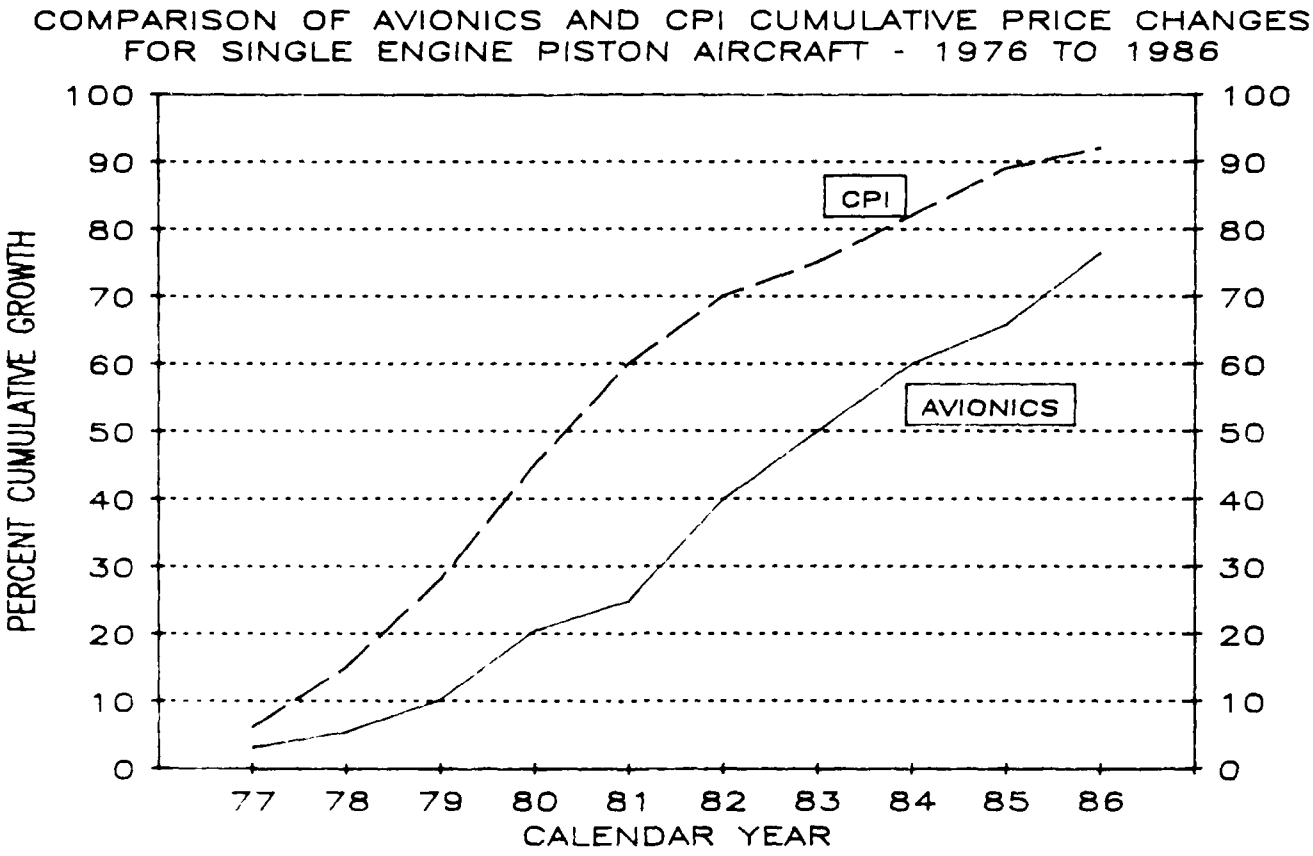
Aircraft Price Analyses

Numerous studies during the past few years have shown that accelerating aircraft prices and operating and maintenance costs during the latter part of the 1970's and throughout the 1980's have had a dampening effect on domestic and international sales. Insights have been made into the reasons for the continued high operating costs. It was pointed out earlier that fuel prices have not declined as quickly as crude oil prices because of the desire of fixed base operators to maintain income levels in a shrinking market. In analyzing the underlying causes of price increases, however, inferences could only be made from a very limited data base. Data on the costs of aircraft production are unavailable. A breakdown of the costs of production over a relatively long time period is essential for isolating the factors that have been responsible for the recent escalation of prices.

Price of Avionics

In order to look at price changes for avionics separately from aircraft prices, a 10-year time series of prices was constructed for six pieces of equipment suitable for installation on single engine piston aircraft. Prices for distance measuring equipment (DME), emergency location transmitters (ELT), transponders, VHF navigation receivers, VHF communication transceivers, and VHF navigation receiver/communications transceivers were collected for the years 1976 through 1986. It was not possible to obtain historical or current sales data for each of these items. Therefore, the average yearly prices for a number of models made by several different manufacturers were computed. In the process of computing the average prices, some of the most expensive items were eliminated since it is unlikely they would be installed on a single engine piston aircraft. Tables in the published study present item prices, average prices, annual growth rates, year-to-year price changes, and growth rates of the Consumer Price Index (CPI) for the same 10-year period. The graph of avionics and CPI cumulative price changes illustrates the overall results of the study.

Although there is considerable variation in year-to-year prices, avionics prices generally increased less than the CPI for the same 10-year period. For example, the average annual growth rate for DME's was higher than the CPI in only 1 year, 1978. By 1986, the average annual growth rate for prices over the 10-year period was 3.7 percent compared with 6.7 percent for the CPI. This situation is generally true for all the equipment except for ELT's. The price increase may be partially explained by the fact that when ELT's were first required by the FAA, a number of manufacturers jumped into the market to equip the large active fleet of general aviation aircraft, creating [illegible] competition. As the market began to taper off, many [illegible] ceased production enabling those in the business for the long term to [illegible] their markup and improve profitability. Over the period [illegible] has been very little change in FAA requirements for avionics [illegible] and capability of avionics have improved greatly over the [illegible] of technological advances. The advent of digital [illegible] substantial reduction in cost of production, [illegible] power requirements. These improvements have also [illegible] the useful life of the equipment. In some cases [illegible] smaller size have provided incentive for [illegible] equipment for safety and convenience.



Pilot Trends

The continuing decline in the numbers of private pilots provides further evidence that structural changes are occurring in general aviation. This trend will also contribute to the slowing of activity at FAA facilities. For the period 1979 through 1985, the number of student pilots fell from 210,000 to 140,000, a decline of 6.0 percent a year. In 1987 it rose to 150,273, a 7.3 percent increase. During the 1960's and 1970's, the number of student pilots generally followed changes in economic activity. This pattern, however, has not occurred in the 1980's. Periods of robust economic growth have not been accompanied by a resurgence of pilot training. Rapidly rising training costs, aircraft prices, and operating and maintenance costs are partly responsible for this phenomenon. A fundamental change may be occurring in the tastes and preferences of consumers for flying. In the long-term, this could have a greater impact on the market than the real growth of aircraft prices and training costs. A declining population of students, except for last year, and an moderate attrition rate of private pilots have reduced the total number of active pilots over the last 6 years. From 1980 to 1986, the total number of active private pilots fell from 357,479 to 305,736, a yearly rate of 2.5 percent. Based on the turnaround in students pilots and the strong demand for airline transport pilots, the downward trends in the active pilot population are expected to turn around in 1988. Slow growth is projected for the remainder of the forecast period.

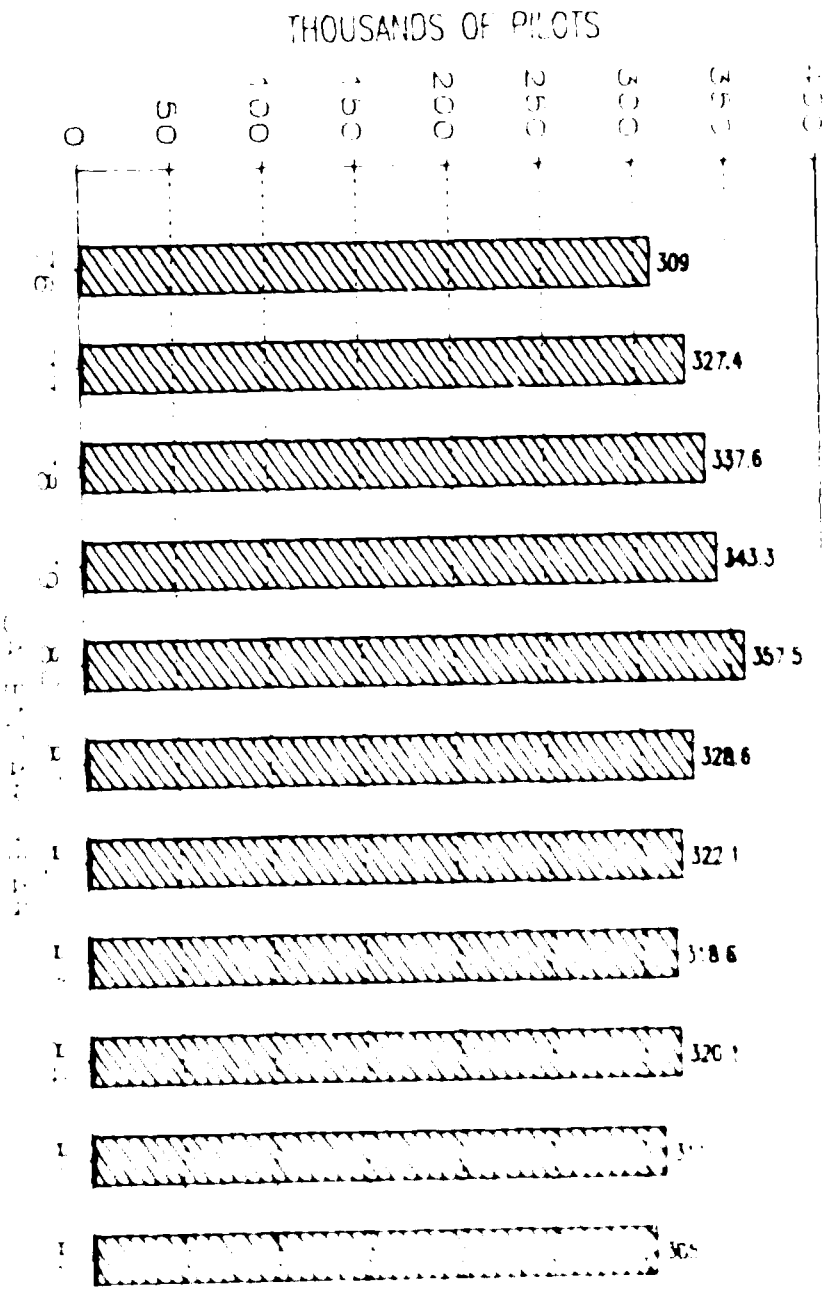
GENERAL AVIATION FORECASTS

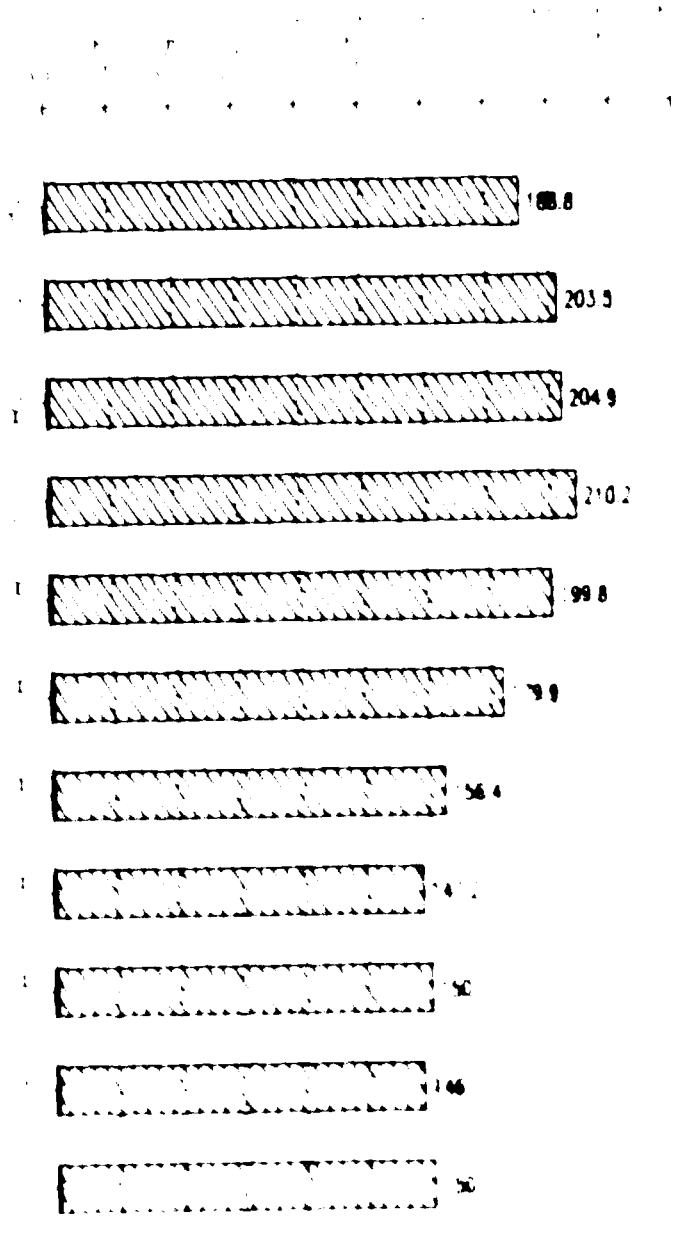
Hours Flown

Growth over the entire forecast period for general aviation hours is expected to average only 0.4 percent a year, resulting in an estimated [illegible] million hours flown in 1998. During the 1960's and 1970's, the average annual growth rate of hours flown was about 6.0 percent. Single engine piston aircraft hours flown is forecast to decline from 22.0 million hours in [illegible] to [illegible] million in 1999. Turbine-powered aircraft hours flown is projected to increase from 4.5 million in 1987 to 6.0 million in 1999, growing at the rate of [illegible] percent a year. Turbine rotorcraft hours flown is expected to increase at a yearly rate of 2.4 percent.

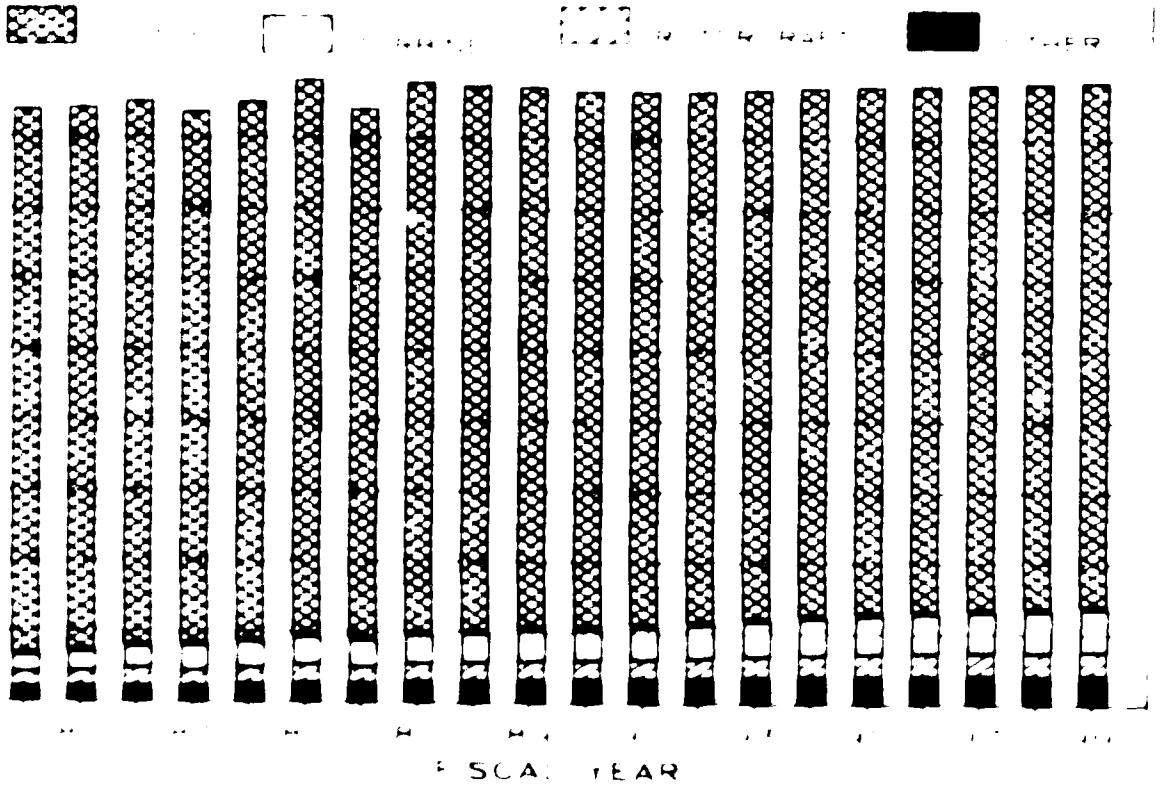
Fleet

The active general aviation fleet will decline from [illegible] through 1992, then grow slowly for the remainder of the forecast period. The population of active aircraft is forecast to increase only slightly over the 12 year period with a decline of 0.2 between 1987 and 1992, and 0.2 percent growth in 1992 to 1999. Active single engine piston aircraft is projected to decline at an annual rate of 0.4 percent, falling from 171,800 in 1987 to 162,200 in 1999. The number of multi-engine piston aircraft is expected to decline through 1993, and then to increase at about 100 aircraft per year until the total reaches the present level of 23,900. Turbine powered aircraft is projected to increase from 14,300 in 1987 to 15,700 in 1999, growing at the rate of approximately 1.2 percent a year. The forecast of the turbine rotorcraft fleet shows a yearly rate of increase of 1.9 percent.


THOUSANDS OF PILOTS
0
50
100
150
200
250
300
350
400
309
327.4
337.6
343.3
357.5
328.6
322.1
320.1

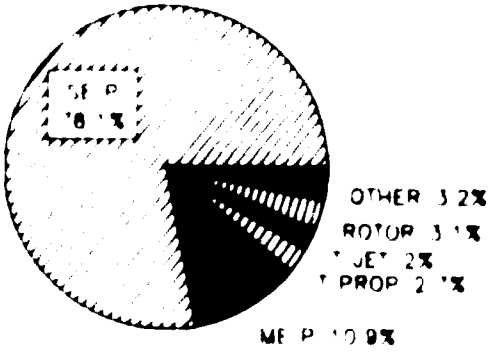

203.5
204.9
99.8
56.4

A[illegible] GENERAL AVIATION AIRCRAFT

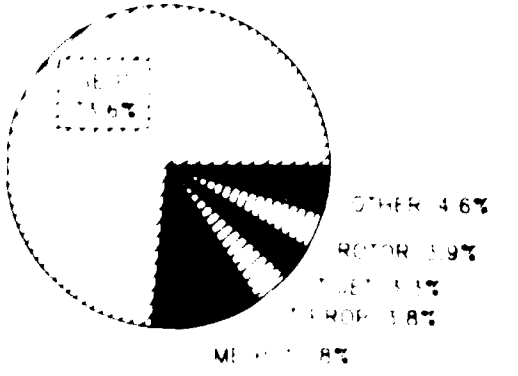


FISCAL YEAR

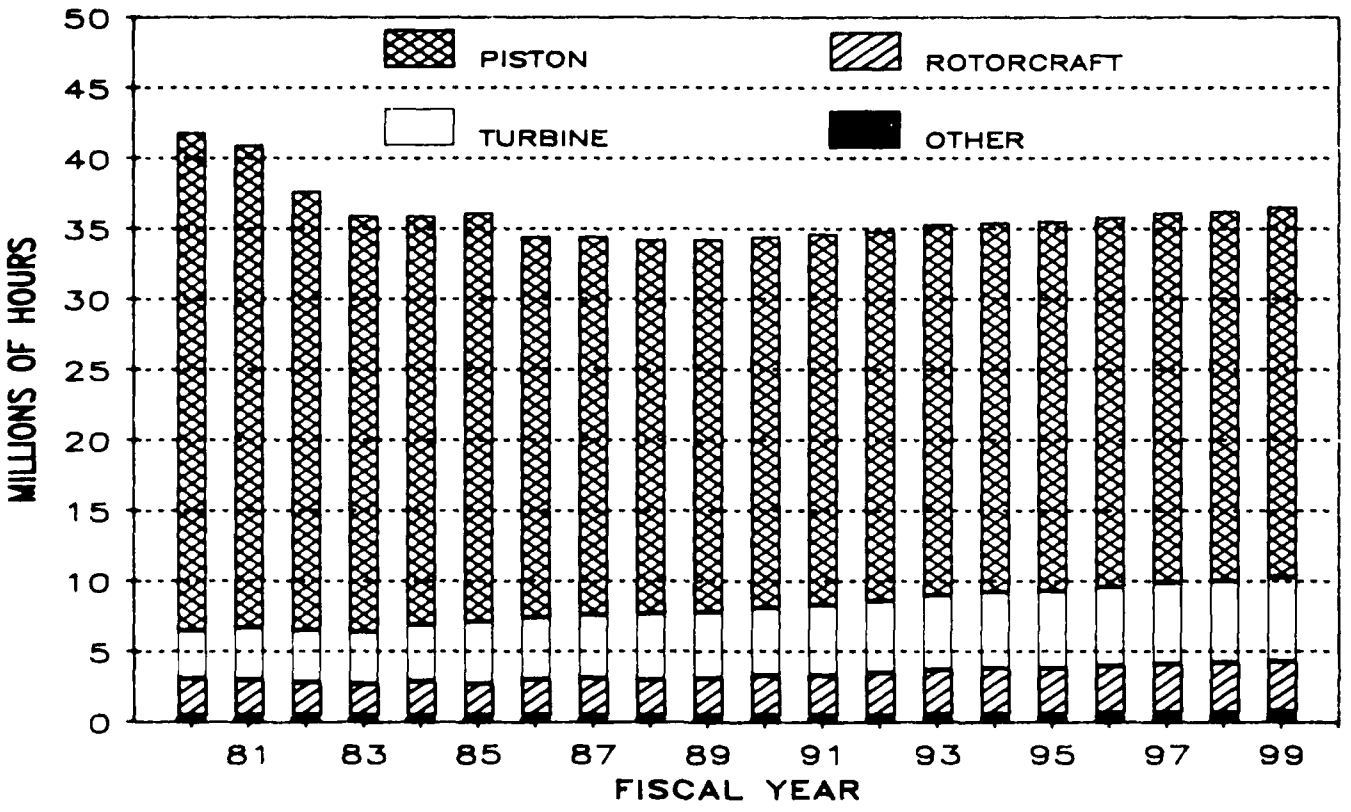
PERCENT BY AIRCRAFT TYPE



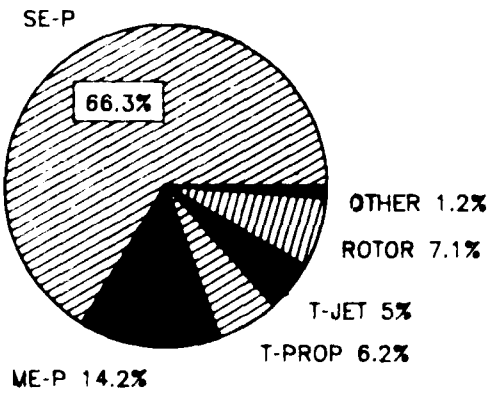
'88



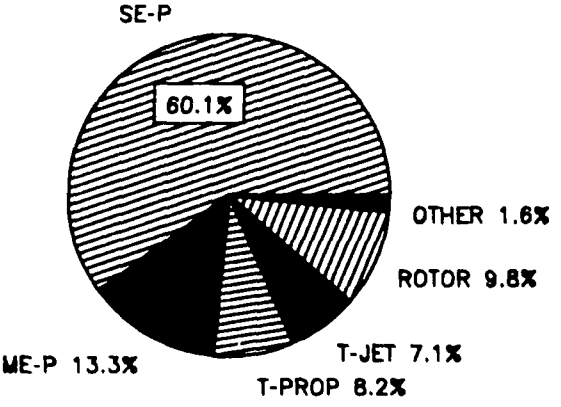
GENERAL AVIATION HOURS FLOWN



PERCENT BY AIRCRAFT TYPE



1987



1999

CHAPTER VI
HELICOPTERS

REVIEW OF 1987

Shipments

Preliminary data for calendar year [illegible] helicopters will total 283, a [illegible] percent decrease [illegible] helicopters shipped in 1986. [illegible] \$250 million compared with \$[illegible] million [illegible] Exports of civil helicopters fell to [illegible] \$84 million. Consequently, production for export [illegible] made a net contribution of \$1[illegible] million [illegible] \$55 million less than the contribution made in [illegible] shipments have declined considerably since the [illegible] Recovery in the industry tends to lag behind the [illegible] national economy. However, the recessionary conditions [illegible] helicopter industry in preceding years continued in [illegible]

Key factors responsible for the depressed state of the [illegible] include the continuation of the oil glut, low levels of oil [illegible] and exploration, an ample supply of used helicopters, and with the [illegible] exception of the New York/New Jersey area, inability of helicopter [illegible] penetrate passenger markets. In addition, a number of operators [illegible] upgrading their helicopter fleets with units that outperform their predecessors in range, speed, and capacity. The net effect of such upgrading is greater efficiency; fewer helicopters can perform a greater number and variety of tasks than those performed prior to upgrading. The end result, however, is that the anticipated rebound in the civil helicopter industry failed to materialize except in areas such as emergency medical services and in police and weather related work where demand continues to be steady.

The technology for a military tilt-rotor aircraft has been demonstrated successfully and such aircraft are on order for the armed forces. It is likely a question of time before a modified version of the tilt rotor aircraft penetrates the civilian market. The aircraft functions as a helicopter on takeoffs and landings, and is capable of flying at a cruise speed of 300 knots per hour at an altitude of 20,000 to 25,000 feet as a conventional fixed-wing aircraft.

Fleet and Hours Flown

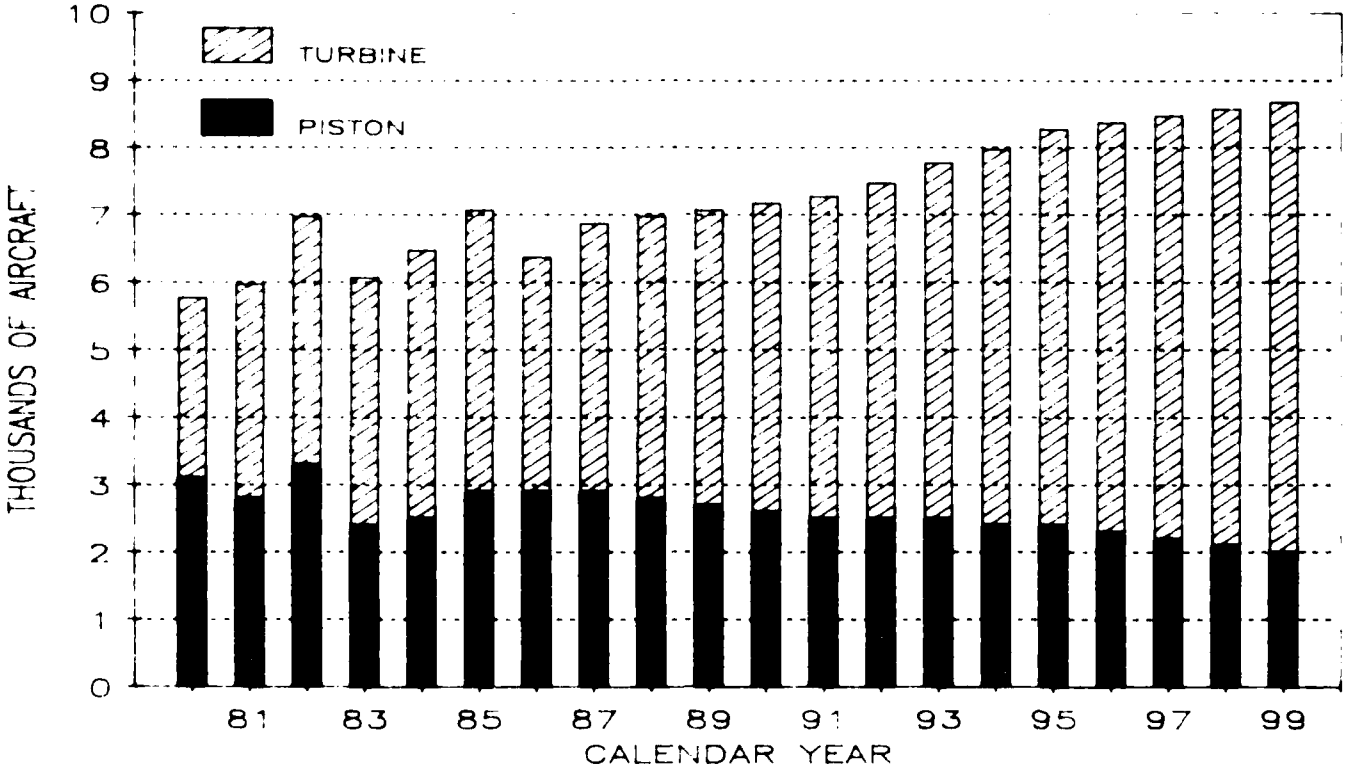
HELICOPTER FORECASTS

The forecasts of rotorcraft fleet and hours flown presented in this report represent a consensus of results derived from econometric analysis, trend analysis, and industry projections. The results were developed using recent benchmark data for calendar year 1989 and assume continued economic conditions in the industry.

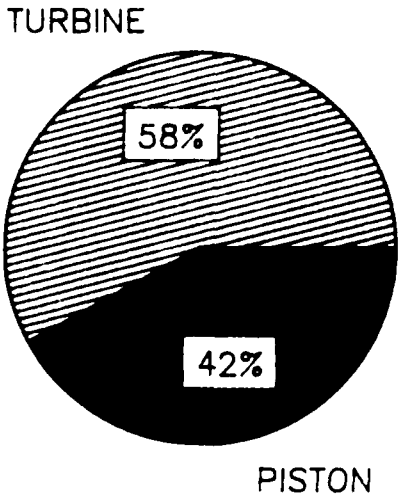
Fleet and Hours Flown

Fuel Consumed

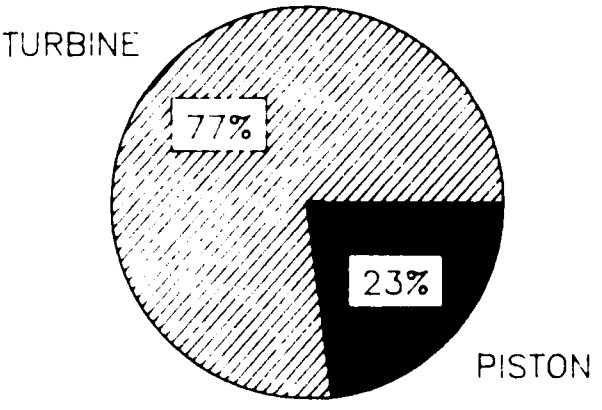
ACTIVE ROTORCRAFT



PERCENT BY AIRCRAFT TYPE

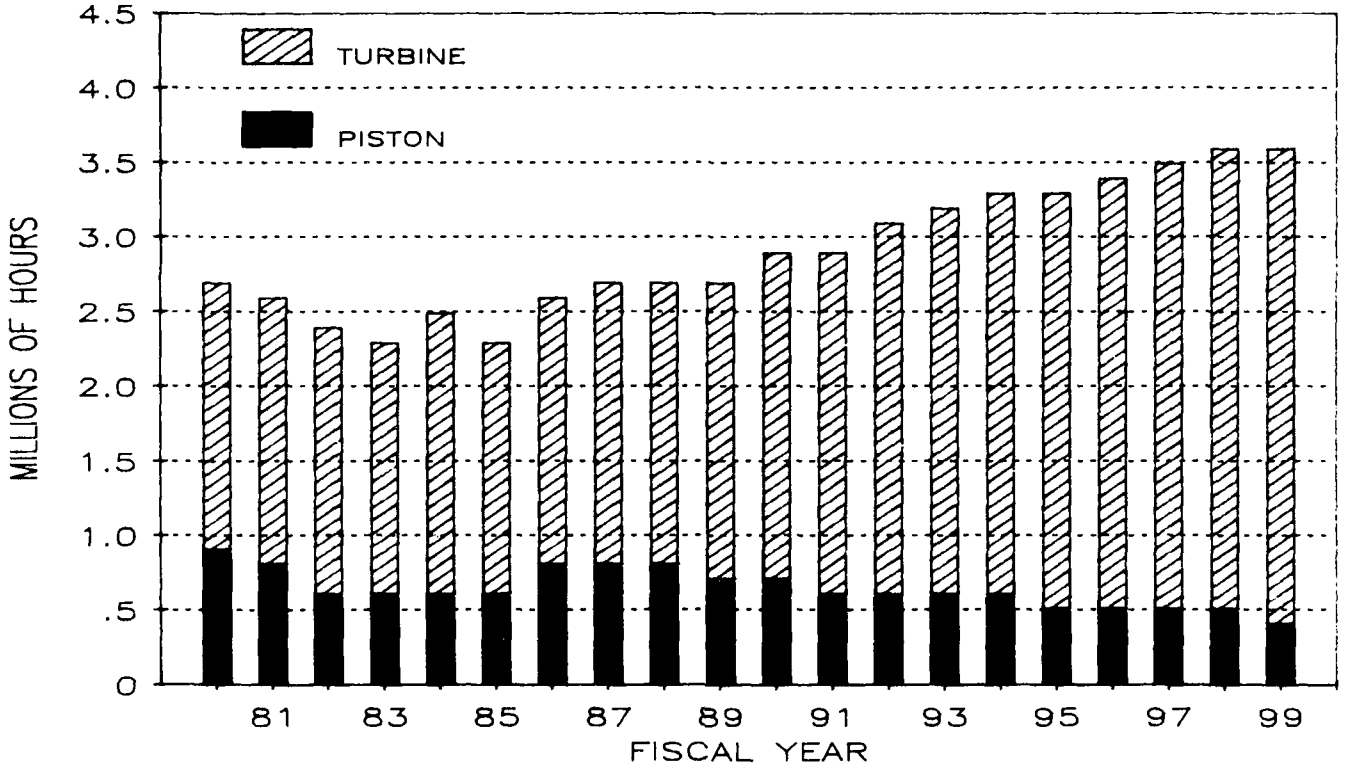


1987

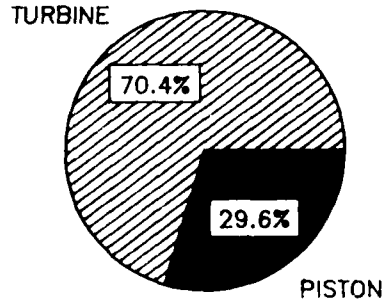


1999

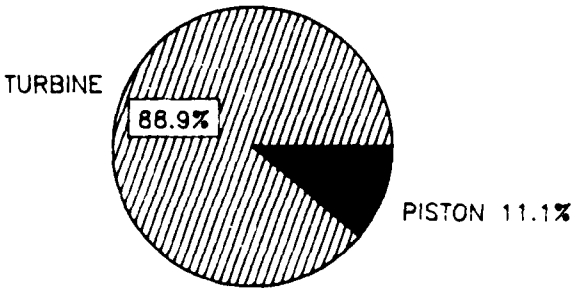
ROTORCRAFT HOURS FLOWN



PERCENT BY AIRCRAFT TYPE



1987



1999

CHAPTER VII

FAA WORKLOAD MEASURES

The FAA provides the aviation community with three distinct operational services: air traffic control at selected airports, traffic surveillance and aircraft separation by Air Route Traffic Control Centers, and flight planning and pilot briefings at Flight Service Stations. All four aviation system user groups--commercial air carriers, commuters/air taxis, general aviation, and military--utilize these operational services to enhance aviation traffic safety.

Multiple indicators are used to describe the total FAA operational workload. The four aviation system user groups differ in the demands they impose on the air traffic system. Consequently, no single measure typifies past trends or future demand for the services provided by the FAA. There have been, and will continue to be, different socioeconomic forces driving the growth of each of the aviation-user categories.

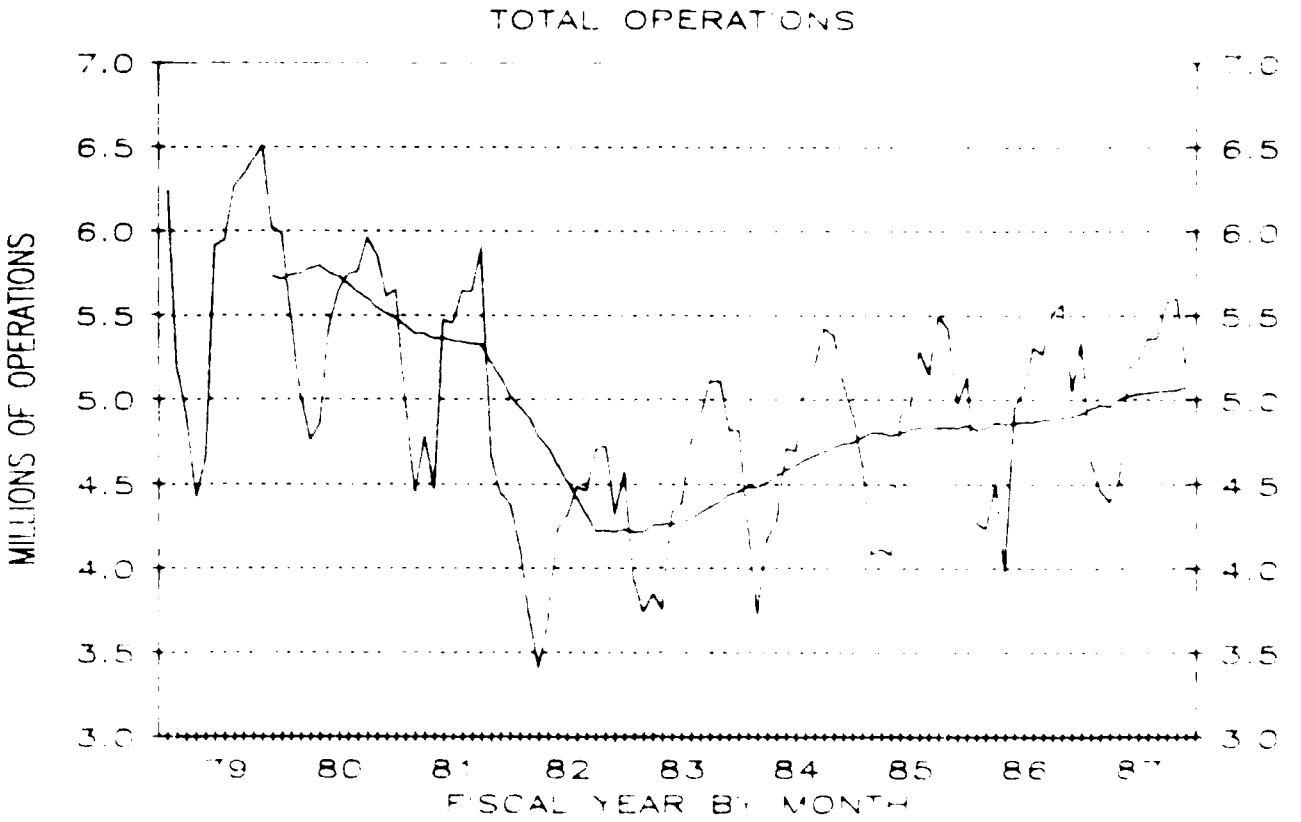
REVIEW OF 1987

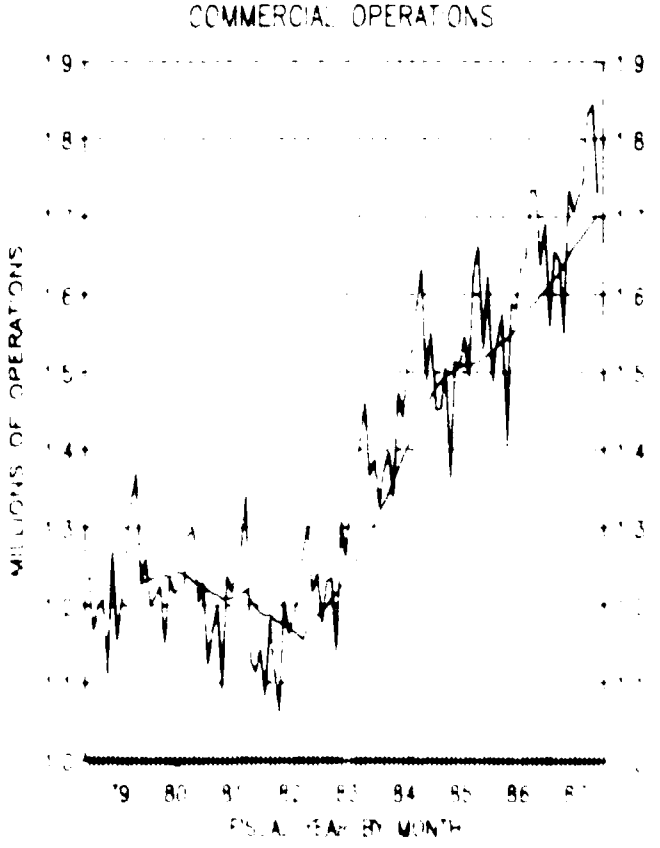
FAA Tower Activity

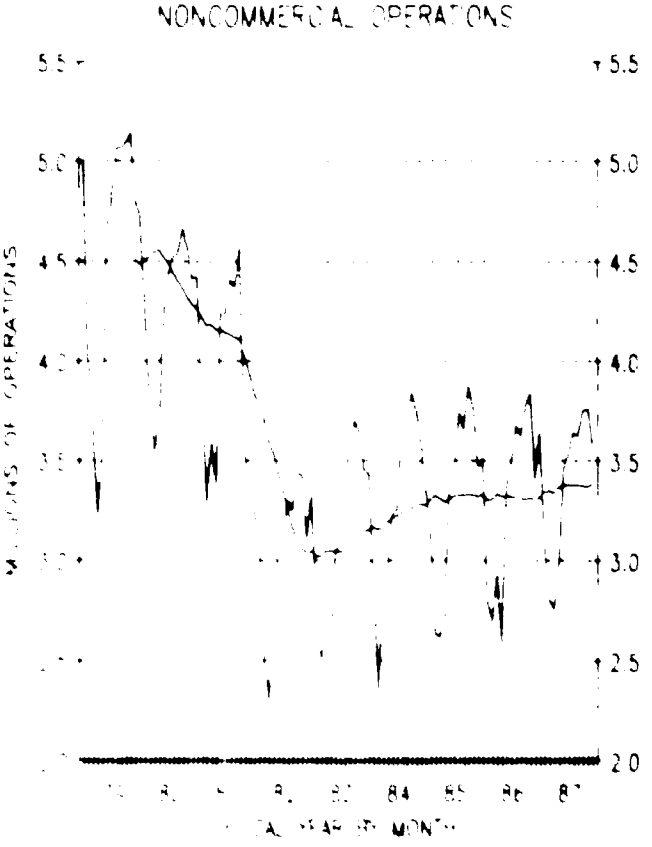
Aircraft activity at the [illegible] FAA towered airports [illegible] fiscal year 1987, the fifth consecutive year of growth. During this time period, operations at FAA towers have increased [illegible] from [illegible] million operations [illegible]

[illegible]

TOWERED AIRPORT OPERATIONS
ACTUAL AND 12-MONTH MOVING AVERAGE







[illegible] operations at FAA towered airports totaled 13.076 million in 1987, [illegible] 1986 and [illegible] percent above the 9.049 million [illegible] in fiscal year 1982, the first year following the air [illegible]. The [illegible] in air carrier activity in 1987 was due [illegible] activity at large and medium hub air carrier [illegible] activity was aided by three factors: (1) the [illegible] minimal or to retirement of the [illegible] increased utilization of aircraft in the [illegible]

[illegible] the fastest growing user group over the past [illegible] fiscal year 1987. This level of activity [illegible] percent over depressed 1982 activity levels. [illegible] air taxi/commuter operations had shown an increase in every [illegible] activity was first initiated in fiscal year 1972. The [illegible] appears to have been a one-time [illegible] of related factors. The increase [illegible] code-sharing and schedule tie-in agreements [illegible] carriers resulted in a rationalization of the [illegible] systems. In addition, these agreements precipitated a [illegible] small commuter aircraft under 30 seats to the larger and [illegible] thought to be more comparable to the jet aircraft [illegible] air carriers. While these factors resulted in an [illegible] the number of seats offered in air carrier/regional tie-in markets, [illegible] a slight decline in the number of regional/commuter [illegible]

[illegible] activity at FAA towered airports increased by [illegible] fiscal year 1987, this segment of the aviation community has, [illegible] failed to respond to the general upturn in the U.S. economy [illegible] The 37.811 million operations recorded in 1987 equalled [illegible] percent of the pre-strike level of operations. However, local general aviation did show signs of revival, increasing by 3.8 percent in fiscal [illegible] 23.438 million operations. Unfortunately, itinerant general [illegible] rose by only 0.1 percent, totaling 22.068 million operations.

Military operations totaled 2.129 million in fiscal year 1987, 3.8 percent above 1986 levels. Itinerant military activity increased by 1.3 percent [illegible] operations) while local military operations increased by [illegible] percent [illegible] million) in fiscal year 1987.

Instrument Operations

Instrument operations handled at FAA towers totaled 43.64 million in 1987, [illegible] percent above the 1986 activity level and 11.7 percent above the level of activity recorded in the pre-strike period. A large part of this increase can be attributed to expanded air carrier and regional/commuter hubbing activity at large and medium hub airports. Instrument operations performed by commercial carriers increased by 8.3 percent in fiscal year 1987, with commuters/air taxis leading all user groups with a 10.6 percent increase. Air carrier operations increased [illegible] percent during this same time period.

AD-A191 711 FAA AVIATION FORECASTS FISCAL YEARS 1988-1999(U) 2/3
FEDERAL AVIATION ADMINISTRATION WASHINGTON DC OFFICE OF
AVIATION POLICY AND PL ANS FEB 88 FAA-APO-88-1

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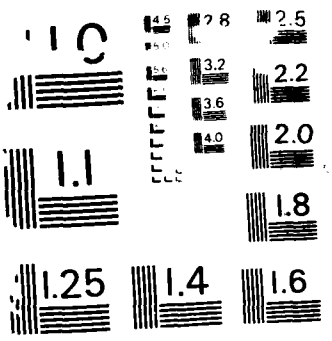
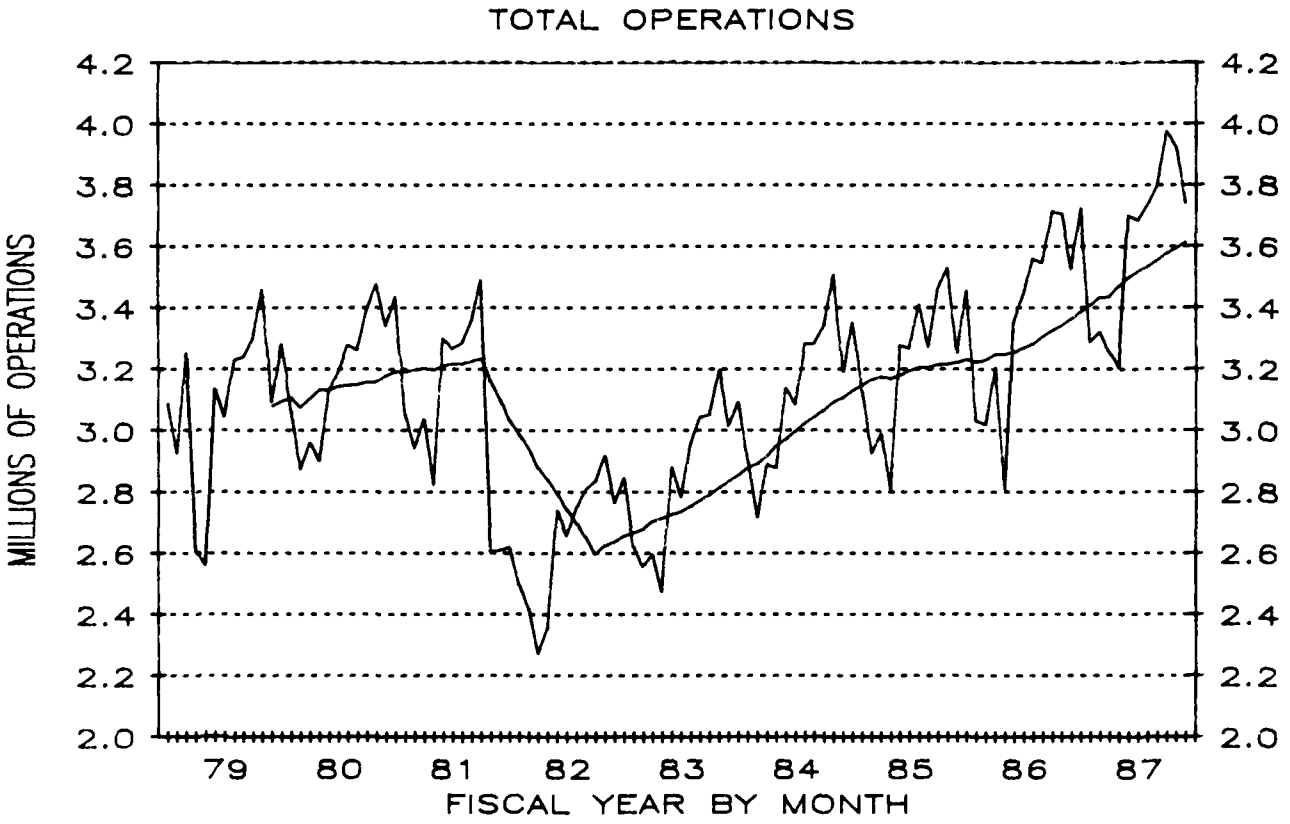
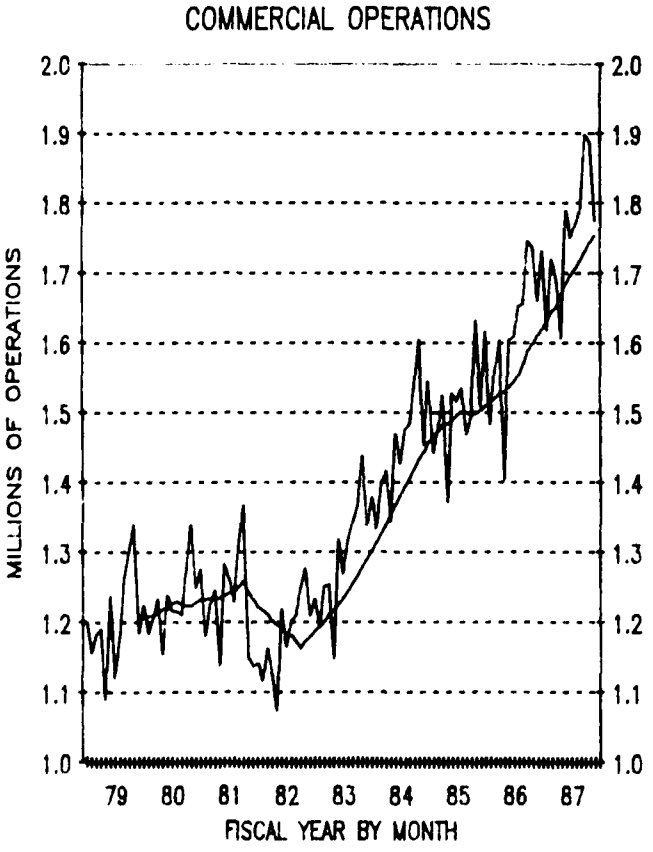
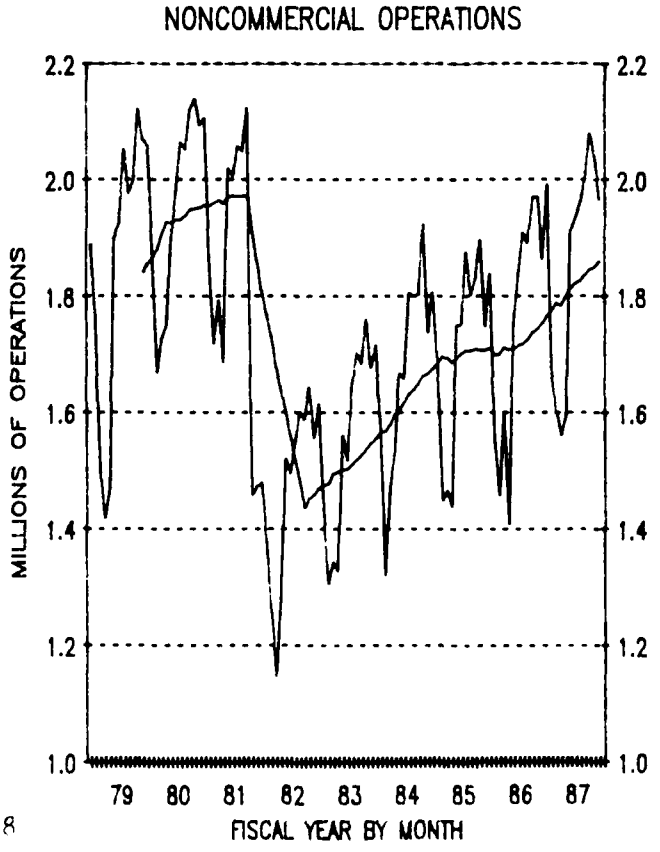


TEST CHART

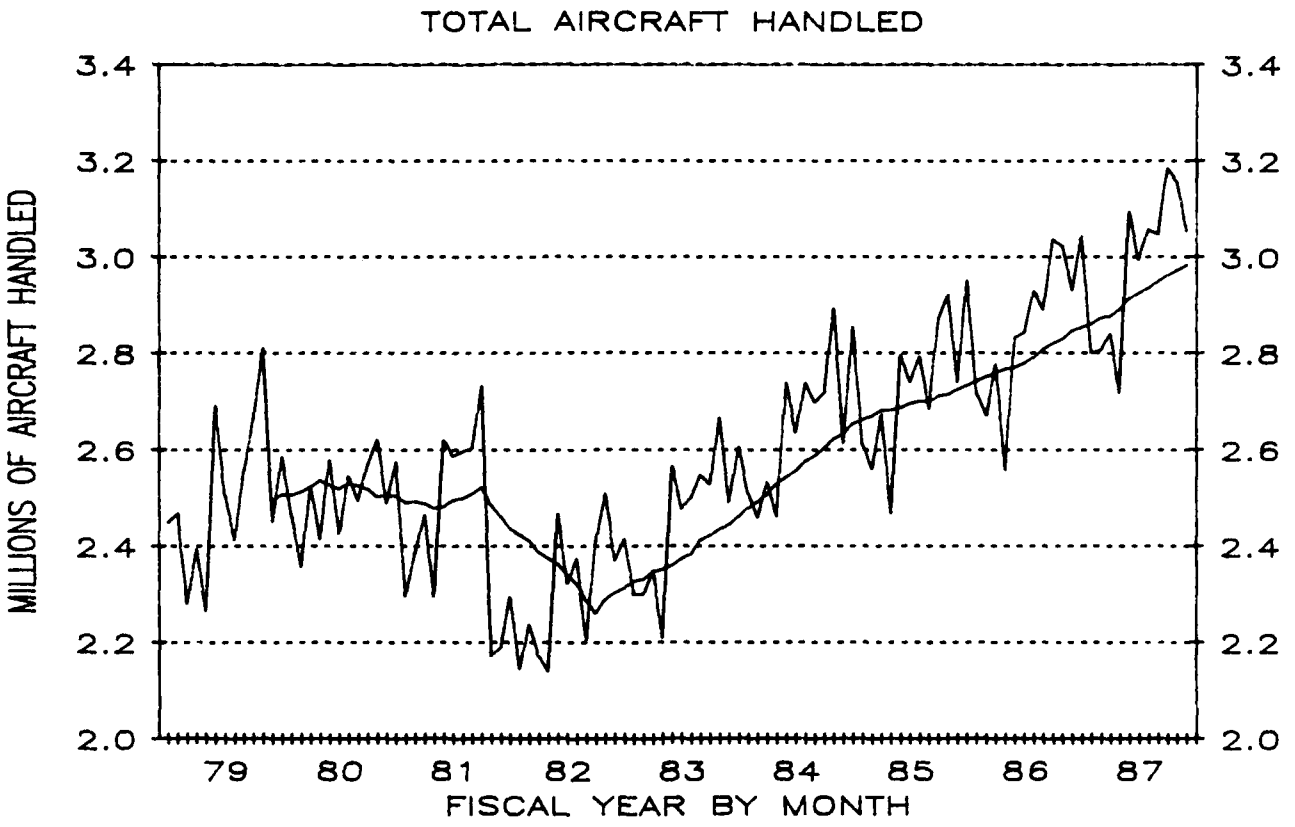
INSTRUMENT OPERATIONS
ACTUAL AND 12-MONTH MOVING AVERAGE

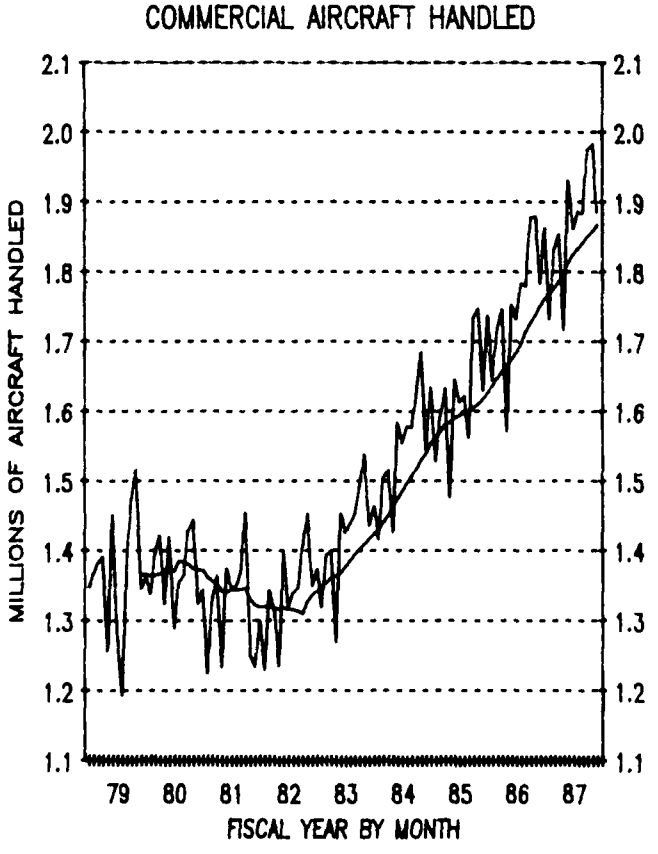


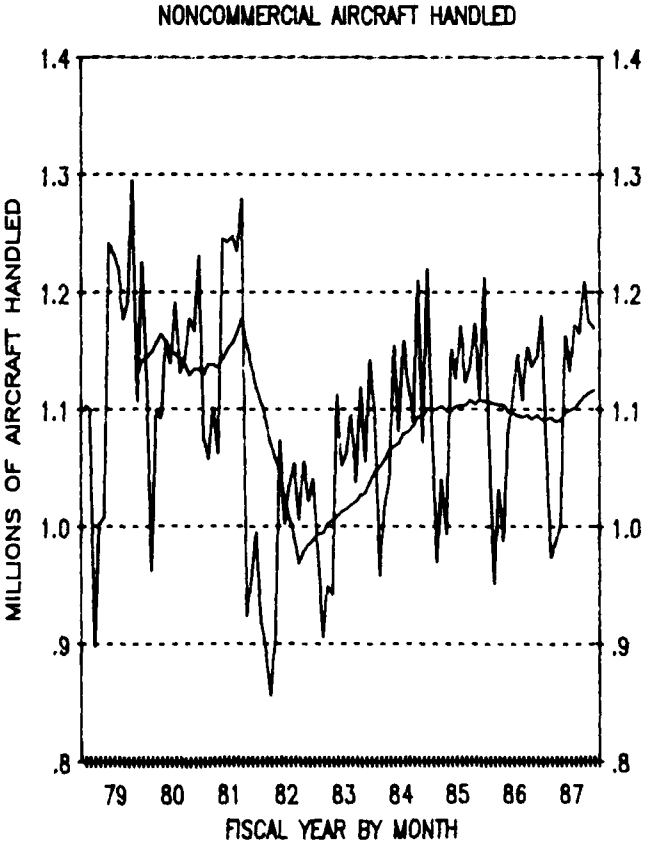




IFR AIRCRAFT HANDLED
ACTUAL AND 12-MONTH MOVING AVERAGE







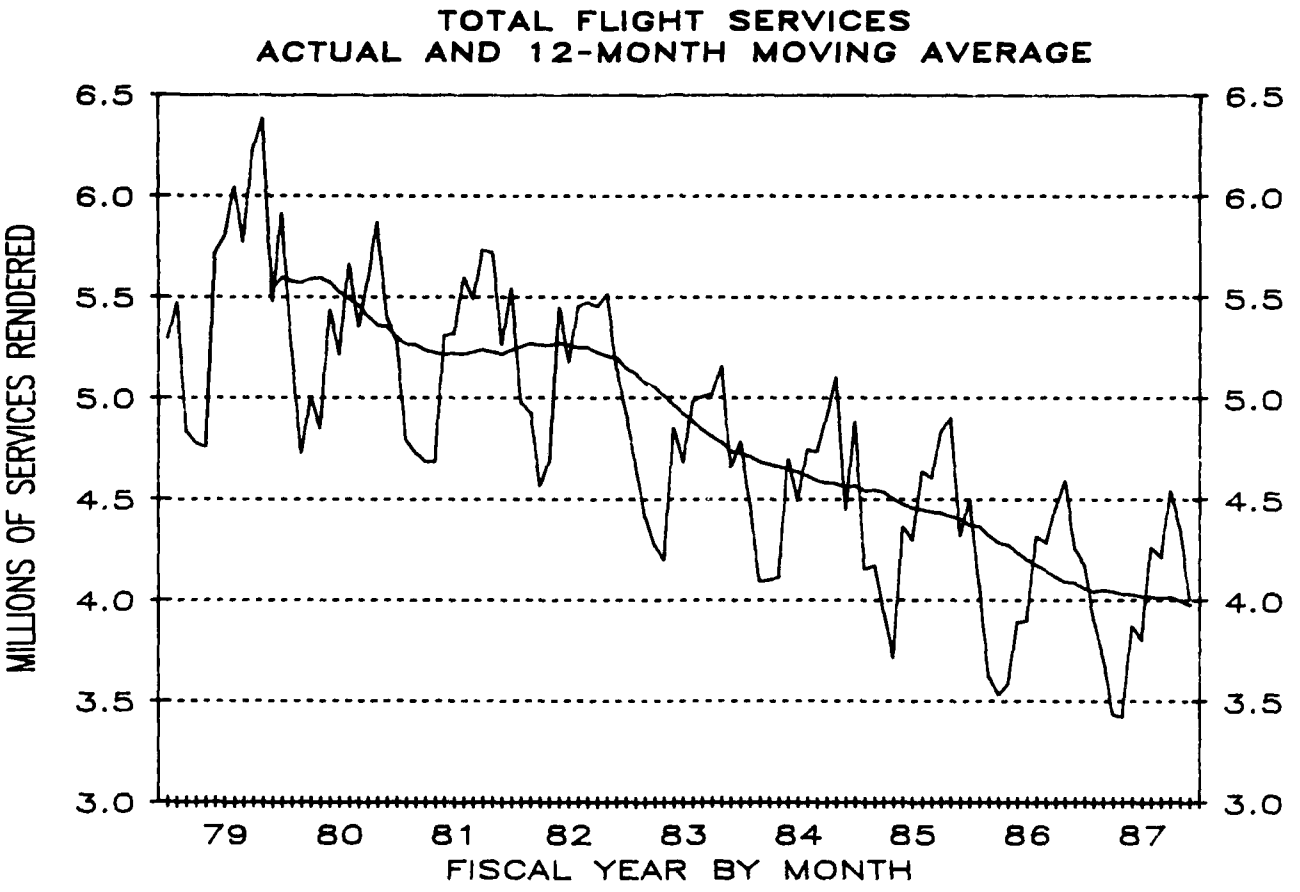
Much of the increase, however, can also be attributed to a definitional change in facility counting procedures which resulted from the formation of new Airport Radar Service Area (ARSA's). The ARSA, a new concept in terminal airspace design, has been installed at 137 locations in the United States as a replacement for the Terminal Radar Service Area (TRSA). The primary difference between the two is that pilots can enter the TRSA without communicating with Air Traffic Control (ATC) while all aircraft entering the ARSA must be in contact with ATC. Under the TRSA concept, a general aviation aircraft may not be counted as an operation; however, under the ARSA concept, this same aircraft will always be counted as an operation. Therefore, the higher activity levels recorded by general aviation aircraft, up 6.5 percent in fiscal year 1987, do not necessarily reflect increased activity levels. Military instrument operations increased by 2.3 percent in fiscal year 1987.

Center Activity

In fiscal year 1987, the number of aircraft flying under instrument rules handled by Air Traffic Control Centers' personnel totaled 35.807 million, an increase of 4.8 percent over 1986. Most of the increase at the Centers can also be attributed to the growth in commercial aviation activity. Commercial aircraft handled at the Centers increased by 6.7 percent compared with an increase of 1.9 percent in the number of noncommercial aircraft handled. The number of air carrier aircraft handled increased by 6.9 percent, while the number of commuter/air taxi aircraft handled increased by 6.0 percent. Military aircraft handled increased by 3.9 percent in fiscal year 1987, while the number of general aviation aircraft handled remained constant at 1986 activity levels.

Flight Service Station Activity

User demand at Flight Service Stations--pilot briefings, flight plans, and aircraft contacted--totaled 47.748 million in fiscal year 1987. This marked the eighth consecutive year of declining activity, down 2.7 percent from 1986 and 28.1 percent below the peak 66.390 million services rendered in 1979. User demand declined for two of the flight service categories in 1987: the number of pilot briefings declined 4.5 percent and the number of aircraft contacted declined 2.8 percent. On the positive side, the number of flight plans originated increased by 1.3 percent in fiscal year 1987.



Contract Towers

The FAA is currently contracting out "low activity towers," and the operation counts at these locations are no longer included in the FAA tower workload measures. There were 14 contract towers in operation in fiscal year 1987, one less than in operation in fiscal year 1986. Operations at contract towers totaled 800,481 in fiscal year 1987, an increase of 17.2 percent over the number of operations recorded at contract towers in 1986. General aviation accounted for the vast majority (86.1 percent) of the activity at these contract towers, up 16.2 percent to 689,180 operations. Commuter/air taxi operations totaled 62,831 (7.9 percent) while military operations totaled 43,283 (5.4 percent), an increase of 14.6 and 42.7 percent, respectively, over 1986 levels. Air carrier operations at contract towers totaled only 5,187 in fiscal year 1987; however, this represented a 6.6 percent increase over 1986.

Operation counts for individual FAA and contract towers, by user group, can be found in the publication FAA Air Traffic Activity FY 1987, compiled by the FAA's Office of Management Systems (AMS-420).

FORECAST ASSUMPTIONS

Number of FAA Facilities

Growth in FAA workload measures includes not only the demand imposed on the National Airspace System, but also aviation activity at those locations previously not provided FAA services. Conversely, aviation activity at contract towers is excluded from the workload measures.

The current forecast assumes that the number of FAA towered airports will remain constant at the 399 in operation in fiscal year 1987. There are currently 23 Terminal Control Areas (TCA's) and 93 ARSA's. Over the next few years, nine additional TCA's are planned as well as significant increases in the number of ARSA's. This expansion of controlled airspace is reflected in the forecast for instrument operations at airports with FAA traffic control service.

A list of the 399 FAA towered airports can be found in Appendix H; the 14 contract towers in Appendix I. A current listing of TCA's and ARSA's are included in Appendix J.

WORKLOAD FORECASTS

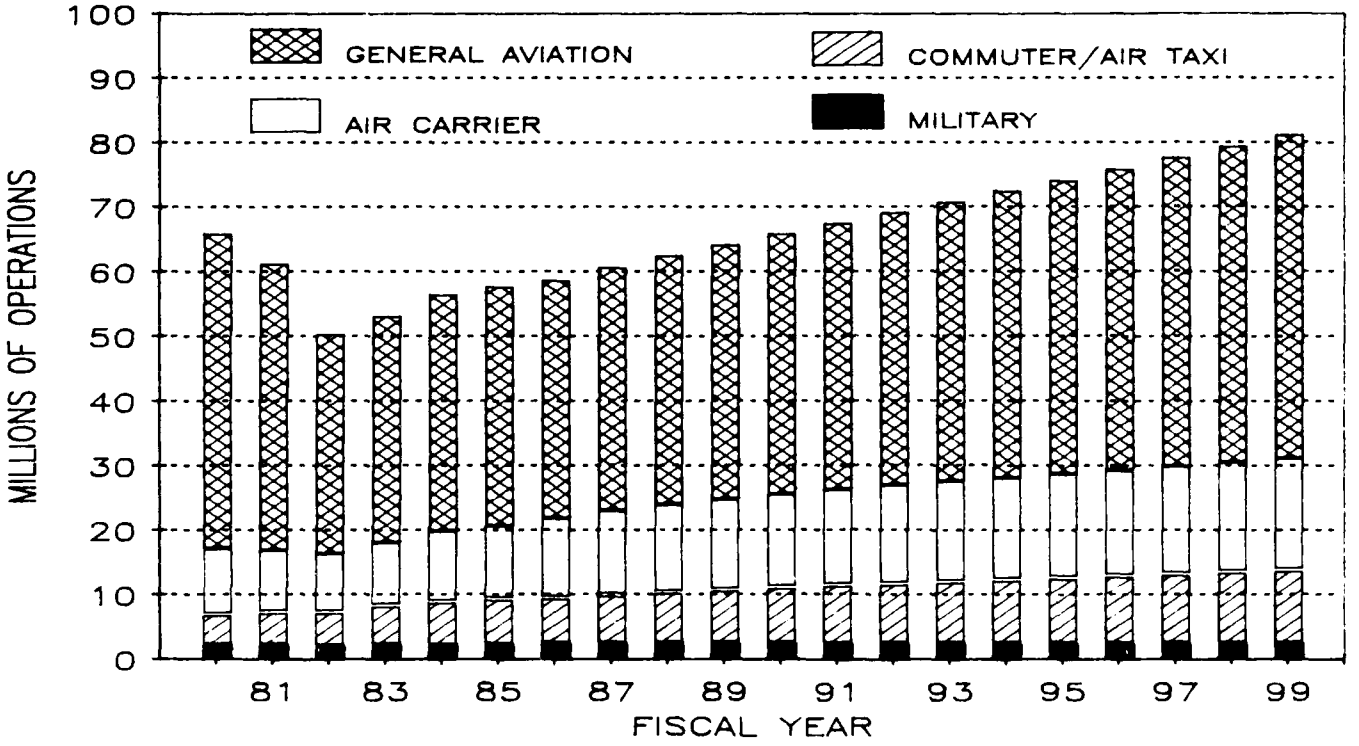
FAA Tower Activity

Despite 5 years of relatively strong growth, aircraft activity at FAA towered airports in fiscal year 1987 totaled only 95.3 percent of the pre-strike level of activity. In addition, the 1987 operations' count was still 11.7 percent below the all-time-high activity level (69.039 million) recorded in 1979. Activity at FAA towered airports is not expected to return to the pre-strike level (63.966 million) until 1989 and will not exceed the 1979 peak until 1992. Operations at FAA towered airports are forecast to increase by 2.8 percent in 1988 and by 2.7 percent in 1989, and to average 2.4 percent over the 12-year forecast period. In absolute numbers, towered operations are forecast to increase from 60.950 million in 1987 to 81.400 million in 1999.

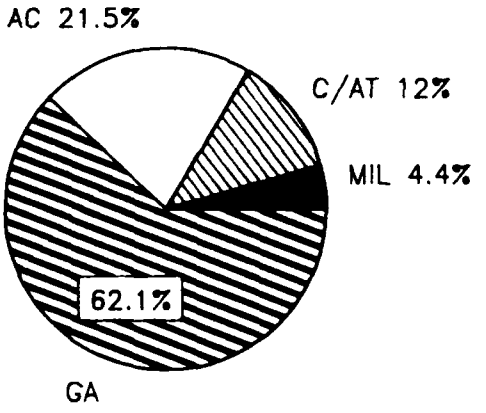
The mix of traffic at FAA towered airports is expected to become somewhat more heterogeneous over the forecast period. This results from the fact that the combined total of general aviation and commuter/air taxi operations is expected to grow at a slightly faster pace than the number of air carrier operations (36.1 percent compared to 32.1 percent). The combined activities of general aviation and commuters/air taxis are expected to account for 75.5 percent of total tower operations in 1999, up from 74.1 percent in fiscal year 1987.

The forecasted average annual growth rate for each aviation user group over the 1987 to 1999 period is: commuter/air taxi, 3.6 percent; general aviation, 2.4 percent; and air carrier, 2.3 percent. Military operations are expected to remain constant at the 1987 level of activity.

AIRCRAFT OPERATIONS AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE



DISTRIBUTION OF WORKLOAD BY USER GROUP



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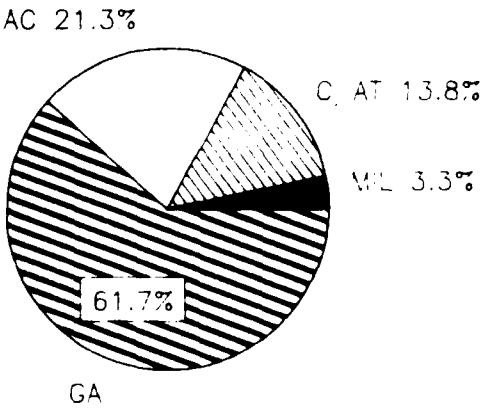

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Instrument Operations

Instrument operations at FAA towered airports exceeded the pre-strike level of activity (38.828 million) by 11.7 percent in fiscal year 1987. Owing in large part to the definitional change in counting procedures associated with the change from TRSA's to ARSA's, the number of instrument operations is projected to increase fairly rapidly in the short-term, growing by 4.6 percent in 1988 and by 4.0 percent in 1989. Over the entire 12-year forecast period, instrument operations are expected to increase at an average annual rate of 2.7 percent, growing from a total of 43.364 million operations in 1987 to 59.500 million in 1999.

The mix of instrument operations is also expected to become more heterogeneous over the forecast period. The number of commuter/air taxi and general aviation operations performed by smaller aircraft is expected to increase at a substantially faster rate than the number of operations performed by the larger, more sophisticated air carrier aircraft (46.4 percent versus 32.8 percent). By 1999, 62.0 percent of all instrument operations are expected to be performed by commuter/air taxi and general aviation aircraft, up from 58.0 percent in 1987.

The forecasted average annual growth rate for each user group is: commuter/air taxi, 3.6 percent; general aviation, 3.1 percent; and air carrier, 2.3 percent. Military operations are expected to remain constant throughout the forecast period.

Center Activity

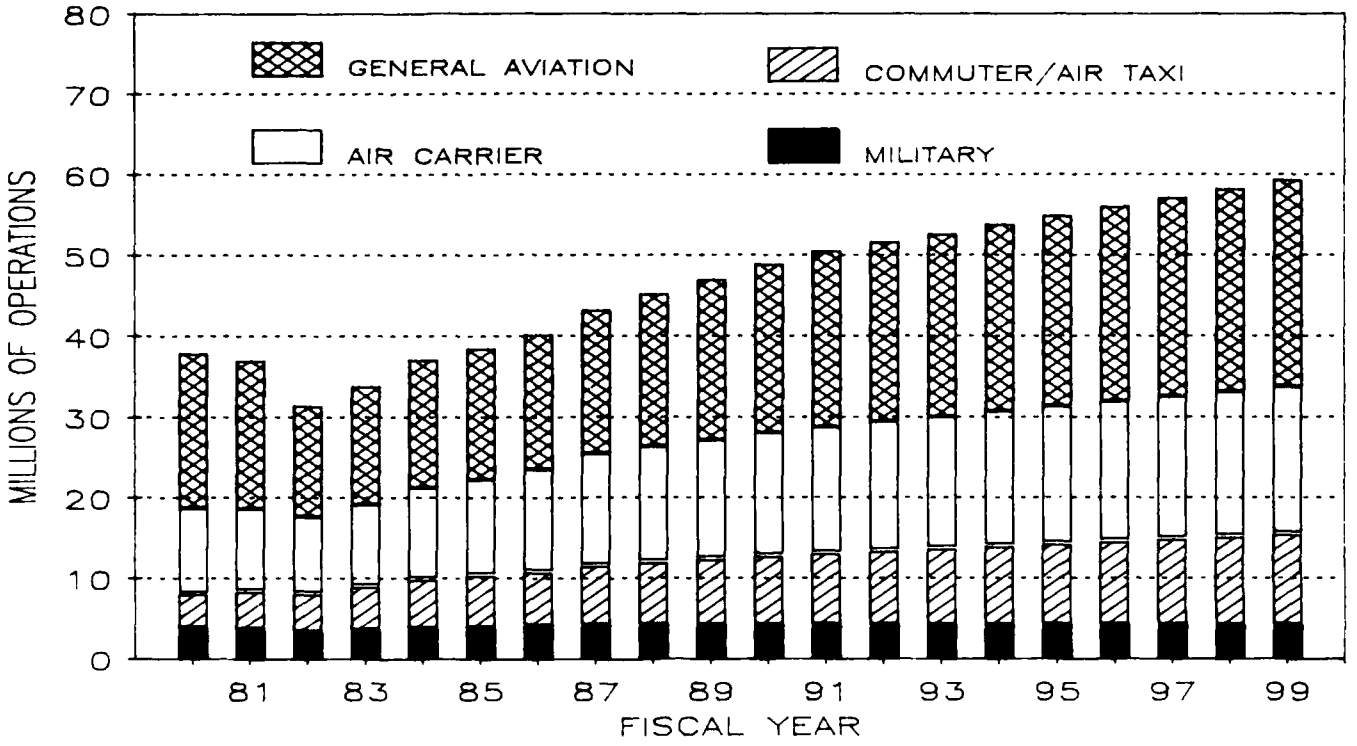
Following five consecutive years of strong growth, the number of aircraft handled by FAA Centers has exceeded its pre-strike activity level (30.280 million) by 18.3 percent. The workload at FAA Air Route Traffic Control Centers is expected to continue to exhibit strong growth throughout the forecast period, increasing by 3.4 percent in 1988 and by 2.7 percent in 1989, and averaging 2.4 percent over the 12-year forecast period. In absolute numbers, the Center workload is forecast to increase from 35.807 million aircraft handled in 1987 to 47.800 million in 1999.

Both air carrier and general aviation's shares of Center workload are expected to decline over the forecast period. Air carrier's share is projected to decline only slightly from 47.8 percent in 1987 to 47.7 percent in 1999. General aviation's share is expected to decline from 22.6 percent to 22.0 percent over the same time period. Commuter/air taxi's share is expected to increase to 19.2 percent of Center workload by 1999, up from 14.8 percent in 1987.

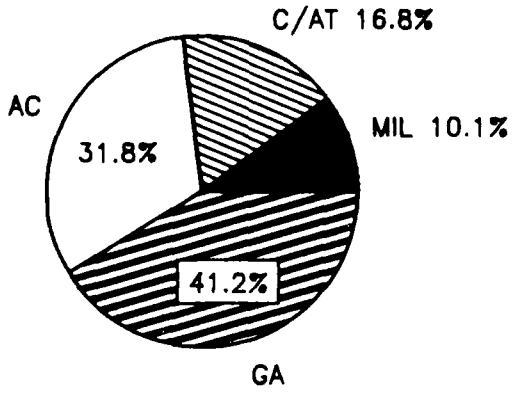
The projected average annual growth rate by user group is: commuter/air taxi, 4.7 percent; air carrier, 2.4 percent; and general aviation, 2.2 percent. The number of military operations is expected to remain constant at the 1987 level of activity.

Forecasts for individual Centers are available upon request from the Forecast Branch, Office of Aviation Policy and Plans (APO-110).

INSTRUMENT OPERATIONS AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE



DISTRIBUTION OF WORKLOAD BY USER GROUP



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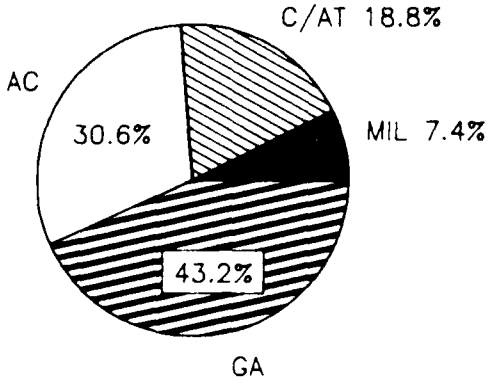

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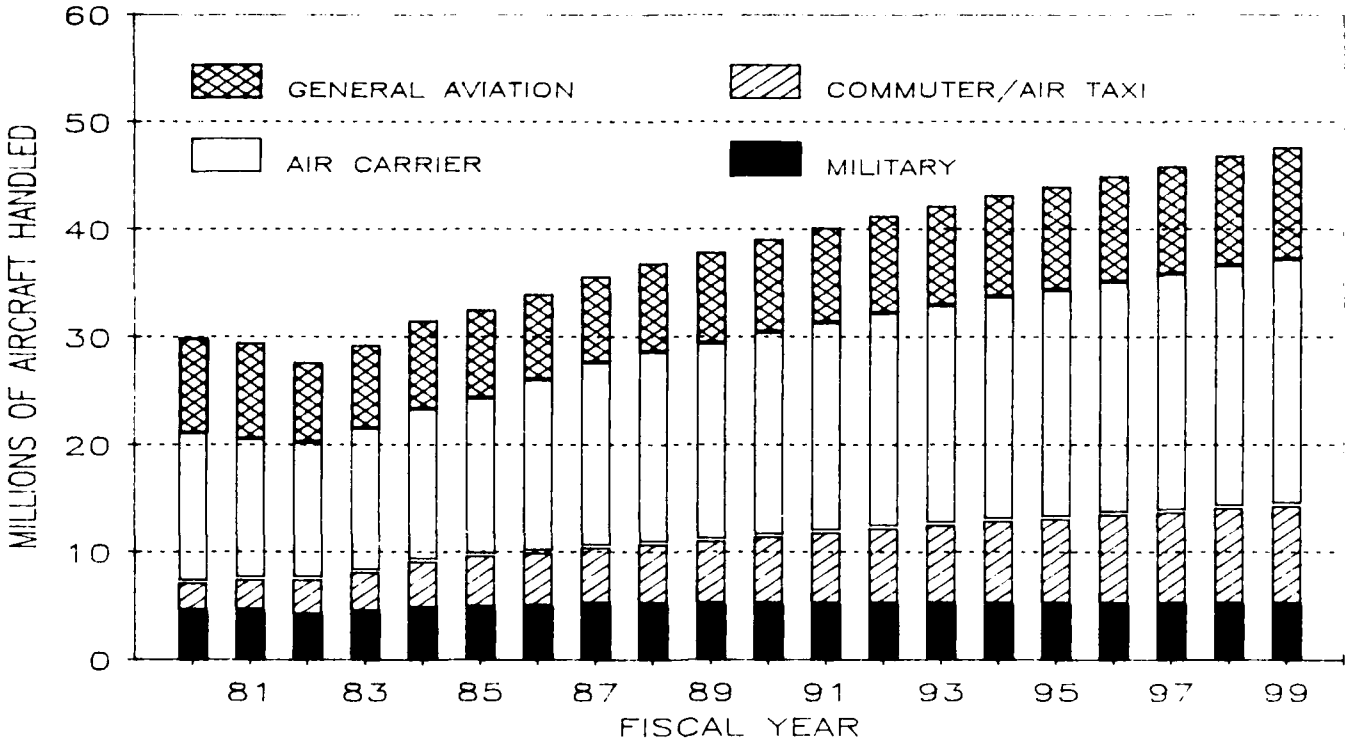
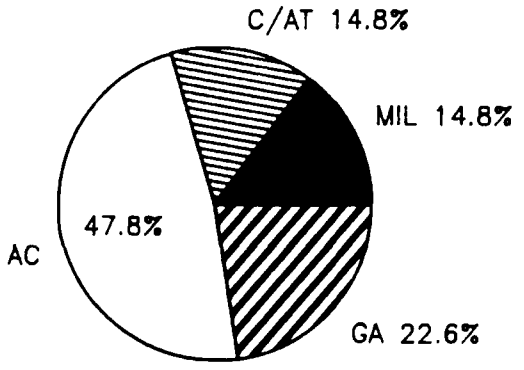
IFR AIRCRAFT HANDLED AT FAA AIR ROUTE TRAFFIC CONTROL CENTERS



DISTRIBUTION OF WORKLOAD BY USER GROUP



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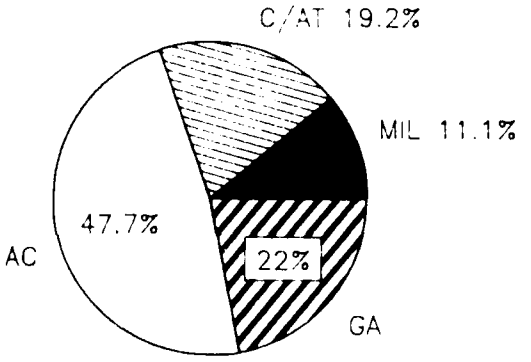


1999

Flight Service Station Activity

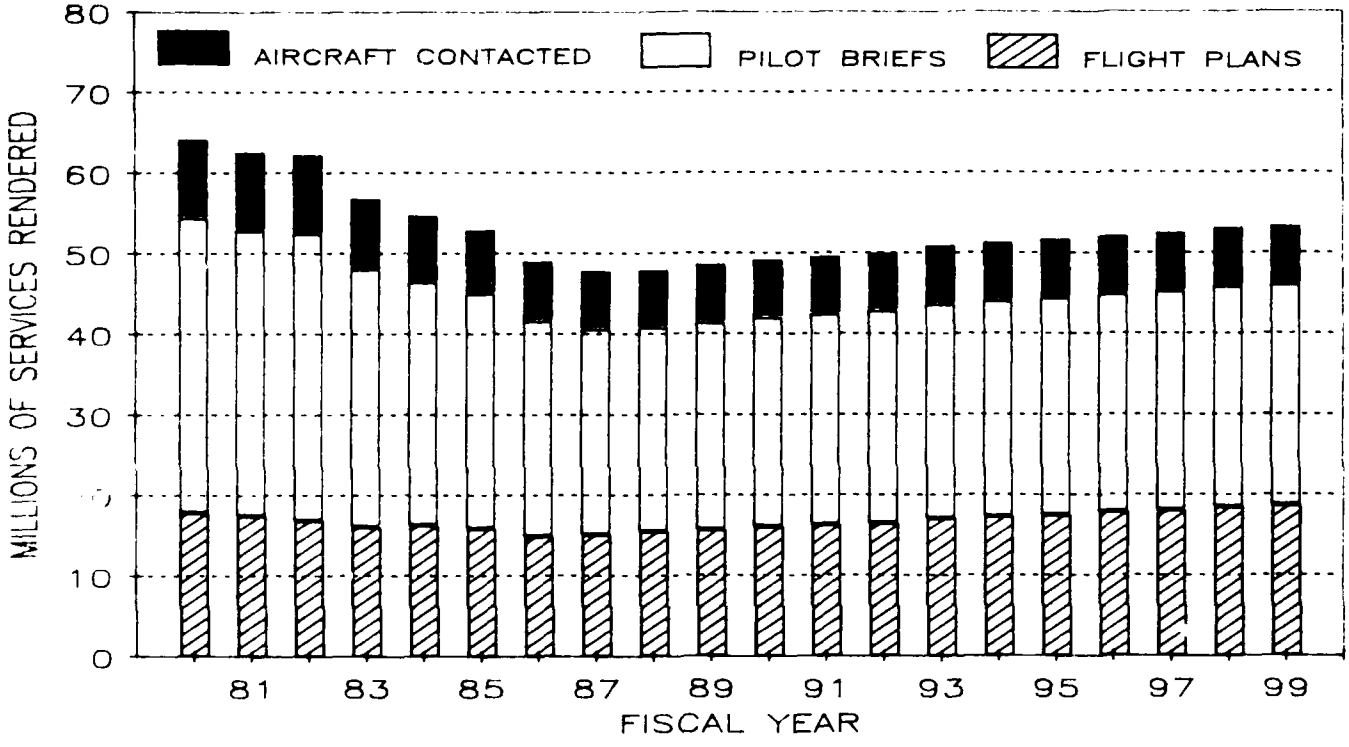
In fiscal year 1987, the number of services rendered at FAA Flight Service Stations equaled only 75.9 percent of the level of activity achieved in the pre-strike period and reflects the reduction which has occurred in general aviation flying hours. Most important, however, is the fact that the level of activity is not expected to return to the pre-strike activity level (62.916 million) during the entire forecast period. Total flight services originating at Flight Service Stations are projected to increase by 0.4 percent in 1988 and by 1.5 percent in 1999, and to average only 0.9 percent annual growth over the entire forecast period. In actual numbers, flight services rendered are forecast to increase from 47.748 million in 1987 to 53.300 million in 1999.

The number of pilot briefings is expected to increase from 12.751 million in 1987 to 13.700 million in 1999, an average annual growth rate of only 0.6 percent. The number of flight plans originated is forecast to increase at an average annual rate of 1.8 percent between 1987 and 1999, from 7.644 million to 9.400 million. The number of aircraft contacted is projected to increase at an annual rate of only 0.1 percent over the forecast period, from 6.959 million in 1987 to 7.100 million in 1999.

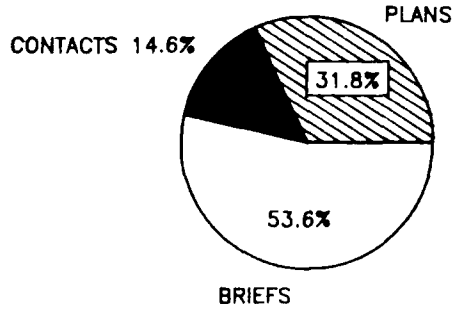
It should be noted that user demand, as measured by total flight services, is not indicative of the total workload of the flight service station system. For example, a substantial amount of time is devoted to the preparation of recorded weather briefing data, and the processing and dissemination of Notices to Airmen (NOTAM's), Pilot Reports (PIREP's), and Significant Meteorological Events (SIGMET's). However, these activities are not directly related to the level of user demand, and the resources required to perform these functions are not included in the flight service station workload measure.

Forecasts for individual Flight Service Stations are available upon request from the Forecast Branch, Office of Aviation Policy and Plans (APO-110).

FLIGHT SERVICES ORIGINATED AT FAA FLIGHT SERVICE STATIONS



DISTRIBUTION BY TYPE OF SERVICE RENDERED



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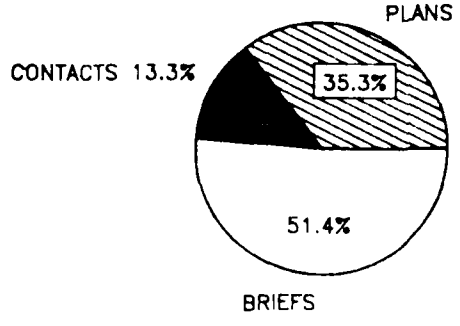

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CHAPTER VIII

TERMINAL AREA FORECASTS
LARGE HUBS

The Terminal Area Forecasts (TAF) is a set of forecasts of enplanements, aircraft operations, instrument operations, and instrument approaches prepared for approximately 4,000 airports in the United States. The data base for the TAF includes airports with FAA towers, airports with commercial service, airports that are in the National Plan of Integrated Airport Systems, and other nontowered public use airports. This chapter presents data from the TAF for: (1) the top 50 airports in the United States ranked by total enplanements in fiscal year 1986; (2) the top 50 airports ranked by total operations in 1986; (3) forecasts of total enplanements and total operations at 29 large hub airports, (4) summary data for large, medium, and small hub airports, and (5) selected data by user category for two airports where "hub studies" were conducted for the metropolitan areas in 1987. For analytical purposes, airport hub size is consistent with the enplanement percentages indicated in the definition for air traffic hubs, page 165 of the Glossary of Terms.

The preliminary forecasts contained in this chapter are currently undergoing regional review. The final forecasts will be available in FAA Terminal Area Forecasts FY 1988-2000 from the FAA Office of Aviation Policy and Plans.

REVIEW OF 1986

Top 50 Airports

In fiscal year 1986, Chicago O'Hare was the busiest airport in the U.S. when ranked both by total enplanements (air carrier, commuter, and air taxi) and by total aircraft operations. Chicago had 25.5 million passenger enplanements and 794,800 aircraft operations. Atlanta was the second busiest airport with 22.0 million enplanements and 774,800 operations. These ranks were identical to those observed since 1983. In terms of total enplanements, Chicago and Atlanta reversed ranks in 1983 and later years relative to 1981 and 1982.

TOP 50 AIRPORTS RANKED BY 1986 TOTAL PASSENGER ENPLANEMENTS*

(IN THOUSANDS)

Airport	Total Enplanements*	Percent**	Cumulative Percent	FY-85 Rank
1. Chicago O'Hare	25,463	5.92	5.92	1
2. Atlanta	22,040	5.12	11.04	2
3. Los Angeles Internat'l	19,729	4.58	15.62	3
4. Dallas/Ft. Worth	19,682	4.57	20.19	4
5. Denver	15,694	3.65	23.84	7
6. Newark	15,361	3.57	27.41	6
7. San Francisco Internat'l	13,272	3.08	30.49	8
8. New York Kennedy	13,248	3.08	33.57	5
9. New York LaGuardia	10,774	2.50	36.07	11
10. Boston	10,628	2.47	38.54	10
11. Miami	10,438	2.42	40.96	9
12. St. Louis Internat'l	10,089	2.34	43.30	12
13. Honolulu	8,814	2.04	45.34	13
14. Detroit	8,611	2.00	47.34	16
15. Minnneapolis/St. Paul	8,252	1.92	49.26	14
16. Pittsburgh	7,815	1.82	51.08	15
17. Phoenix	7,557	1.76	52.84	19
18. Houston Intercontinental	6,947	1.61	54.45	18
19. Washington National	6,937	1.61	56.06	17
20. Seattle-Tacoma	6,799	1.58	57.64	20
21. Philadelphia	6,009	1.40	59.04	21
22. Orlando	5,917	1.37	60.41	24
23. Charlotte	5,900	1.37	61.78	23
24. Las Vegas	5,772	1.34	63.12	22
25. Tampa	4,730	1.10	64.22	25
26. Salt Lake City	4,679	1.09	65.31	26
27. San Diego	4,480	1.04	66.35	27
28. Baltimore	4,296	.99	67.34	28
29. Memphis	4,275	.99	68.33	33
30. Washington Dulles	4,077	.95	69.28	39
31. Kansas City	3,984	.93	70.22	30
32. Ft. Lauderdale	3,777	.88	71.11	31
33. Houston Hobby	3,644	.85	71.96	29
34. Cleveland	3,308	.77	72.73	34
35. New Orleans	3,218	.75	73.48	35
36. Dallas Love Field	2,851	.66	74.14	32
37. San Jose	2,783	.65	74.79	40
38. San Juan	2,761	.64	75.43	37
39. Portland	2,504	.58	76.01	36
40. Cincinnati	2,308	.54	76.55	41
41. San Antonio	2,241	.52	77.08	38
42. Kahului	2,160	.50	77.58	43
43. Albuquerque	2,141	.50	78.08	44
44. Dayton	2,125	.49	78.57	45
45. Indianapolis	2,069	.48	79.05	47
46. Ontario	2,020	.47	79.52	51
47. Hartford	1,999	.46	79.98	48
48. West Palm Beach	1,944	.45	80.44	49
49. Nashville	1,935	.45	80.89	52
50. Oakland	1,922	.45	81.34	42

Source: FAA Terminal Area Forecasts FY 1988-2000

* Includes U.S. certificated route air carriers, foreign flag carriers, supplementals, air commuter, and air taxis

** Based on 430,601 million passenger enplanements

TOP 50 AIRPORTS RANKED BY 1986 TOTAL AIRCRAFT OPERATIONS

(IN THOUSANDS)

Airport	Total Operations	Percent*	Cumulative Percent	FY-85 Rank
1. Chicago O'Hare	794.8	1.35	1.35	1
2. Atlanta	774.8	1.31	2.66	2
3. Dallas/Ft. Worth	575.2	.97	3.63	3
4. Los Angeles Internat'l	565.2	.96	4.59	4
5. Santa Ana	540.1	.92	5.51	5
6. Denver Stapleton	520.7	.88	6.39	7
7. Van Nuys	472.4	.80	7.19	6
8. St. Louis International	460.4	.78	7.97	8
9. San Francisco Internat'l	422.7	.72	8.69	12
10. Boston	420.1	.71	9.40	9
11. Newark	413.7	.70	10.10	10
12. Phoenix Sky Harbor	412.3	.70	10.80	13
13. Detroit Metro	406.0	.69	11.49	17
14. Minneapolis/St. Paul	401.8	.68	12.17	19
15. Seattle Boeing Field	400.7	.68	12.85	14
16. Long Beach	397.1	.67	13.52	11
17. Memphis	380.2	.64	14.16	26
18. Oakland	371.0	.63	14.79	15
19. Philadelphia	368.2	.62	15.41	22
20. Pittsburgh	365.6	.62	16.03	20
21. New York LaGuardia	365.2	.62	16.65	16
22. Pontiac	364.3	.62	17.27	32
23. Honolulu	363.9	.62	17.89	21
24. Denver Arapahoe	363.7	.62	18.51	23
25. Charlotte	361.2	.61	19.12	28
26. Las Vegas	352.2	.60	19.72	33
27. San Jose	348.8	.59	20.31	18
28. Miami International	345.2	.59	20.90	29
29. New York Kennedy	326.5	.55	21.45	24
30. Washington National	325.7	.55	22.00	27
31. Miami Tamiami	313.9	.53	22.53	35
32. Anchorange Merrill	301.2	.51	23.04	25
33. New Orleans Lakefront	299.1	.51	23.55	37
34. Houston Intercontinental	298.3	.51	24.06	30
35. Ft. Worth Meacham	286.2	.49	24.55	41
36. Baltimore	283.2	.48	25.03	36
37. Houston Hobby	279.6	.47	25.50	31
38. Washington Dulles Int'l	271.3	.46	25.96	83
39. Salt Lake City	270.2	.46	26.42	43
40. Teterboro	263.9	.45	26.87	38
41. Tampa	261.4	.44	27.31	39
42. Hayward	261.1	.44	27.75	48
43. Dallas Love Field	259.1	.44	28.19	34
44. Seattle Tocoma Int'l	253.6	.43	28.62	52
45. Atlanta Peachtree	250 8	.43	29.05	59
46. Caldwell	245.6	.42	29.47	44
47. Torrance	243.3	.41	29.88	40
48. Phoenix Deer Valley	240.1	.41	30.29	49
49. San Diego Montgomery	240.0	.41	30.70	42
50. Nashville Metro	238.9	.41	31.11	67

Source: FAA Terminal Area Forecasts FY 1988-2000

* Based on 58.956 million operations at 399 FAA-operated airport traffic control towers in FY 1986.

Other airports among the top five ranked by total enplanements in 1986 were Los Angeles International, Dallas/Fort Worth International, and Denver. These were ranked third, fourth, and fifth in total enplanements and fourth, third, and sixth, respectively, in total operations. Because of the temporary decline in international traffic which resulted from fear of hijack, hostage-taking and other forms of terrorism, enplanements at John F. Kennedy International Airport declined in 1986. Consequently, Kennedy fell from fifth in total enplanements in 1985 to eighth in 1986, marking the first year that Newark and San Francisco enplaned more passengers than Kennedy. Prior to 1985, Van Nuys was the only general aviation airport which ranked among the top five in total operations. In 1986, Van Nuys was ranked seventh; it was surpassed in total operations by both Santa Ana and Denver.

In FY 1986, the top 50 commercial airports accounted for 81.3 percent of the total number of enplanements (air carrier, commuter, and air taxi) which occurred at airports with 1,000 or more enplanements. In fact, the top five airports (Chicago, Atlanta, Los Angeles, Dallas/Fort Worth, and Denver) accounted for 23.8 percent of total passenger enplanements. The top 20 airports had 57.6 percent of total enplanements. These percentages have remained essentially unchanged from those of 1985.

Large/Medium/Small Hub Airports

In 1986, there were 29 large hub airports, 43 medium hub airports, and 65 small hub airports. The large hub airports accounted for 294.0 million enplanements, 68.3 percent of the approximately 430.5 million air carrier/commuter/air taxi passengers enplaned nationally. The medium hub airports enplaned 88.3 million passengers and the small hubs enplaned 31.5 million, 20.5 percent and 7.3 percent of the total, respectively. In terms of total passengers, the large hub airports grew by 5.6 percent in 1986. The medium and small hub airports grew by 6.8 percent and 8.1 percent, respectively.

Aircraft operations at the large hub airports totalled 11.5 million in 1986, about 5.4 percent above the 1985 level. At the medium and small hub airports, there were 9.1 million and 8.4 million operations, respectively. The 1986 operations at both medium and small hub airports were essentially unchanged from the 1985 levels.

LARGE HUB AIRPORT FORECASTS

Using 1986 as the base year, forecasts for airports in the TAF were generated for each year to 2000. The total enplanements and related operations forecasts for the 29 large hub airports for fiscal years 1990 and 2000 are presented on pages 115 and 117. By 2000, Chicago O'Hare is expected to reach nearly 43.6 million enplanements and Atlanta is expected to reach 34.6 million. It is anticipated that both Dallas/Fort Worth and Denver will have surpassed Atlanta in terms of total enplaned passengers by the year 2000.

TOTAL PASSENGER ENPLANEMENTS AT LARGE HUB AIRPORTS*

(IN THOUSANDS)

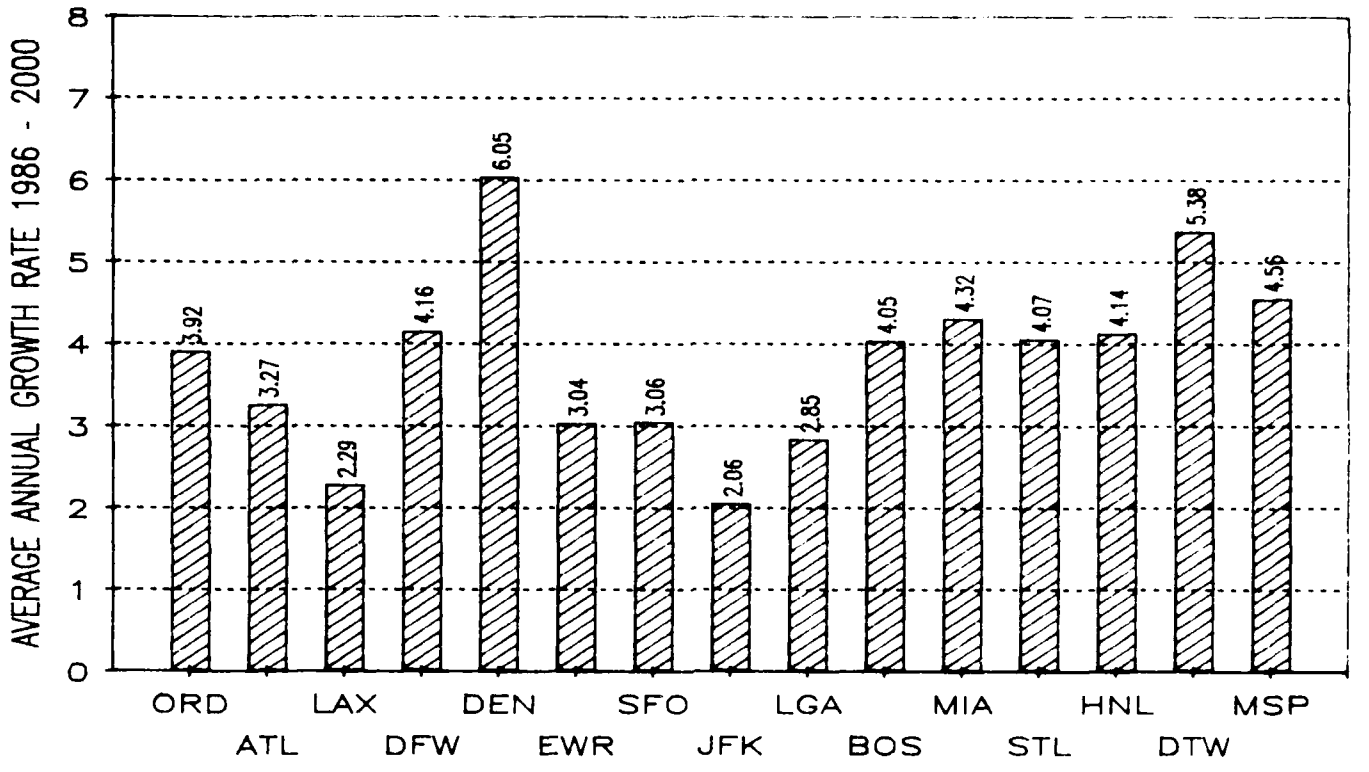
Airport	FY 1986	FY 1990	FY 2000
Chicago O'Hare	25,463	32,906	43,591
Atlanta	22,040	27,549	34,586
Los Angeles	19,729	23,949	27,073
Dallas/Ft. Worth	19,682	23,565	34,828
Denver	15,694	17,704	35,731
Newark	15,361	16,024	23,357
San Francisco	13,272	17,027	20,253
New York Kennedy	13,248	14,670	17,637
New York LaGuardia	10,774	13,266	15,966
Boston	10,628	13,212	18,529
Miami	10,438	13,810	18,866
St. Louis	10,089	12,151	17,629
Honolulu	8,814	11,845	15,554
Detroit**	8,611	12,390	17,939
Minneapolis/St. Paul	8,252	10,891	15,413
Pittsburgh	7,815	10,354	16,952
Phoenix	7,557	10,769	19,383
Houston Intercontinental	6,947	8,697	12,862
Washington National	6,937	7,693	8,043
Seattle-Tacoma	6,799	8,706	11,328
Philadelphia	6,009	8,753	13,555
Orlando	5,917	9,368	15,362
Charlotte	5,900	7,409	11,304
Las Vegas	5,772	8,522	13,392
Tampa	4,730	6,224	9,920
Salt Lake City**	4,679	6,972	10,736
San Diego	4,480	5,781	9,136
Memphis	4,275	6,256	9,223
Washington Dulles	4,077	6,993	10,679

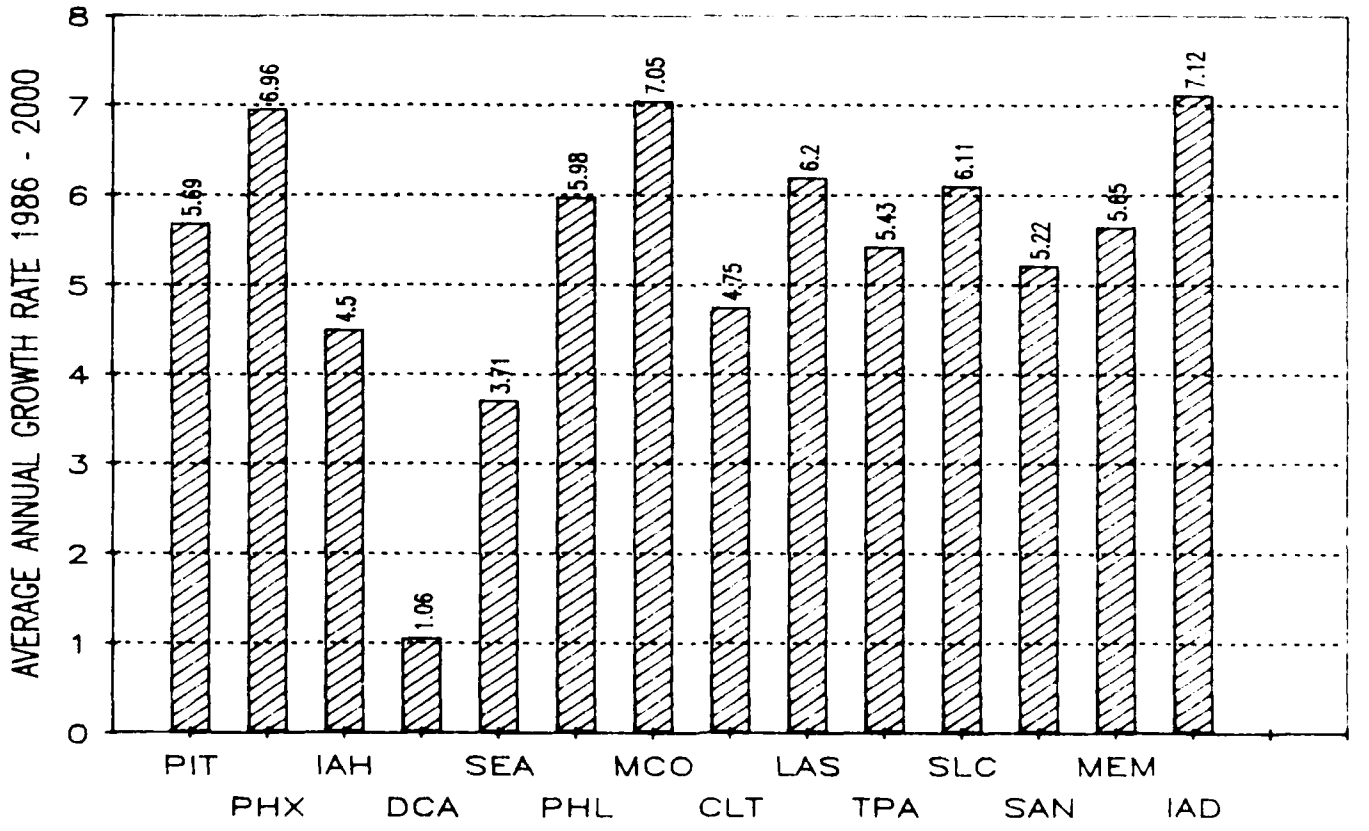
* Includes U.S. certificated route air carriers, foreign flag carriers, supplementals, air commuters and air taxis.

** Forecasts as shown in individual hub forecast reports (or as adjusted)

Source: FAA Terminal Area Forecasts FY 1988-2000

PASSENGER ENPLANEMENTS AT LARGE HUB AIRPORTS





TOTAL AIRCRAFT OPERATIONS AT LARGE HUB AIRPORTS*

(IN THOUSANDS)

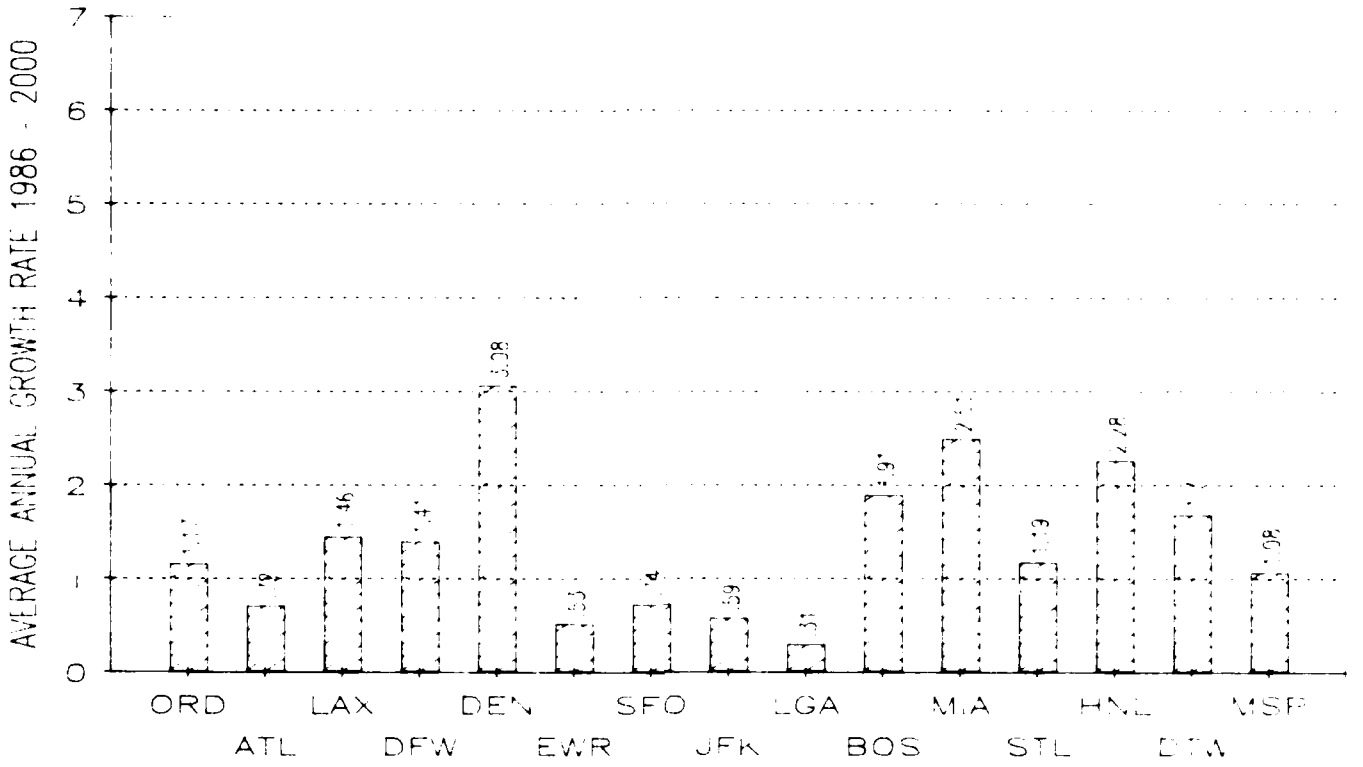
Airport	FY 1985	FY 1990	FY 2000
Chicago O'Hare	904	960	925
Atlanta	775	832	852
Los Angeles	665	685	692
Dallas/Ft. Worth	575	639	700
Denver	521	549	597
Newark	414	411	446
San Francisco	423	458	469
New York Kennedy	327	328	356
New York LaGuardia	365	381	381
Boston	420	467	547
Miami	345	391	488
St. Louis	460	503	543
Honolulu	364	416	499
Detroit**	506	468	514
Minneapolis/St. Paul	462	511	467
Pittsburgh	506	508	488
Phoenix	412	488	598
Houston Intercontinental	298	333	399
Washington National	335	360	400
Seattle-Tacoma	298	301	366
Philadelphia	364	482	516
Orlando	318	301	492
Charlotte	361	414	531
Las Vegas	355	424	522
Tampa	291	350	333
Salt Lake City	275	322	458
San Diego	194	229	256
Memphis	285	321	440
Washington Dulles	231	264	327

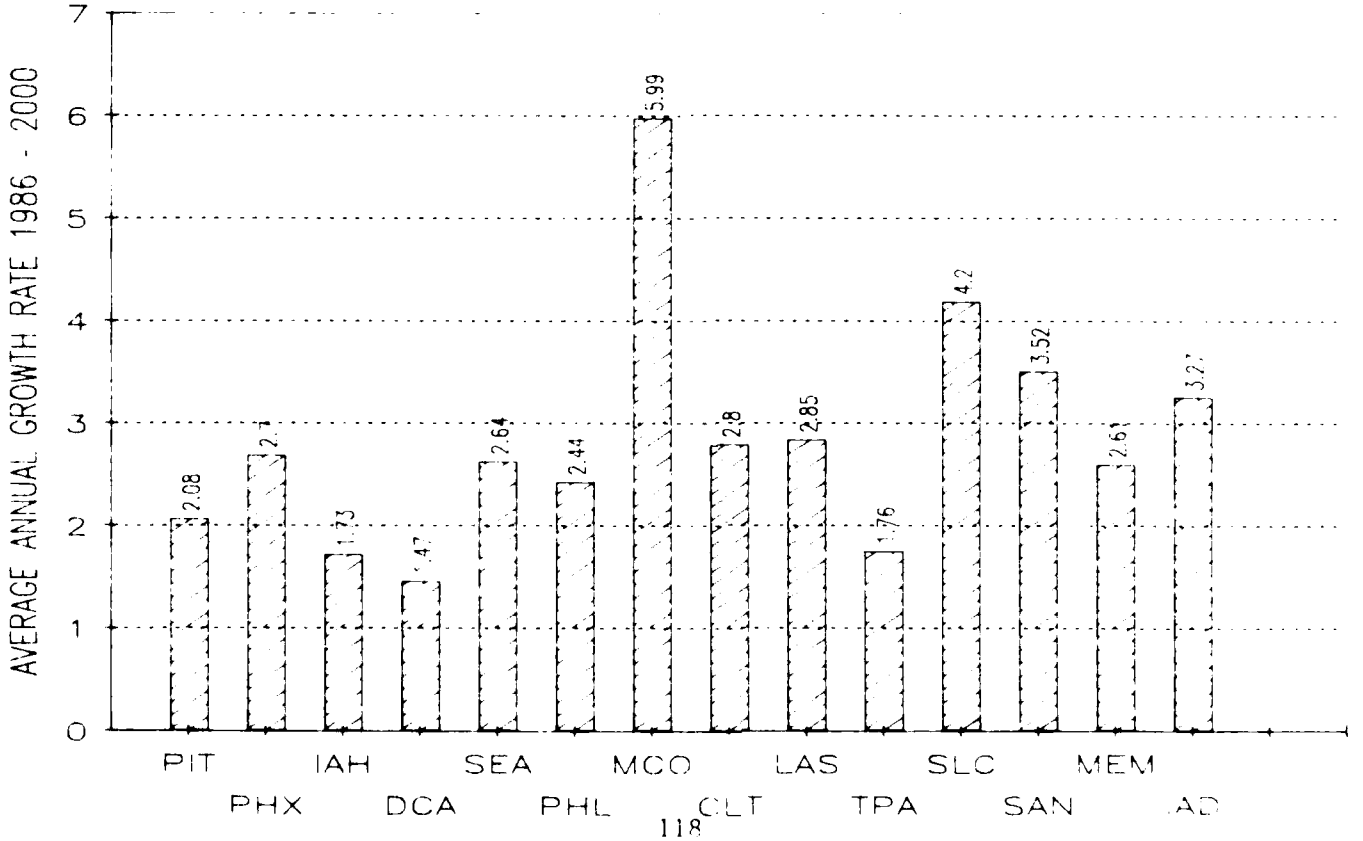
* Includes total itinerant and local operations (air carrier, commercial air carriers, air taxis, military, and general aviation).

** Forecasts as shown in individual Terminal Area Forecasts adjusted.

Source: FAA Terminal Area Forecasts FY 1986-2000

TOTAL AIRCRAFT OPERATIONS AT LARGE HUB AIRPORTS





Total aircraft operations will reach 935,000 at Chicago O'Hare and 857,000 at Atlanta by the year 2000. These airports will continue to be the two busiest in the aviation system. Denver is expected to be the third largest airport and Dallas/Fort Worth will be fourth. The increases in aviation activity at these and other airports will come from growth in the U.S. economy, as a whole, and local airport and airline developments. These developments may include the addition of new gates and the restructuring of airline fleets and, in the case of Denver, the construction of a new air carrier airport.

Some airports (such as Dulles, Orlando, and Phoenix) will continue to have reasonably high enplanement growth resulting from general economic conditions and managerial decisions by air carriers to use these airports as hubs. Other airports (Los Angeles, New York Kennedy, and Washington National, for example) are expected to experience relatively slow growth because of capacity, environmental or policy constraints.

The average annual growth rates expected for the large hub airports for operations and enplanements for the 1986 to 2000 period are indicated in graphic form on pages 116 and 118. Because of differences in the growth rates among airports, the relative ranks of these 29 hub airports in 2000 will differ from the ranks observed in 1986. For example, in the year 2000 Denver will rank second in total enplanements and Dallas/Fort Worth will rank third. These airports were ranked fifth and fourth, respectively, in 1986. The most significant increase in rank is exemplified by Phoenix which is expected to rise from seventeenth in 1986 to eighth place in 2000. At the other extreme, Washington National Airport is expected to fall from nineteenth place in 1986 to thirty-second in 2000 when ranked by total enplanements. Large shifts could occur also at other airports if a major airline decides to use a small or medium hub airport as a primary hub. Dulles International Airport has grown significantly following United Airlines' decision to use this airport as a hub. Nashville and Raleigh-Durham, for example, will experience similar shifts following American Airlines' decision to use these airports as hubs. Airline mergers, consolidations and restructuring of routes may also affect the enplanements and operations forecasts and, consequently, the relative ranks of the major hub airports discussed in this section

MEDIUM/SMALL HUB AIRPORT FORECASTS

The growth of enplanements and operations at the 43 medium and 65 small hub airports are indicated in the following tables below relative to growth at the large hub airports taken as a whole.

The following table shows that passenger enplanements at the medium hub airports are expected to increase somewhat faster than at the large hub airports, growing at an annual average rate of 6.8 percent during the 1986-1990 period and at 4.6 percent between 1990 and 2000. Passenger enplanements at the small hub airports are expected to grow at a slower rate than the medium hubs during the forecast period, 5.0 percent between 1986 and 1990 and 4.3 percent between 1990 and 2000.

SUMMARY OF PASSENGER ENPLANEMENTS AT HUB AIRPORTS
(Millions)

	1986	1990	2000	AVERAGE ANNUAL % CHANGE 1986-1990	1990-2000
Large Hubs	294.0	373.5	528.8	6.2%	3.5%
Medium Hubs	88.3	114.8	179.7	6.8	4.6
Small Hubs	31.5	38.3	58.4	5.0	4.3

As indicated in the following table, aircraft operations at both the medium and small hub airports are expected to grow faster than the large hubs during the 15-year period. Between 1986 and 1990 operations are expected to grow at 3.9 percent at the medium hubs and 3.7 percent at the small hubs. During the 1990-2000 period, the growth rates are expected to be 2.8 percent and 3.1 percent respectively.

SUMMARY OF AIRCRAFT OPERATIONS AT HUB AIRPORTS
(Millions)

	1986	1990	2000	AVERAGE ANNUAL % CHANGE 1986-1990	1990-2000
Large Hubs	11.5	12.9	15.0	2.9%	1.5%
Medium Hubs	9.1	10.6	14.0	3.9	2.8
Small Hubs	8.4	9.7	13.2	3.7	3.1

SPECIAL HUB FORECASTS

Continuing the individual hub forecasting efforts begun in 1978, FAA sponsored two studies in 1986--Detroit and Salt Lake City. These studies were conducted in conjunction with FAA regional, state and local planners, chambers of commerce, universities, and other interested parties. These groups often provide local aviation data, discuss general economic conditions (current, historical, and future outlook), sponsor and attend local seminars, and review preliminary reports. This procedure keeps the public informed of aviation activity in the local community, encourages local input and public participation in the planning process and, consequently, it enhances the acceptability of the final product.

The hub forecast studies examine the metropolitan statistical area or standard consolidated statistical area, as a whole. The area usually contains a major air carrier airport and several general aviation airports. Major objectives of these studies include: (1) examination of the interplay between the growth of aviation activity at the major airport and other airports in the area; (2) assessment of possible impacts of the growth of aviation activity in the area; and (3) examination of possible plans to accommodate the growth in aviation. Such plans may include reviews of possible distribution or redistribution of commercial and general aviation traffic and the development of reliever or satellite airports.

The graphics shown on the following pages depict the relative size and growth of enplanements and operations, by user category, at the two major airports with commercial service in the large hubs discussed. Copies of the detailed studies are available from the Forecast Branch, Office of Aviation Policy and Plans.

Detroit Hub

The Detroit Hub is located in Southeastern Michigan and is designated as Planning Region No. 1., an area covering 4,603 square miles. The population in 1985 was estimated at 4.5 million. By the year 2000, the population is expected to reach 4.7 million. Detroit is one of the primary manufacturing centers in the world and continues to be the headquarters of many of the major automobile manufacturers.

International, domestic, and commuter air services, as well as general aviation, are handled by 34 public use airports located in the hub. Of the 34 airports, five have FAA towers. Detroit Metropolitan Wayne County Airport, located 21 miles west of Detroit is the hub's primary air carrier airport. Twenty-three scheduled air carriers and four all cargo carriers serve the airport.

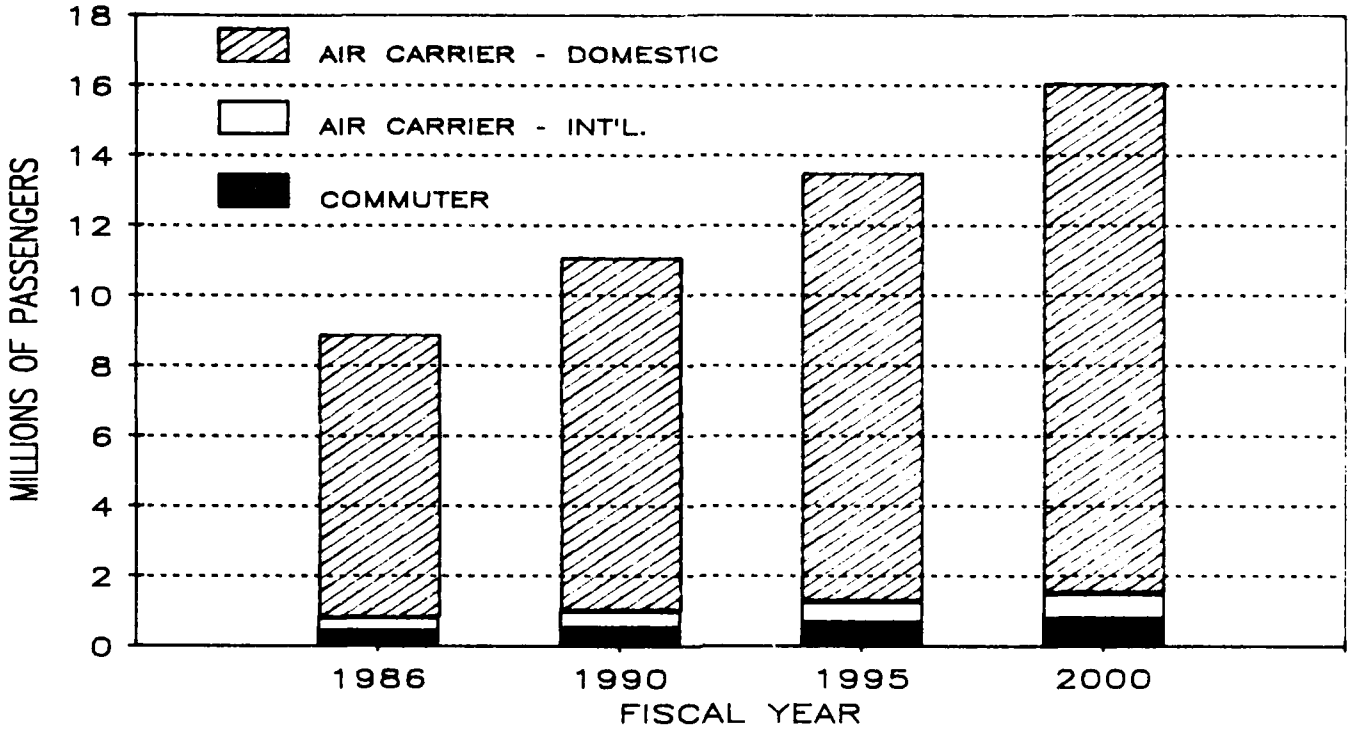
Total passenger enplanements in the hub are projected to reach 18.1 million in 2000. This represents a 103.4 percent increase over the 8.9 million passengers enplaned in 1986. Commercial aircraft operations are forecast to reach 586,600, 44.8 percent higher than the 1986 total. During the period 1986 through 2000, general aviation itinerant operations at the 34 airports in the Detroit hub is expected to grow at an annual average rate of 3.1 percent. General aviation local operations is expected to grow at 1.2 percent annually.

Salt Lake City Hub

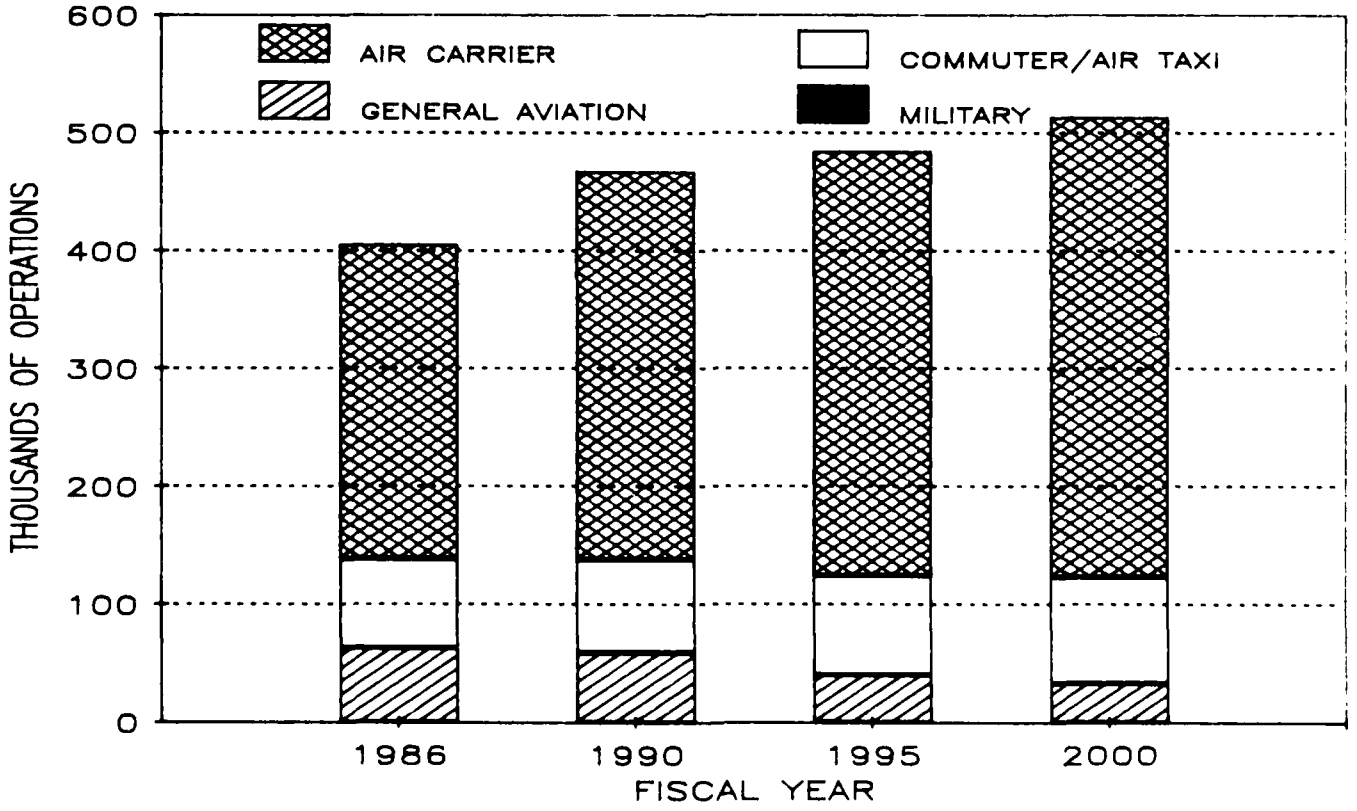
The Salt Lake City hub is located in the northern part of the State of Utah in the Wasatch Range of the Rocky Mountains. In 1985, the population of the hub was estimated at 1.3 million. By 2000, the population is forecast to reach 1.7 million, an increase of over 30.7 percent. The hub encompasses 3,639 square miles in a four-county area. Salt Lake City is an important center of industry, commerce, and finance, and it is the headquarters of the Church of Jesus Christ of Latter-day Saints.

DETROIT METROPOLITAN AIRPORT

PASSENGER ENPLANEMENTS

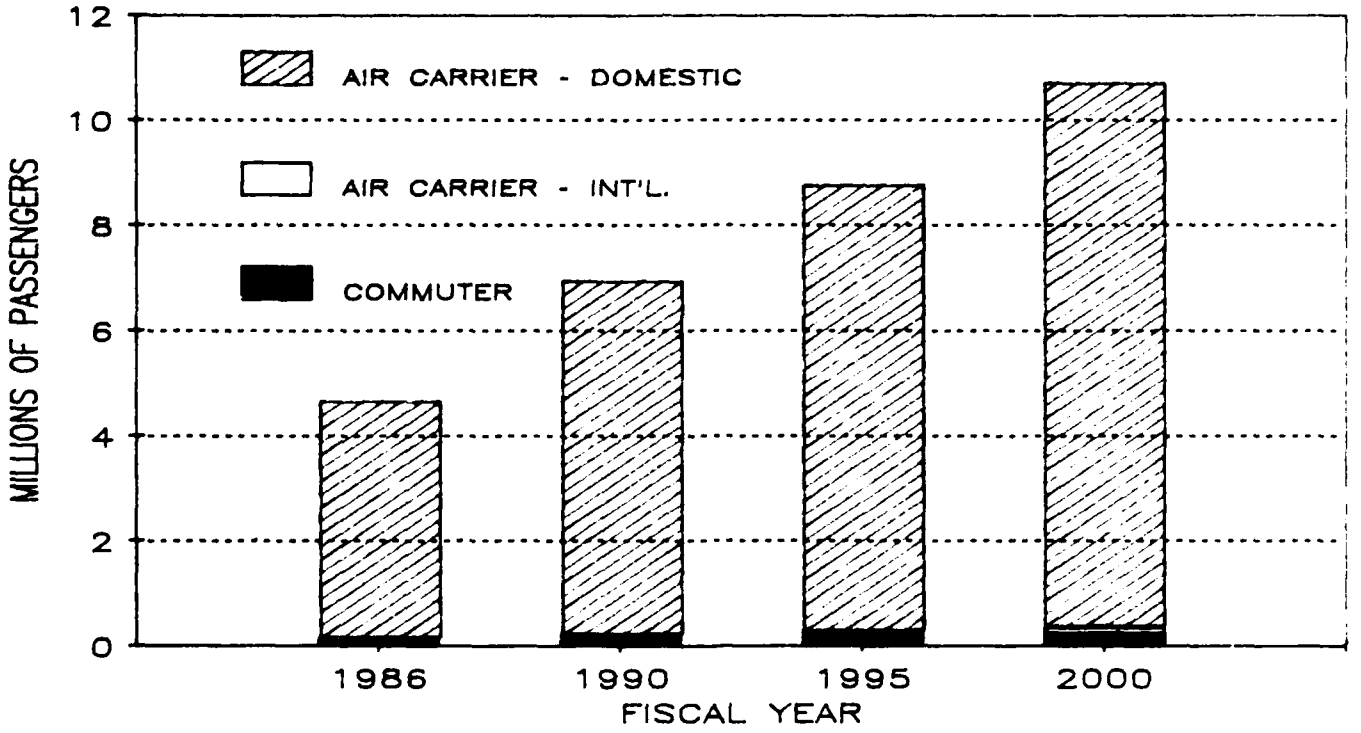


TOTAL AIRCRAFT OPERATIONS

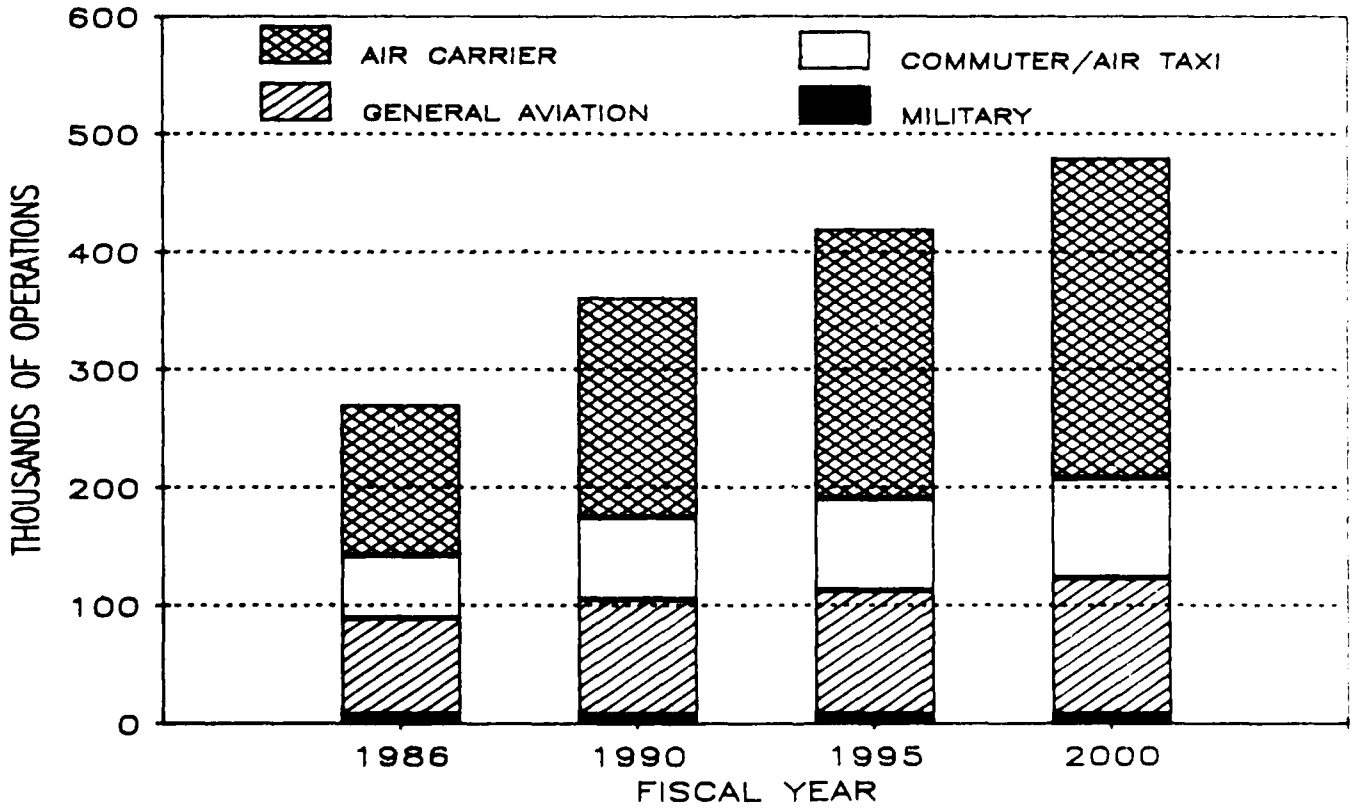


SALT LAKE CITY INTERNATIONAL AIRPORT

PASSENGER ENPLANEMENTS



TOTAL AIRCRAFT OPERATIONS



International, domestic, and commuter air services, as well as general aviation, are provided at the area's eight public use airports. FAA air traffic control service is provided at two of these airports. Salt Lake City International Airport, located 3 miles west of downtown Salt Lake City, is the hub's only air carrier airport. It is served by 11 scheduled air carriers and five all cargo carriers.

Total passenger enplanements in the hub is expected to reach nearly 10.7 million a year by 2000, 127.7 percent more than the 4.7 million passengers enplaned in 1986. Commercial aircraft operations are forecast to reach 356,600, 97.3 percent more than the 180,700 operations reached in 1986. During the 1986-2000 period, general aviation itinerant operations in the hub is expected to grow at an annual average of 3.1 percent. General aviation local operations is expected to increase at a rate of 3.6 percent annually.

CHAPTER IX

FORECAST ACCURACY

The FAA provides 12-year forecasts of workload measures annually for manpower and facility planning. To provide some measure of the accuracy of these forecasts, the following two tables compare forecast data for 10 years with actual data for two key FAA workload measures: instrument operations and aircraft handled. The forecast error for FY 1987, beginning with the forecast issued in FY 1977 for instrument operations, ranged from -3.9 percent to +17.5 percent with the average absolute error for the 10 data points being 6.6 percent.

The forecast error in the short-term (1 to 5 years), the primary input for manpower planning, tends to be minimal. In FY 1987, the error for instrument operations for this 5-year period ranged from -3.9 to +2.0 percent, with the average absolute error for the five data points being 2.6 percent.

LOW SCENARIO

The short-term economic outlook is very uncertain at this time. As noted in Chapter II, estimates for GNP growth in 1988 ranges from an outright recession to 3.1 percent growth. In the event that we do experience a significant downturn, commercial air transportation would be adversely impacted. Using the Evans Economics U.S. economic outlook for 1988, we would expect a no-growth year for passenger enplanements. The impact on FAA workload would be for air carrier operations at FAA towers to remain at the 1987 level of activity, 13.1 million versus the current forecast of 13.6 million. The consensus opinion is that any downturn would be temporary, and, therefore, it would not impact our long-term trend.

FAA INSTRUMENT OPERATIONS FORECAST EVALUATION
(Millions)

Forecast - Years Out

Year	Actual	1	2	3	4	5	6	7	8	9	10
1984	37.3	36.6	37.8	41.4	46.6	45.5	41.5	41.0	43.0	N.I.	N.I.
1985	38.7	39.1	39.4	40.9	43.1	48.1	47.3	43.1	41.8	44.5	N.I.
1986	40.4	40.6	40.9	40.8	42.6	44.8	49.4	49.2	45.1	43.7	46.2
1987	43.4	41.7	42.3	42.3	42.4	44.3	46.2	50.6	51.0	47.4	45.9
1988		45.4	43.0	43.8	43.6	44.2	46.0	47.7	51.5	53.2	49.9
1989			47.2	44.2	45.7	45.5	45.3	47.4	49.1	53.0	53.9
1990				49.1	45.4	47.3	47.2	46.6	48.7	50.8	54.2
1991					50.7	46.4	48.5	48.7	47.8	50.2	52.4
1992						51.8	47.5	49.5	50.2	49.1	51.5
1993							52.8	48.5	50.4	51.1	50.3
1994								54.0	49.6	51.3	52.0
1995									55.1	50.7	52.2
1996										56.2	51.7
1997											57.3

PERCENT ERROR
(Forecast/Actual)

1984		(1.9)	1.3	11.0	24.9	22.0	11.3	9.9	15.3	N.I.	N.I.
1985		1.0	1.8	5.7	11.4	24.3	22.2	11.4	8.0	15.0	N.I.
1986		0.5	1.2	1.0	5.4	10.9	22.3	21.8	11.6	8.2	14.4
1987		(3.9)	(2.5)	(2.5)	(2.3)	2.1	6.5	16.6	17.5	9.2	5.8

N.I. = Not Issued

FAA ARTCC AIRCRAFT HANDLED FORECAST EVALUATION
(Millions)

Forecast - Years Out

Year	Actual	1	2	3	4	5	6	7	8	9	10
1984	31.6	31.2	30.5	30.8	35.6	36.1	36.9	35.8	33.9	N.I.	N.I.
1985	32.7	32.8	32.1	31.6	32.4	37.2	37.3	38.4	37.2	35.0	N.I.
1986	34.1	34.0	33.9	33.1	32.8	33.6	38.4	38.7	39.7	38.2	36.3
1987	35.8	35.4	35.1	35.0	34.0	34.0	34.7	39.5	40.1	41.4	39.6
1988		37.0	36.6	36.1	36.1	35.1	35.2	36.1	40.5	41.1	42.8
1989			38.0	37.6	37.2	37.4	36.3	36.1	37.5	41.3	42.0
1990				39.2	38.7	38.4	38.3	37.4	37.1	38.9	42.2
1991					40.3	39.6	39.4	39.8	38.4	38.3	40.3
1992						41.4	40.6	40.5	41.1	39.6	39.3
1993							42.3	41.3	41.5	42.5	40.7
1994								43.3	42.3	42.6	43.6
1995									44.1	43.1	43.6
1996										45.1	44.0
1997											46.0

PERCENT ERROR
(Forecast/Actual)

1984	(1.3)	(3.5)	(2.5)	12.7	14.2	16.8	13.3	7.3	N.I.	N.I.
1985	0.3	(1.8)	(3.4)	(0.9)	13.8	14.1	17.4	13.8	7.0	N.I.
1986	(0.3)	(0.6)	(2.9)	(3.8)	(1.5)	12.6	13.5	16.4	12.0	6.5
1987	(1.1)	(2.0)	(2.2)	(5.0)	(5.0)	(3.1)	10.3	12.0	15.6	10.6

N.I. = Not Issued

HIGH SCENARIO

In August 1987, it was necessary to revise the short-term outlook for air carrier growth based on the assumption that there would be no fleet retirements through 1991. This forecast provided the agency with the upper limit for air carrier growth at FAA facilities (see table below). The current forecast has assumed that with the projected slowdown in the national economy, the air carriers will retire approximately 110 older aircraft in fiscal year 1988. This results in a slightly lower projected growth during this period. The current outlook for instrument operations, however, is higher than our August forecast, due to formation of new airport radar service areas (ARSA's). However, in the event of an improved economic outlook, or a marketing decision on the part of the airlines to engage in significant fare competition to stimulate traffic growth, the August short-term outlook provides an upper limit for planning purposes.

FACILITY FORECASTS

(Millions)

	Tower Operations		Instrument Operations		IFR Aircraft Handled	
	Aug. Fcst.	FY-88 Fcst.	Aug. Fcst.	FY-88 Fcst.	Aug. Fcst.	FY-88 Fcst.
1986	59.0*	59.0*	40.5*	40.5*	34.2*	34.2*
1987	61.4	61.0*	43.5	43.4*	35.8	35.8*
1988	63.5	62.7	45.8	45.4	37.3	37.0
1989	65.7	64.4	47.3	47.2	38.8	38.0
1990	67.7	66.1	48.7	49.1	40.2	39.2
1991	69.6	67.7	49.9	50.5	41.4	40.3
1986-1991 Annual Growth Rate	3.3%	2.8	4.3	4.5	3.9	3.3

* Actual

CHAPTER X

YEAR-BY-YEAR DATA FOR FAA AVIATION FORECASTS FISCAL YEARS 1988 - 1999

Chapter X provides the detailed data for the National Aviation and FAA workload series forecasted by the FAA Office of Aviation Policy and Plans. The following should be noted with regard to the data contained in the Tables listed below:

- o Table 5 - Contains the unduplicated passenger traffic reported by U.S. scheduled air carriers reporting on RSPA Form 41 and commuter carriers reporting on RSPA Form 298-C.

- o Table 6 - San Juan and Virgin Island traffic is reported as domestic, beginning January 1, 1981.

  - Those carriers contained in the Air Carrier forecast data base can be found in Appendices A and B.

  - Includes the following traffic which is also reported as commuters/regionals traffic in Table 12.

	ENPLANEMENTS (Millions)	RPM'S (Millions)		ENPLANEMENTS (Millions)	RPM'S (Millions)
1980	4.199	627.4	1984	3.153	615.6
1981	5.642	906.2	1985	4.666	844.2
1982	4.478	732.1	1986	6.537	1,029.0
1983	2.410	455.4	1987E	3.467	642.3

- o Table 12 - Includes the duplicated traffic listed above for those air carriers and commuters/regionals reporting on both RSPA Forms 41 and 298-C.

  - Forecasts and historical data exclude Alaska and foreign territory traffic.

  - The forecasts exclude the following carriers because of the predominance of jet aircraft in their fleets: Altair (beginning in 1982), Empire (1985) and Air Wisconsin (1987).

- o Table 13 - Includes only aircraft with 60 seats or less. Aircraft also included with general aviation fleet shown in Tables 14 and 15.

- o Table 17 - Includes the rotorcraft fleet and hours flown shown in Tables 14 and 16.

TABLE 1

ECONOMIC FORECASTS USED IN DEVELOPING FAA FORECASTS

FISCAL YEAR	GROSS NATIONAL PRODUCT (Billions 1982$)	CONSUMER PRICE INDEX (1967 = 100)	OIL AND GAS DEFLATOR (1982 = 100)
Historical			
1980	3,187.7	239.8	90.4
1981	3,243.8	266.3	103.2
1982	3,181.0	285.5	101.6
1983	3,227.7	295.3	97.5
1984	3,458.9	304.9	95.9
1985	3,578.5	315.9	95.5
1986	3,693.1	322.7	82.4
1987E	3,783.7	331.3	75.8
Forecast			
1988	3,901.8	345.7	80.7
1989	4,011.6	360.0	83.9
1990	4,152.0	373.5	86.9
1991	4,295.7	385.9	90.6
1992	4,440.1	396.7	95.6
1993	4,584.8	405.9	100.7
1994	4,694.8*	427.0*	107.8*
1995	4,802.8*	449.7*	114.5*
1996	4,918.1*	473.0*	122.4*
1997	5,031.2*	498.1*	131.9*
1998	5,151.9*	524.5*	142.2*
1999	5,275.6*	554.4*	153.2*

Source: Office of Management and Budget, December 1987

* Based on consensus growth rates of DRI, Evans, and Wharton Forecasts contained in Table 2.

TABLE 2

ALTERNATIVE ECONOMIC FORECASTS

CALENDAR YEAR	GROSS NATIONAL PRODUCT (Billions, 1982$) DRI	EVANS	WHARTON	CONSUMER PRICE INDEX (1967 = 100) DRI	EVANS	WHARTON	FUEL PRICE INDEX (1982 = 100) DRI	EVANS	WHARTON
Historical									
1980	3,187.2	3,187.2	3,187.2	246.8	246.8	246.8	94.8	94.8	94.8
1981	3,248.7	3,248.7	3,248.7	272.4	272.4	272.4	105.6	105.6	105.6
1982	3,166.0	3,166.0	3,166.0	289.2	289.1	289.1	100.0	100.0	100.0
1983	3,279.1	3,279.1	3,279.1	298.4	298.4	298.4	96.7	96.8	96.7
1984	3,501.4	3,501.4	3,501.4	311.2	311.2	311.1	95.2	95.2	95.2
1985	3,607.5	3,607.5	3,607.5	322.2	322.2	322.1	96.0	96.0	96.0
1986	3,713.3	3,713.3	3,713.3	328.4	328.4	328.4	75.3	75.1	75.3
1987E	3,810.8	3,803.5	3,803.3	340.4	339.9	341.0	80.4	79.6	79.4
Forecast									
1988	3,895.6	3,880.5	3,930.6	354.8	353.7	357.3	87.2	83.6	83.0
1989	3,980.6	3,928.7	4,011.6	371.9	369.9	375.3	91.2	87.6	86.9
1990	4,041.9	3,948.4	4,058.2	388.3	388.0	391.1	97.8	92.9	90.0
1991	4,141.9	4,094.6	4,220.8	406.0	407.2	406.4	104.4	98.8	93.0
1992	4,251.0	4,246.5	4,340.2	424.8	428.9	421.2	111.8	105.1	96.5
1993	4,369.5	4,375.1	4,484.2	444.2	452.6	437.1	118.6	111.8	100.2
1994	4,481.4	4,467.1	4,612.1	465.0	477.3	456.9	125.4	118.8	109.6
1995	4,597.5	4,554.8	4,748.4	487.5	503.2	479.2	133.7	126.3	115.9
1996	4,714.2	4,664.0	4,883.4	511.2	529.6	501.3	143.8	134.3	123.8
1997	4,832.1	4,775.9*	4,999.6	563.3	557.1*	536.3	158.3	142.8*	131.9
1998	4,952.2	4,890.6*	5,118.6*	595.6	586.1*	562.5*	174.2	151.8*	140.4*
1999	5,076.7	5,007.9*	5,240.4*	629.6	616.6*	590.1*	192.9	161.3*	149.5*

Data Resources, Inc., Fall, 1987; Evans Economics, Inc., September 1987; and Wharton Econometric Associates, November 1987

* Escalated to 1999 for forecast purposes

TABLE 3

BASELINE AIR CARRIER FORECAST ASSUMPTIONS - DOMESTIC OPERATIONS

FISCAL YEAR	AVERAGE SEATS PER AIRCRAFT (Seats)	AVERAGE PASSENGER TRIP LENGTH (Miles)	REVENUE PER PASSENGER MILE CURRENT$ (Cents)	REVENUE PER PASSENGER MILE 1967$ (Cents)	AVERAGE JET FUEL PRICE (Cents)
Historical					
1980	141.0	730.4	10.82	4.51	83.2
1981	143.6	748.0	12.93	4.86	100.8
1982	150.7	761.7	12.47	4.37	98.3
1983	153.4	769.2	11.90	4.03	90.3
1984	153.2	758.5	13.00	4.26	85.1
1985	152.0	758.6	12.36	3.91	80.7
1986	152.7	764.3	11.33	3.51	63.5
1987E	152.3	776.0	11.23	3.39	50.8
Forecast					
1988	154	772	11.75	3.40	60.7
1989	156	772	12.20	3.39	63.1
1990	158	773	12.64	3.38	65.4
1991	160	776	13.06	3.38	68.2
1992	162	778	13.49	3.40	72.0
1993	164	780	13.89	3.42	75.8
1994	166	782	14.49	3.39	81.2
1995	168	784	15.11	3.36	86.2
1996	170	786	15.79	3.34	92.1
1997	172	787	16.50	3.31	99.3
1998	174	790	17.25	3.29	107.0
1999	176	793	18.02	3.25	115.4

Source: ESPA, Form 41

TABLE 4

BASELINE AIR CARRIER FORECAST ASSUMPTIONS - INTERNATIONAL OPERATIONS

FISCAL YEAR	AVERAGE SEATS PER AIRCRAFT (Seats)	AVERAGE PASSENGER TRIP LENGTH (Miles)	REVENUE PER PASSENGER MILE CURRENT$ (Cents)	REVENUE PER PASSENGER MILE 1967$ (Cents)	AVERAGE JET FUEL PRICE (Cents)
Historical*					
1980	257.4	2,250.2	8.67	3.62	96.8
1981	264.7	2,365.5	9.75	3.66	113.1
1982	268.1	2,495.2	9.92	3.47	109.6
1983	279.2	2,506.8	9.99	3.38	99.7
1984	283.1	2,594.1	9.63	3.16	91.3
1985	290.5	2,636.2	9.38	2.97	84.9
1986	290.2	2,605.7	9.63	2.98	69.1
1987E	282.6	2,583.9	9.76	2.95	56.9
Forecast					
1988	281	2,610	10.09	2.92	65.0
1989	279	2,620	10.44	2.90	67.5
1990	281	2,630	10.81	2.89	70.0
1991	283	2,640	11.19	2.90	73.0
1992	286	2,650	11.58	2.92	77.1
1993	289	2,660	11.93	2.94	81.1
1994	292	2,670	12.43	2.91	86.9
1995	295	2,680	12.95	2.88	92.2
1996	298	2,690	13.50	2.85	98.6
1997	301	2,700	14.06	2.82	106.2
1998	304	2,710	14.65	2.79	114.5
1999	307	2,720	15.31	2.76	123.4

* Source: RSPA, Form 41

TABLE 5

UNITED STATES COMMERCIAL AIR CARRIERS AND REGIONALS/COMMUTERS
TOTAL SCHEDULED PASSENGER TRAFFIC 1/

	REVENUE PASSENGER ENPLANEMENTS (Millions)			REVENUE PASSENGER MILES (Billions)		
FISCAL YEAR	DOMESTIC	INTERNATIONAL	TOTAL	DOMESTIC	INTERNATIONAL	TOTAL
Historical *:						
1980	287.9	24.1	312.0	204.4	54.2	258.6
1981	276.7	21.2	295.9	199.2	50.3	249.5
1982	286.1	19.7	305.8	209.5	49.2	258.7
1983	308.2	21.1	329.3	226.0	52.8	278.8
1984	334.0	23.3	357.3	240.7	60.3	301.0
1985	370.1	24.6	394.7	268.8	64.8	333.6
1986	404.7	24.6	429.3	297.4	64.1	361.5
1987E	438.7	29.3	468.0	325.6	75.8	401.4
Forecast:						
1988	457.1	29.9	487.0	337.3	78.0	415.3
1989	477.8	30.9	508.7	352.3	81.0	433.3
1990	500.9	32.4	533.3	369.5	85.1	454.6
1991	533.4	34.7	568.1	394.8	91.5	486.3
1992	564.1	36.7	600.8	418.6	97.3	515.9
1993	592.9	38.6	631.5	440.9	102.7	543.6
1994	622.1	40.4	662.5	463.5	107.8	571.3
1995	651.1	42.4	693.5	486.0	113.7	599.7
1996	669.8	44.4	714.2	508.5	119.4	627.9
1997	699.4	46.0	745.4	523.0	124.2	647.2
1998	733.5	48.4	781.9	550.4	131.1	681.5
1999	764.2	50.5	814.7	575.3	137.4	712.7

* Source: ESPA, Form 41 and 298-C

1/ Sum of Table's 6 and 11 less duplicated traffic. See note on page 123.

TABLE 6

UNITED STATES COMMERCIAL AIR CARRIERS
SCHEDULED PASSENGER TRAFFIC

FISCAL YEAR	REVENUE PASSENGER ENPLANEMENTS (Millions) DOMESTIC	INTERNATIONAL	TOTAL	REVENUE PASSENGER MILES (Billions) DOMESTIC	INTERNATIONAL	TOTAL
Historical*						
1980	278.2	24.1	302.3	203.2	54.2	257.4
1981	264.3	21.2	285.5	198.0	50.3	248.3
1982	272.8	19.7	292.5	207.8	49.2	257.0
1983	290.3	21.1	311.4	223.6	52.8	276.4
1984	313.4	23.3	336.7	237.7	60.3	298.0
1985	350.4	24.6	375.0	265.8	64.8	330.6
1986	385.2	24.6	409.8	294.4	64.1	358.5
1987E	415.0	29.3	444.3	322.0	75.8	397.8
Forecast						
1988	431.7	29.9	461.6	333.3	78.0	411.3
1989	450.8	30.9	481.7	348.0	81.0	429.0
1990	471.8	32.4	504.2	364.7	85.1	449.8
1991	501.9	34.7	536.6	389.5	91.5	481.0
1992	530.7	36.7	567.4	412.9	97.3	510.2
1993	557.4	38.6	596.0	434.8	102.7	537.5
1994	584.4	40.4	624.8	457.0	107.8	564.8
1995	610.8	42.4	653.2	478.9	113.7	592.6
1996	637.3	44.4	681.7	500.9	119.4	620.3
1997	664.3	46.0	700.3	514.9	124.2	639.1
1998	685.7	48.4	734.1	541.7	131.1	672.8
1999	713.7	50.5	764.2	566.0	137.4	703.4

* Source: RSPA, Form 41

TABLE 7

UNITED STATES COMMERCIAL AIR CARRIERS
SCHEDULED PASSENGER CAPACITY, TRAFFIC AND LOAD FACTORS

	DOMESTIC			INTERNATIONAL		
FISCAL YEAR	ASM'S (BIL)	RPM'S (BIL)	% LOAD FACTOR	ASM'S (BIL)	RPM'S (BIL)	% LOAD FACTOR
Historical[1]						
1980	349.0	203.2	58.2	86.8	54.2	62.5
1981	343.4	198.0	57.7	79.5	50.3	63.3
1982	355.9	207.8	58.4	79.6	49.2	61.8
1983	374.4	223.6	59.7	82.6	52.8	64.0
1984	411.7	237.7	57.8	91.1	60.3	66.2
1985	436.7	265.8	60.9	98.6	64.8	65.8
1986	488.3	294.4	60.3	108.3	64.1	59.2
1987E	521.6	322.0	61.7	117.1	75.8	64.8
Forecast						
1988	545.8	333.3	61.1	122.6	78.0	63.6
1989	571.9	348.0	60.8	128.5	81.0	63.0
1990	597.6	364.7	61.0	136.2	85.1	62.5
1991	624.2	389.5	62.4	144.4	91.5	63.4
1992	652.4	412.9	63.3	152.3	97.3	63.9
1993	682.1	434.8	63.7	159.9	102.7	64.2
1994	712.5	457.0	64.1	167.9	107.8	64.2
1995	741.7	478.9	64.6	175.4	113.7	64.8
1996	773.5	500.9	64.8	183.2	119.4	65.2
1997	806.4	514.9	63.9	191.4	124.2	64.9
1998	838.5	541.7	64.6	199.0	131.1	65.9
1999	872.1	566.0	64.9	207.0	137.4	66.4

[1] Source: DOT, Form 41

TABLE 8

UNITED STATES COMMERCIAL AIR CARRIERS
LARGE JET AIRCRAFT

AS OF JANUARY 1	NARROW BODY			WIDE BODY			TOTAL
	2 ENGINE	3 ENGINE	4 ENGINE	2 ENGINE	3 ENGINE	4 ENGINE	
Historical*							
1980	615	1,029	380	12	227	131	2,394
1981	663	1,097	297	19	255	144	2,475
1982	730	1,096	218	25	267	147	2,483
1983	839	1,057	199	43	277	141	2,556
1984	962	1,122	161	83	271	146	2,745
1985	1,074	1,161	179	91	277	156	2,938
1986	1,238	1,195	171	111	293	160	3,168
1987E	1,460	1,160	193	130	298	160	3,401
Forecast							
1988	1,577	1,160	187	139	303	162	3,528
1989	1,728	1,125	179	158	303	165	3,658
1990	1,896	1,090	172	187	303	171	3,819
1991	2,003	1,055	164	221	307	179	3,929
1992	2,091	1,007	156	258	313	187	4,012
1993	2,204	917	148	288	317	196	4,070
1994	2,327	827	143	312	321	206	4,136
1995	2,469	744	141	345	321	216	4,236
1996	2,632	677	139	378	317	229	4,372
1997	2,777	610	136	418	311	242	4,494
1998	2,882	543	129	458	303	255	4,570
1999	2,993	476	120	501	293	268	4,651

* Source: FAA Aircraft Utilization and Propulsion Reliability Report

TABLE 9

UNITED STATES COMMERCIAL AIR CARRIERS
TOTAL AIRBORNE HOURS
(Thousands)

	NARROW BODY			WIDE BODY			
FISCAL YEAR	2 ENGINE	3 ENGINE	4 ENGINE	2 ENGINE	3 ENGINE	4 ENGINE	TOTAL
Historical*							
1980	1,579	2,994	690	38	712	525	6,538
1981	1,688	2,806	388	60	716	501	6,159
1982	1,951	2,635	254	67	742	510	6,159
1983	2,355	2,573	360	160	772	533	6,753
1984	2,853	2,805	342	260	787	545	7,592
1985	3,338	2,884	261	309	829	539	8,160
1986	4,142	2,985	335	381	890	551	9,284
1987E	4,743	2,952	387	440	943	558	10,023
Forecast							
1988	5,160	2,895	377	484	948	567	10,431
1989	5,558	2,846	366	564	948	583	10,865
1990	5,918	2,795	355	671	954	607	11,300
1991	6,213	2,728	344	788	970	635	11,678
1992	6,525	2,586	333	900	973	665	11,982
1993	6,883	2,266	323	992	975	699	12,138
1994	7,262	2,075	317	1,087	970	734	12,445
1995	7,661	1,801	312	1,196	954	777	12,701
1996	8,159	1,734	305	1,318	929	824	13,269
1997	8,527	1,571	291	1,453	899	872	13,613
1998	8,910	1,408	272	1,592	876	919	13,977
1999	9,222	1,267	255	1,743	862	966	14,315

* Source: RSPA, Form 41

TABLE 10

TOTAL JET FUEL AND AVIATION GASOLINE FUEL CONSUMPTION
UNITED STATES CIVIL AVIATION AIRCRAFT
(Millions of Gallons)

FISCAL YEAR	JET FUEL					AVIATION GASOLINE			TOTAL FUEL CONSUMED
	U.S. AIR CARRIERS			GENERAL AVIATION	TOTAL	AIR CARRIER	GENERAL AVIATION	TOTAL	
	DOMESTIC	INT'L.	TOTAL						
Historical*									
1980	9,126	2,136	11,262	777	12,039	13	533	546	12,585
1981	8,376	1,881	10,257	761	11,018	11	497	508	11,526
1982	8,242	1,797	10,039	855	10,894	9	458	467	11,361
1983	8,697	1,972	10,669	681	11,350	7	433	440	11,790
1984	9,478	2,176	11,654	707	12,361	6	445	451	12,812
1985	9,906	2,387	12,293	702	12,995	5	436	441	13,436
1986	10,733	2,525	13,258	738	13,996	5	411	416	14,412
1987E	11,411	2,746	14,157	768	14,925	4	409	413	15,338
Forecast									
1988	11,829	2,875	14,704	803	15,507	4	403	407	15,914
1989	12,273	3,014	15,287	806	16,093	3	399	402	16,495
1990	12,634	3,162	15,796	839	16,635	3	398	401	17,036
1991	13,004	3,311	16,315	877	17,192	2	396	398	17,590
1992	13,325	3,450	16,775	909	17,684	2	396	398	18,082
1993	13,656	3,577	17,233	948	18,181	2	398	400	18,581
1994	13,916	3,700	17,616	978	18,594	2	397	399	18,993
1995	14,133	3,808	17,941	989	18,930	2	396	398	19,328
1996	14,380	3,919	18,299	1,019	19,318	2	398	400	19,718
1997	14,625	3,999	18,624	1,057	19,681	2	398	400	20,081
1998	14,801	4,111	18,912	1,061	19,973	2	398	400	20,373
1999	14,982	4,204	19,186	1,099	20,285	2	399	401	20,686

* Source: Air carrier jet fuel, RSPA Form 41; All others, FAA APO estimates

E - Estimate

TABLE 11

BASELINE REGIONALS/COMMUTERS FORECAST ASSUMPTIONS

FISCAL YEAR	AVERAGE SEATS PER AIRCRAFT (Seats)	AVERAGE PASSENGER TRIP LENGTH 48 STATES (Miles)	AVERAGE PASSENGER TRIP LENGTH HA/P.R./V.I. (Miles)	AVERAGE PASSENGER LOAD FACTOR (Percent)
Historical*				
1980	15.1	135.2	71.9	45.5
1981	15.9	141.1	76.0	43.4
1982	16.9	146.0	95.2	44.0
1983	18.2	151.9	96.0	45.6
1984	19.1	160.5	98.9	46.2
1985	19.4	162.4	98.9	44.3
1986	20.2	158.9	99.1	45.6
1987E	20.1	161.3	97.8	45.5
Forecast				
1988	20.9	166.4	99.0	46.1
1989	22.1	171.6	97.0	44.9
1990	22.9	176.7	98.0	45.5
1991	23.7	180.8	98.0	45.7
1992	24.9	183.8	98.0	45.9
1993	25.9	186.3	98.0	46.1
1994	27.0	188.8	98.0	46.2
1995	27.5	191.3	98.0	46.3
1996	28.0	193.8	98.0	46.7
1997	28.5	196.0	98.0	46.0
1998	28.8	198.0	98.0	46.4
1999	29.1	200.0	98.0	46.8

* Source: RSPA, Form's 298-C and 41

TABLE 12
UNITED STATES REGIONALS/COMMUTERS
SCHEDULED PASSENGER TRAFFIC
(Millions)

FISCAL YEAR	REVENUE PASSENGER ENPLANEMENTS			REVENUE PASSENGER MILES		
	48 STATES	HAWAII/ PUERTO RICO/ VIRGIN ISLANDS	TOTAL	48 STATES	HAWAII/ PUERTO RICO/ VIRGIN ISLANDS	TOTAL
Historical*						
1980	12.4 (11.4)	1.5	13.9 (12.9)	1,676.1 (1,522.2)	107.8	1,783.9 (1,630.0)
1981	14.2 (12.9)	1.8	16.0 (14.7)	2,004.0 (1,756.8)	136.8	2,140.8 (1,893.6)
1982	15.6 (14.3)	2.2	17.8 (16.5)	2,278.3 (2,042.4)	187.4	2,465.7 (2,229.8)
1983	17.8 (16.9)	2.5	20.3 (19.4)	2,703.1 (2,436.2)	240.1	2,943.2 (2,676.3)
1984	21.0 (19.0)	2.8	23.8 (21.8)	3,369.6 (2,998.8)	276.8	3,646.4 (3,275.6)
1985	21.9 (20.5)	2.5	24.4 (23.0)	3,555.6 (3,318.3)	247.2	3,802.8 (3,565.5)
1986	23.3 (21.3)	2.7	26.0 (24.0)	3,769.0 (3,378.5)	267.7	4,036.7 (3,646.2)
1987E	24.4	2.8	27.2	3,960.1	273.8	4,233.9
Forecast						
1988	26.1	3.0	29.1	4,395.2	291.0	4,686.2
1989	27.8	3.2	31.0	4,798.3	313.6	5,111.9
1990	29.8	3.5	33.3	5,279.8	343.0	5,622.8
1991	32.3	3.8	36.1	5,839.8	372.4	6,212.2
1992	34.2	4.1	38.3	6,283.0	401.8	6,684.8
1993	36.3	4.4	40.7	6,762.7	431.2	7,193.9
1994	38.5	4.7	43.2	7,268.8	460.6	7,729.4
1995	41.1	5.0	46.1	7,862.4	490.0	8,352.4
1996	43.4	5.3	48.7	8,419.6	519.4	8,939.0
1997	46.2	5.5	51.7	9,055.2	539.0	9,594.2
1998	49.1	5.7	54.8	9,721.8	558.6	10,280.4
1999	52.0	5.9	57.9	10,400.0	578.2	10,978.2

* Source: RSPA, Form's 298-C and 41

E Estimate

Note: Numbers in parenthesis represent the removal of Altair, Air Wisconsin and Empire from the historical series.

TABLE 13

UNITED STATES REGIONALS/COMMUTERS
PASSENGER AIRCRAFT

AS OF JANUARY 1	LESS THAN 15 SEATS	15 TO 19 SEATS	20 TO 40 SEATS	MORE THAN 40 SEATS	TOTAL
Historical*					
1980	861	365	101	86	1,413
1981	734	383	99	97	1,313
1982	716	433	117	122	1,388
1983	701	493	125	175	1,494
1984	569	533	147	172	1,421
1985	624	561	162	204	1,551
1986	564	615	200	159	1,538
1987E	581	652	213	158	1,604
Forecast					
1988	534	667	255	192	1,648
1989	526	679	281	225	1,711
1990	509	687	322	270	1,788
1991	483	703	367	303	1,856
1992	445	708	393	351	1,897
1993	415	710	429	396	1,950
1994	382	714	469	448	2,013
1995	356	724	518	474	2,072
1996	309	739	583	492	2,123
1997	248	755	651	516	2,170
1998	188	769	719	537	2,213
1999	174	788	791	549	2,252

* Source: FAA Aircraft Utilization and Propulsion Reliability Report

E Estimate

TABLE 14

ACTIVE GENERAL AVIATION AIRCRAFT
(Thousands)

AS OF JANUARY 1	FIXED WING				ROTORCRAFT		OTHER	TOTAL
	PISTON							
	SINGLE ENGINE	MULTI-ENGINE	TURBOPROP	TURBOJET	PISTON	TURBINE		
Historical*								
1980	168.4	25.1	3.5	2.7	3.1	2.7	4.8	210.3
1981	168.4	24.6	4.1	3.0	2.8	3.2	4.9	211.0
1982	167.9	25.5	4.7	3.2	3.3	3.7	5.0	213.3
1983	164.2	25.0	5.2	4.0	2.4	3.7	5.2	209.7
1984	166.4	25.1	5.5	3.9	2.5	4.0	5.9	213.3
1985	171.9	25.5	5.8	4.3	2.9	4.2	6.3	220.9
1986	164.4	23.8	5.4	4.4	2.9	3.5	6.3	210.7
1987E	171.8	23.9	6.0	4.5	2.9	4.0	7.0	220.0
Forecast								
1988	170.2	23.8	6.1	4.6	2.8	4.2	7.3	219.0
1989	168.6	23.7	6.6	4.9	2.7	4.4	7.6	218.5
1990	167.0	23.5	6.4	5.1	2.6	4.6	7.9	217.1
1991	166.3	23.4	6.6	5.3	2.5	4.8	8.2	217.1
1992	165.5	23.3	6.7	5.6	2.5	5.0	8.5	217.1
1993	164.8	23.3	7.1	5.9	2.5	5.3	8.9	217.8
1994	164.3	23.4	7.4	6.2	2.4	5.6	9.2	218.5
1995	163.8	23.5	7.7	6.4	2.4	5.9	9.5	219.2
1996	163.3	23.6	7.9	6.6	2.3	6.1	9.6	219.4
1997	163.0	23.7	8.1	6.8	2.2	6.3	9.8	219.9
1998	162.8	23.8	8.3	7.0	2.1	6.5	9.9	220.4
1999	162.5	23.9	8.5	7.2	2.0	6.7	10.1	220.9

* Source: FAA Statistical Handbook of Aviation

Notes: Detail may not add to total because of independent rounding.

An active aircraft is one which is currently registered and flown. Aircraft [illegible] or temporarily [illegible] are excluded.

TABLE 15

ACTIVE GENERAL AVIATION AIRCRAFT
BY FAA REGION
(Thousands)

AS OF JANUARY 1	FAA REGION									TOTAL
	ANE	AEA	ASO	AGL	ACE	ASW	AWP	ANM	AAL	
Historical*										
1980	7.4	22.9	29.7	39.7	14.1	30.9	35.3	24.4	5.9	210.3
1981	7.4	23.0	29.8	39.9	14.1	31.0	35.4	24.5	5.9	211.0
1982**	7.0	21.2	32.1	40.0	14.0	32.2	36.7	23.8	6.2	213.2
1983	7.7	22.8	32.2	37.0	12.8	34.0	34.4	22.1	6.8	209.8
1984	7.8	23.2	32.7	37.6	13.0	34.6	35.0	22.5	6.9	213.3
1985	8.2	23.9	33.3	38.8	13.1	34.6	37.6	23.8	7.6	220.9
1986	8.0	22.7	32.8	37.5	12.4	32.7	36.9	21.2	6.5	210.7
1987E	9.0	25.5	33.5	37.8	13.1	32.7	38.8	22.0	7.6	220.0
Forecast										
1988	8.9	25.4	33.4	37.6	13.0	32.6	38.7	21.9	7.5	219.0
1989	8.9	25.3	33.3	37.5	12.9	32.5	38.7	21.9	7.5	218.5
1990	8.8	25.1	33.1	37.3	12.7	32.3	38.6	21.8	7.4	217.1
1991	8.8	25.1	33.3	37.1	12.6	32.4	38.6	21.8	7.4	217.1
1992	8.7	25.0	33.2	37.1	12.6	32.5	38.7	21.9	7.4	217.1
1993	8.7	25.0	33.4	37.1	12.6	32.7	38.9	22.0	7.4	217.8
1994	8.7	25.0	33.5	37.2	12.7	32.8	39.0	22.1	7.5	218.5
1995	8.8	25.1	33.7	37.2	12.7	32.9	39.1	22.2	7.5	219.2
1996	8.8	25.1	33.7	37.2	12.7	33.0	39.2	22.2	7.5	219.4
1997	8.8	25.2	33.8	37.3	12.7	33.0	39.3	22.3	7.5	219.9
1998	8.9	25.2	33.9	37.3	12.7	33.2	39.4	22.3	7.5	220.4
1999	8.9	25.2	34.0	37.3	12.8	33.3	39.5	22.4	7.5	220.9

* Source: FAA Statistical Handbook of Aviation

** Regional totals were adjusted so that they sum to the national total.

Notes: Detail may not add to total because of independent rounding.

TABLE 16

GENERAL AVIATION HOURS FLOWN
(Millions)

	FIXED WING							
	PISTON				ROTORCRAFT			
FISCAL YEAR	SINGLE ENGINE	MULTI-ENGINE	TURBOPROP	TURBOJET	PISTON	TURBINE	OTHER	TOTAL
Historical*								
1980	28.8	6.6	2.1	1.3	0.9	1.8	0.4	41.9
1981	27.9	6.4	2.2	1.5	0.8	1.8	0.4	41.0
1982	25.2	6.0	2.1	1.6	0.6	1.8	0.4	37.7
1983	23.8	5.8	2.2	1.5	0.6	1.7	0.4	36.0
1984	23.4	5.7	2.4	1.6	0.6	1.9	0.4	36.0
1985	23.4	5.7	2.6	1.8	0.6	1.7	0.4	36.2
1986	22.2	4.9	2.7	1.7	0.8	1.8	0.4	34.5
1987E	22.0	4.9	2.7	1.8	0.8	1.9	0.4	34.5
Forecast								
1988	21.8	4.8	2.8	1.9	0.8	1.9	0.4	34.4
1989	21.8	4.7	2.8	1.9	0.7	2.0	0.4	34.3
1990	21.7	4.7	2.8	2.0	0.7	2.2	0.4	34.5
1991	21.7	4.7	2.9	2.1	0.6	2.3	0.4	34.7
1992	21.6	4.7	2.9	2.2	0.6	2.5	0.4	34.9
1993	21.6	4.8	3.0	2.3	0.6	2.6	0.5	35.4
1994	21.5	4.8	3.0	2.4	0.6	2.7	0.5	35.5
1995	21.5	4.8	3.1	2.4	0.5	2.8	0.5	35.6
1996	21.4	4.9	3.1	2.5	0.5	2.9	0.6	35.9
1997	21.4	4.9	3.2	2.6	0.5	3.0	0.6	36.2
1998	21.3	4.9	3.2	2.6	0.5	3.1	0.6	36.2
1999	21.3	5.0	3.3	2.7	0.4	3.2	0.7	36.6

* Source: FAA Statistical Handbook of Aviation

E Estimate

Notes: Details may not add to total because of independent rounding.

TABLE 17

ACTIVE PILOTS BY TYPE OF CERTIFICATE
(Thousands)

AS OF JANUARY 1	STUDENTS	PRIVATE	COMMERCIAL	AIRLINE TRANSPORT	HELICOPTER	GLIDER	LIGHTER-THAN-AIR	TOTAL	INSTRUMENT RATED(1)
Historical*									
1980	210.2	343.3	182.1	63.7	5.2	6.8	3.4	814.7	247.1
1981	199.8	357.5	183.4	69.6	6.0	7.0	3.7	827.0	260.5
1982	179.9	328.6	168.6	70.3	6.5	7.4	3.0	764.2	252.5
1983	156.4	322.1	165.1	73.5	7.0	7.8	1.4	733.3	255.1
1984	147.2	318.6	159.5	75.9	7.2	8.2	1.3	718.0	254.3
1985	150.1	320.1	155.9	79.2	7.5	8.4	1.2	722.4	256.6
1986	146.7	311.1	151.6	82.7	8.1	8.2	1.1	709.5	258.6
1987E	150.3	305.7	147.8	87.2	8.6	8.4	1.1	709.1	262.4
Forecast									
1988	153.3	306.0	147.8	90.7	8.7	8.5	1.2	716.2	266.3
1989	156.4	306.6	148.5	94.3	8.8	8.6	1.2	724.4	269.0
1990	159.1	307.5	149.3	97.1	8.9	8.8	1.2	731.9	271.7
1991	161.5	308.2	150.8	100.1	9.0	8.9	1.2	739.7	273.6
1992	163.5	308.8	152.3	103.1	9.1	9.0	1.2	747.0	275.5
1993	165.1	309.7	153.8	106.2	9.3	9.1	1.3	754.5	277.4
1994	166.3	310.6	155.3	108.3	9.4	9.2	1.4	760.5	279.4
1995	167.1	311.6	156.9	110.5	9.5	9.3	1.5	766.4	281.3
1996	167.8	312.5	158.5	112.7	9.6	9.4	1.6	772.1	283.3
1997	168.3	313.4	160.1	114.9	9.7	9.5	1.7	777.6	285.3
1998	168.8	314.4	161.7	117.2	9.8	9.6	1.8	783.3	287.3
1999	169.3	315.3	163.3	119.6	9.9	9.7	1.9	789.0	289.3

* Source: FAA Statistical Handbook of Aviation.

(1) Instrument rated pilots should not be added to other categories in deriving total.

Notes: Detail may not add to total because of independent rounding.

TABLE 18

GENERAL AVIATION AIRCRAFT FUEL CONSUMPTION
(Millions of Gallons)

	FIXED WING							
	Piston				ROTORCRAFT			
FISCAL YEAR	SINGLE ENGINE	MULTI-ENGINE	TURBOPROP	TURBOJET	PISTON	TURBINE	OTHER	TOTAL
Historical*								
1980	287.6	231.1	223.9	474.6	13.3	59.7	0.8	1,291.0
1981	276.5	206.1	219.6	483.2	13.3	57.8	0.8	1,257.3
1982	251.2	197.4	230.8	562.1	9.7	62.5	0.5	1,314.2
1983	235.1	189.3	230.9	396.2	7.8	54.2	0.4	1,113.9
1984	248.8	196.3	236.4	408.0	8.5	62.9	0.2	1,161.1
1985	249.4	178.4	210.2	433.2	8.7	58.9	0.1	1,138.9
1986	242.0	157.8	230.0	451.4	11.0	56.7	0.1	1,149.0
1987E	239.8	157.8	230.0	477.9	11.0	59.8	0.1	1,176.4
Forecast								
1988	237.6	154.6	238.6	504.5	11.0	59.8	0.1	1,206.2
1989	237.6	151.3	238.6	504.5	9.7	63.0	0.1	1,204.8
1990	236.5	151.3	238.6	531.0	9.7	69.3	0.1	1,236.5
1991	236.5	151.3	247.1	557.6	8.3	72.5	0.1	1,273.4
1992	235.4	151.3	247.1	584.1	8.3	78.8	0.1	1,305.1
1993	235.4	154.6	255.6	610.7	8.3	81.9	0.1	1,346.6
1994	234.3	154.6	255.6	637.2	8.3	85.1	0.1	1,375.2
1995	234.3	154.6	264.1	637.2	6.9	88.2	0.1	1,385.4
1996	233.3	157.8	264.1	663.8	6.9	91.4	0.2	1,417.5
1997	233.3	157.8	272.6	690.3	6.9	94.5	0.2	1,455.6
1998	233.3	157.8	272.6	690.3	6.9	97.7	0.3	1,458.9
1999	232.2	161.0	281.2	716.9	5.5	100.8	0.2	1,497.8

* Source: FAA APO Estimates

E Estimate

TABLE 19

ACTIVE ROTORCRAFT FLEET AND HOURS FLOWN

AS OF JANUARY 1	ACTIVE FLEET (Thousands) PISTON	TURBINE	TOTAL	HOURS FLOWN(1) (Millions) PISTON	TURBINE	TOTAL
Historical*						
1980	3.1	2.7	5.8	0.9	1.8	2.7
1981	2.8	3.2	6.0	0.8	1.8	2.6
1982	3.3	3.7	7.0	0.6	1.8	2.4
1983	2.4	3.7	6.1	0.6	1.7	2.3
1984	2.5	4.0	6.5	0.6	1.9	2.5
1985	2.9	4.2	7.1	0.6	1.7	2.3
1986	2.9	3.5	6.4	0.8	1.8	2.6
1987E	2.9	4.0	6.9	0.8	1.9	2.7
Forecast						
1988	2.8	4.2	7.0	0.8	1.9	2.7
1989	2.7	4.4	7.1	0.7	2.0	2.7
1990	2.6	4.6	7.2	0.7	2.2	2.9
1991	2.5	4.8	7.3	0.6	2.3	2.9
1992	2.5	5.0	7.5	0.6	2.5	3.1
1993	2.5	5.3	7.8	0.6	2.6	3.2
1994	2.4	5.6	8.0	0.6	2.7	3.3
1995	2.4	5.9	8.3	0.5	2.8	3.3
1996	2.3	6.1	8.4	0.5	2.9	3.4
1997	2.2	6.3	8.5	0.5	3.0	3.5
1998	2.1	6.5	8.6	0.5	3.1	3.6
1999	2.0	6.7	8.7	0.4	3.2	3.6

* Source: FAA Statistical Handbook of Aviation

(1) Helicopter hours flown are on a fiscal year basis.

TABLE 20

TOTAL AIRCRAFT OPERATIONS
AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE
(Millions)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL	NUMBER OF FAA TOWERS
Historical*						
1980	10.1	4.6	48.9	2.5	66.2	432
1981	9.5	4.9	44.6	2.5	61.5	433
1982	9.0	5.1	34.2	2.3	50.6	375
1983	9.7	5.9	35.3	2.5	53.3	390
1984	10.9	6.6	36.	2.4	56.8	403
1985	11.3	6.9	37.2	2.5	57.9	398
1986	12.3	6.9	37.1	2.6	59.0	399
1987E	13.1	7.3	37.8	2.7	61.0	399
Forecast						
1988	13.6	7.7	38.7	2.7	62.7	399
1989	14.0	8.1	39.6	2.7	64.4	399
1990	14.4	8.5	40.5	2.7	66.1	399
1991	14.8	8.8	41.4	2.7	67.7	399
1992	15.2	9.1	42.4	2.7	69.4	399
1993	15.5	9.4	43.4	2.7	71.0	399
1994	15.8	9.7	44.5	2.7	72.7	399
1995	16.1	10.0	45.5	2.7	74.3	399
1996	16.4	10.3	46.7	2.7	76.1	399
1997	16.7	10.6	47.9	2.7	77.9	399
1998	17.0	10.9	49.0	2.7	79.6	399
1999	17.3	11.2	50.2	2.7	81.4	399

* Source: FAA Air Traffic Activity.

Notes: 1982-1984 operations reflect the temporary closures of FAA Air Traffic Control Towers. Detail may not add to total because of independent rounding.

TABLE 21

ITINERANT AIRCRAFT OPERATIONS
AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE
(Millions)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL
Historical*					
1980	10.1	4.6	28.3	1.2	44.2
1981	9.5	4.9	26.4	1.2	42.0
1982	9.0	5.1	20.7	1.1	36.0
1983	9.7	5.9	21.3	1.2	38.0
1984	10.9	6.6	22.2	1.2	41.0
1985	11.3	6.9	22.4	1.3	41.9
1986	12.3	6.9	21.9	1.4	42.5
1987E	13.1	7.3	22.1	1.4	43.9
Forecast					
1988	13.6	7.7	22.6	1.4	45.3
1989	14.0	8.1	23.1	1.4	46.6
1990	14.4	8.5	23.6	1.4	47.9
1991	14.8	8.8	24.1	1.4	49.1
1992	15.2	9.1	24.7	1.4	50.4
1993	15.5	9.4	25.3	1.4	51.6
1994	15.8	9.7	26.0	1.4	52.9
1995	16.1	10.0	26.6	1.4	54.1
1996	16.4	10.3	27.3	1.4	55.4
1997	16.7	10.6	28.0	1.4	56.7
1998	17.0	10.9	28.6	1.4	57.9
1999	17.3	11.2	29.3	1.4	59.2

* Source: FAA Air Traffic Activity.

Notes: Detail may not add to total because of independent rounding.

TABLE 22

LOCAL AIRCRAFT OPERATIONS
AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE
(Millions)

FISCAL YEAR	GENERAL AVIATION	MILITARY	TOTAL
Historical*			
1980	20.6	1.3	21.9
1981	18.2	1.3	19.5
1982	13.5	1.2	14.7
1983	14.0	1.3	15.3
1984	14.6	1.2	15.8
1985	14.8	1.2	16.0
1986	15.2	1.3	16.4
1987E	15.7	1.3	17.0
Forecast			
1988	16.1	1.3	17.4
1989	16.5	1.3	17.8
1990	16.9	1.3	18.2
1991	17.3	1.3	18.6
1992	17.7	1.3	19.0
1993	18.1	1.3	19.4
1994	18.5	1.3	19.8
1995	18.9	1.3	20.2
1996	19.4	1.3	20.7
1997	19.9	1.3	21.2
1998	20.4	1.3	21.7
1999	20.9	1.3	22.2

* Source: FAA Air Traffic Activity.

Notes: Detail may not add to total because of independent rounding.

TABLE 23

INSTRUMENT OPERATIONS
AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE
(Millions)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL	
Historical*						
1980	10.6	4.1	19.3	4.1	38.2	(10.3)
1981	10.2	4.6	18.5	3.9	37.2	(9.6)
1982	9.5	4.6	13.9	3.6	31.7	(6.5)
1983	10.1	5.3	14.8	3.8	34.0	(7.0)
1984	11.3	6.0	16.0	4.0	37.3	(7.8)
1985	11.8	6.4	16.4	4.1	38.7	(8.0)
1986	12.8	6.6	16.8	4.3	40.5	(8.4)
1987E	13.8	7.3	17.9	4.4	43.4	(9.2)
Forecast						
1988	14.3	7.7	19.0	4.4	45.4	(9.9)
1989	14.7	8.1	20.0	4.4	47.2	(10.6)
1990	15.2	8.5	21.0	4.4	49.1	(11.2)
1991	15.6	8.8	21.9	4.4	50.7	(11.7)
1992	16.0	9.1	22.3	4.4	51.8	(11.7)
1993	16.3	9.4	22.7	4.4	52.8	(11.7)
1994	16.7	9.7	23.2	4.4	54.0	(11.7)
1995	17.0	10.0	23.7	4.4	55.1	(11.7)
1996	17.3	10.3	24.2	4.4	56.2	(11.7)
1997	17.6	10.6	24.7	4.4	57.3	(11.7)
1998	17.9	10.9	25.2	4.4	58.4	(11.7)
1999	18.2	11.2	25.7	4.4	59.5	(11.7)

* Source: FAA Air Traffic Activity.

Notes: Non-IFR instrument counts at Terminal Control Area (TCA) facilities and expanded area radar service are included in the totals and noted in parenthesis as an information item (see Table 24).
The data include instrument operations at FAA operated military radar approach control facilities. Detail may not add to total because of independent rounding.

TABLE 34

NON-IFR INSTRUMENT OPERATIONS
(Millions)

FISCAL YEAR	TERMINAL CONTROL AREAS	EXPANDED RADAR SERVICE AREA STAGE II, STAGE III, ARSA	TOTAL
Historical*			
1980	2.7	7.6	10.3
1981	2.8	6.8	9.6
1982	1.9	4.6	6.5
1983	2.3	4.7	7.0
1984	2.4	5.4	7.8
1985	2.0	6.0	8.0
1986	2.2	6.2	8.4
1987E	2.6	6.6	9.2
Forecast			
1988	2.8	7.1	9.9
1989	2.9	7.7	10.6
1990	2.9	8 3	11.2
1991	2.9	8.8	11.7
1992	2.9	8.8	11.7
1993	2.9	8.8	11.7
1994	2.9	8.8	11.7
1995	2.9	8.8	11.7
1996	2.9	8.8	11.7
1997	2.9	8.8	11.7
1998	2.9	8.8	11.7
1999	2.9	8.8	11.7

* Source: FAA

Notes: 1982-1983 operations reflect the temporary termination of Stage III Service at 34 locations.

TABLE 25

IFR AIRCRAFT HANDLED
AT FAA AIR ROUTE TRAFFIC CONTROL CENTERS
(Millions)

FISCAL YEAR	IFR AIRCRAFT HANDLED				
	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL
Historical*					
1980	13.9	2.6	8.9	4.7	30.1
1981	13.0	2.9	9.0	4.7	29.5
1982	12.7	3.3	7.5	4.3	27.9
1983	13.3	3.7	7.8	4.6	29.4
1984	14.1	4.4	8.3	4.9	31.6
1985	14.6	4.8	8.3	5.0	32.7
1986	16.0	5.0	8.1	5.1	34.2
1987E	17.1	5.3	8.1	5.3	35.8
Forecast					
1988	17.8	5.6	8.3	5.3	37.0
1989	18.3	5.9	8.5	5.3	38.0
1990	18.9	6.3	8.7	5.3	39.2
1991	19.4	6.7	8.9	5.3	40.3
1992	19.9	7.1	9.1	5.3	41.4
1993	20.3	7.4	9.3	5.3	42.3
1994	20.7	7.8	9.5	5.3	43.3
1995	21.1	8.0	9.7	5.3	44.1
1996	21.5	8.4	9.9	5.3	45.1
1997	22.0	8.6	10.1	5.3	46.0
1998	22.4	9.0	10.3	5.3	47.0
1999	22.8	9.2	10.5	5.3	47.8

* Source: FAA Air Traffic Activity.

Notes: Detail may not add to total because of independent rounding.

TABLE 26

IFR DEPARTURES AND OVERS
AT FAA AIR ROUTE TRAFFIC CONTROL CENTERS
(Millions)

FISCAL YEAR	AIR CARRIER IFR DEPARTURES	AIR CARRIER OVERS	AIR TAXI/COMMUTER IFR DEPARTURES	AIR TAXI/COMMUTER OVERS	GENERAL AVIATION IFR DEPARTURES	GENERAL AVIATION OVERS	MILITARY IFR DEPARTURES	MILITARY OVERS	TOTAL DEPARTURES	TOTAL OVERS
Historical*										
1980	4.9	4.0	1.2	0.1	3.9	1.2	1.7	1.4	11.7	6.7
1981	4.6	3.8	1.4	0.1	3.9	1.2	1.6	1.4	11.5	6.5
1982	4.4	3.8	1.6	0.2	3.2	1.2	1.5	1.3	10.7	6.4
1983	4.7	4.0	1.7	0.2	3.3	1.2	1.6	1.4	11.3	6.8
1984	5.0	4.1	2.0	0.3	3.5	1.3	1.7	1.4	12.3	7.0
1985	5.2	4.1	2.2	0.3	3.5	1.3	1.8	1.4	12.8	7.1
1986	5.7	4.6	2.3	0.4	3.4	1.3	1.8	1.5	13.2	7.7
1987E	6.0	4.9	2.5	0.4	3.4	1.3	1.9	1.5	13.8	8.1
Forecast										
1988	6.4	5.0	2.6	0.4	3.5	1.3	1.9	1.5	14.4	8.2
1989	6.6	5.1	2.7	0.5	3.6	1.3	1.9	1.5	14.8	8.4
1990	6.9	5.1	2.9	0.5	3.7	1.3	1.9	1.5	15.4	8.4
1991	7.1	5.2	3.1	0.5	3.8	1.3	1.9	1.5	15.9	8.5
1992	7.3	5.3	3.3	0.5	3.9	1.3	1.9	1.5	16.4	8.6
1993	7.5	5.3	3.4	0.6	4.0	1.3	1.9	1.5	16.8	8.7
1994	7.7	5.3	3.6	0.6	4.1	1.3	1.9	1.5	17.3	8.7
1995	7.9	5.3	3.7	0.6	4.2	1.3	1.9	1.5	17.7	8.7
1996	8.1	5.3	3.9	0.6	4.3	1.3	1.9	1.5	18.2	8.7
1997	8.3	5.4	4.0	0.6	4.4	1.3	1.9	1.5	18.6	8.8
1998	8.5	5.4	4.2	0.6	4.5	1.3	1.9	1.5	19.1	8.8
1999	8.7	5.4	4.3	0.6	4.6	1.3	1.9	1.5	19.5	8.8

* Source: FAA Air Traffic Activity.

TABLE 27

TOTAL FLIGHT SERVICES
AT FAA FLIGHT SERVICE STATIONS AND COMBINED STATIONS/TOWERS
(Millions)

FISCAL YEAR	FLIGHT PLANS ORIGINATED	PILOT BRIEFS	AIRCRAFT CONTACTED	TOTAL FLIGHT SERVICES
Historical*				
1980	9.0	18.3	9.6	64.2
1981	8.8	17.7	9.6	62.6
1982	8.5	17.8	9.7	62.4
1983	8.1	16.0	8.6	56.9
1984	8.2	15.1	8.1	54.7
1985	8.0	14.6	7.7	52.9
1986	7.5	13.4	7.2	49.0
1987E	7.6	12.8	7.0	47.7
Forecast				
1988	7.8	12.7	6.9	47.9
1989	7.9	12.9	7.0	48.6
1990	8.1	13.0	7.0	49.2
1991	8.2	13.1	7.0	49.6
1992	8.3	13.2	7.0	50.0
1993	8.6	13.3	7.1	50.9
1994	8.7	13.4	7.1	51.3
1995	8.8	13.5	7.1	51.7
1996	9.0	13.5	7.1	52.1
1997	9.1	13.6	7.1	52.5
1998	9.3	13.7	7.1	53.1
1999	9.4	13.7	7.1	53.3

* 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 28

FLIGHT PLANS ORIGINATED
AT FAA FLIGHT SERVICE STATIONS AND COMBINED STATIONS/TOWERS
(Millions)

FISCAL YEAR	FLIGHT PLANS ORIGINATED IFR-DVFR	VFR	TOTAL
Historical*			
1980	6.6	2.4	9.0
1981	6.5	2.3	8.8
1982	6.5	2.0	8.5
1983	6.3	1.9	8.1
1984	6.4	1.8	8.2
1985	6.3	1.7	8.0
1986	5.9	1.6	7.5
1987E	5.9	1.7	7.6
Forecast			
1988	6.0	1.8	7.8
1989	6.1	1.8	7.9
1990	6.2	1.9	8.1
1991	6.3	1.9	8.2
1992	6.4	1.9	8.3
1993	6.6	2.0	8.6
1994	6.7	2.0	8.7
1995	6.8	2.0	8.8
1996	6.9	2.1	9.0
1997	7.0	2.1	9.1
1998	7.1	2.2	9.3
1999	7.2	2.2	9.4

* Source: FAA Air Traffic Activity.

Notes: Detail may not add to total because of independent rounding.

TABLE 29

AIRCRAFT CONTACTED
AT FAA FLIGHT SERVICE STATIONS AND COMBINED STATIONS/TOWERS
(Millions)

	USER CATEGORY				FLIGHT RULES		
FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	IFR-DVFR	VFR	TOTAL
Historical*							
1980	0.4	0.9	7.9	0.4	2.0	7.7	9.6
1981	0.4	0.9	7.9	0.4	2.0	7.6	9.6
1982	0.4	1.2	7.7	0.4	2.5	7.2	9.7
1983	0.4	1.1	6.6	0.4	2.3	6.3	8.6
1984	0.4	1.1	6.3	0.4	2.3	5.9	8.1
1985	0.4	1.1	5.8	0.4	2.2	5.5	7.7
1986	0.4	1.0	5.4	0.4	2.1	5.1	7.2
1987E	0.4	1.0	5.2	0.4	2.1	4.9	7.0
Forecast							
1988	0.3	1.1	5.1	0.4	2.1	4.8	6.9
1989	0.3	1.2	5.1	0.4	2.2	4.8	7.0
1990	0.3	1.2	5.1	0.4	2.2	4.8	7.0
1991	0.3	1.2	5.2	0.4	2.2	4.8	7.0
1992	0.3	1.2	5.2	0.4	2.2	4.8	7.0
1993	0.3	1.2	5.2	0.4	2.2	4.9	7.1
1994	0.3	1.2	5.2	0.4	2.2	4.9	7.1
1995	0.3	1.2	5.2	0.4	2.2	4.9	7.1
1996	0.3	1.2	5.2	0.4	2.2	4.9	7.1
1997	0.3	1.2	5.2	0.4	2.2	4.9	7.1
1998	0.3	1.2	5.2	0.4	2.2	4.9	7.1
1999	0.3	1.2	5.2	0.4	2.2	4.9	7.1

* Source: FAA Air Traffic Activity.

Notes: Detail may not add to total because of independent rounding.

TABLE 30

ACTIVE U.S. MILITARY AIRCRAFT
IN THE CONTINENTAL UNITED STATES (1)

	FIXED WING AIRCRAFT				
FISCAL YEAR	JET	TURBOPROP	PISTON	HELICOPTER	TOTAL
Historical*					
1980	8,794	1,869	699	7,607	18,969
1981	9,111	1,943	591	7,718	19,363
1982	9,647	1,900	516	9,665	21,728
1983	9,495	1,745	363	7,049	18,652
1984	9,551	1,777	333	7,172	18,833
1985	9,640	1,881	408	7,404	19,333
1986	9,730	1,803	386	8,238	20,157
1987E	9,819	1,865	370	8,460	20,514
Forecast					
1988	9,899	1,890	360	8,580	20,729
1989	9,905	1,910	358	8,798	20,971
1990	9,959	1,925	350	8,875	21,109
1991	9,965	1,930	350	9,011	21,256
1992	10,060	1,935	345	9,090	21,430
1993	10,121	1,948	345	9,150	21,564
1994	10,250	1,962	340	9,203	21,755
1995	10,313	1,968	340	9,240	21,861
1996(2)	10,313	1,968	340	9,240	21,861
1997	10,313	1,968	340	9,240	21,861
1998	10,313	1,968	340	9,240	21,861
1999	10,313	1,968	340	9,240	21,861

* Source: Office of the Secretary of Defense, Department of Defense.

(1) Includes Army, Air Force, Navy and Marine regular service aircraft, as well as Reserve and National Guard aircraft.

(2) Detail planning information not available beyond 1995. Fiscal Years 1996-1999 projected at 1995 level.

TABLE 31

ACTIVE U.S. MILITARY AIRCRAFT
HOURS FLOWN IN THE CONTINENTAL UNITED STATES (1)
(Thousands)

	FIXED WING AIRCRAFT				
FISCAL YEAR	JET	TURBOPROP	PISTON	HELICOPTER	TOTAL
Historical*					
1980	2,904	796	235	1,320	5,255
1981	2,966	840	253	1,791	5,850
1982	3,347	762	192	1,876	6,177
1983	3,345	746	119	1,557	5,767
1984	3,389	761	120	1,605	5,875
1985	3,350	739	126	1,567	5,782
1986	3,510	820	155	1,798	6,283
1987E	3,268	753	140	1,879	6,040
Forecast					
1988	3,215	751	140	1,879	5,985
1989	3,215	768	137	1,898	6,018
1990	3,235	773	137	1,902	6,047
1991	3,265	780	137	1,993	6,175
1992	3,350	790	137	2,030	6,307
1993	3,415	793	137	2,105	6,450
1994	3,830	810	137	2,140	6,917
1995	3,895	810	137	2,140	6,982
1996(2)	3,895	810	137	2,140	6,982
1997	3,895	810	137	2,140	6,982
1998	3,895	810	137	2,140	6,982
1999	3,895	810	137	2,140	6,982

* Source: Office of the Secretary of Defense, Department of Defense.

(1) Includes Army, Air Force, Navy and Marine regular service aircraft, as well as Reserve and National Guard aircraft.

(2) Detail planning information not available beyond 1995. Fiscal Years 1996-1999 projected at 1995 level.

GLOSSARY OF TERMS

Air Carrier Operations -- Arrivals and departures performed by air carriers certificated in accordance with FAR Parts 121 and 127.

Air Route Traffic Control Center (ARTCC) -- A facility established to provide air traffic control service to aircraft operating on an IFR flight plan within controlled airspace and principally during the en route phase of flight. When equipment capabilities and controller workload permit, certain advisory/assistance service may be provided to VFR aircraft.

Air Taxi -- An air carrier certificated in accordance with FAR Part 135 and authorized to provide, on demand, public transportation of persons and property by aircraft. Generally operate small aircraft "for hire" for specific trips.

Air Traffic -- Aircraft operating in the air or on an airport surface, exclusive of loading ramps and parking areas.

Air Traffic Hub -- Air traffic hubs are not airports; they are the cities and Metropolitan Statistical Areas requiring aviation services and may include more than one airport. Communities fall into four classes as determined by each community's percentage of the total enplaned passengers by scheduled air carriers in the 50 United States, the District of Columbia, and other U.S. areas designated by the Federal Aviation Administration.

1. Large: 1.00 percent (4,000,080 passengers and over in CY 1986).

2. Medium: 0.25 percent to 0.999 percent (between 1,000,000 and 4,000,079 passengers in CY 1986).

3. Small: 0.05 percent to 0.249 percent (between 200,004 and 1,000,019 passengers in CY 1986).

4. Nonhub: Less than 0.05 percent (under 200,004 passengers in CY 1986).

Air Travel Club -- An operator certificated in accordance with FAR Part 123 to engage in the carriage of members who are qualified for that carriage by payment of an assessment, dues, membership fees, or other similar remittance.

Aircraft Contacted -- Aircraft with which the flight service stations have established radio communications contact. One count is made for each en route landing or departing aircraft contacted by a flight service station, regardless of the number of contacts made with an individual aircraft during the same flight. A flight contacting five FSS's would be counted as five aircraft contacted.

Aircraft Handled -- See IFR AIRCRAFT HANDLED.

Aircraft Operations -- The airborne movement of aircraft in controlled or noncontrolled airport terminal areas, and counts at en route fixes or other points where counts can be made. There are two types of operations: local and itinerant.

1. LOCAL OPERATIONS are performed by aircraft which:

   (a) operate in the local traffic pattern or within sight of the airport;

   (b) are known to be departing for or arriving from flights in local practice areas located within a 20-mile radius of the airport;

   (c) execute simulated instrument approaches or low passes at the airport.

2. ITINERANT OPERATIONS are all aircraft operations other than local operations.

Airport Advisory Service -- A service provided by flight service stations at airports not served by a control tower. This service provides information to arriving and departing aircraft concerning wind direction/speed, favored runway, altimeter setting, pertinent-known traffic/field conditions, airport taxi routes/traffic patterns, and authorized instrument approach procedures. This information is advisory in nature and does not constitute an ATC clearance.

Airport Traffic Control Tower -- A terminal facility which through the use of air/ground communications, visual signaling, and other devices, provides ATC services to airborne aircraft operating in the vicinity of an airport and to aircraft operating on the movement area.

All-Cargo Carrier -- An air carrier certificated in accordance with FAR Part 121 to provide scheduled air freight, express, and mail transportation over specified routes, as well as the conduct of nonscheduled operations which may include passengers.

Approach Control Facility -- A terminal air traffic control facility providing approach control service.

Approach Control Service -- Air traffic control service provided by an approach control facility for arriving and departing VFR/IFR aircraft and, on occasion, en route aircraft. At some airports not served by an approach control facility, the ARTCC provides limited approach control service.

ARTCC -- See AIR ROUTE TRAFFIC CONTROL CENTER.

ASMs -- See AVAILABLE SEAT MILES.

Available Seat Miles (ASMs) -- The aircraft miles flown in each flight stage multiplied by the number of seats available on that stage for revenue passenger use.

Business Transportation -- Any use of an aircraft not for compensation or hire by an individual for the transportation required by a business in which he is engaged.

Center -- See AIR ROUTE TRAFFIC CONTROL CENTER.

Center Area -- The specified airspace within which an air route traffic control center (ARTCC) provides air traffic control and advisory service.

Center Radar Approach Control (CERAP) -- A combined air route traffic control center (ARTCC) and a terminal approach control facility (TRACON).

CERAP -- See CENTER RADAR APPROACH CONTROL.

Commercial Air Carriers -- An air carrier certificated in accordance with FAR Parts 121 or 127 to conduct scheduled services on specified routes. These air carriers may also provide nonscheduled or charter services as a secondary operation. Four carrier groupings have been designated for statistical and financial data aggregation and analysis.

1. MAJORS: Air carriers with annual operating revenues greater than $1 billion.

2. NATIONALS: Air carriers with annual operating revenues of between $100 million, and $1 billion.

3. LARGE REGIONALS: Air carriers with annual operating revenues of between $10 million and $99,999,999.

4. MEDIUM REGIONALS: Air carriers with annual operating revenues of less than $10 million.

Common IFR Room -- A highly automated terminal radar control facility. It provides terminal radar service in an area encompassing more than one major airport which accommodates instrument flight operations.

Commuter Air Carrier -- An air carrier certificated in accordance with FAR Part 135 which operates aircraft with a maximum of 60 seats, and provides at least five scheduled round trips per week between two or more points, or carries mail.

Commuter/Air Taxi Operations -- Those arrivals and departures performed by air carriers certificated in accordance with FAR Part 135.

Control Tower -- See AIRPORT TRAFFIC CONTROL TOWER.

Domestic Operations -- All air carrier operations having destinations within the 50 United States, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands.

Executive Transportation -- Any use of an aircraft by a corporation, company or other organization for the purpose of transporting its employees and/or property not for compensation or hire, and employing professional pilots for the operation of the aircraft.

FAA -- Federal Aviation Administration.

Facility -- See AIR TRAFFIC CONTROL FACILITY.

Flight Plan -- Specified information relating to the intended flight of an aircraft that is filed orally or in writing with a flight service station or an air traffic control facility.

Flight Service Station (FSS) -- Air Traffic Service facilities within the National Airspace System which provide preflight pilot briefings and en route communications with IFR flights; assist lost IFR/VFR aircraft; assist aircraft having emergencies; relay ATC clearances, originate, classify, and disseminate Notices to Airmen; broadcast aviation weather and NAS information; receive and close flight plans; monitor radio NAVAIDS; notify search and rescue units of missing VFR aircraft; and operate the national weather teletypewriter systems. In addition, at selected locations, FSS's take weather observations, issue airport advisories, administer airmen written examinations, and advise Customs and Immigration of transborder flights.

Flight Services -- See TOTAL FLIGHT SERVICES.

Foreign Flag Air Carrier -- An air carrier other than a U.S. flag air carrier in international air transportation. "Foreign air carrier" is a more inclusive term than "foreign flag air carrier," presumably including those non-U.S. air carriers operating solely within their own domestic boundaries. In practice, the two terms are used interchangeably.

FSS -- See FLIGHT SERVICE STATION.

General Aviation -- All civil aviation activity except that of air carriers certificated in accordance with FAR Parts 121, 123, 127, and 135. The types of aircraft used in general aviation (GA) activities cover a wide spectrum from corporate multi-engine jet aircraft piloted by professional crews to amateur-built single engine piston acrobatic planes, balloons, and dirigibles.

General Aviation Operations -- Arrivals and departures of all civil aircraft, except those classified as air carrier and commuter/air taxi.

Hub -- See AIR TRAFFIC HUB.

IFR -- See INSTRUMENT FLIGHT RULES.

IFR Aircraft Handled -- The number of IFR departures multiplied by two, plus the number of IFR overs. This definition assumes that the number of departures (acceptances, extensions, and originations of IFR flight plans) is equal to the number of landings (IFR flight plans closed).

IFR Departures -- An IFR departure includes IFR flights that:

1. originated in a Center's area;

2. are extended by the Center; or

3. are accepted by the Center under SOLE EN ROUTE clearance procedures.

IFR Overs -- An IFR flight that originates outside the ARTCC area and passes through the area without landing.

IFSS -- See INTERNATIONAL FLIGHT SERVICE STATION.

International and Territorial Operations -- The operation of aircraft flying between the 50 United States and foreign points, between the 50 United States and U.S. possessions and territories, and between two foreign points. Includes both the combination passenger/cargo and the all-cargo carriers engaged in international and territorial operations.

Instructional Flying -- Any use of aircraft for the purpose of formal instruction with the flight instructor aboard or with the maneuvers on the particular flight(s) specified by the flight instructor.

Instrument Approach -- A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually. It is prescribed and approved for a specific airport by competent authority (FAR Part 91).

Instrument Flight Rules (IFR) -- Rules governing the procedures for conducting instrument flight.

Instrument Operation -- An aircraft operation in accordance with an IFR flight plan or an operation where IFR separation between aircraft is provided by a terminal control facility or air route traffic control center.

International Flight Service Station (IFSS) -- A central operations facility in the flight advisory system, manned and equipped to control aeronautical point-to-point telecommunications, and air/ground telecommunications with pilots operating over international territory or waters, providing flight plan filing, weather information, search and rescue action, and other flight assistance operations.

Itinerant Operations -- See AIRCRAFT OPERATIONS.

Large Regionals -- See COMMERCIAL AIR CARRIERS.

Local Operations -- See AIRCRAFT OPERATIONS.

Majors -- See COMMERCIAL AIR CARRIERS.

Medium Regionals -- See COMMERCIAL AIR CARRIERS.

Military Operations -- All arrivals and departures performed by aircraft not classified as civil.

Nationals -- See COMMERCIAL AIR CARRIERS.

Personal/Pleasure Flying -- Any use of an aircraft for personal purposes not associated with a business or profession, and not for hire. This includes maintenance of pilot proficiency.

Pilot Briefing -- A service provided by the Flight Service Station to assist pilots in flight planning. Briefing items may include weather information NOTAMS, military activities, flow control information, and other items as requested.

Radar Air Traffic Control Facility (RATCF) -- An air traffic control facility, located at a U.S. Navy (USN) or Marine Corps (USMC) Air Station, utilizing surveillance and, normally, precision approach radar and air/ground communication equipment to provide approach control services to aircraft arriving, departing, and transiting the airspace controlled by the facility. The facility may be operated by the FAA, the USN and the FAA, the USN, or the USMC. Service may be provided to both civil and military airports.

Radar Approach Control (RAPCON) -- An air traffic control facility, located at a U.S. Air Force (USAF) Base, utilizing surveillance and, normally, precision approach radar and air/ground communication equipment to provide approach control services to aircraft arriving, departing, and transiting the airspace controlled by the facility. The facility may be operated by the FAA, or the USAF. Service may be provided to both civil and military airports.

Radio Contacts -- The initial radio call-up to a flight service station by en route aircraft; a complete interchange of information and a termination of the contact.

RAPCON -- See RADAR APPROACH CONTROL.

RARCF -- See RADAR AIR TRAFFIC CONTROL FACILITY.

Registered Active General Aviation Aircraft -- A civil aircraft registered with the FAA that has been flown one or more hours during the previous calendar year. Excluded are aircraft owned and operated in regularly scheduled, nonscheduled, or charter service by commercial air carriers or aircraft in excess of 12,500 pounds maximum gross takeoff weight, and owned and operated by a commercial operator certificated by the FAA to engage in intrastate common carriage.

Revenue Passenger Enplanements -- The total number of passengers boarding aircraft. This includes both originating and connecting passengers.

Revenue Passenger Load Factor -- Revenue passenger-miles as a percent of available seat-miles in revenue passenger services, i.e., the proportion of aircraft seating capacity that is actually sold and utilized.

Revenue Passenger Mile (RPM) -- One revenue passenger transported one mile in revenue service. Revenue passenger miles are computed by summation of the products of the revenue aircraft miles flown on each inter-airport hop multiplied by the number of revenue passengers carried on that hop.

Revenue Ton Mile (RTM) -- One ton of revenue traffic transported one mile.

RPM -- See REVENUE PASSENGER MILE.

RSPA -- The Research and Special Programs Administration of the U.S. Department of Transportation. This office is responsible for the collection of air carrier traffic and financial data on Form 41 that was formally collected by the Civil Aeronautics Board.

RTM -- See REVENUE TON MILE.

Secondary Airport -- An airport receiving approach control service as a satellite to a primary approach control facility, or one at which control is exercised by the approach control facility under tower en route control procedure.

Supplemental Air Carrier -- An air carrier certificated in accordance with FAR Part 121, and providing nonscheduled or supplemental carriage of passengers or cargo, or both, in air transportation. They are also referred to as nonscheduled or charter air carriers.

Terminal Radar Approach Control (TRACON) -- An FAA traffic control facility using radar and air/ground communications to provide approach control services to aircraft arriving, departing, or transiting the airspace controlled by the facility. Service may be provided to both civil and military airports. A TRACON is similar to a RAPCON (USAF), RATCF (USN), and ARAC (Army).

Total Flight Services -- The sum of flight plans originated and pilot briefs, multiplied by two, plus the number of aircraft contacted. No credit is allowed for airport advisories.

Total Operations -- All arrivals and departures performed by military, general aviation, commuter/air taxi, and air carrier aircraft.

Tower -- See AIRPORT TRAFFIC CONTROL TOWER.

TRACON -- See TERMINAL RADAR APPROACH CONTROL.

U.S. Flag Carrier -- One of a class of air carriers holding a certificate issued by the Department of Transportation, and approved by the President, authorizing the carrier to provide scheduled operations over a specified route between the U.S. (and/or its territories) and one or more foreign countries.

VFR -- See VISUAL FLIGHT RULES.

VFR Tower -- An airport traffic control tower that does not provide approach control service.

Visual Flight Rules (VFR) -- Rules that govern the procedures for conducting flight under visual conditions. The term "VFR" is also used in the U.S. to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.

APPENDIX A

ACTIVE U.S. COMMERCIAL AIR CARRIERS

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	International
1. Aerial (AG)	F	MR	12-84	8-84
2. Aeron	F	MR		4-83
3. Air Wisconsin (ZW)	S	N	7-79	
4. Alaska (AS) (4)	S	N	X	
5. Aloha (AQ) (5)	S	N	X	6-84
6. American (AA) (6)	S	M	X	X
7. America West (HP)	S	N	8-83	
8. American Trans Air	S	N	X	X
9. Arrow (JW)	S	LR	11-82	6-83
10. Aspen (AP) (7)	S	LR	1-85	
11. Atlantic Gulf (ZY)	C	MR	9-85	
12. Braniff (BN) (8)	S	N	3-84	
13. Buffalo	C	LR	4-84	4-84
14. Challenge Air Cargo	F	MR		7-86
15. Challenge Air Int'l.	S	MR		7-86
16. Connor	F	MR	1-87	1-87
17. Continental (CO) (9)	S	M	X	X
18. Delta (DL)	S	M	X	X
19. Eastern (EA)	S	M	X	X
20. Emerald (OD)	S	LR	7-82	
21. Evergreen (JO)	F	LR	X	X
22. Federal Express (FM)	F	M	1-86	1-86
23. Five Star	C	LR	12-85	
24. Florida Express (ZO)	S	LR	1-84	1-87
25. Florida West	F	MR	2-87	
26. Flying Tiger (FT)	F	M	X	X
27. Galaxy (GY)	C	MR	10-83	12-83
28. Great American (FD)	C	MR	10-80	
29. Gulf Air Transport (GA)	C	MR		1-85
30. Hawaiian (HA)	S	N	X	10-84

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	International
31. Horizon Air (QX)	S	LR	9-84	
32. Independent Air	S	MR	9-94	9-84
33. Jet East	C	MR	1-85	
34. Jet Fleet (JL)	C	MR	6-83	
35. Key	C	LR	6-84	1-85
36. Markair (BF) (10)	S	LR	X	
37. Midway (ML)	S	N	11-79	
38. Mid Pacific (HO)	S	LR	10-85	
39. Midwest Express (YX)	S	LR	7-84	
40. Million	C	MR		1-86
41. MGM Grand (MG)	S	N	9-87	
42. Northern Air Cargo (HU)	F	LR	12-82	
43. Northwest (NW) (11)	S	M	X	X
44. Orion	F	MR	1-87	1-87
45. Pacific Interstate (QT)	S	LR	12-84	
46. Pacific Southwest (PS)	S	N	1-79	
47. Pan American (PA)	S	M	X	X
48. Piedmont (PI) (12)	S	M	X	
49. Pilgrim (PM)	S	LR	9-85	
50. Presidential Air (XV)	S	LR	10-85	
51. Reeve (RV)	S	LR	X	
52. Rich (XR)	C	MR	1-82	
53. Rosenbalm	F	MR	4-85	4-85
54. Royal West	S	LR	7-86	
55. Skybus (FW)	S	MR	7-85	
56. Sky World	C	LR	10-85	10-85
57. Southern Air	F	LR	5-80	4-80
58. South Pacific Island (HK)	S	LR		7-81
59. Southwest (WN)	S	N	2-79	
60. Sun Coast (WS)	C	MR		5-87
61. Sun Country (SC)	C	MR	1-83	3-83
62. Sunworld (JK)	S	LR	5-83	
63. Tower (FF)	S	LR		11-83
64. Trans Air-Link	F	MR	1-84	1-84
65. Trans International	F	MR	5-85	1-85

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	International
66. Trans World (TW) (13)	S	M	X	X
67. United (UA)	S	M	X	4-83
68. US Air (AL)	S	M	X	
69. Zantop	F	LR	X	X

(1) S = Scheduled; C = Charter; F = All-Cargo.

(2) M = Majors; N = Nationals; LR = Large Regionals; MR = Medium Regionals.

(3) Date of first reported traffic is indicated for those carriers starting service since the passage of the Airline Deregulation Act of 1978. Traffic reported by those carriers certificated prior to deregulation indicated by an X.

(4) Acquired Jet America.

(5) Discontinued international service 1/85.

(6) Acquired AirCal.

(7) Carrier reported as a commuter air carrier from 9/82 to 12/84.

(8) Carrier did not operate from 5/82 to 2/84.

(9) Acquired Frontier, New York Air, and People Express.

(10) Formerly Alaska International.

(11) Acquired Republic Airlines.

(12) Acquired Empire Airlines.

(13) Acquired Ozark Airlines.

APPENDIX B

CARRIERS NO LONGER INCLUDED IN AIR CARRIER DATA BASE

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	Int'l.	Date of Last Reported Traffic (4)
1. Aeromech (KC)	S	MR	7-79		5-81**
2. Air Atlanta (CC)	S	LR	2-84		7-86*
3. AirCal (OC)	S	N	1-79		3-87m
4. Air Florida (QH)	S	N	1-79	7-80	5-84*
5. Air Illinois (UX)	S	LR	1-83		2-84*
6. Airlift (RD)	C	MR	7-84	7-84	12-85*
7. Airmark	C	MR	8-84	9-84	12-84*
8. Air Midwest (ZV)	S	LR	X		12-84**
9. Air National (AH)	C	LR		4-84	6-84*
10. Air Nevada (LW)	S	MR	4-81		7-82**
11. Air New England (NE)	S	MR	X		10-81*
12. Air North (NO)	S	MR	6-80		8-82**
13. Air North/Nenana (XG)	S	MR	3-81		8-82**
14. Air One (CB)	S	LR	4-83		7-84*
15. AirPac (RI)	S	LR	4-84		12-85*
16. All Star (LS)	S	MR	4-83	4-83	10-85*
17. Altair (AK)	S	MR	1-79		9-82*
18. American Int'l. (AV)	S	LR	11-82		9-84*
19. Apollo (ID)	S	MR	5-79		7-81**
20. Arista (RI)	C	MR	12-82	8-82	3-84*
21. Best (IW)	S	MR	7-82		10-85**
22. Big Sky (GQ)	S	MR	6-79		9-82**
23. Blue Bell (BB)	C	MR	6-83		2-84*
24. Britt (RU)	S	LR	10-84		6-87**
25. Cascade (CZ)	S	LR	1-85		11-85*
26. Capitol (CL)	S	N	7-80	7-81	9-84*
27. Challenge (CN)	F	MR		8-82	6-86*
28. Cochise (DP)	S	MR	1-79		12-81*
29. Coleman (CH)	S	MR	9-79		3-80*
30. Colgan (CJ)	S	MR	4-81		3-83**

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	Int'l.	Date of Last Reported Traffic (4)
31. Empire (UR)	S	LR	10-79		4-86m
32. Flight International	C	MR	4-84	6-84	9-85*
33. Frontier (FL)	S	N	X	X	8-86m
34. Frontier Horizon (FH)	S	LR	1-84		1-85*
35. Global (GL)	C	LR	X	X	12-84*
36. Golden Gate (GG)	S	MR	5-80		7-81*
37. Golden West (GW)	S	MR	2-79		7-82**
38. Guy America (HX)	S	MR		8-81	2-83*
39. Hawaii Express (LP)	S	LR	10-82		10-83*
40. Imperial (II)	S	MR	1-80		6-82**
41. Int'l. Air Service (IE)	C	LR	11-83		5-85*
42. Interstate	F	LR	5-85	5-85	10-87*
43. Jet America (SI)	S	N	1-82		8-87m
44. Jet Charter	C	MR	7-82	7-82	5-85*
45. Kodiak (KO)	S	MR	X		11-82**
46. L.A.B. (JF)	S	MR	1-82		8-82**
47. McClain (MU)	S	LR	11-86		2-87**
48. Mid-South (VL)	S	MR	6-80		2-84*
49. Midstate (IU)	S	MR	7-81		7-82**
50. Midway Express	S	LR	10-84		7-85*
51. Mississippi Valley (XV)	S	MR	4-79		8-82**
52. Munz (XY)	S	MR	X		8-83*
53. New Air (NC)	S	MR	5-79		9-82**
54. New York Air (NY)	S	N	12-80		12-86m
55. New Wien (WC)	S	MR	9-85		10-85*
56. Northeastern (QS)	S	LR	7-84		2-85*
57. Overseas (OV)	C	LR	10-82		10-85*
58. Ozark (OZ)	S	N	X		9-86m
59. Pacific East (PR)	S	LR	9-82		3-84*
60. Pacific Express (VB)	S	LR	2-82		10-83*
61. Peninsula (KS)	S	MR	1-82		1-83**
62. People Express (PE)	S	N	5-81	5-83	12-86m
63. Ports of Call Travel Club	C	LR	9-85		1-86*
64. Pride Air (NI)	S	LR	10-85		11-85*
65. Republic (RC)	S	M	X		9-86m

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	Int'l.	Date of Last Reported Traffic (4)
66. Rocky Mountain (JC)	S	MR	7-81		9-82**
67. Royale (OQ)	S	LR	3-84		6-84**
68. Ryan	C	LR	4-84	4-84	5-86*
69. Sea Airmotive (KJ)	S	MR	1-80		6-82**
70. Skystar	C	MR	1-85	3-85	1-87*
71. Sky West (QG)	S	MR	7-79		12-84**
72. Samoa (MB)	S	MR		2-85	6-85*
73. Southeast (NS)	S	MR	7-79		1-80*
74. Swift Aire (WI)	S	MR	1-79		7-81*
75. T-Bird (DQ)	C	MR		4-82	8-84*
76. Total Air (TA)	C	MR	10-84	5-85	1-87
77. Transamerica (TV)	S	N		5-79	9-86*
78. Transtar (MA) (11)	S	LR	8-81		8-87m
79. Wien (WC)	S	N	X		11-84*
80. Western (WA)	S	M	X	X	3-87m
81. Western Yukon (WX)	S	MR	7-81		6-82*
82. World (WO)	C	N	7-80	5-81	9-86*
83. Worldwide	C	MR	10-84	10-84	3-86*
84. Wright (FW)	S	MR	X		11-82**

(1) S = Scheduled; C = Charter; F = All-Cargo.

(2) M = Majors; N = Nationals; LR = Large Regionals; MR = Medium Regionals.

(3) Date of first reported traffic is indicated for those carriers starting service since the passage of the Airline Deregulation Act of 1978. Traffic reported by those carriers certificated prior to deregulation indicated by an X.

(4) Date of last reported traffic is indicated. Carriers that have discontinued scheduled passenger service indicated by an *. Carriers now filing RSPA Form 298-C in lieu of RSPA Form 41 indicated by **. Carriers that have merged operations indicated by an m.

APPENDIX C

U.S. SCHEDULED AIR CARRIERS SCHEDULED TRAFFIC AND CAPACITY BY INTERNATIONAL TRAVEL REGION

ATLANTIC ROUTES

FISCAL YEAR	ASM'S (MIL)	RPM'S (MIL)	L.F. (%)	ENPLANEMENTS (000)
Historical*				
1980	38,137	24,365	63.9	8,364
1981	38,039	25,328	66.6	8,427
1982	39,480	25,881	65.6	8,298
1983	40,273	27,693	68.8	8,887
1984	46,392	32,001	69.0	10,087
1985	53,918	36,098	67.0	11,368
1986	58,248	32,602	56.0	10,515
1987E	58,953	38,497	65.3	12,398

LATIN AMERICAN ROUTES

FISCAL YEAR	ASM'S (MIL)	RPM'S (MIL)	L.F. (%)	ENPLANEMENTS (000)
Historical*				
1980	25,652	16,314	63.6	12,251
1981	20,719	12,306	59.4	9,411
1982	18,417	10,000	54.3	7,986
1983	17,965	9,974	55.5	8,168
1984	17,254	10,239	59.3	8,238
1985	16,012	9,658	60.3	7,891
1986	18,411	11,076	60.2	8,539
1987E	21,731	12,900	59.4	10,268

PACIFIC ROUTES

FISCAL YEAR	ASM'S (MIL)	RPM'S (MIL)	L.F. (%)	ENPLANEMENTS (000)
Historical*				
1980	22,328	13,134	58.8	3,366
1981	20,794	12,694	61.1	3,370
1982	21,946	13,470	61.4	3,548
1983	24,397	15,168	62.2	4,124
1984	27,144	17,740	65.4	4,853
1985	28,084	18,645	66.4	5,067
1986	31,482	20,277	64.4	5,406
1987E	35,973	24,224	67.3	6,559

Source: RSPA Form 41

APPENDIX D

U.S. AIR CARRIERS
NONSCHEDULED TRAFFIC AND CAPACITY

DOMESTIC

FISCAL YEAR	ASM'S (MIL)	RPM'S (MIL)	L.F. (%)	ENPLANEMENTS (000)
Historical*				
1980	4,600	3,497	76.0	2,378
1981	2,914	2,173	74.6	1.555
1982	3,007	2,160	71.8	1,641
1983	6,854	5,109	74.5	2,882
1984	8,142	6,078	74.6	3,840
1985	9,841	7,491	76.1	5,318
1986	8,404	6,342	75.5	4,856
1987E	6,250	4,466	71.5	3,925

INTERNATIONAL

FISCAL YEAR	ASM'S (MIL)	RPM'S (MIL)	L.F. (%)	ENPLANEMENTS (000)
Historical*				
1980	3,910	3,244	83.0	927
1981	3,391	2,922	86.2	904
1982	4,260	3,643	85.5	1,149
1983	9,443	8,045	85.2	3,034
1984	8,513	7,385	86.8	2,824
1985	8,637	7,438	86.1	2,857
1986	7,517	6,327	84.2	2,662
1987E	10,226	8,421	82.3	3,311

TOTAL

FISCAL YEAR	ASM'S (MIL)	RPM'S (MIL)	L.F. (%)	ENPLANEMENTS (000)
Historical*				
1980	8,510	6,741	79.2	3,305
1981	6,305	5,095	80.8	2,459
1982	7,267	5,803	79.9	2,790
1983	16,297	13,154	80.7	5,916
1984	16,655	13,463	80.8	6,664
1985	18,478	14,929	80.8	8,175
1986	15,921	12,669	79.6	7,518
1987E	16,476	12,887	78.2	7,236

Source: RSPA Form 41

APPENDIX E

U.S. AIR CARRIERS
FREIGHT/EXPRESS AND MAIL REVENUE TON MILES
(In Millions)

FREIGHT/EXPRESS RTM'S

FISCAL YEAR	DOMESTIC	INTERNATIONAL	TOTAL
Historical*			
1980	3,419	2,893	6,312
1981	3,365	2,651	6,016
1982	3,144	2,792	5,936
1983	3,809	2,910	6,719
1984	4,391	3,328	7,719
1985	3,943	3,340	7,284
1986	4,869	3,988	8,857
1987E	5,329	4,627	9,956

MAIL RTM'S

FISCAL YEAR	DOMESTIC	INTERNATIONAL	TOTAL
Historical*			
1980	922	390	1,312
1981	994	376	1,370
1982	999	392	1,391
1983	1,040	400	1,440
1984	1,145	441	1,586
1985	1,203	450	1,653
1986	1,233	438	1,671
1987E	1,303	434	1,737

TOTAL RTM'S

FISCAL YEAR	DOMESTIC	INTERNATIONAL	TOTAL
Historical*			
1980	4,341	3,283	7,624
1981	4,359	3,027	7,386
1982	4,143	3,184	7,327
1983	4,849	3,310	8,159
1984	5,536	3,769	9,305
1985	5,146	3,790	8,936
1986	6,102	4,426	10,528
1987E	6,632	5,061	11,693

Source: RSPA Form 41

APPENDIX F

ACTIVE U.S. REGIONALS/COMMUTERS

1. Action Air
2. Aero Coach
3. Aero Virgin Islands
4. Air Kentucky (2)
5. Air Link
6. Air Midwest (2)
7. Air Nevada
8. Air New Orleans
9. Air Sunshine
10. Air L.A.
11. Air-lift Associates
12. Airways International
13. Alaska Island Air (1)
14. Alliance Airlines
15. Alpha Air
16. Alpine Air
17. Altus Airlines
18. AVAir (2)
19. ANA Ltd. (2)
20. Armstrong Air Service (1)
21. Aspen (2)
22. Atlantic Southeast Airlines (1)
23. Atlantis (2)
24. Audi Air (1)
25. Bader Express
26. Baker Aviation (1)
27. Bankair
28. Bar Harbor Airlines (2)
29. Barrow Air (1)
30. BAS Beaver Aviation
31. Bellair (1)
32. Bemidji
33. Bering Air (1)
34. Big Island Air
35. Big Sky (2)
36. Britt (2)
37. Business Express (2)
38. California Seaboard
39. Cape Smythe (1)
40. Capitol Airlines (2)
41. Caribbean Express
42. Catskill Airways
43. CCAir (2)
44. Centennial
45. Chalks International
46. Channel Flying Service (1)
47. Chaparral Airlines (2)
48. Chautauqua Airlines (2)
49. Chitna Air Service (1)
50. Christman Air System
51. Clinton Aero (Brockway) (2)
52. Coastal Air Transport
53. Colgan (2)
54. Comair (2)
55. Command Airways (2)
56. Crown Airways (2)
57. Crownair
58. Cumberland Airlines
59. Desert Sun Airlines
60. Direct Air

61. Eastern Metro Express (2)
62. Empire Airways
63. ERA Helicopters (1)
64. Executive Express (2)
65. Executive Air Charter (2)

66. Express Airline I (2)
67. Fischer Brothers (2)
68. Flamenco
69. Freedom Air
70. Friendship Air Alaska (1)

71. Frontier Flying Service (1)
72. Galena Air Service (1)
73. Golden Pacific Airlines
74. GP Express
75. Grand Canyon Airlines

76. Grand Canyon Helicopters
77. Great Lakes Aviation
78. Green Hills Aviation
79. Gull Air
80. Harbor Air Service (1)

81. Harbor Airlines
82. Havasu Airlines
83. Henson Aviation (2)
84. Helitrans
85. Hermens Air (1)

86. Holiday Airlines
87. Horizon (2)
88. Iliamana Air Taxi (1)
89. Iowa Airways (2)
90. Jetstream International (2)

91. King Flying Service (1)
92. L.A. Helicopters
93. IAB Flying Service (1)
94. Larry's Flying Service (1)
95. Long Island Airlines

96. Mall Airways
97. Manu'a Air Transport
98. Maui Airlines
99. Mesa Air Shuttle
100. Mesaba Aviation (2)

101. Metro Express II (2)
102. Metroflight Airlines (2)
103. Michigan Airways
104. Mid-Pacific Airlines (2)
105. Midcontinent Airlines (2)

106. Midstate Airlines
107. Midwest Aviation
108. MST Aviation
109. New England Airlines
110. New York Helicopters

111. Omniflight Helicopter
112. Panorama Air Tours
113. Provincetown-Boston (2)
114. Peninsula Airways (1)
115. Pennsylvania Airlines (2)

116. Pilgrim Airlines (2)
117. Pocono Airlines (2)
118. Precision Airlines (2)
119. Prime Air
120. Princeville Airways

121. Pro Air Service
122. Propheter Aviation
123. Ransome Airlines (2)
124. Resort Air (2)
125. Resort Commuter (2)

126. Resorts International
127. Rio Airways
128. Rocky Mountain Airways (2)
129. Ross Aviation
130. Royale Airlines (2)

131. Ryan Air Service (1)
132. San Juan Airlines
133. Scenic Airlines
134. Simmons Airlines (2)
135. SkyWest Aviation (2)

136. SouthCentral Air (1)
137. Southern Airlines
138. Southern Jersey Airlines (2)
139. Statesboro Airlines
140. Suburban Airlines (2)

141. Sunair
142. Tanana Air Service (1)
143. Tatonduk Flying Service (1)
144. Temsco Airlines (1)
145. Tennessee Airways

146. Texas National Airlines
147. Trans-Colorado Airlines (2)
148. Tropic Air/Air Molokai
149. Valley Airlines
150. Viequies Air Link

151. Village Aviation/Camai Air (1)
152. Virgin Air
153. Virgin Island Seaplane
154. Walker's International
155. WestAir Airlines (2)
156. Wheeler Flying Service
157. Wilbur's Inc. (1)
158. Wings Airways
159. Wings of Alaska (1)
160. Wings West (2)

161. Wrangell Air Service (1)
162. Wright Air Service (2)
163. Yute Air Alaska (1)
164. 40-Mile Air (1)

(1) Alaskan commuter airlines - not included in regional/commuter forecast.

(2) Regional/commuter airlines having code-sharing agreements with a national or major airline.

APPENDIX G

GENERAL AVIATION AIRCRAFT COST INDICES

SINGLE ENGINE PISTON AIRCRAFT

PRICE AND COST INDICES

(1972 = 100)

Calendar Year	Purchase Price	Maintenance Cost	Operating Cost	Total Cost
1970	93.7	86.4	98.2	95.0
1971	95.7	93.2	98.8	97.4
1972	100.0	100.0	100.0	100.0
1973	100.0	109.2	109.9	109.8
1974	100.0	129.6	148.8	143.6
1975	114.1	138.9	158.9	153.6
1976	132.4	169.1	173.1	172.1
1977	142.2	184.5	202.2	197.5
1978	149.9	192.0	230.9	220.5
1979	165.6	201.1	287.6	264.5
1980	173.8	214.8	364.6	324.5
1981	216.6	227.8	425.7	372.7
1982	245.3	256.2	443.7	393.6
1983	280.7	269.1	450.6	401.9
1984	304.3	279.6	446.1	401.5
1985	316.4	289.1	436.8	397.1
1986	338.4	294.6	411.9	380.4
1987	*	299.3	405.3	376.6

* Not calculated because all models in index have stopped production.

Source: FAA-APO Estimates

MULTI-ENGINE PISTON AIRCRAFT

PRICE AND COST INDICES

(1972 = 100)

Calendar Year	Purchase Price	Maintenance Cost	Operating Cost	Total Cost
1970	82.6	96.7	98.1	97.5
1971	90.5	99.9	98.8	99.2
1972	100.0	100.0	100.0	100.0
1973	100.0	109.0	109.9	109.5
1974	102.9	130.0	148.6	140.5
1975	117.5	150.0	158.8	154.9
1976	128.6	172.8	173.0	173.0
1977	137.6	187.8	202.0	196.8
1978	151.8	196.5	230.8	215.8
1979	168.9	207.1	287.3	252.1
1980	185.3	216.6	364.2	299.5
1981	211.3	226.5	425.3	338.1
1982	232.9	240.6	443.4	359.2
1983	248.0	250.4	450.2	362.6
1984	289.4	260.0	445.7	364.3
1985	327.5	268.8	436.7	363.1
1986	343.2	274.2	411.7	351.2
1987	341.0	278.3	405.0	349.6

Source: FAA-APO Estimates

TURBOPROP AIRCRAFT

PRICE AND COST INDICES

(1972 = 100)

Calendar Year	Purchase Price	Maintenance Cost	Operating Cost	Total Cost
1970	87.7	99.3	92.7	95.3
1971	93.9	103.1	97.9	99.9
1972	100.0	100.0	100.0	100.0
1973	100.0	108.9	118.8	114.8
1974	103.0	130.0	146.6	139.9
1975	113.8	144.4	156.8	151.7
1976	125.6	150.2	164.6	158.7
1977	125.6	144.1	181.9	166.6
1978	131.9	156.8	221.4	195.2
1979	145.0	160.7	296.9	241.8
1980	157.8	163.4	354.0	276.9
1981	182.7	169.6	403.8	309.0
1982	189.9	180.2	420.8	323.2
1983	204.3	187.5	434.7	334.6
1984	213.0	194.7	434.7	337.5
1985	236.2	201.3	429.9	335.4
1986	247.5	205.3	384.8	310.2
1987	351.8	208.4	384.8	311.5

Source: FAA-APO Estimates

TURBOJET AIRCRAFT

PRICE AND COST INDICES

(1972 = 100)

Calendar Year	Purchase Price	Maintenance Cost	Operating Cost	Total Cost
1970	87.0	94.6	92.6	93.3
1971	87.0	96.2	97.8	97.2
1972	100.0	100.0	100.0	100.0
1973	100.2	109.0	118.7	115.6
1974	104.7	130.0	127.4	128.2
1975	115.1	140.2	156.8	151.4
1976	123.4	153.5	164.6	160.9
1977	135.9	167.6	181.9	177.3
1978	151.5	174.3	221.4	206.2
1979	167.2	179.4	296.9	259.0
1980	205.7	182.7	353.9	298.7
1981	216.7	187.1	403.8	333.9
1982	240.4	198.7	420.8	348.9
1983	251.8	206.7	434.7	361.2
1984	266.4	214.7	434.7	363.7
1985	278.4	221.3	429.9	362.8
1986	299.0	225.7	384.8	333.8
1987	309.3	229.1	384.8	334.9

Source: FAA-APO Estimates

APPENDIX H

FAA TOWERED AIRPORTS

Birmingham, AL (BHM)
Dothan, AL (DHN)
Huntsville Madison County, AL (HSV)
Mobile Bates Field, AL (MOB)
Montgomery Dannelly Field, AL (MGM)

Tuscaloosa Van De Graaf, AL (TCL)
Anchorage International, AK (ANC)
Anchorage Lake Hood SPB, AK (LHD)
Anchorage Merrill, AK (MRI)
Bethel, AK (BET)

Fairbanks International, AK (FAI)
Juneau, AK (JNU)
Kenai Municipal, AK (ENA)
King Salmon, AK (AKN)
Kodiak, AK (ADQ)

Deer Valley, AZ (DVT)
Falcon/Mesa, AZ (FFZ)
Goodyear, AZ (GYR)
Grand Canyon Municipal, AZ (GCN)
Phoenix Sky Harbor Intl., AZ (PHX)

Prescott, AZ (PRC)
Scottsdale, AZ (SDL)
Tuscon, AZ (TUS)
Fayetteville Drake Field, AR (FYV)
Fort Smith Municipal, AR (FSM)

Little Rock Adams Field, AR (LIT)
Texarkana, AR (TXK)
Bakersfield Meadows Field, CA (BFL)
Burbank, CA (BUR)
Carlsbad Palomar, CA (CRQ)

Chico, CA (CIC)
Chino, CA (CNO)
Concord, CA (CCR)
El Monte, CA (EMT)
Fresno Air Terminal, CA (FAT)

Fullerton Municipal, CA (FUL)
Hawthorne, CA (HHR)
Hayward, CA (HWD)
La Verne Brackett, CA (POC)
Lancaster Fox Airport, CA (WJF)

Livermore Municipal, CA (LVK)
Long Beach, CA (LGB)
Los Angeles International, CA (LAX)
Modesto City County, CA (MOD)
Monterey, CA (MRY)

Napa County, CA (APC)
Oakland International, CA (OAK)
Ontario, CA (ONT)
Oxnard Ventura County, CA (OXR)
Palm Springs Municipal, CA (PSP)

Palmdale, CA (PMD)
Palo Alto, CA (PAO)
Redding, CA (RDD)
Riverside Municipal, CA (RAL)
Sacramento Executive, CA (SAC)

Sacramento Metro, CA (SMF)
Salinas Municipal, CA (SNS)
San Carlos, CA (SQL)
San Diego Brown Field, CA (SDM)
San Diego Gillespi, CA (SEE)

San Diego Lindberg, CA (SAN)
San Diego Montgomery, CA (MYF)
San Francisco, CA (SFO)
San Jose International, CA (SJC)
San Jose Reid Hillview, CA (RHV)

San Luis Obispo, CA (SBP)
Santa Ana, CA (SNA)
Santa Barbara, CA (SBA)
Santa Maria Public, CA (SMX)
Santa Monica, CA (SMO)

Santa Rosa Sonoma County, CA (STS)
South Lake Tahoe, CA (TVL)
Stockton, CA (SCK)
Torrance Municipal, CA (TOA)
Van Nuys, CA (VNY)

Aspen Pitkin County, CO (ASE)
Broomfield Jefferson County, CO (BJC)
Colorado Springs, CO (COS)
Denver Stapleton International, CO (DEN)
Denver/Centennial, CO (APA)

Grand Junction, CO (GJT)
Pueblo, CO (PUB)
Bridgeport, CT (BDR)
Danbury Municipal, CT (DXR)
Groton Trumbull, CT (GON)

Hartford Brainard, CT (HFD)
New Haven, CT (HVN)
Windsor Locks, CT (BDL)
Wilmington Greater Wilmington, DE (ILG)
Washington National, DC (DCA)

Craig Field Jacksonville, FL (CRG)
Daytona Beach, FL (DAB)
Fort Lauderdale, FL (FLL)
Fort Lauderdale Executive, FL (FXE)
Fort Myers Page Field, FL (FMY)

Fort Myers Regional, FL (RSW)
Gainesville, FL (GNV)
Hollywood, FL (HWO)
Jacksonville International, FL (JAX)
Key West, FL (EYW)

Melbourne, FL (MLB)
Miami International, FL (MIA)
Opa Locka, FL (OPF)
Orlando Executive, FL (ORL)
Orlando International Airport, FL (MCO)

Panama City Bay County, FL (PFN)
Pensacola, FL (PNS)
Pompano Beach Airpark, FL (PMP)
Sarasota Braderton, FL (SRQ)
St. Petersburg Clearwater, FL (PIE)

St. Petersburg Whitt, FL (SPG)
Tallahassee, FL (TLH)
Tamiami, FL (TMB)
Tampa International, FL (TPA)
Vero Beach, FL (VRB)

West Palm Beach, FL (PBI)
Albany, GA (ABY)
Atlanta DeKalb Peachtree, GA (PDK)
Atlanta Fulton County, GA (FTY)
Atlanta International, GA (ATL)

Augusta, GA (AGS)
Columbus, GA (CSG)
Macon Lewis B. Wilson, GA (MCN)
Savannah Municipal, GA (SAV)
Hilo General Lyman Field, HI (ITO)

Honolulu, HI (HNL)
Kahului, HI (OGG)
Kona Ke Ahole, HI (KOA)
Lihue, HI (LIH)
Molokai, HI (MKK)

Boise, ID (BOI)
Idaho Falls Fanning Field, ID (IDA)
Lewiston, ID (LWS)
Pocatello, ID (PIH)
Twin Falls, ID (TWF)

Alton Civic Memorial, IL (ALN)
Aurora Municipal, IL (ARR)
Bloomington Normal, IL (BMI)
Carbondale, IL (MDH)
Champaign University of Illinois, IL (CMI)

Chicago Du Page, IL (DPA)
Chicago Meigs, IL (CGX)
Chicago Midway, IL (MDW)
Chicago O'Hare International, IL (ORD)
Chicago Palwaukee, IL (PWK)

Decatur, IL (DEC)
East St. Louis Bi State Park, IL (CPS)
Moline, IL (MLI)
Peoria, IL (PIA)
Rockford, IL (RFD)

Springfield Capital, IL (SPI)
Bloomington Monroe County, IN (BMG)
Evansville, IN (EVV)
Fort Wayne, IN (FWA)
Indianapolis International, IN (IND)

Lafayett Purdue University, IN (LAF)
Muncie Delaware County, IN (MIE)
South Bend, IN (SBN)
Terre Haute, IN (HUF)
Cedar Rapids, IA (CID)

Des Moines Municipal, IA (DSM)
Dubuque, IA (DBQ)
Sioux City Municipal, IA (SUX)
Waterloo, IA (ALO)
Hutchinson, KS (HUT)

Olathe, KS (OJC)
Salina, KS (SLN)
Topeka Forbes AFB, KS (FOE)
Wichita Mid Continent, KS (ICT)
Cincinnati Greater, KY (CVG)

Lexington, KY (LEX)
Louisville Bowman, KY (LOU)
Louisville Standiford, KY (SDF)
Alexandria, LA (ESF)
Baton Rouge Ryan Field, LA (BTR)

Houma, LA (HUM)
Lafayette, LA (LFT)
Lake Charles, LA (LCH)
Monroe, LA (MLU)
New Orleans Lakefront, LA (NEW)

New Orleans Moisant, LA (MSY)
Shreveport, LA (SHV)
Shreveport Downtown, LA (DTN)
Bangor International, ME (BGR)
Portland, ME (PWM)

Baltimore Washington Intl., MD (BWI)
Camp Springs Andrews AFB, MD (ADW)
Hagerstown, MD (HGR)
Bedford, MA (BED)
Beverly Municipal, MA (BVY)

Boston Logan, MA (BOS)
Hyannis, MA (HYA)
Lawrence, MA (LWM)
Nantucket Memorial, MA (ACK)
New Bedford, MA (EWB)

Norwood, MA (OWD)
Westfield, MA (BAF)
Worcester, MA (ORH)
Ann Arbor Municipal, MI (ARB)
Battle Creek, MI (BTL)

Detroit City, MI (DET)
Detroit Metro Wayne County, MI (DTW)
Detroit Willow Run, MI (YIP)
Flint Bishop, MI (FNT)
Grand Rapids, MI (GRR)

Jackson Reynolds Municipal, MI (JXN)
Kalamazoo, MI (AZO)
Lansing, MI (LAN)
Muskegon, MI (MKG)
Pontiac, MI (PTK)

Saginaw Tri City, MI (MBS)
Traverse City, MI (TVC)
Duluth, MN (DLH)
Minneapolis Crystal, MN (MIC)
Minneapolis Flying Cloud, MN (FCM)

Minneapolis St. Paul International, MN (MSP)
Rochester, MN (RST)
St. Paul, MN (STP)
Greenville Municipal, MS (GLH)
Gulfport, MS (GPT)

Jackson Hawkins, MS (HKS)
Jackson Municipal Airport, MS (JAN)
Meridian Key, MS (MEI)
Columbia Regional, MO (COU)
Joplin, MO (JLN)

Kansas City International, MO (MCI)
Kansas City Municipal, MO (MKC)
Springfield, MO (SGF)
St. Joseph, MO (STJ)
St. Louis International, MO (STL)

St. Louis Spirit of St. Louis, MO (SUS)
Billings, MT (BIL)
Great Falls, MT (GTF)
Helena, MT (HLN)
Missoula, MT (MSO)

Grand Island, NE (GRI)
Lincoln Municipal, NE (LNK)
Omaha, NE (OMA)
Las Vegas McCarran International, NV (LAS)
North Las Vegas, NV (VGT)

Reno International, NV (RNO)
Lebanon, NH (LEB)
Manchester, NH (MHT)
Atlantic City, NJ (ACY)
Caldwell, NJ (CDW)

Morristown, NJ (MMU)
Newark, NJ (EWR)
Teterboro, NJ (TEB)
Trenton, NJ (TTN)
Albuquerque International, NM (ABQ)

Roswell, NM (ROW)
Santa Fe, NM (SAF)
Albany County, NY (ALB)
Binghamton Broome County, NY (BGM)
Buffalo International, NY (BUF)

Elmira, NY (ELM)
Farmingdale, NY (FRG)
Islip McArthur, NY (ISP)
Ithaca Tompkins County, NY (ITH)
John F. Kennedy International, NY (JFK)

La Guardia, NY (LGA)
Niagara Falls, NY (IAG)
Poughkeepsie Dutchess County, NY (POU)
Rochester Monroe County, NY (ROC)
Syracuse Hancock International, NY (SYR)

Utica, NY (UCA)
White Plains Westchester, NY (HPN)
Asheville, NC (AVL)
Charlotte Douglas, NC (CLT)
Fayetteville Grannis, NC (FAY)

Greensboro Regional, NC (GSO)
Kinston, NC (ISO)
Raleigh Durham, NC (RDU)
Wilmington New Hanover County, NC (ILM)
Winston Salem, NC (INT)

Bismark, ND (BIS)
Fargo Hector Field, ND (FAR)
Grand Forks International, ND (GFK)
Minot International, ND (MOT)
Akron Canton Regional, OH (CAK)

Cincinnati Lunken, OH (LUK)
Cleveland Burke Lakefront, OH (BKL)
Cleveland Hopkins International, OH (CLE)
Columbus International, OH (CMH)
Columbus Ohio State, OH (OSU)

Dayton, OH (DAY)
Mansfield Lahm Municipal, OH (MFD)
Toledo Express, OH (TOL)
Youngstown, OH (YNG)
Clinton Sherman, OK (CSM)

Lawton Municipal, OK (LAW)
Oklahoma City Wiley Post, OK (PWA)
Oklahoma City Will Rogers, OK (OKC)
Tulsa International, OK (TUL)
Tulsa Riverside, OK (RVS)

Eugene, OR (EUG)
Hillsboro, OR (HIO)
Klamath Falls, OR (LMT)
Medford Jackson County, OR (MFR)
Portland International, OR (PDX)

Salem McNary Field, OR (SLE)
Troutdale, OR (TTD)
Allentown, PA (ABE)
Capital City/Harrisburg, PA (CXY)
Erie, PA (ERI)

Harrisburg International, PA (MDT)
Lancaster, PA (LNS)
North Philadelphia, PA (PNE)
Philadelphia International, PA (PHL)
Pittsburgh Allegheny, PA (AGC)

Pittsburgh Greater International, PA (PIT)
Reading, PA (RDG)
Wilkes Barre, PA (AVP)
Williamsport, PA (IPT)
Providence, RI (PVD)

Charleston AFB Municipal, SC (CHS)
Columbia Metropolitan, SC (CAE)
Florence City, SC (FLO)
Greenville Municipal, SC (GMU)
Greer, SC (GSP)

Rapid City, SD (RAP)
Sioux Falls Foss Field, SD (FSD)
Bristol Tri City, TN (TRI)
Chattanooga, TN (CHA)
Knoxville McGhee Tyson, TN (TYS)

Memphis International, TN (MEM)
Nashville Metropolitan, TN (BNA)
Abilene, TX (ABI)
Amarillo, TX (AMA)
Austin, TX (AUS)

Beaumont Port Arthur, TX (BPT)
Brownsville International, TX (BRO)
College Station, TX (CLL)
Corpus Christi, TX (CRP)
Dallas Addison, TX (ADS)

Dallas Love Field, TX (DAL)
Dallas Redbird, TX (RBD)
Dallas/Ft. Worth Regional, TX (DFW)
El Paso International, TX (ELP)
Fort Worth Meacham, TX (FTW)

Harlingen Industrial, TX (HRL)
Houston Hobby, TX (HOU)
Houston Intercontinental, TX (IAH)
Longview, TX (GGG)
Lubbock, TX (LBB)

McAllen, TX (MFE)
Midland, TX (MAF)
San Angelo, TX (SJT)
San Antonio International, TX (SAT)
San Antonio Stinson, TX (SSF)

Tomball D. W. Hooks, TX (DWH)
Tyler, TX (TYR)
Waco Municipal, TX (ACT)
Ogden Municipal, UT (OGD)
Salt Lake City International, UT (SLC)

Burlington International, VT (BTV)
Charlottesville Albemarle, VA (CHO)
Lynchburg, VA (LYH)
Newport News, VA (PHF)
Norfolk Regional, VA (ORF)

Richmond Byrd International, VA (RIC)
Roanoke, VA (ROA)
Washington Dulles International, VA (IAD)
St. Croix Alex Hamilton, VI (STX)
St. Thomas H. S. Truman, VI (STT)

Everett Paine Field, WA (PAE)
Moses Lake Grant, WA (MWH)
Olympia, WA (OLM)
Pasco Tri Cities, WA (PSC)
Renton, WA (RNT)

Seattle Boeing, WA (BFI)
Seattle Tacoma International, WA (SEA)
Spokane Felts Field, WA (SFF)
Spokane International, WA (GEG)
Tacoma Narrows, WA (TIW)

Walla Walla, WA (ALW)
Yakima Air Terminal, WA (YKM)
Charleston, WV (CRW)
Clarksburg Benedum, WV (CKB)
Huntington, WV (HTS)

Morgantown, WV (MGW)
Parkersburg Wood County, WV (PKB)
Wheeling, WV (HLG)
Appleton, WI (ATW)
Green Bay Austin Straubel, WI (GRB)

Janesville, WI (JVL)
Lacrosse, WI (LSE)
Madison, WI (MSN)
Milwaukee Mitchell, WI (MKE)
Milwaukee Timmerman, WI (MWC)

Oshkosh Wittman Field, WI (OSH)
Casper, WY (CPR)
Cheyenne, WY (CYS)
San Juan International, PR (SJU)
San Juan Isla Grande, PR (SIG)

Kwajalein AAF, WK (KWA)
Pago Pago International, AS (TUT)
Martha's Vineyard, MA (MVY)-Seasonal

APPENDIX I

CONTRACT TOWERS

1. Flagstaff, Arizona
2. Lakeland, Florida
3. Topeka-Phillip Ballard, Kansas
4. Owensboro-Davies County, Kentucky
5. Cape Girardeau, Missouri
6. Farmington, New Mexico
7. Hobbs Lea, New Mexico
8. Cleveland-Cuyahoga County, Ohio
9. Ardmore, Oklahoma
10. Enid, Oklahoma
11. Pendleton, Oregon
12. Myrtle Beach, South Carolina
13. Laredo, Texas
14. Lewisburg-Greenbrier, West Virginia

APPENDIX J

TERMINAL CONTROL AREAS AND AIRPORT RADAR SERVICE AREAS

Birmingham, AL (BHM)
Huntsville Madison County, AL (HSV)
Mobile Bates Field, AL (MOB)
Montgomery Dannelly Field, AL (MGM)
Anchorage International, AK (ANC)

Phoenix Sky Harbor Intl., AZ (PHX)
Tucson, AZ (TUS)
Fort Smith Municipal, AR (FSM)
Little Rock Adams Field, AR (LIT)
Burbank, CA (BUR)

Los Angeles International, CA (LAX)
Monterey, CA (MRY)
Oakland International, CA (OAK)
Ontario, CA (ONT)
Palm Springs Municipal, CA (PSP)

Sacramento Metro, CA (SMF)
San Diego Lindbergh, CA (SAN)
San Francisco, CA (SFO)
[illegible] Springs, CO (COS)
[illegible] International, [illegible]

[illegible]

Champaign University of Illinois, IL (CMI)
Chicago O'Hare International, IL (ORD)
Moline, IL (MLI)
Peoria, IL (PIA)
Rockford, IL (RFD)

Springfield Capital, IL (SPI)
Evansville, IN (EVV)
Fort Wayne, IN (FWA)
Indianapolis International, IN (IND)
South Bend, IN (SBN)

Cedar Rapids, IA (CID)
Des Moines Municipal, IA (DSM)
[illegible] Mid [illegible], KS (ICT)
[illegible] (MCI)
[illegible]

[illegible]

[illegible]

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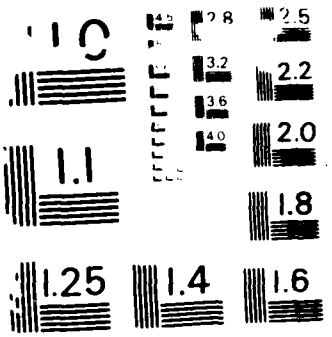
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Great Falls, MT (GTF)
Lincoln Municipal, NE (LNK)
Omaha, NE (OMA)
Las Vegas McCarran Intl., NV (LAS)
Reno International, NV (RNO)

Atlantic City, NJ (ACY)
Newark, NJ (EWR)
Albuquerque International, NM (ABQ)
Albany County, NY (ALB)
Binghamton Broome County, NY (BGM)

Buffalo International, NY (BUF)
Elmira, NY (ELM)
John F. Kennedy International, NY (JFK)
LaGuardia, NY (LGA)
Rochester Monroe County, NY (ROC)

Syracuse Hancock International, NY (SYR)
Asheville, NC (AVL)
Charlotte Douglas, NC (CLT)
Fayetteville Grannis, NC (FAY)
Greensboro Regional, NC (GSO)

Raleigh Durham, NC (RDU)
Wilmington New Hanover County, NC (ILM)
Fargo Hector Field, ND (FAR)
Akron Canton Regional, OH (CAK)
Cleveland Hopkins Intl., OH (CLE)

Columbus International, OH (CMH)
Dayton, OH (DAY)
Toledo Express, OH (TOL)
Youngstown, OH (YNG)
Oklahoma City Will Rogers, OK (OKC)

Tulsa International, OK (TUL)
Portland International, OR (PDX)
Allentown, PA (ABE)
Capital City/Harrisburg, PA (CXY)
Erie, PA (ERI)

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Pittsburgh Greater International, PA (PIT)
Wilkes Barre, PA (AVP)
Providence, RI (PVD)
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Columbia Metropolitan, SC (CAE)
Greer, SC (GSP)
Bristol Tri City, TN (TRI)
Chattanooga, TN (CHA)
Knoxville McGhee Tyson, TN (TYS)

Memphis International, TN (MEM)
Nashville Metropolitan, TN (BNA)
Abilene, TX (ABI)
Amarillo, TX (AMA)
Austin, TX (AUS)

Beaumont Port Arthur, TX (BPT)
Corpus Christi, TX (CRP)
Dallas Love Field, TX (DAL)
Dallas/Ft. Worth Regional, TX (DFW)
El Paso International, TX (ELP)

Houston Hobby, TX (HOU)
Houston Intercontinental, TX (IAH)
Longview, TX (GGG)
Lubbock, TX (LBB)
Midland, TX (MAF)

San Antonio International, TX (SAT)
Salt Lake City Intl., UT (SLC)
Burlington International, VT (BTV)
Norfolk Regional, VA (ORF)
Richmond Byrd International, VA (RIC)

Roanoke, VA (ROA)
Washington Dulles International, VA (IAD)
Seattle Tacoma International, WA (SEA)
Spokane International, WA (GEG)
Charleston, WV (CRW)

Huntington, WV (HTS)
Green Bay Austin Straubel, WI (GRB)
Madison, WI (MSN)
Milwaukee Mitchell, WI (MKE)
San Juan International, PR (SJU)

END

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