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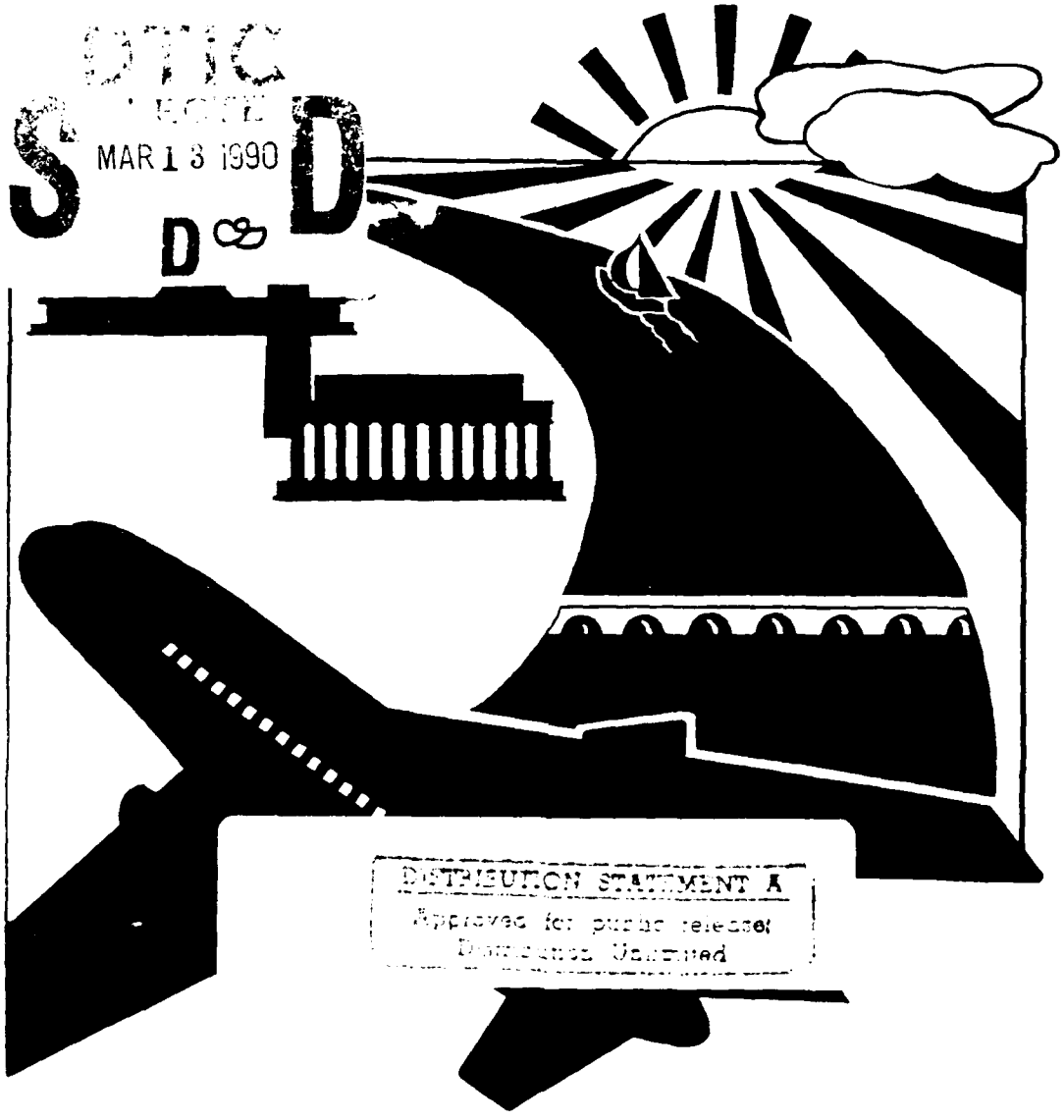
U.S Department
of Transportation
Federal Aviation Administration

FAA AVIATION FORECASTS
FISCAL YEARS 1990-2001



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16. Abstract

This report contains the Fiscal Years 1990-2001 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 2001 is forecast to increase by 29.0 percent at towered airports (commuters, 48.2 percent; air carriers, 33.6 percent; general aviation, 25.4 percent; military, 0.0 percent), 30.1 percent at air route traffic control centers (commuters, 51.9 percent; air carriers, 33.1 percent; general aviation 30.5 percent; military, 0.0 percent), and 5.1 percent in flight services performed. Hours flown by general aviation are forecast to increase 19.2 percent and revenue passenger miles (RPM's) are forecast to increase 67.8 percent, with scheduled international RPM's forecast to increase by 113.2 percent; and regionals/commuters RPM's forecast to increase by 157.1 percent.

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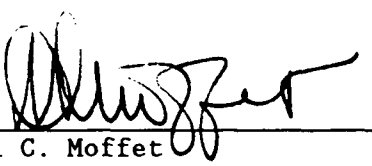
PREFACE

The Federal Aviation Administration (FAA) forecasts of aviation and other selected statistics are developed annually for use in the agency's planning and decision-making. 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 taxi, general aviation, and the military.

For the period 1990-1995, FAA aviation forecasts use projections of economic variables provided by the Executive Office of the President, Office of Management and Budget. For the period 1996-2001, FAA aviation forecasts are based on consensus growth rates of key economic variables provided by Data Resources, Inc., Evans Economics, Inc., and the WEFA Group. 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 herein indicate that aviation activity at FAA facilities should continue to grow at about the same rate as the general economy. The projected total system demand was not specifically constrained as a result of potential capacity problems at some major U.S. air terminals. We presume that if capacity problems develop at individual sites, alternative methods of providing capacity will evolve within the system. Also, there is the impact of constraints on the construction of new runways and major new airports because of increased community resistance to aircraft noise. In order for the forecast of this report to be realized, noise impacts and the resultant restrictions on capacity and system growth must be dealt with at an early date by balancing the concerns of local communities with the need for maintaining reasonable access to our nation's system of integrated airports. 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.



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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 - Nellie Jones

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CHAPTER 1

EXECUTIVE SUMMARY

CHAPTER I

EXECUTIVE SUMMARY

As we move into the last decade of the twentieth century, it is an appropriate time to review the significant events that have occured in the aviation industry during the eighties.

October 1989 marked the eleventh anniversary of the Airline Deregulation Act, perhaps one of the most important events in aviation history. Since enactment of this legislation, we have witnessed a number of significant structural and operational changes in the commercial aviation industry. There has been a proliferation of low fares which is partially responsible for the dramatic increase in passenger traffic. Many communities have seen improved air service with increased frequencies through connecting hub airports to multiple destinations. The more successful air carriers have seen a significant improvement in operating profits. During this period the air carrier industry has gone through three distinct phases: (1) expansion, (2) consolidation, and (3) concentration.

The regional/commuter airlines have experienced similar changes, with the number of carriers increasing from 210 in 1978 to 250 in 1981, then declining to 157 in 1989. In addition, the regional/commuter airlines have become increasingly integrated with the large scheduled air carriers through code-sharing agreements and/or through acquisition in part or in total by their larger partners. Airlines have changed the structure of their routing systems from predominantly linear operations to a system of hub and spokes. The development of connecting hub airports has led to high frequencies in peak hours at major air carrier airports and has significantly increased the demand for FAA services at these airports. As a result, we are now experiencing serious congestion problems at approximately 21 airports.

The U.S. commercial aviation industry has now entered into the fourth phase of the deregulation process--Globalization. This, combined with other "free market" movements around the world, most notably the proposed deregulation of the European Common Market by December 1992, opens the possibility of the creation of multinational "megacarriers" throughout the world. Some have predicted that there will only be a dozen world airlines by the twenty-first century. The race among the world's air carriers is now on to see who can put together the most effective global system. The strategies include marketing agreements, "code sharing", and/or equity stakes in other carriers. What this portends for the commercial aviation industry is open to conjecture. One thing is certain however; the airline industry worldwide will continue to exhibit strong growth rates well into the twenty-first century. Also, the U.S. experience with code-sharing agreements

between the large air carriers and regionals/commuters suggests that the smaller carriers benefit from working relationships with the larger airlines. In future years, the same could hold true for competition in international markets.

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

Since 1978 there has been a dramatic decline in shipments of all types of general aviation aircraft. A number of reasons have been advanced for this, chief among them being rapid price increases, high interest rates, and expensive fuel over this period. A portion of the price increases can be attibuted to massive awards assessed against manufacturers in product liability lawsuits which triggered extreme increases in liability insurace premiums, driving up manufacturer's costs. Recent data, however, suggests that the downturn of the past decade in aircraft shipments may have bottomed out. Shipments in fiscal year 1989 totaled 1,430, an increase of 26.9 percent over 1988.

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

REVIEW OF 1989

In fiscal year 1989--a year greatly affected by a major strike at Eastern Air Lines--the large U.S. air carriers increased their system capacity (seat miles) by 1.8 percent, while demand (revenue passenger miles) increased 3.1 percent. The net result was an increase in the load factor to 63.1 percent.

The airlines, for a second consecutive year, have continued to expand in international markets faster than in their domestic markets. International traffic increased 11.2 percent while domestic traffic increased only 0.9 percent. The airlines were able to achieve, through effective yield management and the avoidance of destructive fare wars, a 5.3 percent increase in average fares. Although the airlines' average fuel cost only increased 0.5 percent over fiscal year 1988, total operating expenses increased by 10.7 percent, while operating revenues increased by 9.7 percent. This resulted in the U.S. commercial airlines reporting operating profits totaling over $2.7 billion in fiscal year 1989 compared to $3.2 billion in fiscal year 1988. However, the industry's net profit totaled only $1.2 billion, due largely to interest payments on long-term debt.

Airline profits over the past several years have tended to be concentrated among a relatively few carriers. The future viability of individual carriers, and possibly the entire industry, is highly dependent on the national economy. That is, a slowing in U.S. economic growth could result in a slowdown in the demand for air services. This, in turn, could result in a return to the economically destructive fare wars of previous

slow growth periods.

Commercial aircraft orders increased by 7.3 percent during the year, and deliveries increased by 18.4 percent. Narrowbody aircraft orders and deliveries continue to outpace the demand for widebody aircraft. This reflects the air carriers' continuing reliance on increased schedule frequency, rather than larger aircraft, to accommodate projected passenger demand.

The growth of the regional/commuter airline industry continued to outpace the growth of the larger commercial carriers in fiscal year 1989. Total revenue passenger enplanements increased by 6.6 percent to 32.1 million, while revenue passenger miles increased by 12.1 percent to 5.6 billion.

In fiscal year 1989, general aviation aircraft shipments increased by 26.9 percent. Single engine piston aircraft shipments grew 43.1 percent, while jet aircraft shipments increased 23.7 percent. Billings increased by 24.6 percent over fiscal year 1988.

In fiscal year 1989, air carrier operations at FAA air traffic control towers declined by 2.3 percent due in great part to the Eastern Air Line strike. Air taxi/commuter, general aviation and military operations increased slightly. As a result, total operations and instrument operations at FAA air traffic control towers and aircraft handled by the Air Route Traffic Control Centers reflected minimal changes from 1988.

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

ECONOMIC FORECASTS

The overall outlook for the 12-year forecast period is for moderate to strong economic growth, increasing real fuel prices, and moderate inflation. The longevity of the current economic recovery has surprised most observers. It is unlikely the economy will experience another 11 years of uninterrupted growth. The projected growth of aviation is consistent with the national long-term economic growth forecast. The table on page 6 is a summary of the key economic assumptions used in developing this forecast. It should be recognized that in any given year there may be some perturbation from the long-term trend, because none of the economic models is sufficiently precise to predict interim business cycles.

AVIATION ACTIVITY FORECASTS

Domestic air carrier revenue passenger miles are forecast to increase at an annual rate of 4.4 percent during 1989-2001. During the same time period, domestic enplanements are forecast to increase by 4.1 percent annually, a rate somewhat slower than revenue passenger mile growth due to longer passenger trip lengths. Air carrier aircraft operations are forecast to increase at an annual rate of 2.4 percent over the forecast period. The high growth in revenue passenger miles and enplanements relative to operations reflects the baseline air carrier assumptions of higher load factors, larger seating capacity for air carrier aircraft, and longer passenger trip lengths.

International air carrier revenue

FAA FORECAST ECONOMIC ASSUMPTIONS

FISCAL YEARS 1990 - 2001

ECONOMIC VARIABLE	HISTORICAL 1985	1988	1989	FORECAST 1990	1991	2001	PERCENT AVERAGE ANNUAL GROWTH 85-89	88-89	89-90	90-91	89-2001
Gross National Product (Billions 1982$)	3,559.7	3,968.4	4,086.9	4,214.4	4,356.0	5,760.4	3.5	3.0	3.1	3.4	2.9
Consumer Price Index (1982-84 = 100)	106.6	115.7	121.3	126.2	130.4	194.5	3.3	4.8	4.0	3.3	4.0
Oil & Gas Deflator (1982 = 100)	95.5	79.4	83.4	83.9	85.1	148.3	(3.1)	5.0	0.6	1.4	5.1

Source: 1990-95; Executive Office of the President, Office of Management and Budget

1996-2001; Consensus growth rate of Data Resources, Inc., Evans Economics, Inc., and The WEFA Group

passenger miles are forecast to increase at an annual rate of 6.5 percent during 1989-2001. This high growth rate is being driven by the strong growth rates being projected for the Pacific Rim markets. During this same period, international enplanements are forecast to increase by 5.9 percent annually, a rate somewhat slower than passenger mile growth due to longer passenger trip lengths in the Pacific.

In 1990, the regionals/commuters are expected to enplane 34.9 million passengers, 7.5 percent of all passenger traffic in scheduled domestic air service. By the year 2001, these carriers are expected to carry 71.2 million passengers and to account for 9.6 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.

Increased business use of general aviation is reflected in the changing character of the fleet. The more expensive and sophisticated turbine-powered part of the fixed wing fleet is expected to grow much faster than the piston aircraft portion between 1989-2001. In 1989, there were 9,500 turbine-powered aircraft in the fixed wing general aviation fleet, and this represented 4.8 percent of the total fixed wing fleet. By the year 2001, it is projected that there will be 14,600 turbine-powered aircraft--7.2 percent of the total fixed wing fleet. Similarly, in the helicopter fleet in 1989 there were 3,800 turbine-powered aircraft, which represented 59.4 percent of the total fleet. By the year 2001, it is projected that there will be 8,500 turbine-powered aircraft--81.0 percent of the total helicopter fleet.

The various FAA aviation traffic and activity forecasts are summarized numerically in the table on page 8.

FAA WORKLOAD FORECASTS

The FAA forecasting process is a continuous one which involves FAA Forecast Branch's interaction with various FAA Offices and Services, other government agencies, and aviation industry groups, including individual discussions with most major carriers and manufacturers. In addition, the process uses various economic and aviation data bases, the outputs of several econometric models and equations, and other analytical techniques. The FAA workload measures, summarized numerically in the table on page 9, are the resultant forecasts of this process and are used annually by the agency for manpower and facility planning.

Aviation activity at FAA facilities is expected to continue the growth pattern that began in 1983. The demand for FAA operational services is anticipated to increase over the forecast period as a result of continued growth in aviation activity. Total aircraft operations at FAA towered airports are forecast to increase to 79.2 million in the year 2001, a 2.1 percent annual growth rate over the 61.4 million operations achieved in 1989.

The increased use of avionics by regionals/commuters and general aviation and the implementation of additional Airport Radar Service Areas will contribute to instrument operations at FAA towered airports growing faster than total aircraft operations. Instrument operations are forecast to increase from 45.0 million in 1989 to 59.6 million in the year 2001, a 2.4 percent annual growth rate.

The workload at the Air Route Traffic Control Centers is forecast to increase at an average annual rate of 2.2 percent between 1989-2001. The number of commuter/air taxi aircraft

AVIATION ACTIVITY FORECASTS

FISCAL YEARS 1990 - 2001

AVIATION ACTIVITY	HISTORICAL 1985	1988	1989	FORECAST 1990	1991	2001	PERCENT AVERAGE ANNUAL GROWTH 85-89	88-89	89-90	90-91	89-2001
AIR CARRIER											
Enplanements (Millions)											
Domestic	350.4	414.2	415.6	430.6	451.0	670.4	4.4	0.3	3.6	4.7	4.1
International	24.6	34.3	36.8	40.0	42.9	73.1	10.6	7.3	8.7	7.3	5.9
System	375.0	448.5	452.4	470.6	493.9	743.5	4.8	0.9	4.0	5.0	4.2
RPM's (Billions)											
Domestic	265.8	325.5	328.4	341.0	358.1	551.1	5.4	0.9	3.8	5.0	4.4
International	64.8	90.5	100.6	110.4	119.3	214.5	11.6	11.2	9.7	8.1	6.5
System	330.6	416.0	429.0	451.4	477.4	765.6	6.7	3.1	5.2	5.8	4.9
COMMUTERS/REGIONALS*											
Enplanements (Millions)	23.0	30.1	32.1	34.9	37.5	71.2	8.7	6.6	8.7	7.5	6.9
RPM's (Billions)	3.6	5.0	5.6	6.3	6.9	14.5	11.7	12.0	12.5	9.5	8.2
FLEET											
Air Carrier	2,938	3,542	3,870	4,055	4,220	4,949	7.1	9.3	4.8	4.1	2.1
Commuter	1,551	1,684	1,782	1,821	1,856	2,229	3.5	5.8	2.2	1.9	1.9
General Aviation (000)	220.9	217.2	210.3	212.9	214.6	222.4	(1.2)	(3.2)	1.2	0.8	0.5
HOURS FLOWN (Millions)											
Air Carrier	7.7	9.8	10.1	10.6	11.1	13.4	7.0	3.1	5.0	4.7	2.4
General Aviation	36.2	33.5	33.9	34.0	34.5	40.4	(1.6)	1.2	0.3	1.5	1.5

Source: 1985-89; RSPA, FAA DATA
1990-2001; FAA Forecast

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

FAA WORKLOAD MEASURES

FISCAL YEARS 1990 - 2001

WORKLOAD MEASURES (IN MILLIONS)	HISTORICAL 1985	1988	1989	FORECAST 1990	1991	2001	PERCENT AVERAGE ANNUAL GROWTH 85-89	88-89	89-90	90-91	89-2001
Aircraft Operations											
Air Carrier	11.3	12.8	12.5	13.1	13.6	16.7	2.6	(2.3)	4.8	3.8	2.4
Air Taxi & Commuter	6.9	8.3	8.3	8.7	9.1	12.3	4.7	0.0	4.8	4.6	3.3
General Aviation	37.2	37.5	37.8	38.2	39.0	47.4	0.4	1.1	1.1	2.1	1.9
Military	2.5	2.8	2.8	2.8	2.8	2.8	2.9	0.0	0.0	0.0	0.0
TOTAL	57.9	61.3	61.4	62.8	64.5	79.2	1.5	0.2	2.3	2.7	2.1
Instrument Operations											
Air Carrier	11.8	13.4	13.5	14.1	14.6	17.7	3.4	0.8	4.4	3.6	2.3
Air Taxi & Commuter	6.4	8.4	8.4	8.8	9.2	12.4	7.0	0.0	4.8	4.6	3.3
General Aviation	16.4	18.3	18.6	19.0	19.7	25.0	3.2	1.6	2.2	3.7	2.5
Military	4.1	4.4	4.5	4.5	4.5	4.5	2.4	2.3	0.0	0.0	0.0
TOTAL	38.7	44.5	45.0	46.4	48.0	59.6	3.8	1.1	3.1	3.5	2.4
IFR Aircraft Handled											
Air Carrier	14.6	17.9	17.5	18.2	18.9	23.3	4.6	(2.2)	4.0	3.9	2.4
Air Taxi & Commuter	4.8	5.8	5.2	5.5	5.7	7.9	2.0	(10.3)	5.8	3.6	3.6
General Aviation	8.3	8.1	8.2	8.4	8.8	10.7	(0.3)	1.2	2.4	4.8	2.2
Military	5.0	4.6	5.7	5.7	5.7	5.7	3.3	23.9	0.0	0.0	0.0
TOTAL	32.7	36.4	36.6	37.8	39.1	47.6	2.9	1.1	3.3	3.4	2.2
Flight Services											
Pilot Briefs	14.6	11.7	12.0	12.1	12.2	12.5	(5.0)	2.6	0.8	0.8	0.3
Flight Plans Originated	8.0	7.6	7.4	7.3	7.3	8.1	(2.0)	(2.6)	(1.4)	0.0	0.8
Aircraft Contacted	7.7	6.4	6.2	6.1	6.0	6.1	(5.6)	(3.1)	0.0	(1.6)	(0.1)
TOTAL	52.9	44.8	45.0	44.9	45.0	47.3	(4.1)	0.5	(0.2)	0.2	0.4

Source: FY 1985-89; FAA Data

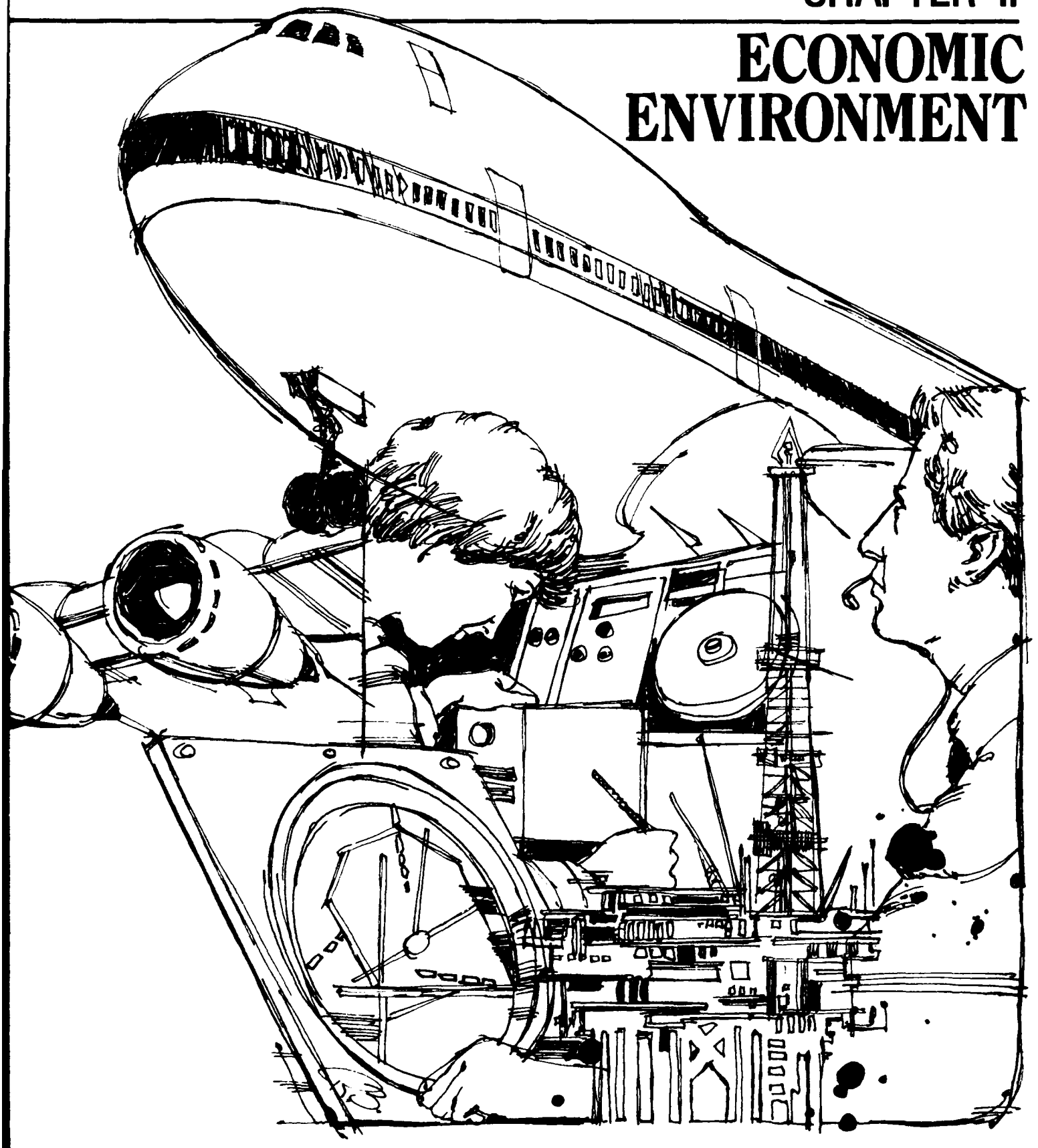
FY 1990-2001; FAA Forecasts

handled are expected to increase at a faster rate than the other user categories--51.9 percent from 5.2 million in 1989 to 7.9 million in fiscal year 2001.

In summary, aviation activity at FAA facilities are 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 activitity 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



CHAPTER II

ECONOMIC ENVIRONMENT

REVIEW OF 1989

UNITED STATES

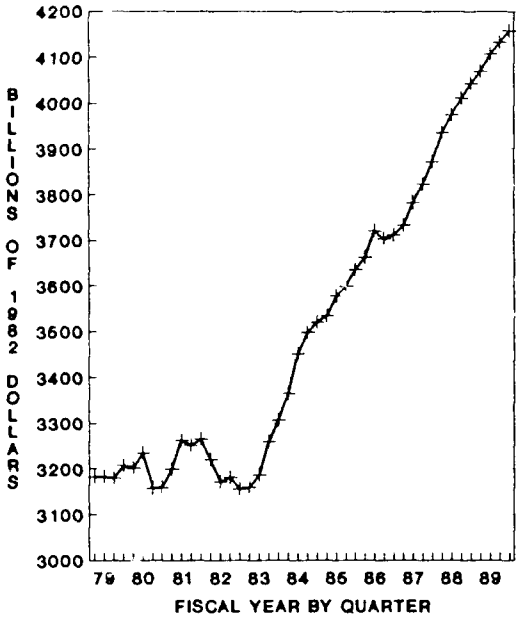
The current economic expansion began in 1983. It is comparable to some of the most robust recoveries of the postwar period, characterized by a favorable mix of rising output, declining inflation, and falling energy prices prior to 1988. In fiscal year 1989, the sixth full year of expansion, gross national product (GNP) rose $359 billion (or 7.5 percent). Gross national product adjusted for price changes rose 3.1 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 4.7 percent. Increasing demand is exerting upward pressure on fuel prices. The oil and gas deflator increased 1.3 percent in fiscal year 1988 and 7.1 percent in fiscal year 1989.

The Federal Reserve Board (FRB) had taken action to slow growth in 1987. 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 Dow Jones Industrials index was 2412.7 on October 16, 1987, the close the week before the major decline. By October 23, 1987, the index had declined 23.5 percent to 1847. By December 28, 1988, the index had recovered to 2167. As of October 20, 1989 the index closed at 2689. Although the index has now surpassed the previous high the market has remained volatile. Aviation has contributed to the volatility in the last year as shown by the relative values and broader swings shown by the Dow Jones Transportation index and by the Standard and Poors Aviation index. In the graphic on page 15 the three indices have been indexed to show the relative change since September 25, 1987, the high before the stock market decline of October 19, 1987. It shows much more variation for the Dow Jones Transportation index than the Dow Jones Industrials index. There is even more variation for the Standard and Poors Aviation index, reflecting, in particular, the actual and rumoured leveraged buyout activities of several airlines during the past year. Many investors have still not returned to the stock market. Money that would have been invested in the stock market is now in other less risky investments.

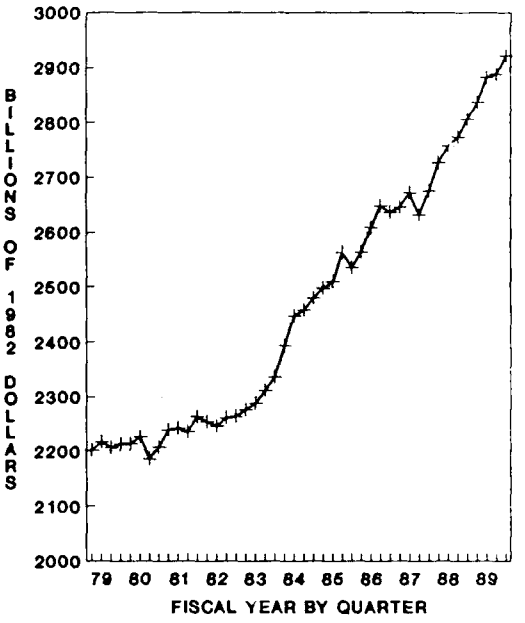
Economic growth is expected to continue through 1990. Gramm-Rudman-Hollings deficit reduction and associated Federal spending constraints and tax increases could reduce projected general economic growth. Inflation is expected to remain moderate as fuel prices increase. Moderately increasing fuel prices, low inflation rates, and an expanding

U.S. ECONOMIC TRENDS

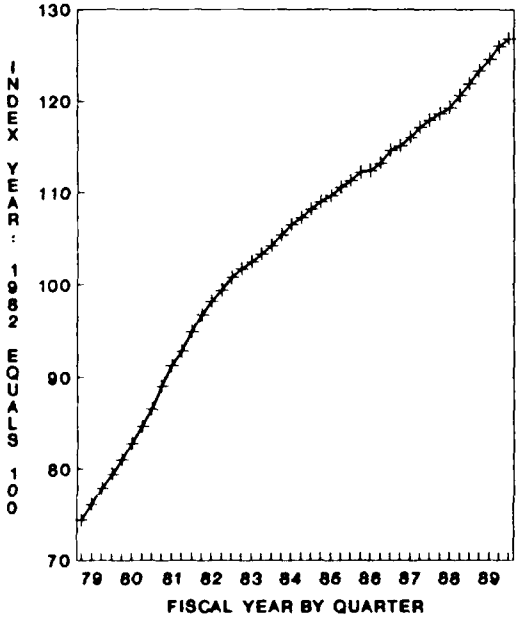
GROSS NATIONAL PRODUCT



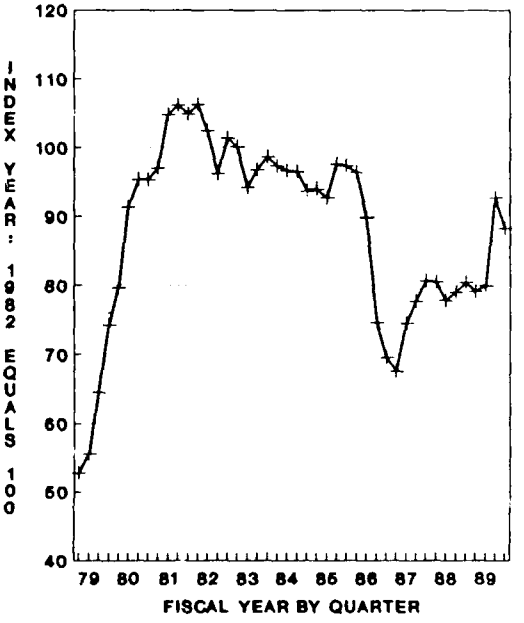
DISPOSABLE PERSONAL INCOME

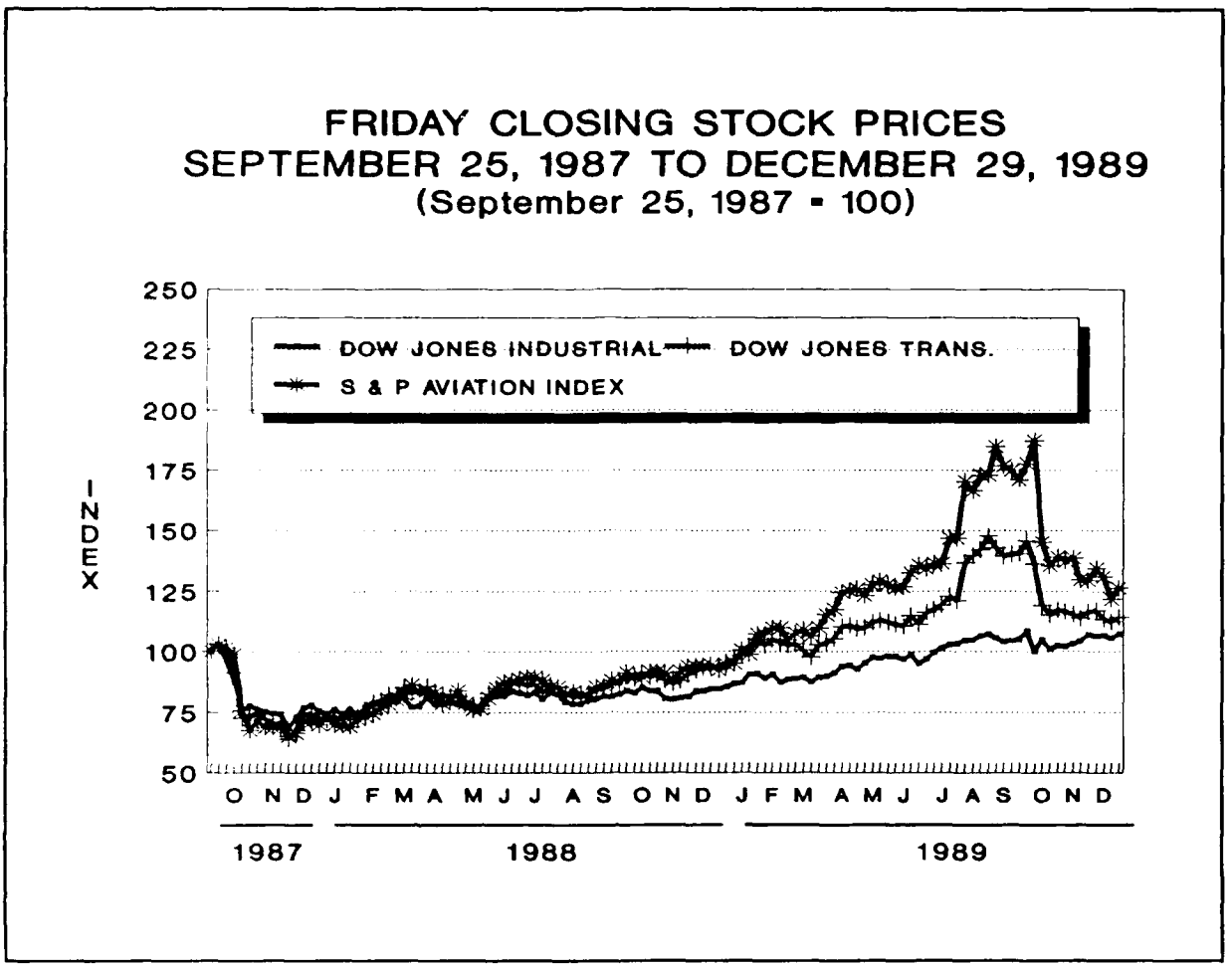


GNP PRICE DEFLATOR



OIL AND GAS DEFLATOR





economy will all contribute to a continuation of the upturn in aviation activity begun in 1983.

During 1989 there was an end to the continuing decline of the U.S. dollar relative to other world currencies. The U.S. dollar effective exchange rate increased 6.0 percent in 1989, although it had declined 5.8 percent in 1988. If the dollar resumes its decline, it is expected to affect 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 overall economic activity. Foreign travel will be more expensive because of increased ground (lodging and meal) costs, but U.S. carriers will gain a relative airfare advantage over foreign carriers.

WORLD

The economic health of various regions of the world are a component of any forecast for the U. S. air carriers. The combined gross domestic product for Europe, Africa and the Middle East, adjusted for price changes, grew 3.8 percent in 1989. The combined gross domestic product for Latin America (including South America, Central America and Mexico), adjusted for price changes, increased only 0.6 percent in 1989. The combined gross domestic product for Japan, Australia, New Zealand, and the Pacific Basin countries, adjusted for price changes, grew 5.2 percent in 1989.

Consumer price inflation in West

Germany increased by 3.1 percent in 1989. Price inflation in the United Kingdom was considerably higher, increasing by 7.8 percent in 1989. Inflation in Japan remained relatively low, with prices increasing by only 2.4 percent in 1989. These consumer price index data are representative of the wide diversity of inflation in various countries and must be taken into account in interpreting economic data.

The U.S. dollar rebounded against both the Japanese yen and the West German deutsche mark in 1989, both gaining 7.7 percent. The exchange rate data with important trading partners and very strong currencies relative to the dollar illustrate the constraints on the air carrier industry because of budget deficits, and trade imbalance.

ECONOMIC FORECASTS

The economic scenario utilized in developing the FAA Baseline Aviation Forecasts for the period 1990-1995 was provided by the Executive Office of the President, Office of Management and Budget (OMB). For the period 1996-2001, the economic scenario utilized consensus growth rates of the economic variables prepared by Data Resources, Inc. (DRI), Evans Economics, Inc. (Evans), and The WEFA Group. All of the indices presented here have a single base year, except for the Consumer Price Index; the Bureau of Labor Statistics has based the index on an average of the 1980 through 1982 time period (previously 1967). The U.S. effective exchange rate index and other international data were derived from The WEFA Group World Economic Outlook.

The principal series utilized in the individual aviation models to develop the FAA aviation forecasts are discussed in the following pages. The data are presented in tabular form in Chapter X, Tables 1 through 3.

GROSS NATIONAL PRODUCT

United States

Gross national product, adjusted for price changes, is expected to grow at an annual rate of 2.8 percent during the forecast period. Annually, real gross national product should increase by 2.4 percent in 1990, then increase 3.0 percent in 1991, and average 3.0 percent between 1989 and 1995. Economic growth is expected to slow somewhat during the latter half of the forecast period, averaging only 2.6 percent from 1996 to the year 2001.

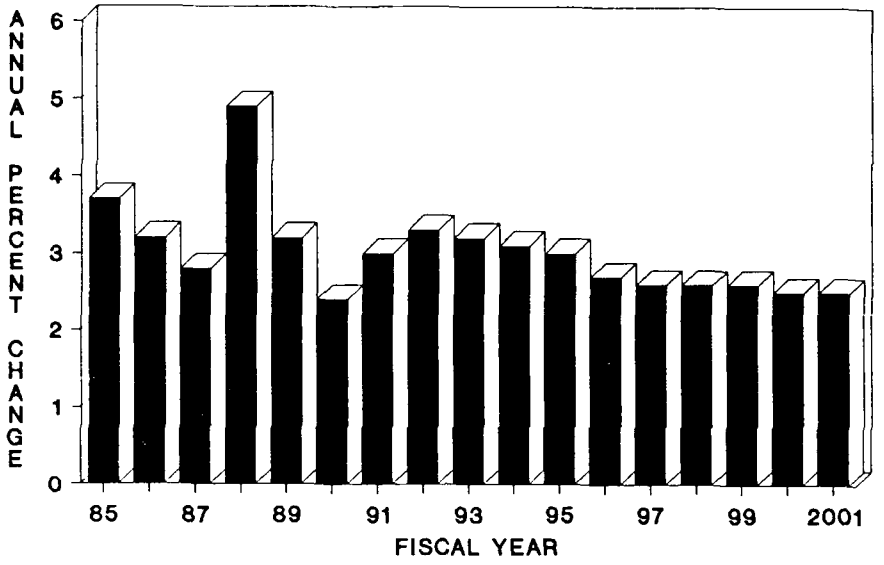
World

The combined gross domestic product for Europe, Africa and the Middle East, adjusted for price changes, is expected to grow at an annual rate of 3.2 percent throughout the forecast period. Real gross national product will increase by 2.9 percent in 1990, then by 2.7 percent in 1991. It will average 3.1 percent between 1990 and 1995. Economic growth is expected to increase slightly during the latter half of the forecast period, averaging 3.2 percent from 1995 to the year 2001.

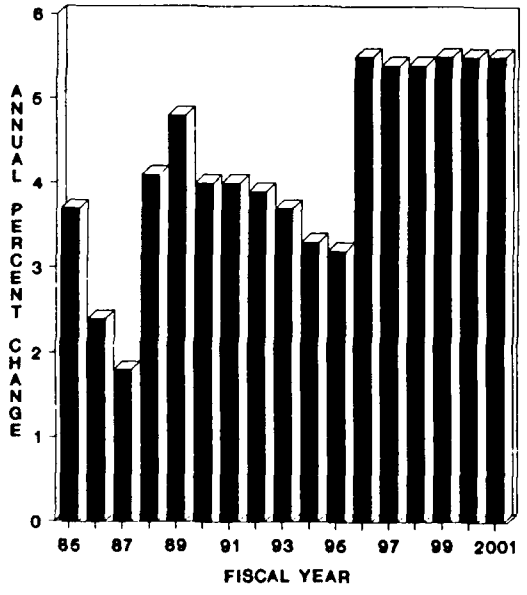
The combined gross domestic product for Latin America (including South America, Central America and Mexico), adjusted for price changes, is expected to grow at an annual rate of 4.3 percent throughout the forecast period. Real gross national product should increase by 2.9 percent in

FORECASTS OF U.S. ECONOMIC VARIABLES

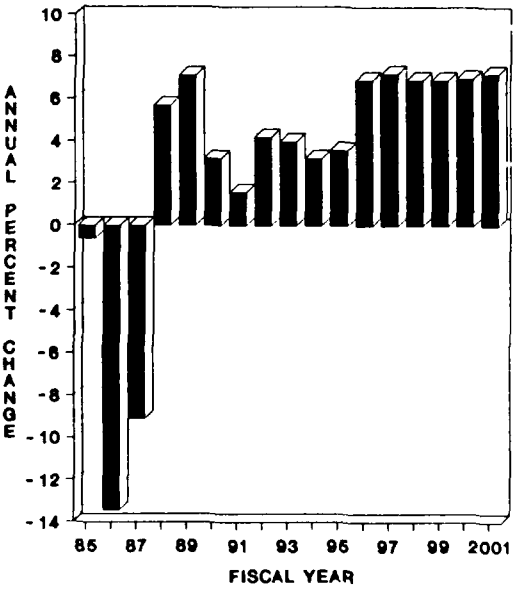
GROSS NATIONAL PRODUCT
(1982 DOLLARS)



CONSUMER PRICE INDEX
(1980-82$)

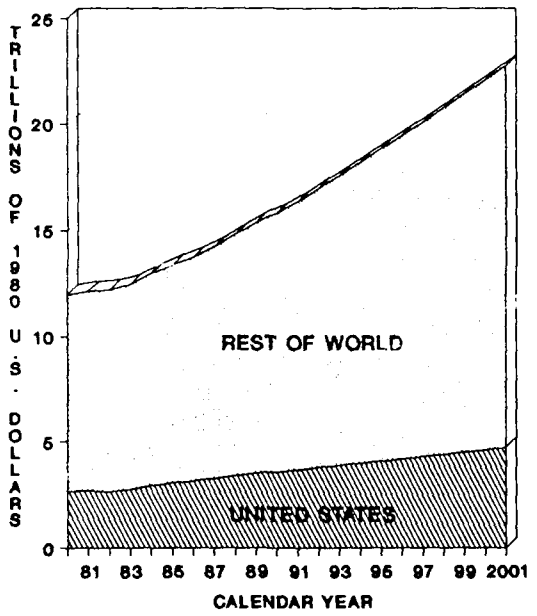


OIL AND GAS DEFLATOR
(1982 = 100)

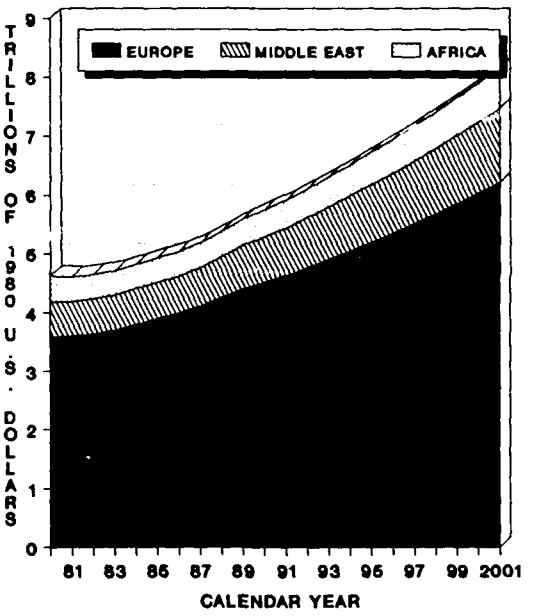


GROSS DOMESTIC PRODUCT BY WORLD REGIONS

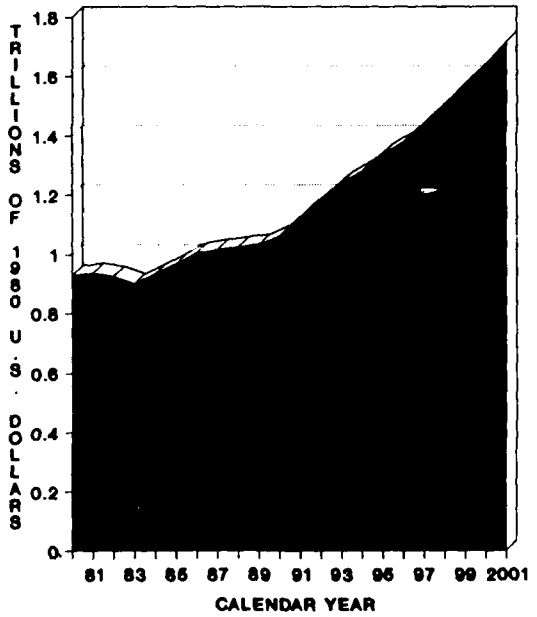
WORLD



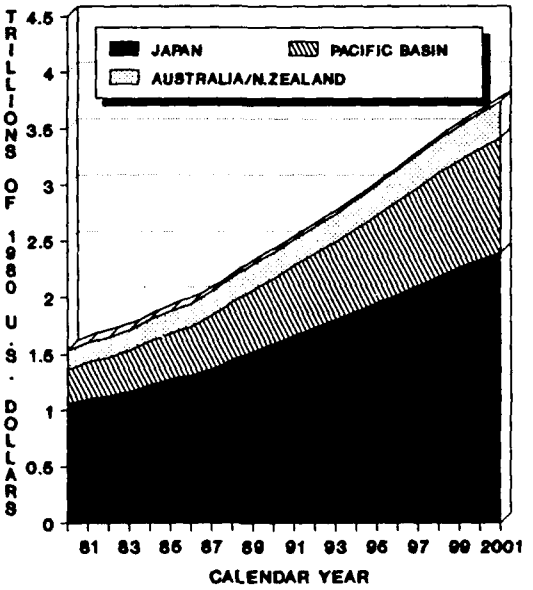
EUROPE/MIDDLE EAST/AFRICA



LATIN AMERICA



JAPAN/PACIFIC BASIN/ AUSTRALIA/NEW ZEALAND



1990, then 6.2 percent in 1991. It should average 4.4 percent between 1990 and 1995. Economic growth is expected to decrease somewhat during the latter half of the forecast period, averaging 4.2 percent from 1995 to the year 2001.

The combined gross domestic product for Japan, Australia, New Zealand, the Pacific Basin countries, adjusted for price changes, is expected to grow at an annual rate of 4.2 percent throughout the forecast period. Real gross national product should increase by 4.5 percent in 1990, then by 5.0 percent in 1991. It should average 4.6 percent between 1990 and 1995. Economic growth is expected to decline somewhat the same during the latter half of the forecast period, averaging 3.7 percent from 1995 to the year 2001.

CONSUMER PRICE INDEX

United States

Consumer prices are expected to remain in the moderate range, increasing at an average annual rate of 4.6 percent over the forecast period. Inflation is forecast to increase by 4.0 percent in both 1990 and in 1991, and settle at an annual average rate of 3.7 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.

World

Consumer price inflation in West Germany is expected to remain low, increasing at an average annual rate of 2.4 percent over the forecast period. Inflation is forecast to increase by 2.6 percent in 1990 and 2.4 percent in 1991 and settle at an average 2.4 percent over the first years of the forecast period. Inflation is expected to remain the same over the latter half of the forecast period.

Consumer price inflation in the United Kingdom is expected to remain moderate, increasing by an average annual rate of 4.1 percent over the forecast period. Inflation is forecast to increase by 5.7 percent in 1990 and 5.1 percent in 1991 and settle at an average 4.4 percent over the first 6 years of the forecast period. Inflation is expected to moderate to an annual rate of 3.8 percent over the latter half of the forecast period.

Consumer price inflation in Japan is expected to remain low, increasing by an average annual rate of 2.0 percent over the forecast period. Inflation is forecast to increase by 1.7 percent in 1990 and 1.5 percent in 1991 and settle at an average 2.0 percent over the first 6 years of the forecast period. Inflation is expected to increase to an annual rate of 2.0 percent over the latter half of the forecast period.

OIL AND GAS DEFLATOR

United States

Over the entire forecast period, nominal fuel prices are predicted to increase at an annual rate of 5.1 percent, and real fuel prices (1982 dollars) are expected to increase by approximately 0.5 percent a year. Fuel prices are forecast to increase by 3.2 percent in 1990, and 1.6 percent in 1991. Over the first 6 years of the forecast period, nominal fuel prices are forecast to increase at an annual rate of 3.3 percent, while real fuel prices are forecast to decline at an annual rate of 0.4 percent a year. Fuel prices

are expected to increase over the 1996 to the year 2001 time period. During this time period, nominal fuel prices will increase at an annual rate of 7.0 percent, while real fuel prices will increase at a yearly rate of 1.6 percent.

DOLLAR EXCHANGE RATE

United States

The U.S. dollar effective exchange rate is expected to decline throughout the entire 12-year forecast period, declining at an average annual rate of 1.5 percent per year. The decline is expected to be somewhat greater over the next several years, declining by 1.4 percent in calendar year 1990, by 3.2 percent in 1991, and by 1.6 percent in 1992. The projected decline in the U.S. effective exchange rate will make imports of foreign goods more expensive to U.S. buyers, possibly reducing imports. At the same time, it will make U.S. originating foreign travel more expensive and, conversely, travel to the U.S. by foreign nationals less expensive.

World

The West German deutsche mark is expected to decline in value relative to the U.S. dollar, averaging 2.3 percent over the 12-year forecast period. The deutsche mark is forecast to decline by 3.3 percent over the first half of the forecast period, decreasing by 5.5 percent in 1990, by 4.1 percent in 1991 and by 2.3 percent in 1992. The exchange rate is expected to decline at an annual rate of 1.3 percent over the latter half of the forecast period.

The Japanese yen is expected to decline in value relative to the U.S. dollar, averaging 2.8 percent over the forecast period. The yen is forecast to increase by 1.3 percent in 1990, then decrease by 9.8 percent in 1991 and decline at an average 4.5 percent over the first 6 years of the forecast period. The yen is expected to decline at an annual rate of 2.8 percent over the latter half of the forecast period.

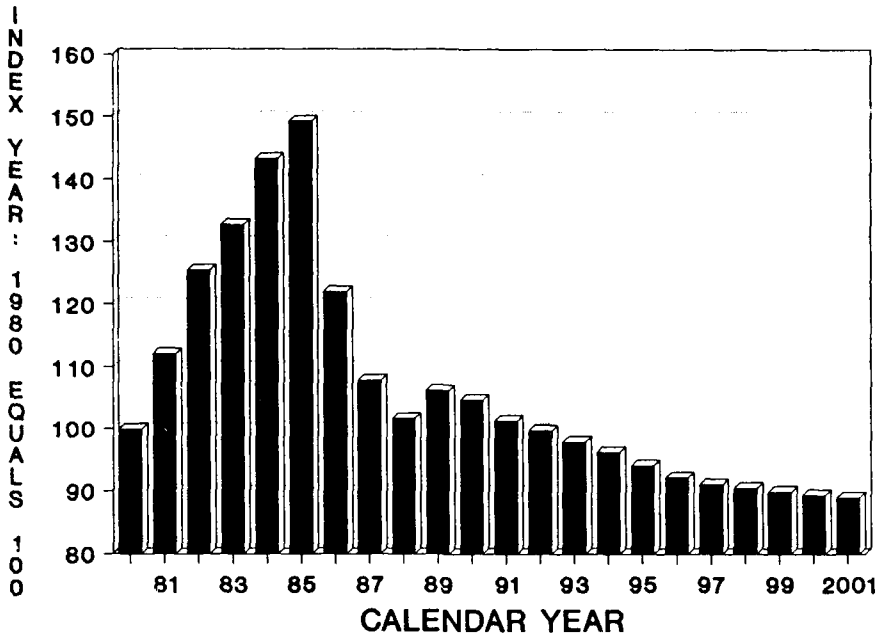
THE UNCERTAIN SHORT-TERM ECONOMIC OUTLOOK

An economic downturn has been a possibility for several years but has not materialized. The following comparison will illustrate some of the conflicting opinions of the "economic experts" as to the short-term outlook for the economy. The official OMB forecast utilized by the FAA projects a slowing of GNP growth in fiscal year 1990 to 2.4 percent then increasing to 3.0 percent in fiscal year 1991. WEFA projects slow growth in both fiscal years 1990 and 1991 with 2.1 percent and 2.4 percent, DRI projects a slowdown in fiscal year 1990, with 1.8 percent growth in fiscal year 1990 and recovery to 2.4 percent in fiscal year 1991. Evans sees growth in fiscal year 1990, with 2.4 percent growth in fiscal year 1990 and 2.3 percent in fiscal year 1991.

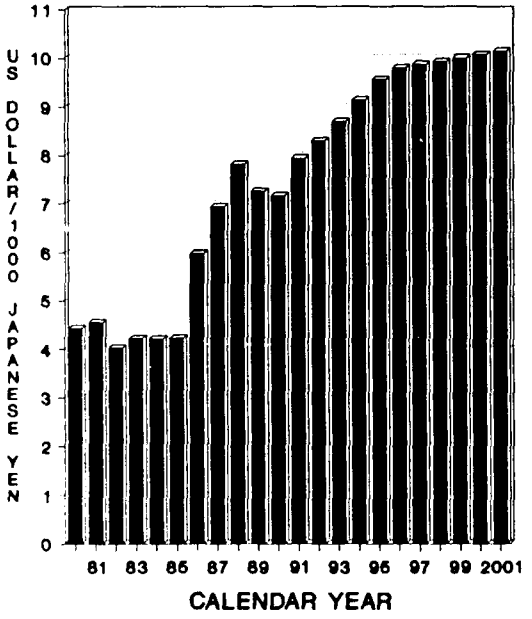
Evans is the only service to predict a slowdown in the rest of the forecast period. Evans projects slowdowns in fiscal year 1992 with 1.6 percent growth, and in 1993, with 1.7 percent growth. The U.S. economy has benefited from the decline in world energy prices over the past few years, but any rebound in energy prices would lower economic growth and increase aviation costs. OMB has

EXCHANGE RATE TRENDS AND FORECASTS

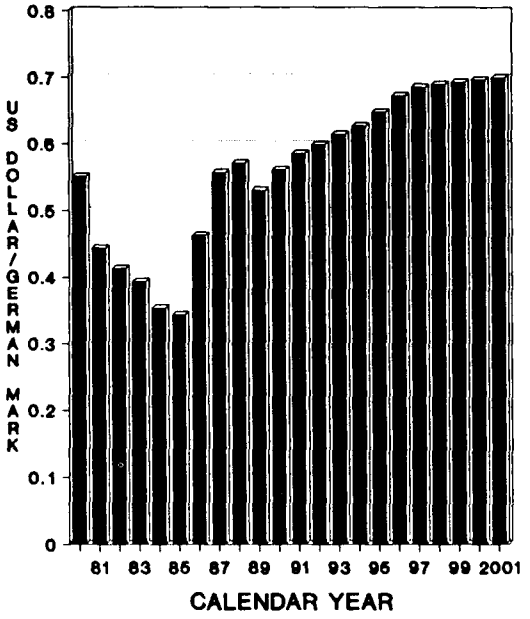
U.S. EFFECTIVE EXCHANGE RATE



JAPANESE YEN

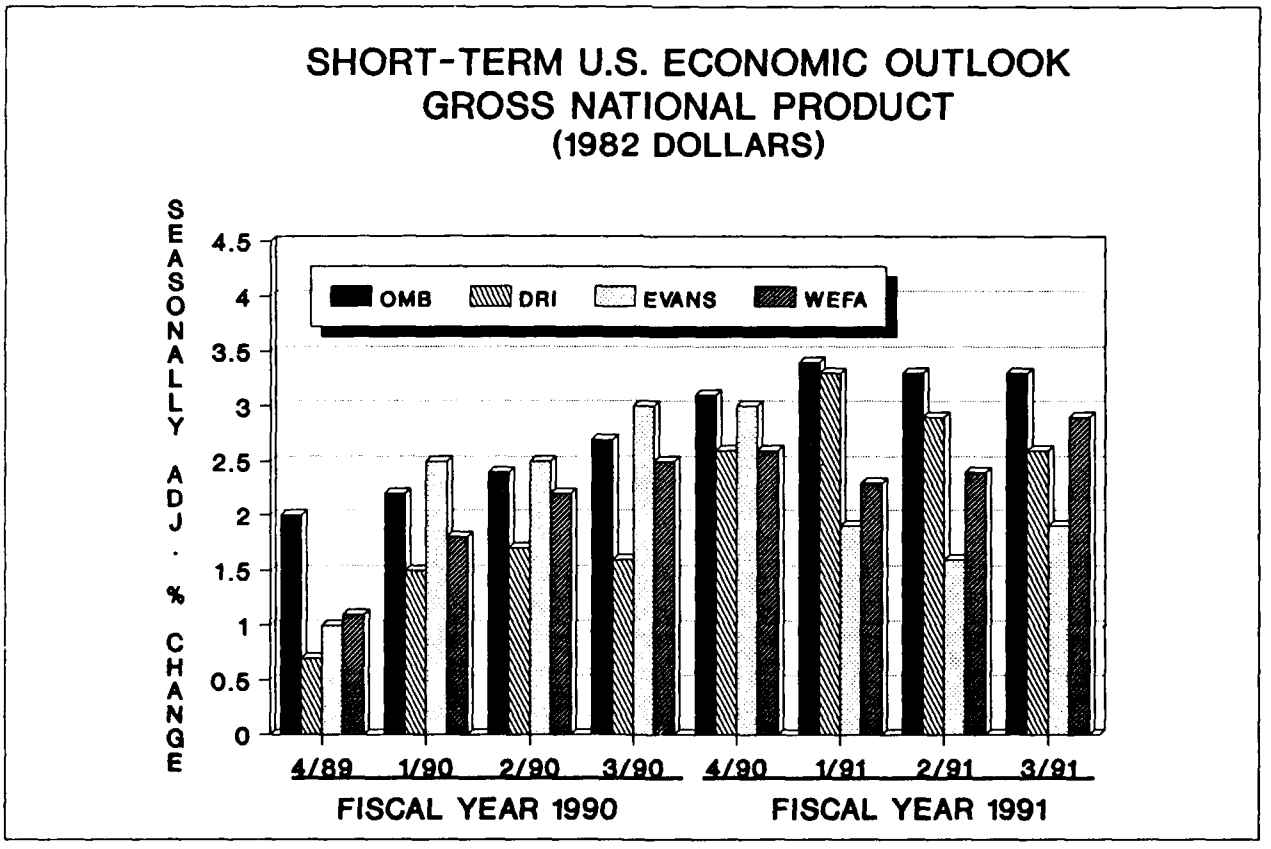


WEST GERMAN DEUTSCHE MARK



forecast modest increases in fiscal year 1990 and fiscal year 1991, 3.2 and 1.6 percent, respectively, for the oil and gas deflator, while the consensus of the three commercial services tends to reflect a stronger rebound in oil and gas prices. The projected changes in the dollar has predictable benefits and costs to the economy. Also, there continues to be a great deal of uncertainty as to the future budget and tax policies of the Federal Government. Recent events in Eastern Europe and the current discussions as to a possible "peace dividend" adds to the uncertainty. The demand for air transportation is highly correlated with these economic variables, and, therefore, dramatic shifts in the course of the economy will affect the short-term aviation forecast.

The short-term forecast of the three forecasting services for fiscal year 1990 and 1991 are different from each other and from the OMB forecast. However, no one is forecasting a recession. For December, 1989, DRI had four slow growth quarters (defined as real GNP growth rate less than 2.0 percent). Evans had one slow quarter, and WEFA had two slow growth quarters. DRI is forecasting GNP growth of 0.7 percent, 1.5 percent, 1.7 percent, and 1.6 percent in the four quarters of fiscal year 1990. Evans is predicting 1.0 percent, 2.5 percent, 2.5 percent, and 3.0 percent, and WEFA 1.1 percent, 1.8 percent, 2.2 percent, and 2.5 percent respectively. Evans is the only service predicting slow growth in fiscal year 1991. Evans is forecasting GNP growth of 3.0 per-



cent, 1.9 percent, 1.6 percent, and 1.9 percent, in the four quarters of fiscal year 1991. OMB is predicting yearly growth rates in GNP of 2.4 percent for fiscal year 1990, increasing to 3.0 percent for fiscal year 1991. In contrast the forecasting services predict lower rates for both fiscal years: DRI is predicting 1.8 percent and 2.4 percent; Evans is predicting 2.5 percent and 2.5 percent; and WEFA is predicting 2.1 percent and 2.3 percent for fiscal years 1990 and 1991, respectively.

DEMOGRAPHIC FACTORS

Demographic factors are being explored to add to FAA forecasting methods. Shifting demographic patterns are a factor behind changing economic and travel patterns. John D. Kasarda, a demographer, notes that migration patterns for states (both domestic migration and net migration from overseas) may be important for forecasting both regional and national air travel activity. (See his article "Demographics - the Spatial Redistribution of People and Jobs," in the proceedings of a TRB workshop which appears in Circular Number 348, August 1989.) Dr. Kasarda notes that the various types of economic activities which take place in states, such as the type of employment or industries present, may affect the demand for air travel. Kasarda also notes that the age distribution of the population may not be an important parameter because the propensity to travel is not that different among various age categories. Kasarda presents projections which indicate that California, Texas, Florida, and Georgia are the states were the most growth in employment is expected to occur. He also notes that air freight could be an even greater player in air transportation because of the switch to "just-in-time" systems of inventory and the use of the Far East as a source of production for some U.S. firms. Further, he emphasized the need to recognize that demographics may affect both the accuracy and meaning of forecasts.

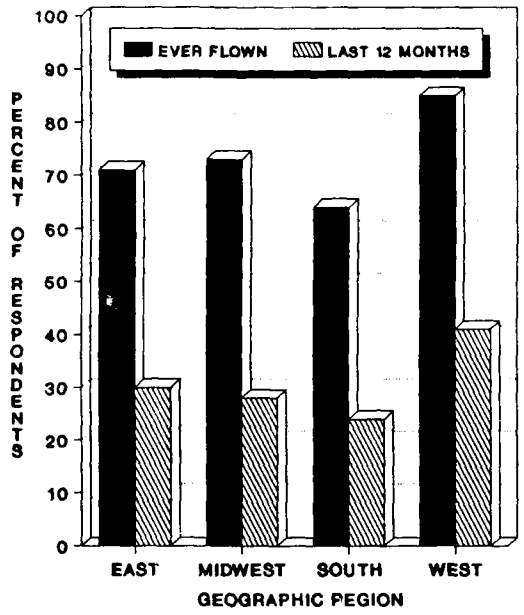
The Air Transportation Association Gallup Poll also provides a number of insights into demographics and aviation. With a few exceptions (especially in the $40,000 plus income group), a large percentage of individuals aged 65 and older flew more frequently than did their younger counterparts. This suggests increased future demand for air travel as the population ages. However an important caveat is that income often falls with age.

There is evidence that the propensity to fly varies across regions of the country. The graphic on page 24 indicates that the populations in the West and East fly more frequently than do travelers from the Midwest and South. In addition, migration itself is likely to affect the demand for air travel. Family and community ties will induce travel by migrants. The graphic on page 25 shows a Bureau of the Census forecast of population growth by census regions between 1986 the year 2000.

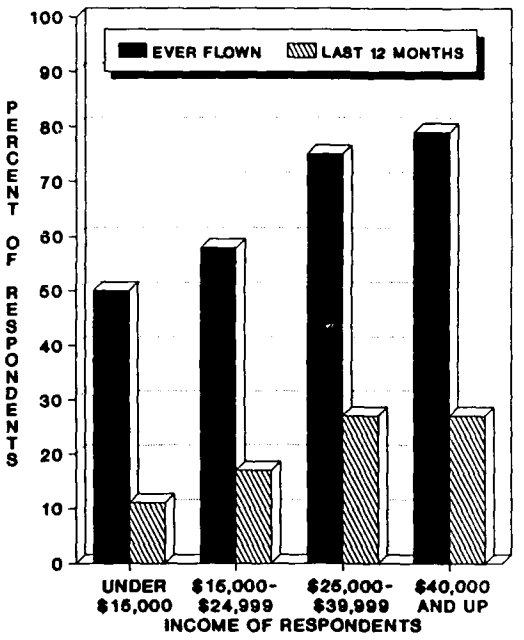
This is the first time that a demographic factors section has been included in the forecast. The capability is being built to utilize demographics factors. The tables and this section illustrate a number of demographic factors which may be utilized in accessing forecasts and in making forecasts. There has not been developed at this time enough of a track record to point to definitive methods that might be useful for FAA forecasting. The general aviation model revision is looking at regional and demographic factors. There is a potential for developing very useful time series data based on the Gallup Poll data to use in forecasting avia-

PROFILE OF AIRLINE TRAVELERS

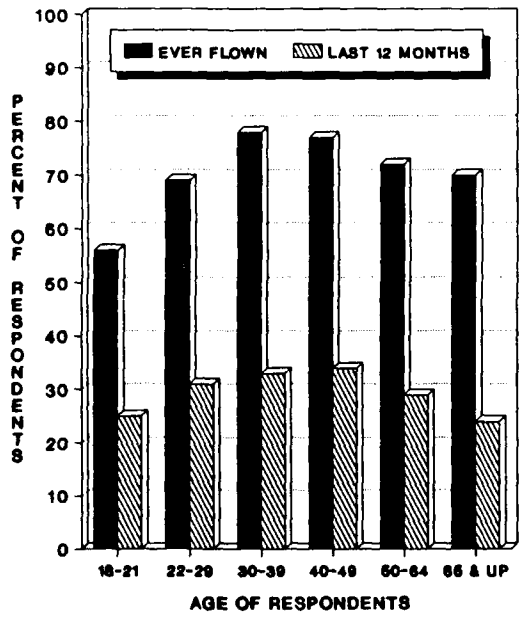
BY GEOGRAPHIC REGION



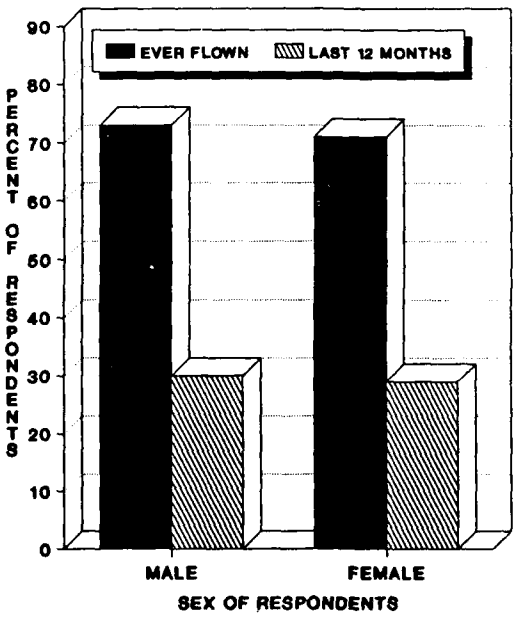
BY INCOME



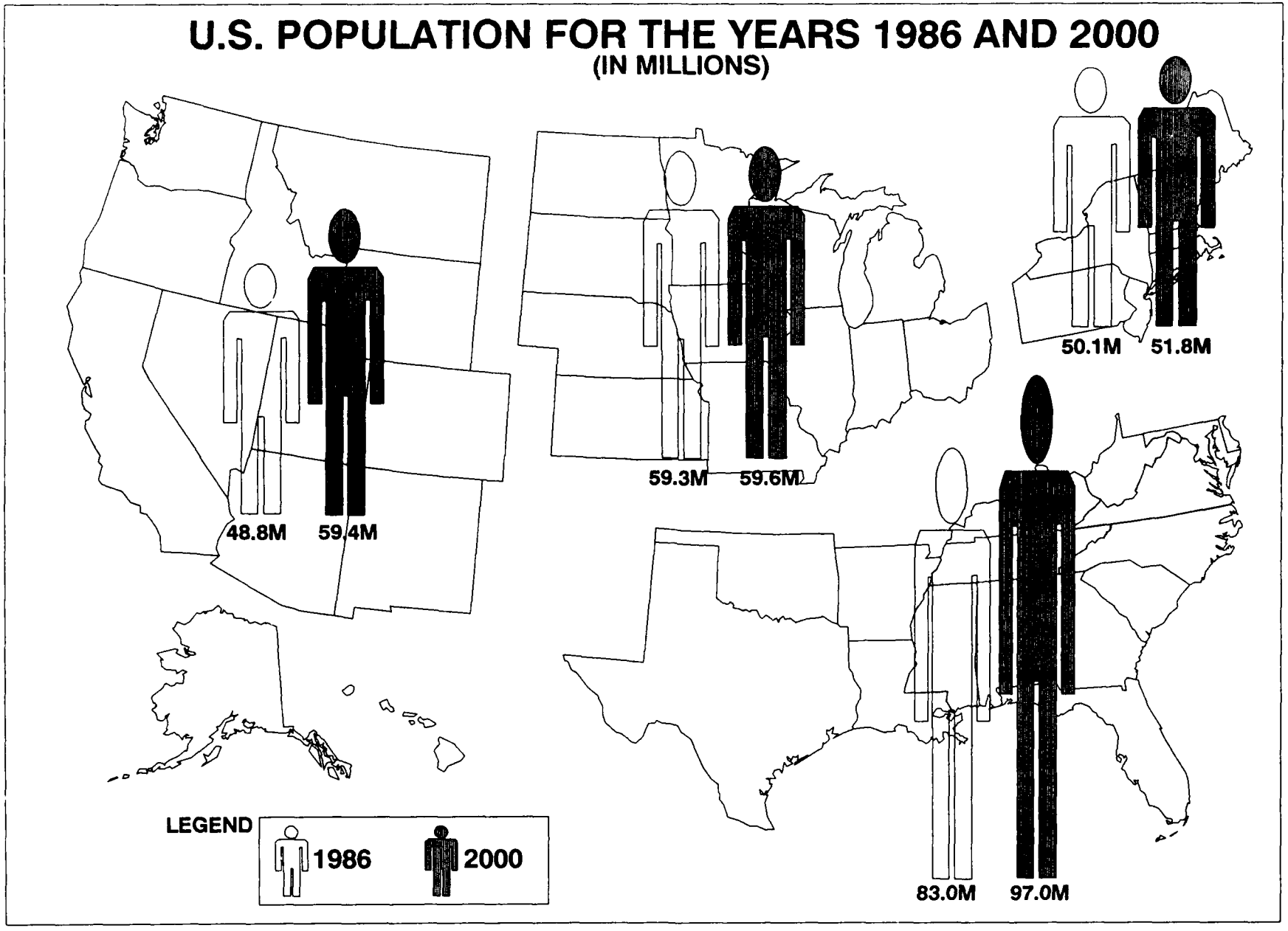
BY AGE



BY SEX



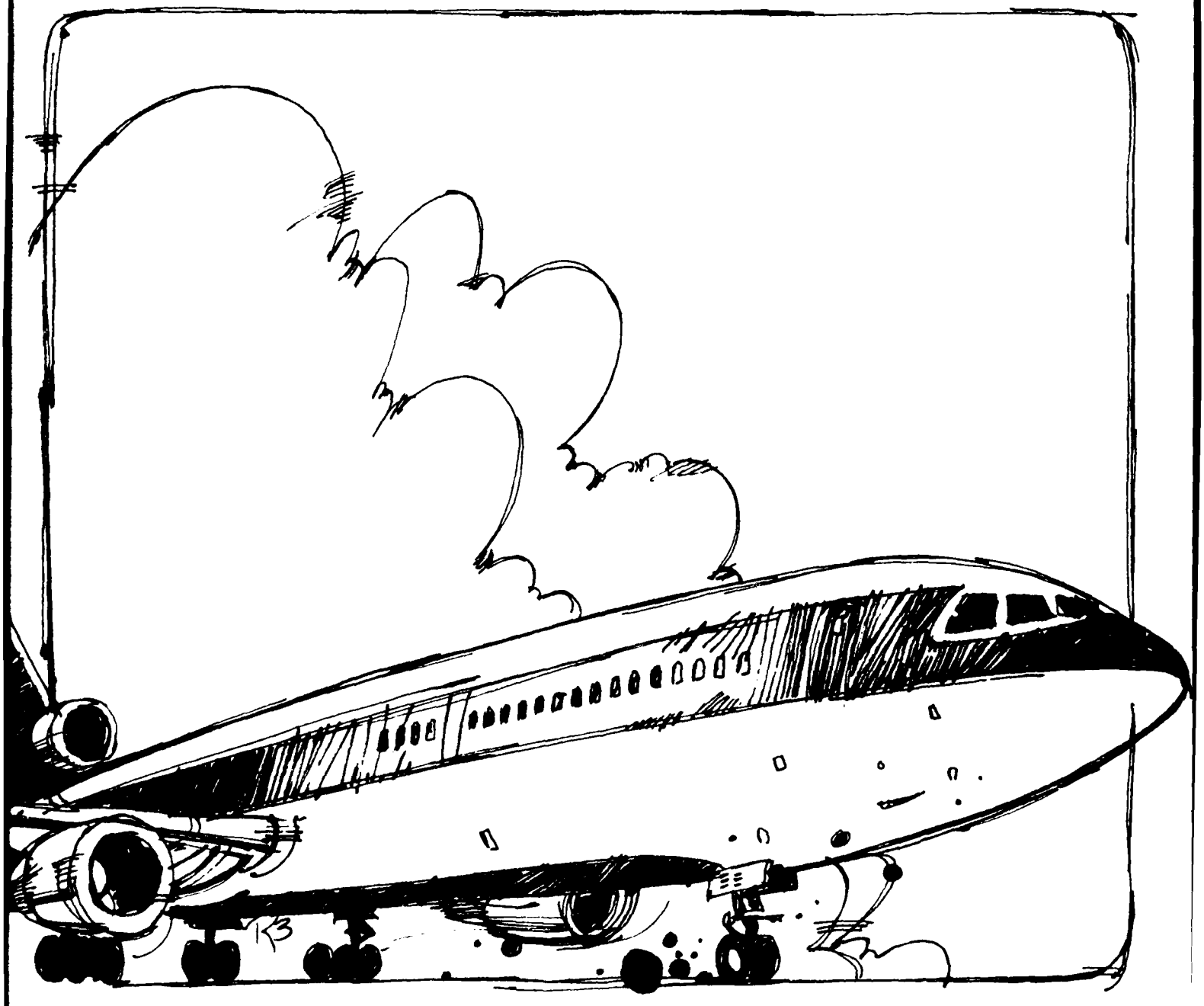
SOURCE: AIR TRANSPORT ASSOCIATION 1987 AIR TRAVEL SURVEY


U.S. POPULATION FOR THE YEARS 1986 AND 2000
(IN MILLIONS)
48.8M
59.4M
59.3M
59.6M
50.1M
51.8M
83.0M
97.0M
LEGEND
1986
2000

tion activity. The FAA is very fortunate that ATA has sponsored such a high quality survey over the years. The contractor is working on such an approach for air carrier and long range forecasting.

CHAPTER III

COMMERCIAL AIR CARRIERS



CHAPTER III

COMMERCIAL AIR CARRIERS

At the end of fiscal year 1989, there were 65 U.S. commercial airlines (both scheduled and charter) reporting traffic and financial data to the Research and Special Programs Administration (RSPA), Department of Transportation (DOT), on Form 41. This includes 47 passenger airlines (operating aircraft with over 60 seats) and 18 all-cargo carriers. Thirty-four of these carriers provide scheduled passenger service and it is these carriers which provide the data base for the air carrier forecasts discussed in this chapter.

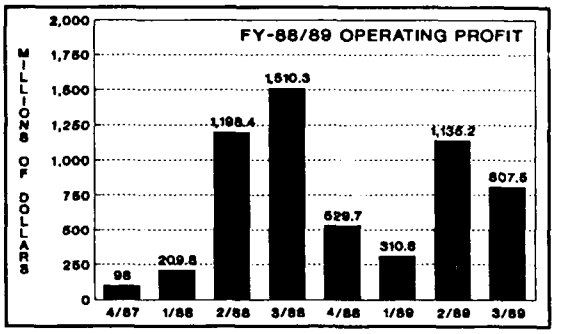
Air carrier traffic forecasts and assumptions are shown numerically in Chapter 10 (Tables 4 through 13). Air carrier workload forecasts are discussed in Chapter 7 and shown numerically in Chapter 10 (Tables 23 through 29).

A list of active and inactive commercial passenger and cargo air carriers may be found in Appendices A and B, beginning on page 221.

REVIEW OF 1989

FINANCIAL RESULTS

Financially, fiscal year 1989 was an exceptional year for the U.S. commercial airline industry. The industry reported its second highest operating profit ($2.8 billion), surpassed only by the record $3.0 billion operating

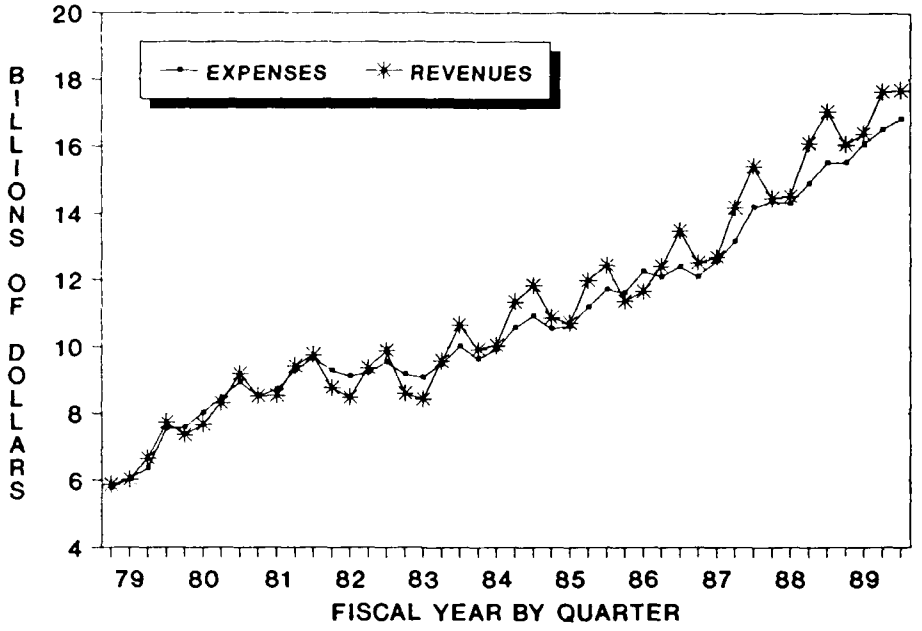


profit posted in fiscal year 1988. In fact, 1989 marked the sixth consecutive profitable year (including 15 consecutive profitable quarters) for U.S. commercial airlines, a period during which industry operating profits have totaled almost $12.9 billion.

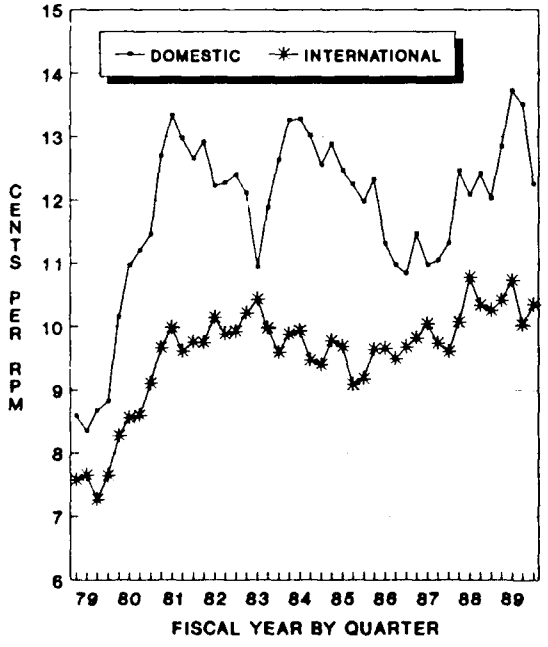
A number of factors are responsible for the financial successes ($5.8 billion operating profit) enjoyed during the past two years. First, both the U.S. and the world economies (up 7.6 and 7.9 percent, respectively, since 1987) have continued to show exceptional strength. Second, despite a slowdown in the demand for domestic travel (revenue passenger miles [RPM's] up only 1.9 percent), domestic passenger yields were up 16.5 percent during this two-year period, accounting for nearly all the growth in domestic operating revenues (up 19.9 percent). Third, strong demand for international travel (RPM's up 32.4 percent), combined with a 6.0 percent increase in international yields, led to spectacular gains in

U.S. AIR CARRIER REVENUE AND COST TRENDS

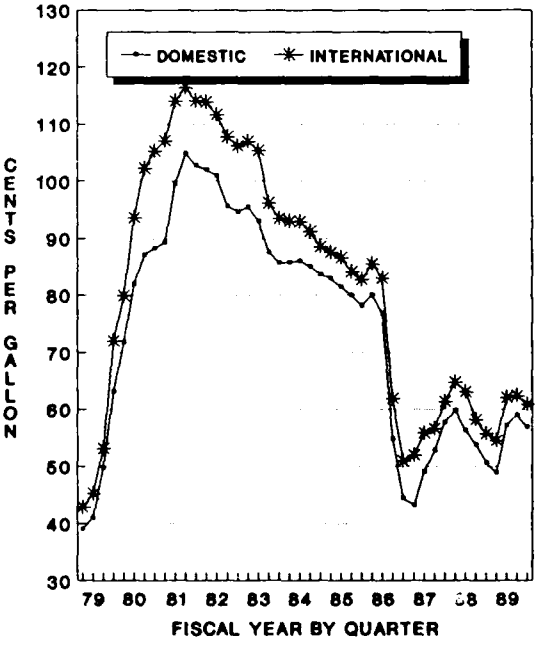
OPERATING REVENUES AND EXPENSES



PASSENGER YIELDS

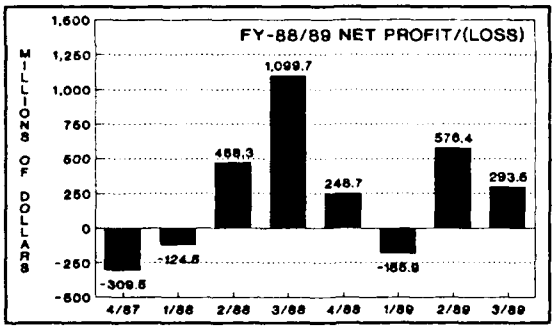


JET FUEL PRICES



international revenues (up 39.8 percent). Fourth, jet fuel prices have remained basically constant since the end of fiscal year 1987 ($0.598 per gallon in September 1987 compared to $0.601 per gallon in September 1989) and this has, to some extent, moderated the increase in overall operating expenses.

U.S. airlines posted a net profit of $933 million in fiscal year 1989, only slightly less than the $1.1 billion earned in 1988. The net profit earned over the last two years represents a considerable improvement over the net



earnings of the previous four-year period. In fact, industry net profits have totaled only $4.0 billion over the last six years, $8.9 billion less than the operating profits posted during the same time period. Much of the difference between the industry's operating and net profits 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 1989, the industry's long-term debt totaled almost $11.0 billion. In 1989 alone, it cost U.S. commercial air carriers just over $2.0 billion to service the interest on its long-term debt. Over the past 6 years, interest payments on the industry's long-term debt have totaled over $10.3 billion, $1.4 billion more than the difference between the industry's operating profit and net profit levels over this time period.

The disparity among the financial results of individual carriers deteriorated considerably over the past year. In fact, the results could be said to be a microcosm of the real world; that is, the rich get richer and the poor get poorer. The financially strong carriers in 1988 (American and Delta) reported combined operating profits totaling almost $1.6 billion in fiscal year 1989, up from profits of $1.2 billion in the previous year. In addition, six carriers reported operating profits totaling almost $3.2 billion, $0.4 billion more than the combined operating profits of the entire U.S. commercial airline industry.

At the other end of the scale, three carriers (Eastern, Braniff and Presidential) entered into Chapter 11 bankruptcy proceedings over the past year. The financially weak carriers in 1988 (Pan American and Eastern) reported combined operating losses totaling over $1.0 billion in fiscal year 1989, considerably more than the combined loss of $398 million in the previous year. In addition, 13 carriers reported operating losses in fiscal year 1989, the cumulative sum of these losses totaling almost $1.2 billion.

At the net level, American and Delta again led all airlines with combined net profits totaling almost $1.0 billion, while Eastern and Pan American posted a combined net loss of over $1.0 billion.

The industry's strong traffic growth during the 1984-87 period (RPM's up 44.3 percent), combined with strong U.S. economic growth (up 10.1 percent) and declining jet fuel prices (down 39.7 percent), eased the pressure on those carriers with weak balance sheets. At the same time, these same factors also tended to mask the seriousness of the industry's long-term debt problem.

However, slower traffic growth over the past 2 years, coupled with the financial misfortunes of several carriers and the highly visible leveraged buyout activities during the past year, has served to heighten public awareness with regard to the financial viability

of the heavily leveraged airlines. The current forecast portends a slowdown in both U.S. economic growth and traffic demand in 1990. Should the general economic slowdown be more severe or longer in duration than now expected, the financial viability of many of the highly leveraged carriers and the industry, in general, could be called into question.

Generally, it is the financially weaker carriers who set discount fare policy. Unfortunately, many times their goal may simply be to generate cash flow, without regard to the profitability of such fares. If this were to occur, there would be a general erosion of industry profits. While most U.S. carriers appear to have a firm grasp on fares at the current time, a lengthy, more wide-spread slowdown in the demand for air travel could precipitate an industry-wide fare war. Such a scenario could lead to greater concentration within the industry, a situation in which there would be very few winners and many losers, including the traveling public.

SCHEDULED PASSENGER TRAFFIC AND CAPACITY

Scheduled passenger traffic on U.S. commercial airlines increased for the eighth consecutive year in 1989. Over this 8-year period (1982 to 1989), system RPM's and enplanements increased by 72.8 and 58.3 percent (an average of 7.1 and 5.9 percent per year), respectively. In fiscal year 1989, system RPM's (429.1 billion) increased by 3.1 percent and passenger enplanements (452.4 million) grew by 0.8 percent.

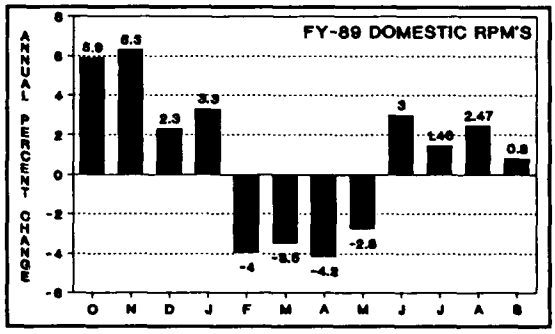
The growth in passenger demand in 1989 can best be described as sluggish, especially in light of the continued strong growth of the U.S. general economy (real GNP up 3.0 percent). However, the Eastern Air Lines' strike (beginning March 4, 1989) and subsequent Chapter 11 bankruptcy is thought to have contributed to this slow growth, although the actual loss in system traffic was probably less than 1.0 percent in fiscal year 1989.

Available seat miles (ASM's) totaled 680.6 billion in fiscal year 1989, an increase of only 1.8 percent over 1988. The strike at Eastern Air Lines, which accounted for 6.2 percent of system capacity in January 1989, is estimated to have had a significant impact on system capacity, reducing system ASM's by approximately 2.6 percent in fiscal year 1989.

Over the past 8 years, system ASM's have grown by 60.9 percent, an average annual increase of 6.1 percent. During this same period, the system load factor increased from 58.7 percent in 1981 to 63.0 percent in 1989, only slightly below its record level of 63.2 percent in fiscal year 1979.

Domestic Passenger Traffic and Capacity

Following three consecutive years of strong domestic traffic growth (RPM's up 35.5 percent between 1984 and 1987), the demand for air travel within the United States has grown by less than 2.0 percent over the past two years. Domestic RPM's (328.4 billion) grew by

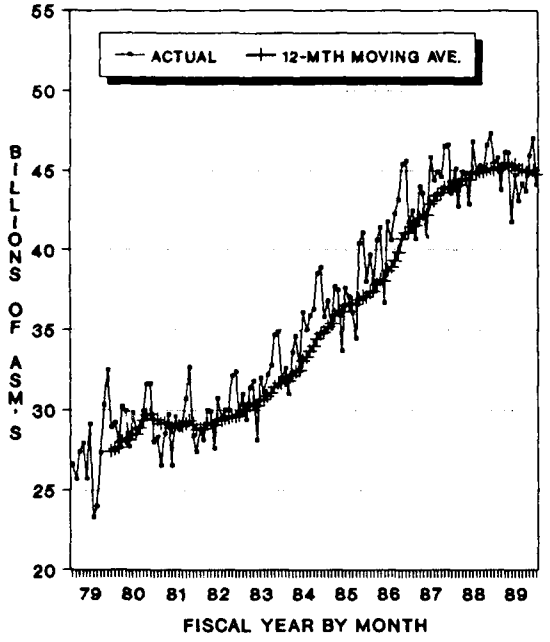


only 0.9 percent in fiscal year 1989 and by only 1.1 percent in fiscal year 1988. The number of domestic passenger enplanements (415.6 million) grew by only 0.4 percent in 1989 after declining by 0.3 percent in 1988.

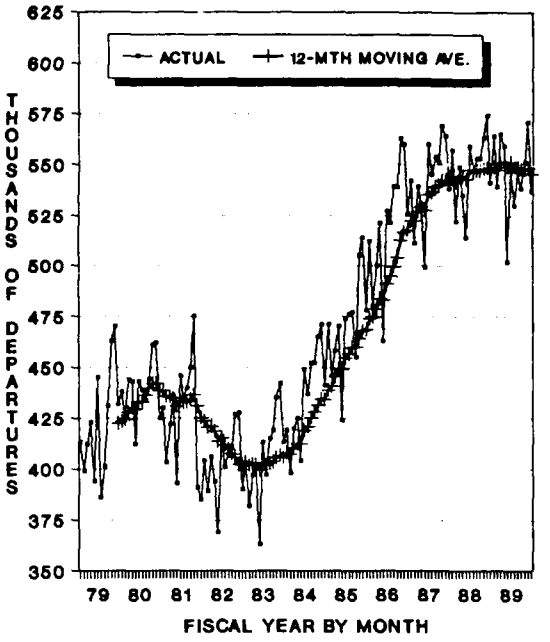
Higher fares (domestic yields up

U.S. AIR CARRIER DOMESTIC TRAFFIC TRENDS

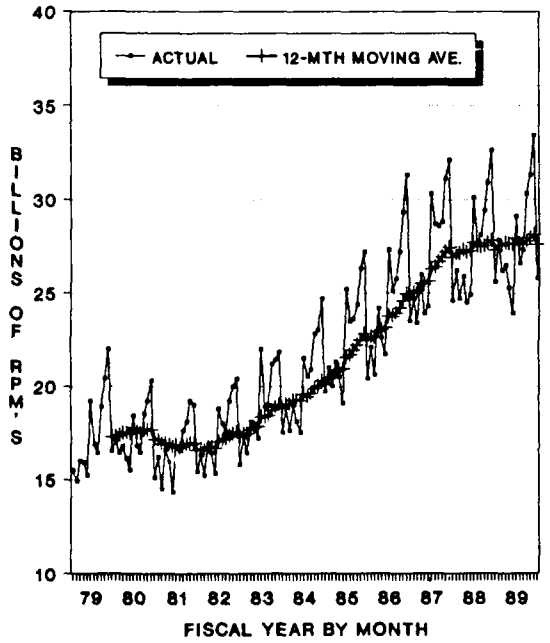
AVAILABLE SEAT MILES



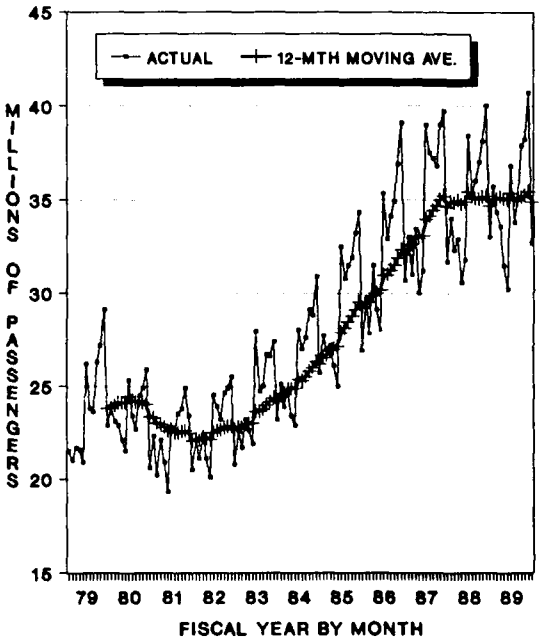
AIRCRAFT DEPARTURES



REVENUE PASSENGER MILES

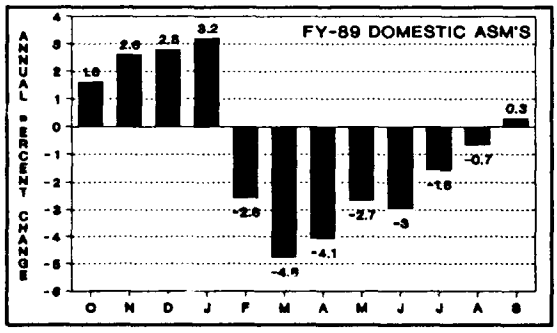


PASSENGER ENPLANEMENTS



16.5 percent since 1987) are probably the main cause for the sluggish growth in domestic passenger demand in both 1988 and 1989. Starting in June 1987, U.S. airlines began to institute a series of fuel surcharges and across-the-board fare increases, while at the same time placing more restrictions and longer advance purchase requirements on the use of discount fares. These higher fare levels held throughout most of 1988 and 1989 and, coupled with only moderate increases in domestic capacity, reduced the demand for domestic travel.

Domestic capacity (529.5 million ASM's), has grown by only 1.5 percent over the last two years, actually declining by 0.7 percent in fiscal year 1989. However, the strike at Eastern Air Lines, which accounted for 6.7 per-

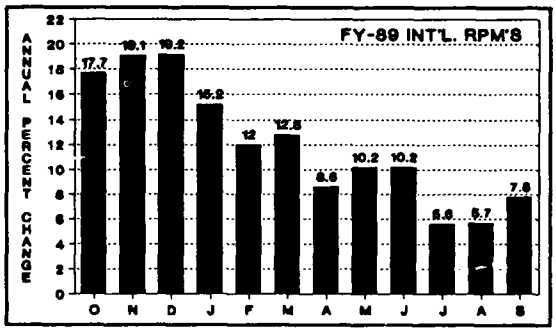


cent of domestic capacity in January 1989, was largely responsible for the decline in 1989, reducing domestic ASM's by approximately 3.2 percent.

Because of the slow growth in capacity over the past two years, domestic load factors have remained at historically high levels, averaging 62.0 percent in fiscal year 1989. This was 1.0 point higher than in 1988 and only 1.0 point below the record high load factor of 63.0 percent achieved in 1979.

International Passenger Traffic and Capacity

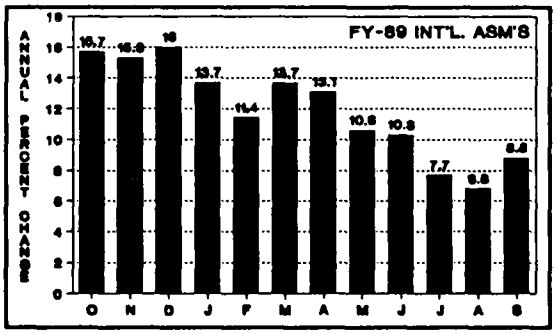
After a disappointing traffic year in fiscal year 1986 (RPM's down 0.7 percent), largely due to terrorist activities abroad, international traffic demand has exceeded almost everyone's expectations. Since 1986, international RPM's and passenger enplanements have increased by 57.4 and 50.4 percent, respectively. In fiscal year 1989, international RPM's (100.6 billion) were



up 11.1 percent, and passenger enplanements (36.8 million) grew by 7.5 percent.

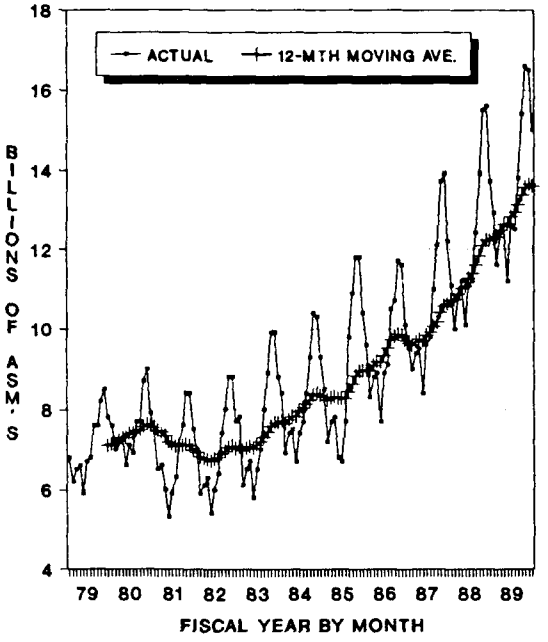
Although the growth in 1989 was considerably slower than the average growth achieved during the two preceding years, (RPM's up 19.0 percent and enplanements up 18.3 percent), two factors account for much of the slower growth. First, the midair destruction of Pan American flight 103 by terrorists in December 1988 had a noticeable impact on U.S. carrier traffic between the United States and European destinations during the early months of calendar year 1989. Second, the Eastern Air Lines strike affected U.S. carrier capacity between the United States and South American destinations.

A large part of the growth in the demand for international travel is attributable to the significant increase in

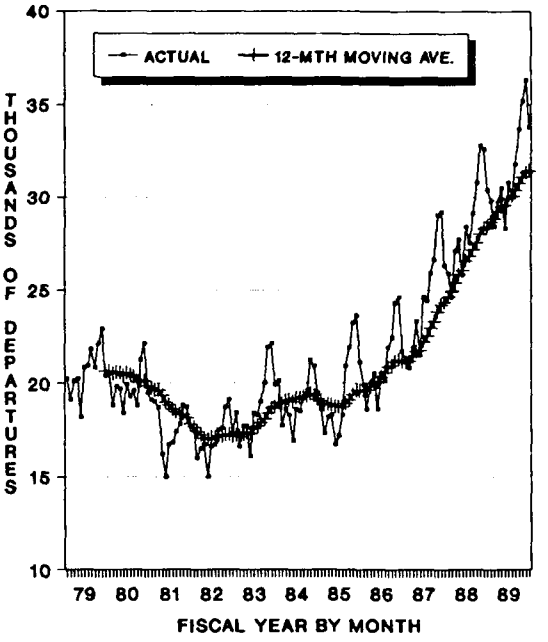


U.S. AIR CARRIER INTERNATIONAL TRAFFIC TRENDS

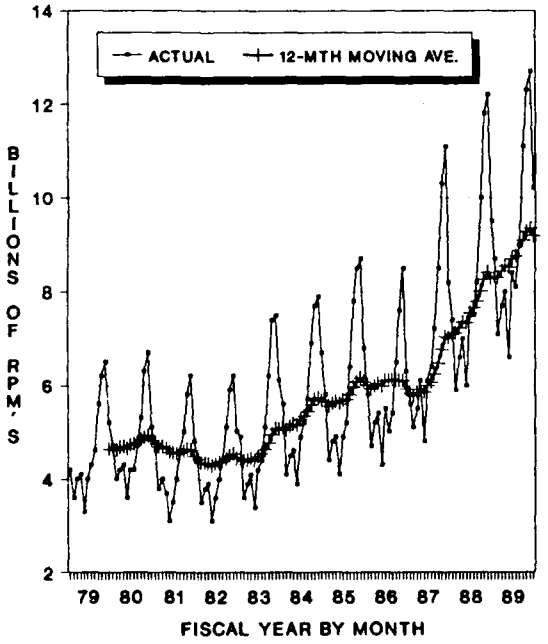
AVAILABLE SEAT MILES



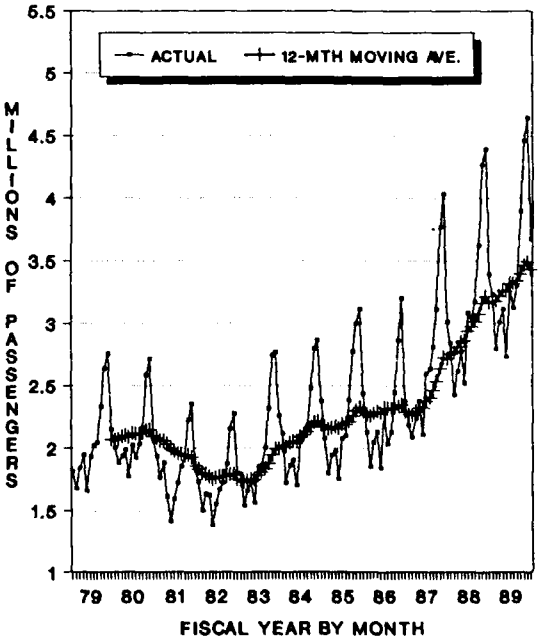
AIRCRAFT DEPARTURES



REVENUE PASSENGER MILES



PASSENGER ENPLANEMENTS



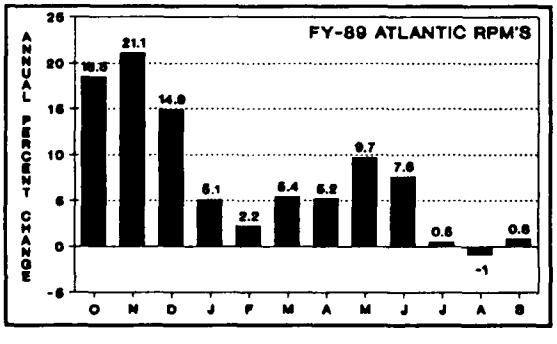
international schedules. International seat miles (151.1 billion) increased by 11.6 percent in fiscal year 1989, this following closely on the heels of a 15.3 percent increase in 1988. The strike at Eastern Air Lines, which accounted for 4.3 percent of international capacity in January 1989, is thought to have had only minimal impact (less than 1.0 percent) on total international capacity in fiscal year 1989. However, the impact on Latin American capacity was quite substantial.

Despite the relatively large increases in international capacity over the past several years, international load factors have remained at consistently high levels, averaging 66.6 percent in fiscal year 1989, only 0.3 points below the record high load factor of 66.9 percent set in 1988.

Historical (1980-1989) traffic (RPM's and enplanements), capacity and load factors for the three international travel regions--Atlantic, Latin America and Pacific--may be found in Appendix C, beginning on page 229.

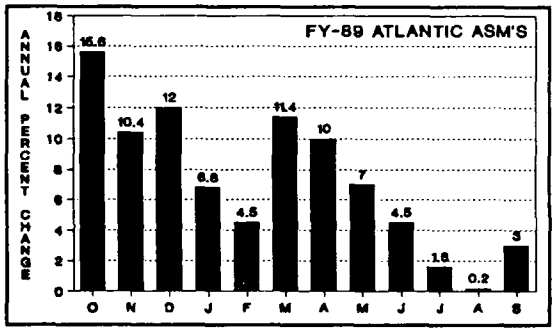
Atlantic Routes

After registering RPM and enplanement increases averaging 19.0 and 17.8 percent, respectively, in fiscal years 1987 and 1988, traffic demand on transatlantic routes slowed somewhat in fiscal year 1989. Revenue passenger miles



(49.1 billion) increased by 6.5 percent, and the number of passenger enplanements (15.0 million) increased by only 2.9 percent. Some of the slowdown in passenger demand occurred as a reaction to the terrorist bombing of Pan American flight 103. Passengers, both United States and foreign citizens, appeared to avoid flying on Pan American, in particular, and U.S. flag carriers, in general, for several months following the terrorist incident. In the three months immediately following the bombing (January-March), Pan American's passenger enplanements declined by 21.7 percent compared to the same 1988 period.

In addition, capacity on the Atlantic routes expanded at a slower pace in fiscal year 1989, with ASM's (74.8 billion) increasing by only 6.6 percent. In fact, during the 4-month peak summer travel period (June - September),



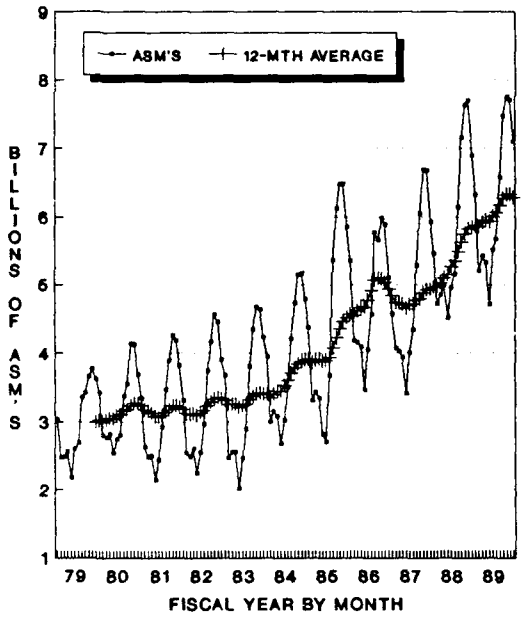
transatlantic capacity was up only 2.3 percent over the same 1988 period.

The number of departures between the United States and Atlantic route destinations, however, continued to outpace the growth in ASM's, increasing by 7.5 percent in fiscal year 1989. The larger percentage increase in departures relative to seat miles reflects a continuation of the trend (begun in 1986) toward the increased use of widebody twins (B-767 and A-310 aircraft) on transatlantic routes.

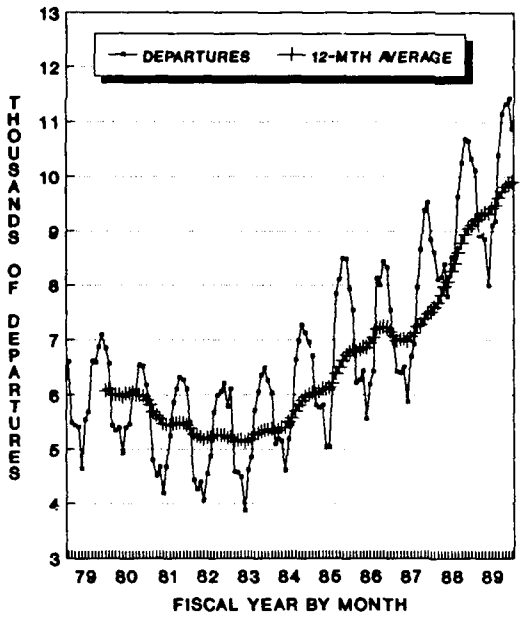
U.S. air carriers achieved an annual load factor of 65.7 percent on the Atlantic routes in fiscal year 1989, only 0.1 point below the 1988 load factor. It was, however, considerably below the record 69.0 percent load factor recorded in 1984.

U.S. AIR CARRIER CAPACITY AND TRAFFIC TRENDS
INTERNATIONAL OPERATIONS - ATLANTIC ROUTES

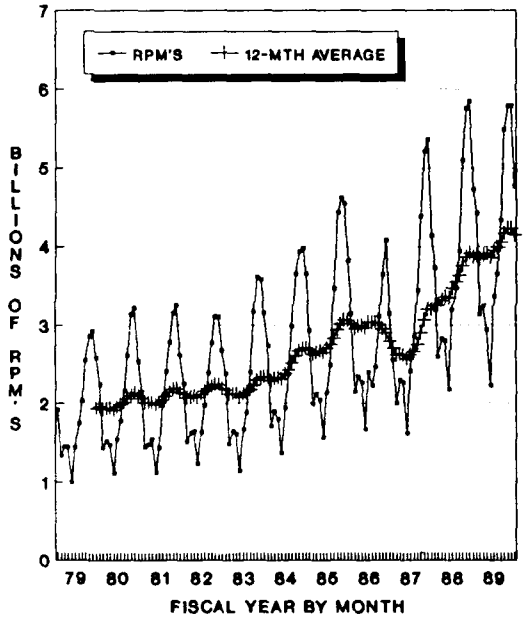
AVAILABLE SEAT MILES



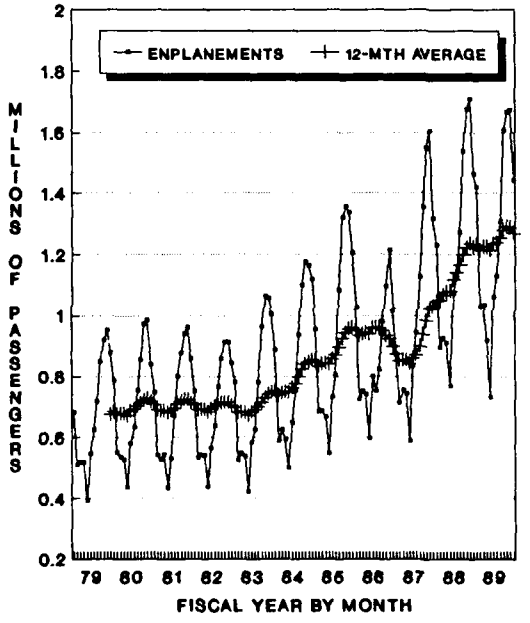
AIRCRAFT DEPARTURES



REVENUE PASSENGER MILES



PASSENGER ENPLANEMENTS

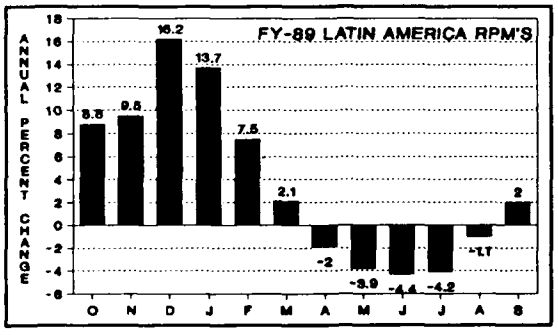


Latin American Routes

Traffic demand to Latin American destinations (South America, Central America, Mexico, and the Caribbean) weakened considerably in fiscal year 1989. However, the slowdown was due, in large part, to the Eastern Air Lines' strike.

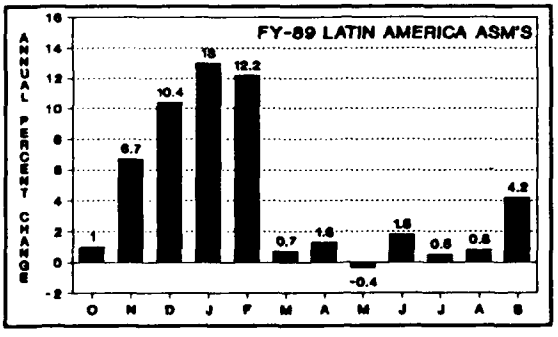
During the 3 years prior to 1989, Latin American RPM's increased by 47.2 percent and passenger enplanements by 45.4 percent, an average annual increase of 13.8 and 13.3 percent, respectively. In fiscal year 1989, however, RPM's (14.7 billion) and enplanements (11.8 million) increased by only 3.3 and 2.6 percent, respectively.

The impact of the Eastern strike is evident from the fact that during the 5-month period immediately preceding the strike, RPM's and enplanements were



up 11.3 and 13.0 percent, respectively, over the same 1988 period. Over the last 7 months of the year, however, Latin American RPM's and enplanements declined by 1.7 and 3.7 percent, respectively.

Latin American ASM's (23.7 billion)



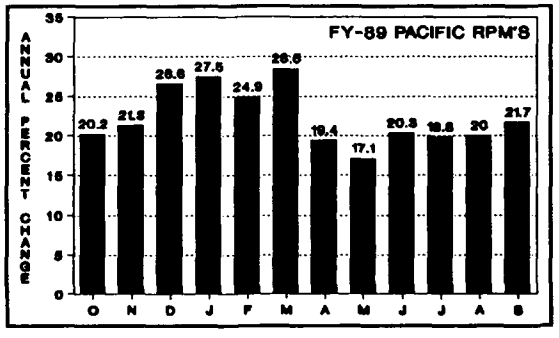
grew by 4.3 percent in fiscal year 1989. However, capacity on Latin America routes in 1989 was significantly affected by the strike at Eastern Air Lines, which accounted for 22.5 percent of Latin American capacity in January 1989. The loss in capacity (ASM's) due to the strike is estimated to be 5.0 percent, although it could be considerably less, the exact loss depending on the competitive redeployment of capacity by the carriers on those routes not governed by bilateral agreements.

The number of aircraft departures between the United States and Latin American destinations increased by 7.9 percent in 1989. The higher growth in departures relative to ASM's reflects the greater use of smaller aircraft on these routes.

Latin American load factors declined slightly in 1989, averaging 61.9 percent. This represents a decline of 0.6 points from the 1988 load factor.

Pacific Routes

The Pacific area continues to be the fastest expanding of the three international regions. Passenger traffic to Pacific destinations increased for the eighth consecutive year in 1989. Over this eight-year period, RPM's and pas-

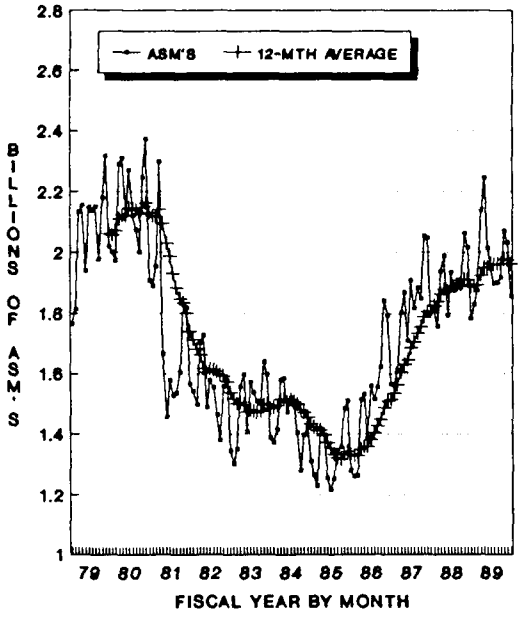


senger enplanements have almost tripled, growing at average annual rates of 14.3 and 14.7 percent, respectively. Over the past 3 years, however, passenger demand has increased at an even faster rate, averaging more than

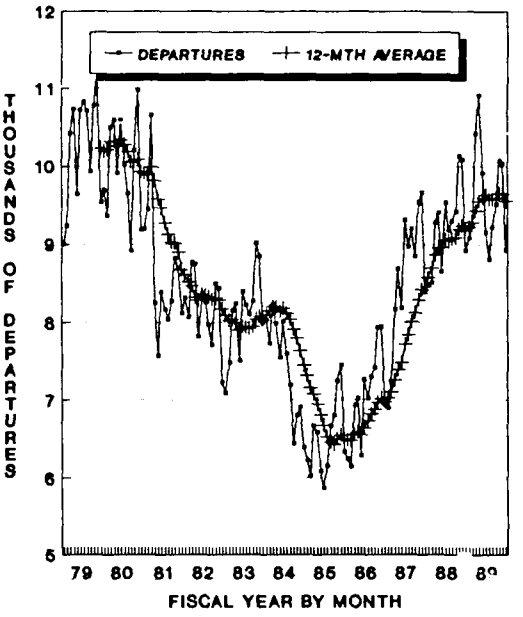
U.S. AIR CARRIER CAPACITY AND TRAFFIC TRENDS

INTERNATIONAL OPERATIONS - LATIN AMERICA ROUTES

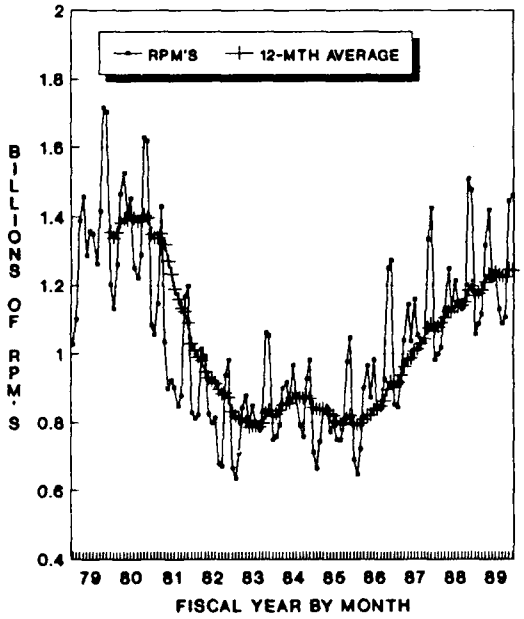
AVAILABLE SEAT MILES



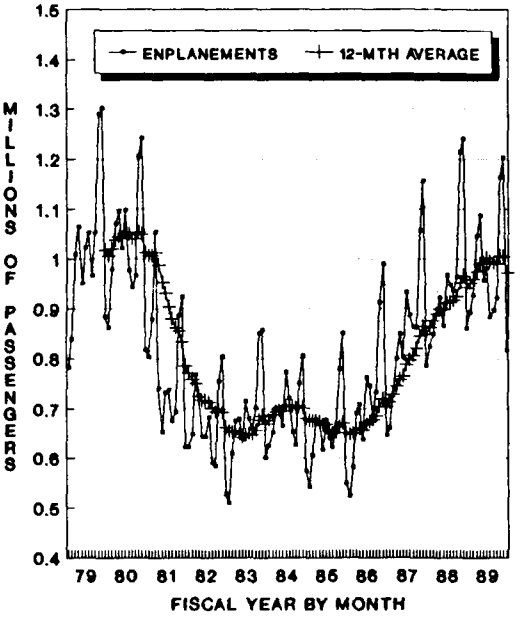
AIRCRAFT DEPARTURES



REVENUE PASSENGER MILES

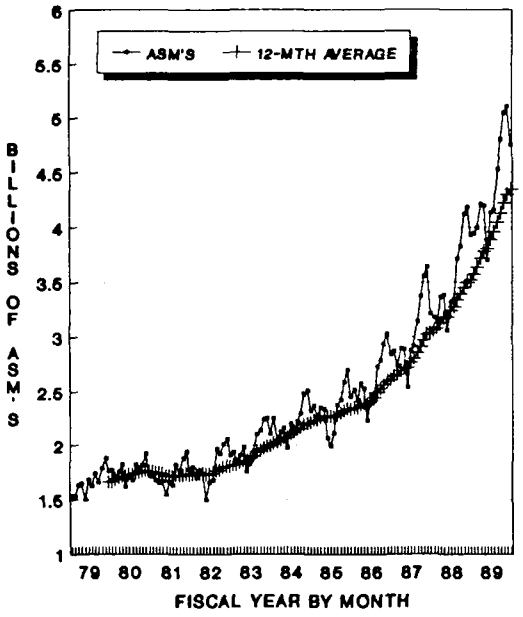


PASSENGER ENPLANEMENTS

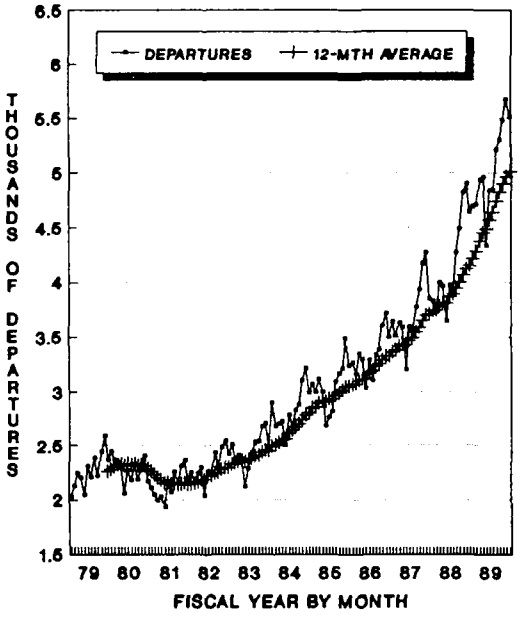


U.S. AIR CARRIER CAPACITY AND TRAFFIC TRENDS
INTERNATIONAL OPERATIONS - PACIFIC ROUTES

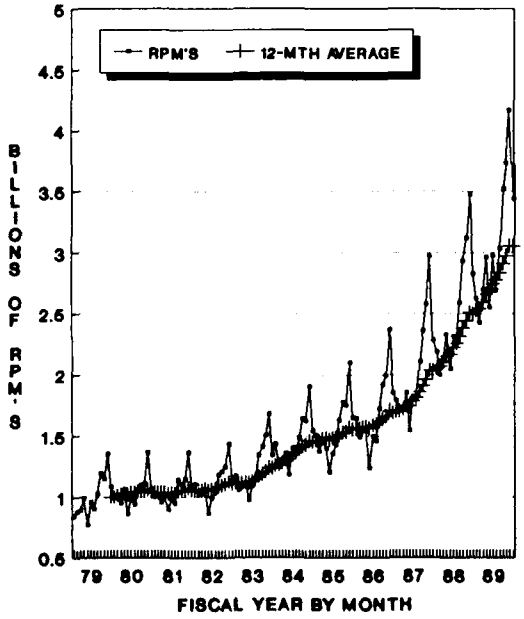
AVAILABLE SEAT MILES



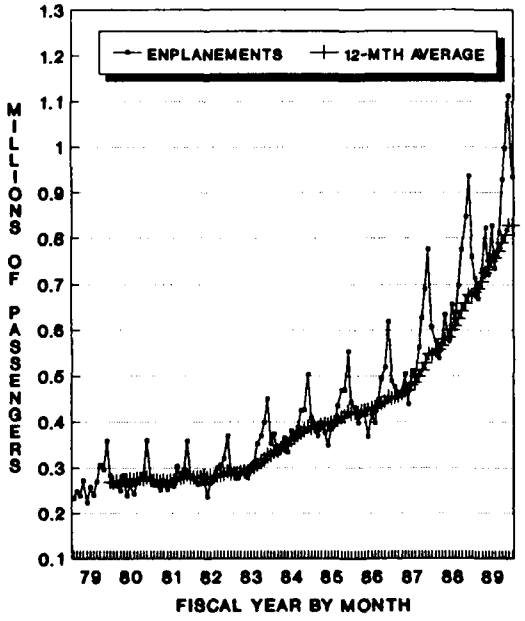
AIRCRAFT DEPARTURES



REVENUE PASSENGER MILES

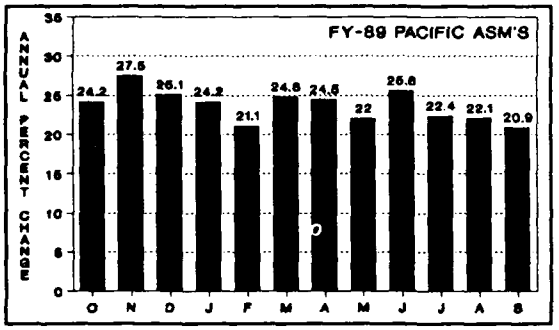


PASSENGER ENPLANEMENTS



22.0 percent annually. In fiscal year 1989, Pacific route passenger miles (36.8 billion) were up 22.0 percent and enplanements (10.0 million) grew by 22.3 percent.

Capacity on transpacific routes has increased by an average of 18.6 percent over the past 3 years. In fiscal year 1989, Pacific ASM's (52.6 billion) grew



by 23.6 percent. The number of aircraft departures between the United States and Pacific destinations grew by 13.0 percent in 1989. This slower growth in departures relative to ASM's reflects the increased utilization of larger capacity aircraft on the transpacific routes.

Despite the large increases in capacity over the past several years, load factors on transpacific routes remain at relatively high levels, 70.1 percent in 1989. This was only slightly below the record high load factor of 71.0 percent achieved in 1988.

NONSCHEDULED TRAFFIC AND CAPACITY

The number of nonscheduled (charter) passengers flying on U.S. commercial air carriers increased by 10.0 percent in fiscal year 1989, to a total of 9.2 million. Domestic enplanements (4.8 million) increased by 6.1 percent while international enplanements (4.5 million) were up by 14.5 percent. Nonscheduled RPM's increased by only 1.8 percent in fiscal year 1989, to a total of 14.3 billion. Domestic passenger miles (5.0 billion) were up 1.3 percent and international passenger miles (9.3 billion) grew by 3.2 percent. Nonscheduled carriers continued to lose share in international markets during fiscal year 1989. This was due, in large part, to the increased number of international gateways and diversity of geographic locations now served by the scheduled air carriers.

Nonscheduled capacity (18.7 billion ASM's) increased by 5.4 percent in fiscal year 1989. Domestic seat miles (6.7 billion) were up only 1.1 percent while international seat miles (11.9 billion) grew by 8.0 percent.

Nonscheduled load factors averaged 76.7 percent in fiscal year 1989, a decline of 2.7 points from 1988. Domestic load factors averaged 74.6 percent (up 0.1 point) while international load factors averaged 77.8 percent (down 4.6 points).

Historical (1980-1989) nonscheduled traffic (RPM's and enplanements), capacity and load factor statistics may be found in Appendix D, beginning on page 231.

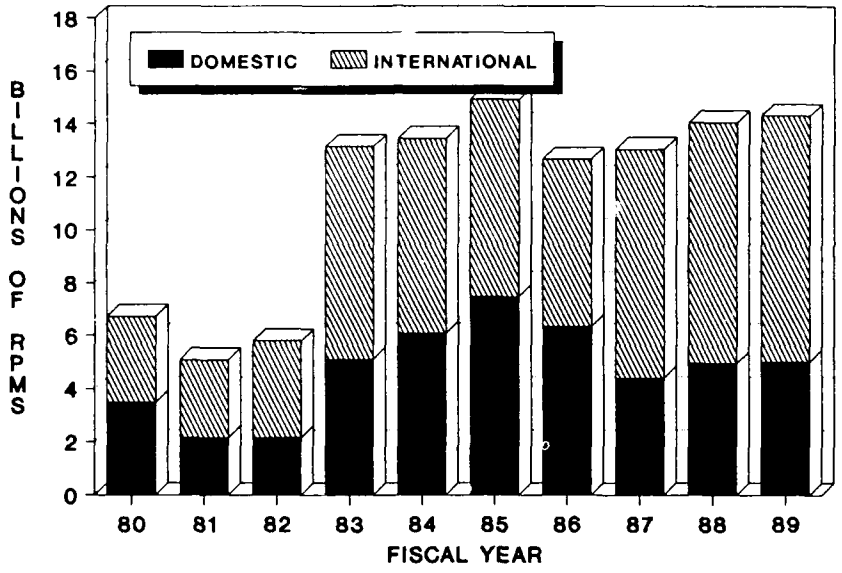
AIR CARGO TRAFFIC

Air cargo revenue ton miles (RTM's) flown by U.S. air carriers reporting on RSPA Form 41 totaled 16.1 billion in fiscal year 1989, an increase of 12.6 percent over statistics published for 1988. This included an increase of 14.0 percent in system freight/express RTM's (14.1 billion) and an increase of 3.4 percent in mail RTM's (2.0 billion).

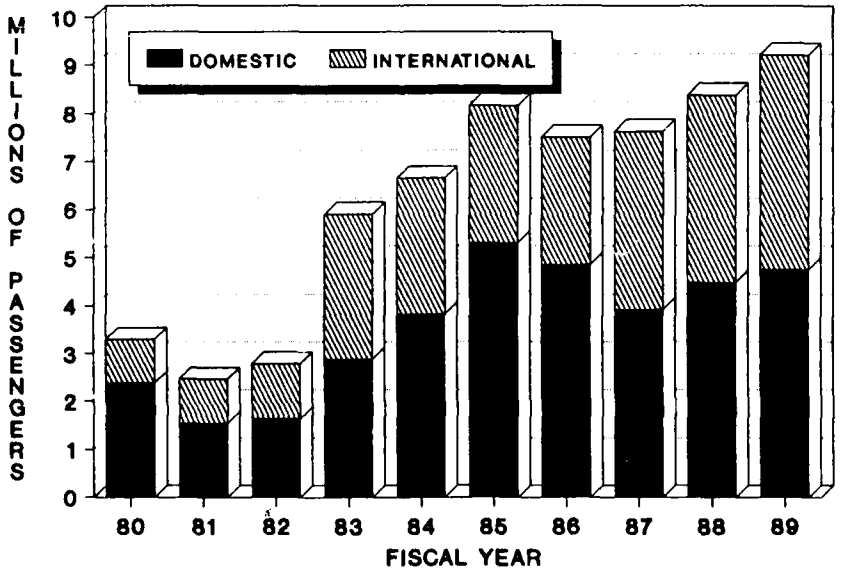
The large increase shown in freight/express RTM's in 1989 is somewhat misleading. A large part of the growth resulted not from increased cargo business, but from the fact that United Parcel cargo statistics were included for the first time in the RSPA data base. Reporting began in October 1988. Based on the reported data, domestic

U.S. COMMERCIAL AIR CARRIERS
NONSCHEDULED TRAFFIC

REVENUE PASSENGER MILES

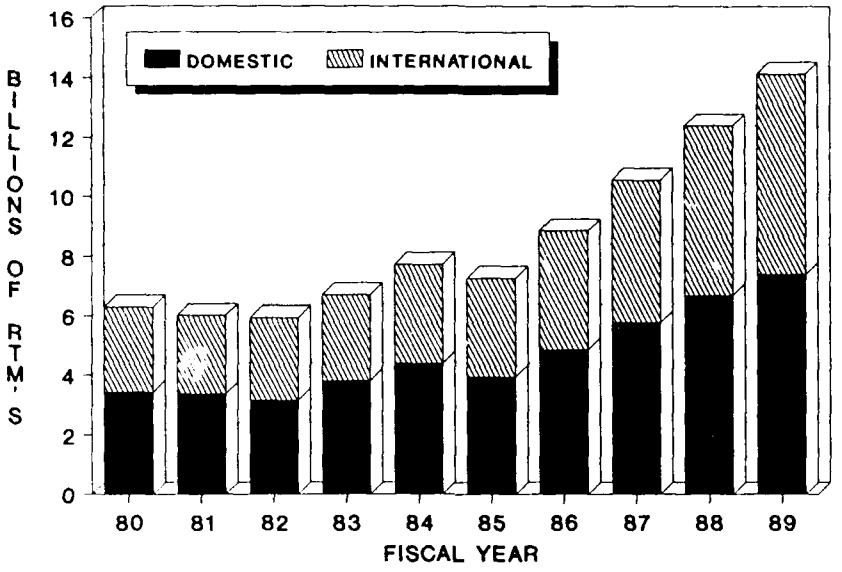


PASSENGER ENPLANEMENTS

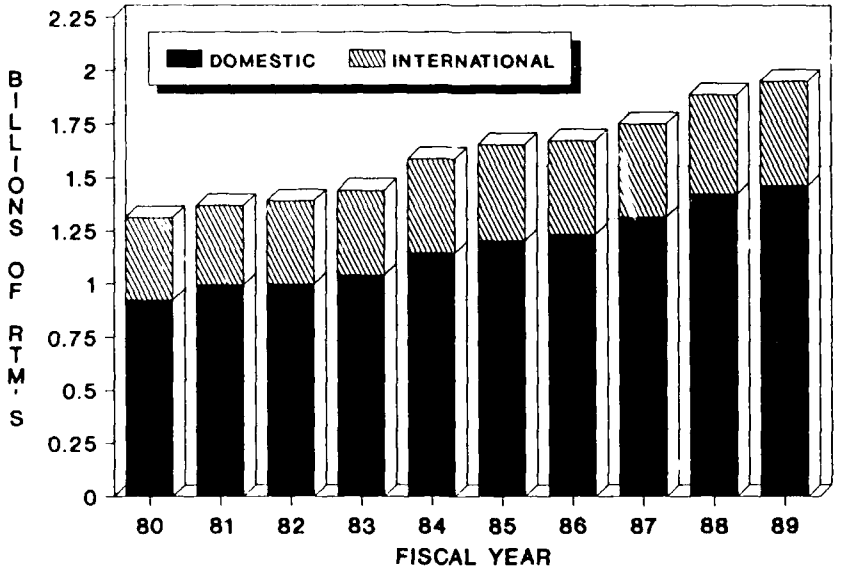


U.S. COMMERCIAL AIR CARRIERS
AIR CARGO REVENUE TON MILES

FREIGHT/EXPRESS TON MILES



MAIL TON MILES



freight\express RTM's (7.4 billion) increased by 10.4 percent in fiscal year 1989 while international freight/express RPM's (6.7 billion) grew by 18.2 percent. If the United Parcel cargo traffic were removed from the 1989 data base, domestic freight/express RTM's would have shown a decline of 8.9 percent and international freight/express RTM growth would have been 17.0 percent. On a systemwide basis, U.S. air carrier freight/express RTM's would have shown an increase of only 3.2 percent, compared to the reported 14.0 percent increase.

Domestic mail RTM's (1.5 billion) increased by 2.7 percent and international mail RTM's (0.5 billion) grew by 5.4 percent in fiscal year 1989.

Historical (1980-1989) domestic and international air cargo statistics may be found in Appendix E, beginning on page 233.

FORECAST ASSUMPTIONS

The baseline forecasts of commercial air carrier traffic and activity over the next 12-year period (1990 to 2001) anticipate that the industry will continue to be affected by the deregulation process for at least the next several years. Although it is impossible to foresee all the changes that will occur, it is highly plausible that the merger/consolidation phase begun in fiscal year 1986 could continue well into the 1990's. It is also probable that one or more of the established larger airlines, including the few remaining post-deregulation low-cost, low-fare carriers, could cease to exist, either through merger or attrition. It is also possible, although highly unlikely, that the industry could witness the emergence of new low-cost airlines seeking to establish a market niche for themselves. This forecast assumes a continuation of the merger/consolidation phase.

The industry is likely to continue to experiment with methods to stimulate travel markets, either through the use of innovative discount fares and/or other travel incentives. In the short term, commercial air carriers can also be expected to continue to expand their present hub systems and to develop new secondary hubs at medium and small airports. This continued expansion, however, could result in increased delays and capacity problems at many of the large U.S. air carrier airports. Additional delay and capacity problems could, in turn, significantly constrain the growth of air carrier traffic in the future.

JET FUEL PRICES

In fiscal year 1989, U.S. commercial air carriers paid an average price of $0.564 per gallon for jet fuel. This represented a nominal increase of only 0.4 percent and a decline of 4.3 percent in real terms (1980-82 dollars). However, the average price, in this case, is somewhat misleading. In fact, jet fuel prices actually increased from $0.508 per gallon in September 1988 to $0.601 per gallon in September 1989, an increase of 18.3 percent.

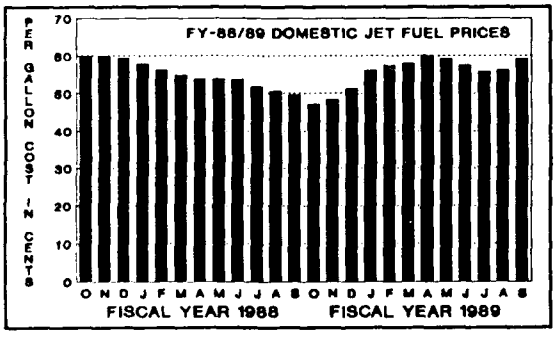
Declining fuel prices certainly have a positive impact on the profitability of U.S. airlines. When jet fuel prices reached their peak during the third quarter of 1981, fuel costs accounted for 31.2 percent of U.S. air carrier operating costs. In the third quarter (April - June) of fiscal year 1989, jet fuel costs accounted for only 13.7 percent of total operating costs. Although jet fuel prices are forecast to increase only moderately during the early years of the forecast period, the long-term trend is for significantly higher jet fuel prices. Nevertheless, jet fuel prices are not expected to return to the peak prices of 1981 during the 12-year forecast period.

Hence, barring any unforeseen major fuel crisis or major new oil discoveries, jet fuel costs as a percent of total operating costs is expected to increase only gradually over the forecast period.

System jet fuel prices are projected to increase by 3.2 percent in 1990 and by 1.6 percent in 1991, then increase by an average of 5.7 percent over the remaining 10 years of the forecast period. System jet fuel prices are forecast to reach $1.028 per gallon by the year 2001, an average annual growth rate of 5.1 percent over the 12-year forecast period. In real terms, system jet fuel prices are expected to increase at an annual rate of 0.5 percent, from $0.465 per gallon in 1989 to $0.497 per gallon by the year 2001.

Domestic Jet Fuel Prices

In fiscal year 1989, U.S. airlines paid an average of $0.554 per gallon for domestic jet fuel, only 0.5 percent above the average price paid in 1988. On a month over month basis, however, domestic fuel prices increased by 19.6 percent between September 1988 and



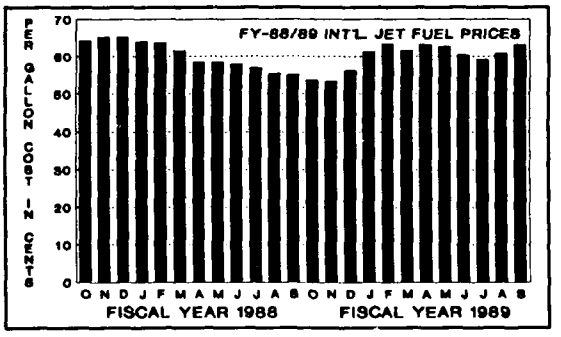
September 1989 (from $0.495 to $0.592 per gallon), thus continuing the roller coaster ride that fuel prices have exhibited since the first world-wide energy crisis in 1973.

Starting from a base of just over $0.115 cents a gallon in 1973, the price of jet fuel, aided by two world-wide energy crises, rose to a peak of $1.052 in May 1981. Over the following five and one-half years (June 1981 to November 1986), the price of domestic jet fuel declined 60.0 percent to $0.422 per gallon. In December 1986, domestic fuel prices began to move upward once again, reaching $0.601 per gallon (up 42.4 percent) in November 1987, before falling to $0.472 per gallon (down 21.5 percent) in October 1988. Since November 1988, however, the trend has been generally upward.

Domestic fuel prices are forecast to increase by 5.1 percent annually over the 12-year forecast period, 0.5 percent in real terms. However, even with such increases, domestic fuel prices are not expected to exceed $1.00 per gallon until fiscal year 2001. The per gallon price of jet fuel is projected to increase to $0.572 in 1990 and to $0.581 in 1991, reaching $1.01 in the year 2001.

International Jet Fuel Prices

International jet fuel prices averaged $0.599 per gallon in fiscal year 1989, a decline of 0.5 percent from the average price paid in 1988. However, on a month over month basis, jet fuel prices increased from $0.55 per gallon in September 1988 to $0.631 per gallon in

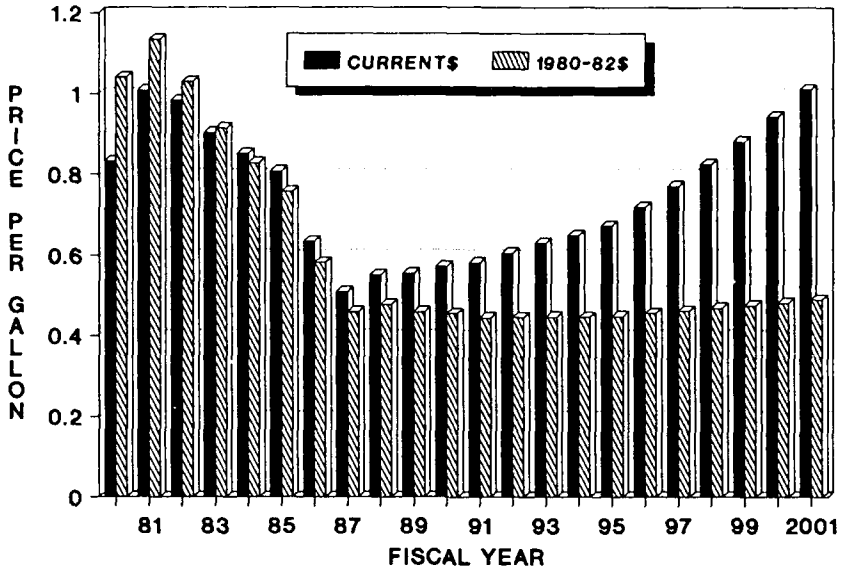


September 1989, a 14.8 percent increase.

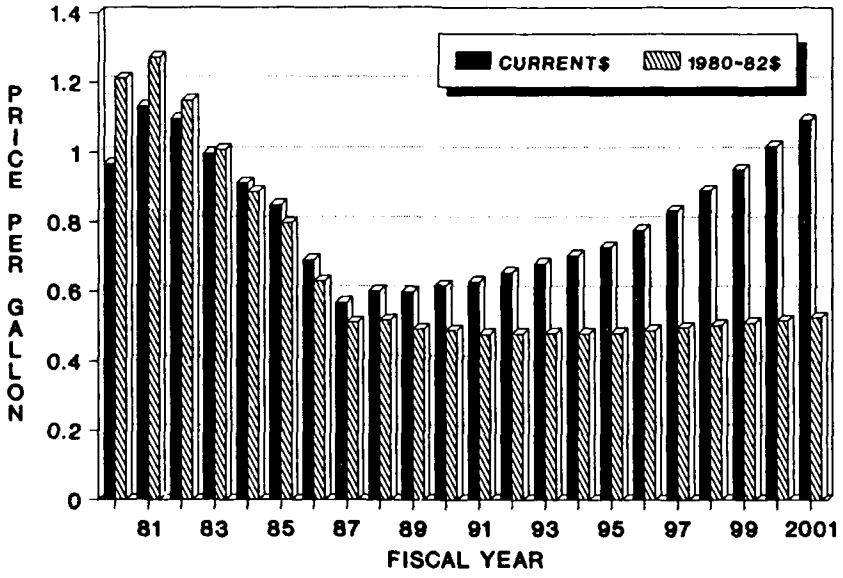
International jet fuel prices peaked at $1.168 per gallon in May 1981. Over the following 66 months (June 1981 to November 1986) the price of interna-

U.S. COMMERCIAL AIR CARRIERS
JET FUEL PRICES

DOMESTIC OPERATIONS



INTERNATIONAL OPERATIONS



tional jet fuel declined 57.2 percent to $0.499 per gallon. Starting in December 1986, however, international jet fuel prices edged upward again, peaking at $0.652 per gallon in December 1987 before declining to $0.534 per gallon in November 1988. Since then, the trend has been generally upward.

International jet fuel prices are not expected to exceed $1.00 per gallon until fiscal year 2000. The price of international jet fuel is projected to increase to $0.618 per gallon in 1990 and to $0.628 per gallon in 1991, reaching $1.092 per gallon in fiscal year 2001.

PASSENGER YIELDS

Between 1984 and 1987, the cost of air travel (as measured by passenger yield, i.e., revenue per passenger mile) on U.S. airlines declined by 11.1 percent in nominal dollars and by 17.9 percent in real dollars (1980-82 base). However, over the past two years, the per mile cost of air travel has increased by 13.7 percent, from 10.93 cents in 1987 to 12.43 cents in 1989. In real dollars, passenger yields increased by 4.4 percent, from 9.83 cents to 10.26 cents over the same time period.

There are at least three factors which have the potential to be disruptive of the short-term fare policy of U.S. air carriers. These factors are (1) the uncertain short-term economic outlook, (2) the recent bankruptcy proceedings by several airlines, and (3) the large numbers of aircraft scheduled to be delivered to U.S. airlines over the next several years. Despite the above, this year's forecast assumes that there will be no major fare wars to stimulate traffic demand.

This is not meant to imply that bankrupt or financially weak carriers will not resort to uneconomic deep discounted fares to recover lost passenger traffic and/or maintain cash flow or that even the healthiest of carriers will not resort to deep discounts to fill empty seats. Rather, the forecast assumes that the industry has achieved a certain maturity or sophistication with regard to fare policy and, is, therefore, less likely to resort to the destructive price competition so prevalent during previous periods of slower growth. "Yield management" will be expected to play an even bigger role in allocating the number of discount seats available on an individual flight basis, matching uneconomic discount fares only in those markets where necessary to meet competition.

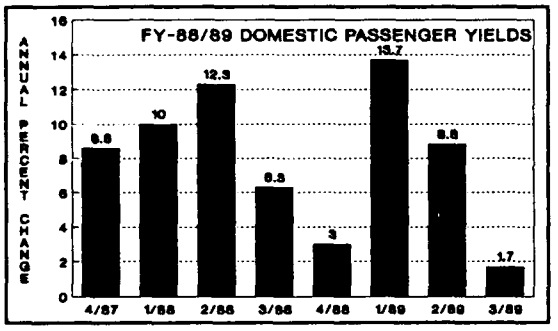
The forecast also assumes that there will be sufficient pressure from competition and other market forces, including the possible threat of legislative initiatives, to keep fare increases to a minimum over the next several years. However, the industry merger/consolidation phase is expected to continue over the next several years and this could lead to greater concentration among a smaller number of large carriers. Therefore, over the longer term, the forecast assumes that the surviving carriers will opt for higher profits and higher fares at the expense of slower traffic growth.

Passenger yields are forecast to decline to 12.31 cents (down 0.9 percent) in fiscal year 1990, then increase to 12.60 cents (up 2.3 percent) in 1991 and to 13.10 cents (up 3.2 percent) in 1992. Over the 12-year forecast period, system yields are expected to increase at an average annual rate of 3.7 percent, reaching 19.24 cents in the year 2001.

Real system yields are projected to decline in each of the next two years, to 9.77 cents (down 4.8 percent) in 1990 and to 9.60 cents (down 1.7 percent) in 1991. Over the next 12 years, real yields are expected to decline by almost 0.8 percent annually, reaching 9.28 cents in 2001.

Domestic Passenger Yields

Domestic passenger yields, after declining on a year-over-year basis for 10 consecutive quarters (fourth quarter 1984 to first quarter 1987), have now increased for ten successive quarters.



As a result, domestic passenger yields have increased from 11.20 cents in 1987 to 12.23 cents in 1988 (up 9.2 percent) and to 13.05 cents in 1989 (up 6.7 percent). In real dollars, domestic passenger yields increased to 10.57 cents (up 4.9 percent) in 1988 and to 10.77 cents (up 1.9 percent) in 1989.

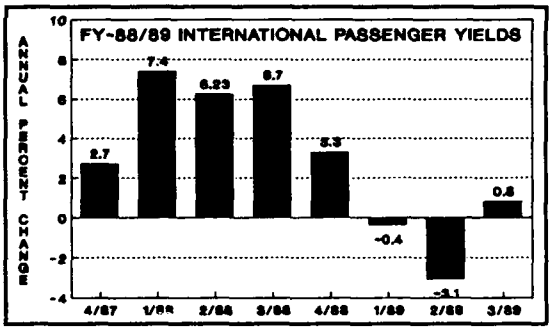
Since the end of fiscal year 1988, U.S. airlines have implemented a number of across-the-board fare increases and have also attempted to restrict the use of discount fares by business travelers by restructuring discounts (i.e., more restrictions and longer advance purchase requirements). Only in the fourth quarter (July - September) of fiscal year 1989, in the light of declining traffic, did the more restrictive fare policies give way to "gimmick" type promotions (e.g., children travel free, etc.) Despite such gimmicks, domestic yields still showed a year-over-year increase (up 1.7 percent) during the quarter.

Domestic yields are expected to remain at the current level (12.25 cents in fourth quarter of fiscal year 1989) for the early part of 1990 and increase only moderately over the next several years. Domestic passenger yields are forecast to decline to 12.95 cents (down 0.8 percent) in 1990 and then increase to 13.30 cents (up 2.7 percent) in 1991 and to 13.75 cents (up 3.4 percent) in 1992.

Somewhat larger increases are projected over the latter half of the forecast period, with increases expected to average 3.9 percent annually over the 12-year forecast period. In fiscal year 2001, domestic yields are forecast to average 20.73 cents. Real domestic yields are forecast to decline to 10.01 cents in 2001, an average annual rate of decline of 0.6 percent.

International Passenger Yields

International passenger yields have increased, albeit gradually, in all but two years (1984 and 1985) since 1978. Over the last 4 years, international yields have increased by 10.9 percent (up 0.1 percent in 1989), from 9.34 cents in 1985 to 10.36 cents

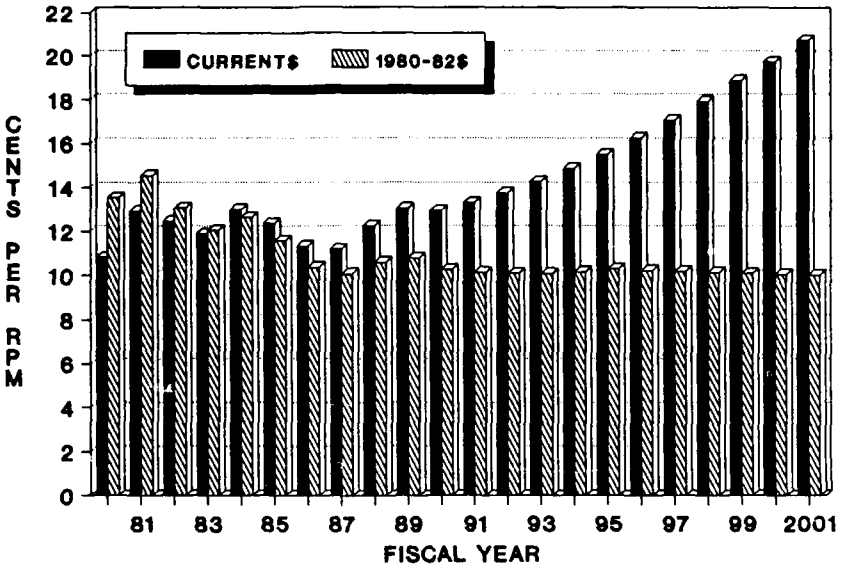


in fiscal year 1989. In real terms, international yields declined by 4.4 percent in fiscal year 1989, from 8.95 cents to 8.55 cents.

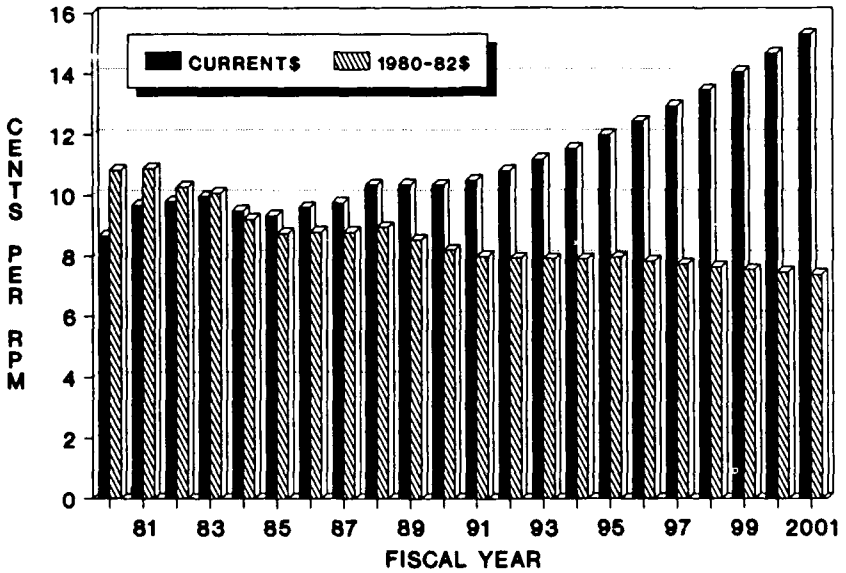
International yields are projected to decline to 10.35 cents (down 0.1 percent) in 1990 and then increase to 10.50 cents (up 1.4 percent) in 1991 and to 10.80 cents (up 2.9 percent) in 1992. Over the 12-year forecast period, international yields are expected to increase at an annual rate of 3.3 percent, reaching 15.31 cents by the year 2001. Real international passenger yields are forecast to decline to 8.21 cents (down 4.0 percent) in

U.S. COMMERCIAL AIR CARRIERS
PASSENGER YIELDS

DOMESTIC OPERATIONS



INTERNATIONAL OPERATIONS



1990 and to 8.00 cents (down 2.5 percent) in 1991. Over the 12-year forecast period, real international yields are expected to decline 1.2 percent annually, reaching 7.39 cents in the year 2001.

Atlantic Routes

Passenger yields on transatlantic routes averaged 8.97 cents in fiscal year 1989, 3.7 percent below the 1988 fare level. In real terms, transatlantic yields averaged 7.40 cents in 1989, a decline of 8.0 percent. Passenger yields on the Atlantic routes are projected to decline to 8.93 cents (down 0.4 percent) in fiscal year 1990. In real terms, yields are expected to decline to 7.08 cents (down 4.3 percent). Transatlantic route yields are forecast to reach 13.25 cents by the year 2001, an average annual increase of 3.3 percent. However, real Atlantic route yields are expected to decline to 6.40 cents by the year 2001, an average annual rate of decline of 1.2 percent.

Latin American Routes

Passenger yields on the Latin American routes increased to 11.59 cents (up 1.1 percent) in fiscal year 1989. In real terms, Latin American passenger yields declined 2.5 percent in 1989, to 9.56 cents. Over the next 12-year period, passenger yields are forecast to increase at an annual rate of 3.6 percent, averaging 17.75 cents in the year 2001. Yields are projected to decline by 0.9 percent annually in real dollars, reaching 8.57 cents in fiscal year 2001.

Pacific Routes

Passenger yields on transpacific routes increased to 11.74 cents (up 2.4 percent) in fiscal year 1989. In real terms, transpacific yields declined by 2.3 percent in 1989, to 9.69 cents. Pacific yields are expected to decline over the next two years, to 11.51 cents (down 2.0 percent) in 1990 and to 11.45 cents (down 0.5 percent) in 1991. However, transpacific passenger yields are projected to increase by 2.8 percent annually over the 12-year forecast period, reaching 16.40 cents in fiscal year 2001. In real dollars, passenger yields are forecast to decline to 7.92 cents in the year 2001, a 1.7 percent average annual rate of decline.

One of the main factors responsible for the decline in transpacific nominal yields in 1990 and 1991, as well as for the relatively large declines in real yields over the 12-year forecast period, is the large increases in capacity that have been forecast for the transpacific routes. Since foreign flag carriers can be assumed to be contemplating similar or even larger increases in capacity, the competition for traffic in this region is expected to be fierce. Lower fares is one way to compete and fill seats.

PASSENGER TRIP LENGTH

The average system passenger trip length (948.4 miles), increased by almost 21 miles in fiscal year 1989. The average trip length is forecast to increase by approximately 7 miles annually over the 12-year forecast period, reaching 1,030 miles by the year 2001.

It should be noted, however, that there are likely to be large swings around the trend line. The movement in any one year will depend on the discount fare policies adopted by U.S. air carriers and by the mix of business/vacation and domestic/international travelers.

Domestic Passenger Trip Length

The domestic passenger trip length increased by only 4 miles in fiscal

year 1989. Over the past 4 years, however, the average domestic passenger trip length has increased by an average of almost 8 miles annually, growing from 758.6 miles in fiscal year 1985 to 790.2 miles in fiscal year 1989.

The projected economic slowdown in 1990 and the uncertain economic outlook over the next several years is expected to have a greater impact on the longer distance discretionary or vacation trips than on the shorter distance business trips. In addition, the forecast assumes a continuation in the expansion of the newer medium sized hubs whose trip lengths, on average, tend to be of shorter distance than trips from the more established large hub airports. As such, the average domestic trip length is forecast to increase by just 2 miles annually over the next several years, averaging just under 3 miles per year over the 12-year forecast period. The domestic passenger trip length is expected to reach an average of 822 miles by the year 2001.

International Passenger Trip Length

The average international passenger trip length (2,735.1 miles) increased by almost 91 miles in fiscal year 1989, this on top of a 58-mile increase in 1988. The increases over the past two years result, in large part, from two factors. First, the large growth in the longer haul transpacific markets tends to exert a disproportionate effect on the average international trip length. Second, the increase in the number of transatlantic gateways, and the resultant overflying of established gateways in both the U.S. and Europe has substantially increased the average transatlantic passenger trip length.

The international trip length is projected to increase to 2,766 miles (up 31 miles) in 1990 and to 2,786 miles (up 19 miles) in 1991. Over the entire 12-year forecast period, the international passenger trip length is forecast to increase by approximately 17 miles per year, reaching 2,934 miles in the year 2001. Much of the projected increase, especially over the next several years, results from the fact that travel demand between the United States and the longer distance Pacific destinations is expected to increase at a considerably faster rate than is travel to other international destinations.

Atlantic Routes

The average passenger trip length on the Atlantic routes (3,272 miles) has increased by 167 miles over the past two years and by 109 miles in fiscal year 1989 alone. The large increases are due, in large part, to the increased utilization of widebody twins on the transatlantic routes. These smaller capacity aircraft have allowed U.S. carriers to provide first-time service between interior U.S. airports and interior European airports, thereby overflying established international gateways, most notably New York and London area airports.

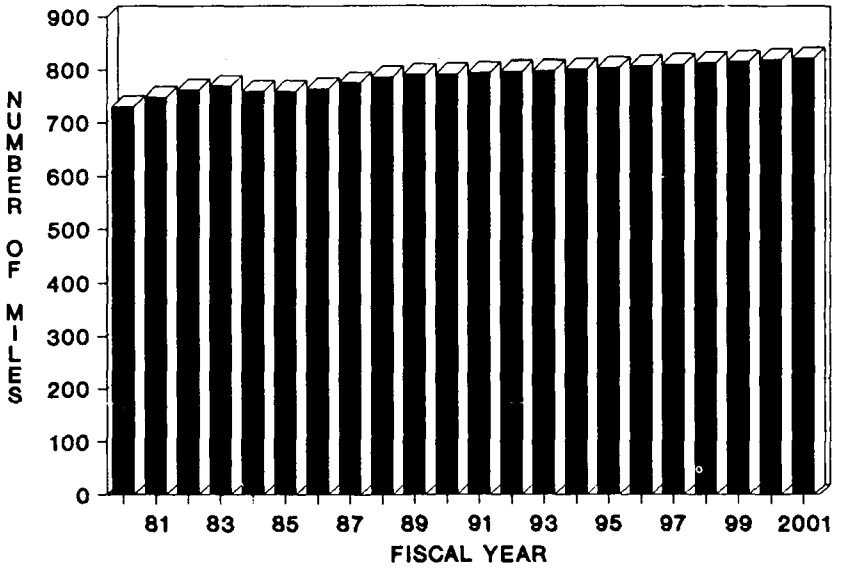
The Atlantic passenger trip length is forecast to increase to 3,209 miles (up 18 miles) in 1990. The transatlantic average passenger trip length is forecast to increase by over 7 miles annually over the 12-year forecast period reaching 3,360 miles by the year 2001.

Latin American Routes

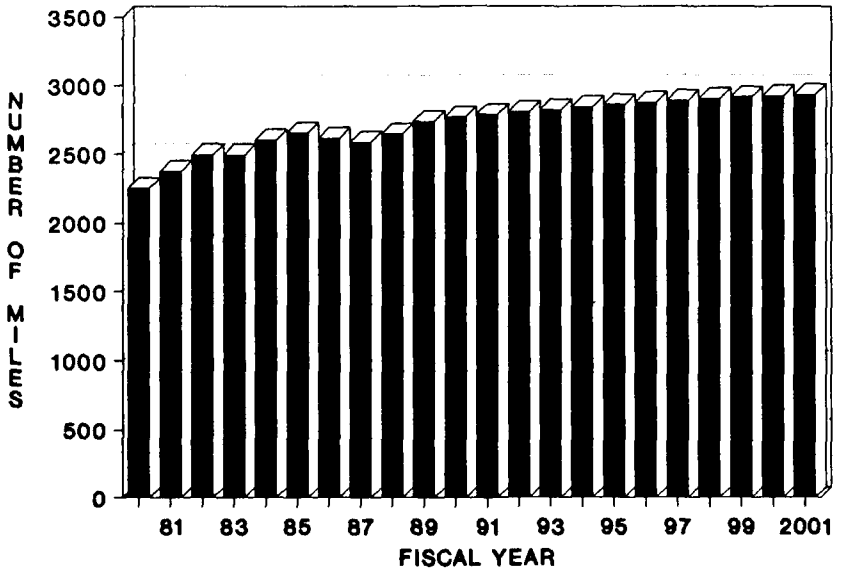
After declining by almost 58 miles between 1986 and 1988, the Latin American average passenger trip length (1246.8 miles) increased by 8 miles in fiscal year 1989. However, the Eastern Air Lines' strike has, in effect, distorted much of the 1989 Latin American data, thereby altering historical trends which were evident from analyses of previous years data.

U.S. COMMERCIAL AIR CARRIERS
PASSENGER TRIP LENGTH

DOMESTIC OPERATIONS



INTERNATIONAL OPERATIONS



The decreases in the passenger trip length in 1987 and 1988 were largely the result of increased service to many of the shorter distance Caribbean and Mexican destinations. An analysis of the pre-and post-strike data shows the same trends to be evident also in 1989. In the five months preceding the Eastern Air Lines' strike (October 1988 to February 1989), the average Latin American passenger trip length declined by 19 miles. Over the remainder of the fiscal year (March to September), however, the average passenger trip length increased by 24 miles. The large increase during the latter period was, in large part, due to the fact that Eastern Air Lines continued to operate its longer haul South American routes throughout most of the strike period, while, at the same time, paring much of its shorter haul Caribbean and Mexico service. Prior to the strike, Eastern's average trip length to Latin American destinations was approximately 1,100 miles. Since March, however, its average trip length has averaged between 1,400 and 1,800 miles.

The Latin American average passenger trip length is projected to increase to 1,250 miles (up almost 3 miles) in fiscal year 1990. This increase assumes that Eastern will maintain its limited, though longer haul, Latin American schedules for, at least, some portion of fiscal year 1990. However, the average trip length is expected to decline by 10 miles over the next two years, (averaging 1,240 miles in 1992), reflecting the continued expansion of service to the shorter haul Caribbean and Mexico destinations. The Latin American passenger trip length is, however, expected to increase by 17 miles over the 12-year forecast period, reaching 1,264 miles in fiscal year 2001.

Pacific Routes

The average passenger trip length on the Pacific routes (3,680.8 miles) has declined by almost 70 miles since 1986, by 10 miles in fiscal year 1989 alone. A large part of the decline is due to an increase in the number of transpacific gateways and the fact that a larger percentage of the trips now originate in Honolulu or on the West Coast.

The average passenger trip length for the transpacific routes is expected to decline by nearly 10 miles over the next 3 years, dropping to 3,671 miles in fiscal year 1992. Thereafter, the average trip length is forecast to increase by between 2 and 5 miles annually, reflecting increased service to points beyond Japan. The transpacific passenger trip length is forecast to reach 3,712 miles by the year 2001, an increase of almost 3 miles annually.

AVERAGE AIRCRAFT SIZE

Between 1978 and 1983, the average system seating capacity of aircraft utilized by U.S. commercial air carriers increased by almost 20 seats (from 147.2 to 167.1 seats). Since 1983, however, the average seating capacity of the U.S. fleet (168.7 seats in 1989) has grown by just under two seats. A number of factors are responsible for this lack of growth in the average seating capacity of the U.S. airline fleet, most notably, (1) deregulation, (2) declining fuel prices, (3) the continued expansion of hub-and-spoke route systems, and (4) the increased utilization of widebody twins on transatlantic routes.

Airport hubbing, with its greater emphasis on higher frequencies, has led to a large increase in the number of small narrowbody aircraft in the U.S. fleet. At the same time, declining fuel costs has allowed U.S. airlines to retain large numbers of the older, less fuel efficient, stage-2 aircraft (B-727, DC-9, BAC-111, F-28) in their fleets.

The uncertainty regarding the U.S. economy and its subsequent impact on passenger demand over the next several years could force some airlines to sell or ground a number of the smaller capacity stage-2 aircraft. This, added to the fact that the aircraft forecast to be delivered to the U.S. fleet are generally larger than the ones being replaced (the exception being the Fokker 100), should result in an increase in the average seating capacity of the air carrier fleet throughout the forecast period.

The forecast assumes that the average seating capacity of the U.S. commercial airline fleet will increase by two seats in each of the next several years and by an average of almost three seats per year over the 12-year forecast period. In the year 2001, U.S. air carrier aircraft are expected to have an average seating capacity of 202 seats.

Domestic Routes
Average Aircraft Size

Between 1978 and 1983, the average seating capacity of aircraft utilized in domestic passenger service increased by just over 17 seats, from 136.4 to 153.6 seats. Since 1983, however, the average seating capacity of domestic aircraft has actually declined by almost two seats, averaging 151.9 seats in fiscal year 1989. The continued expansion of the hub-and-spoke route systems and the retention of older stage-2 aircraft are two of the primary reasons for the decline in the average seating capacity of the domestic fleet since 1983.

The forecast assumes only a slight increase in the average seating capacity of domestic aircraft over the next 4 years, increasing to only 157 seats by fiscal year 1993. Thereafter, the average seating capacity of domestic aircraft is expected to increase between two and three seats annually throughout the remainder of the forecast period. Over the 12-year forecast period, the average seating capacity of aircraft utilized in domestic service is forecast to increase by 18 seats, averaging 180 seats in the year 2001.

International Routes
Average Aircraft Size

The average seating capacity of aircraft flown in international passenger service (275.8 seats) has declined by almost 16 seats since 1986, largely as a result of the increased utilization of the smaller B-767 and A-310 aircraft on transatlantic routes. This forecast assumes that this trend will continue for at least the next several years, but that the overall impact will be blunted somewhat by the expanded utilization of the larger seating capacity B-747-400 and MD-11 aircraft on the transpacific routes.

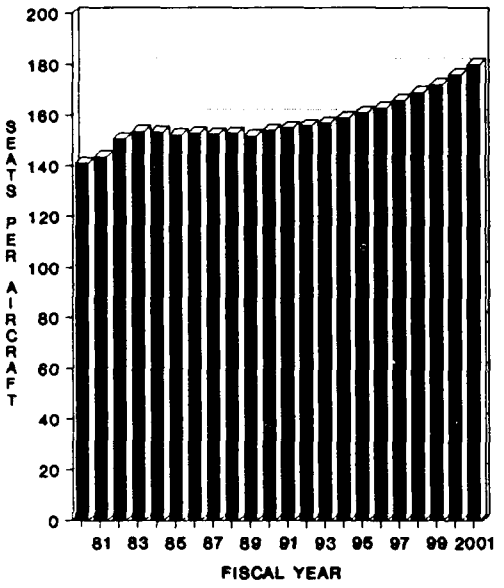
The average seating capacity of aircraft utilized in international passenger service is expected to increase by only one seat annually over the next 4 years, reaching 280 seats in fiscal year 1993. Thereafter, the seating capacity of international passenger aircraft are forecast to increase by an average of almost three seats annually throughout the remainder of the forecast period. In the year 2001, aircraft utilized in international passenger service are forecast to have an average seating capacity of 300 seats.

Atlantic Routes

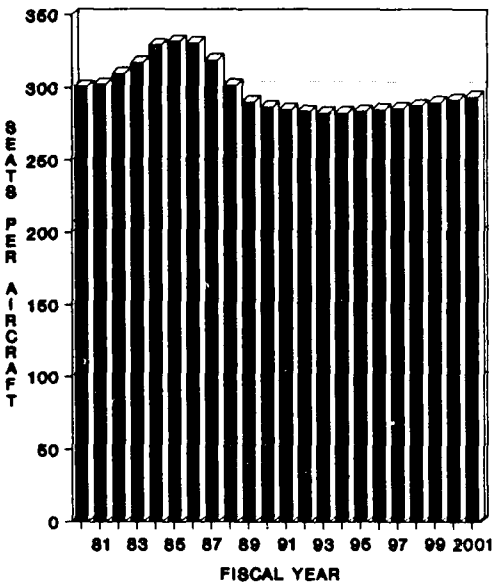
The increased use of widebody twins has reduced the average seating capacity of passenger aircraft on transatlantic routes (290.3 seats) by almost 40 seats during the past 3 years and by over 11 seats in fiscal year 1989 alone. The forecast assumes that this trend will continue for several additional years, but at a considerably slower pace than has been the experience over the past 3 years. This trend, however,

U.S. COMMERCIAL AIR CARRIERS
AVERAGE SEATS PER AIRCRAFT

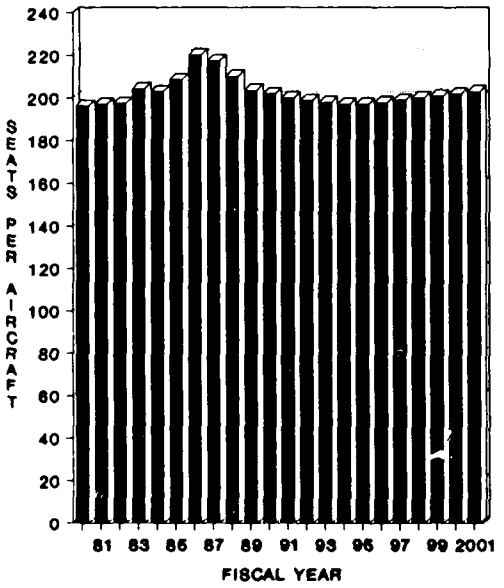
DOMESTIC ROUTES



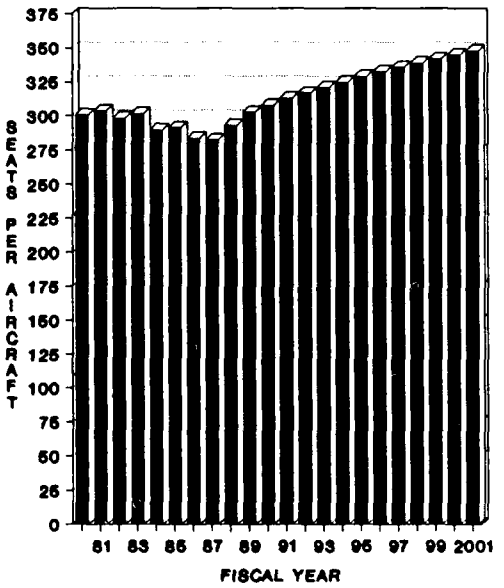
ATLANTIC ROUTES



LATIN AMERICAN ROUTES



PACIFIC ROUTES



cannot continue indefinitely. This is due to the congested airspace over much of Europe and the fact that all aircraft enroute to or from European destinations must fly through the same oceanic centers, even if they are overflying the congested airports.

The average seating capacity of passenger aircraft used on the transatlantic routes is forecast to decline by an additional seven seats over the next 4 years, averaging 283 seats in fiscal year 1993. Starting in 1995, however, the average seating capacity of transatlantic route aircraft is expected to increase by between one and two seats annually over the remainder of the forecast period. In the year 2001, passenger aircraft utilized on the transatlantic are forecast to average 294 seats, less than four seats above the 1989 seating capacity.

Latin American Routes

The average seating capacity of aircraft utilized on Latin American routes (203.6 seats) has declined by over 16 seats since 1986 and by almost seven seats in fiscal year 1989 alone. This forecast assumes that this downward trend will continue over the next 5 years, with the average aircraft size declining to 197 seats by 1994. Beginning in 1996, the number of seats is expected to increase by one seat annually over the remaining 6 years of the forecast period. In fiscal year 2001, the average seating capacity of an aircraft used in Latin American service is expected to average only 203 seats, nearly one seat less than the average seating capacity in 1989.

Pacific Routes

The average seating capacity of aircraft utilized on transpacific routes (302.9 seats) has increased by more than 20 seats during the past two years and by almost 10 seats in fiscal year 1989 alone. Because of the extensive re-equipment programs (B-747-400 and MD-11 aircraft) of carriers now operating on the transpacific routes, this forecast assumes that the average seating capacity of aircraft operating across the Pacific will increase by between four and five seats a year between 1989 and 1996 (reaching 333 seats in 1996), then increase by three seats per year over the remainder of the forecast period. The average seating capacity of an aircraft operating between the United States and Pacific destinations is projected to increase by 45 seats over the 12-year forecast period, reaching 348 seats by the year 2001.

It is possible that the smaller two-engine extended range aircraft (currently the B-767ER and A-310), now utilized extensively between the U.S. and Europe, may be approved for operation on transpacific routes. Based on discussions with representatives at both the Boeing Commercial Airplane Company and the Douglas Aircraft Company, it is felt that these particular aircraft could serve most transpacific markets from Honolulu by staying within the prescribed two hours of land at all times. However, this forecast has not assumed the introduction of these particular aircraft on the transpacific routes during the current 12-year forecast period.

PASSENGER LOAD FACTOR

In fiscal year 1989, U.S. scheduled air carriers recorded a systemwide load factor of 63.0 percent, 0.8 points higher than achieved in 1988 and only 0.2 points below the record high load factor of 63.2 percent achieved in 1979. However, the Eastern Air Lines' strike is largely responsible for the increased load factor in 1989. Had the strike not occurred, system load factors would have shown a decline in 1989.

Based on aircraft delivery schedules and projected capacity and traffic levels, the system load factor is expected to decline to 61.7 percent in 1990 and to stay below 62.0 percent through 1994. Thereafter, system load factors are projected to increase gradually over the remainder of the forecast period, reaching an average of 64.0 percent in fiscal year 2001.

Domestic Passenger Load Factor

U.S. scheduled domestic air carriers achieved a load factor of 62.0 percent in fiscal year 1989, 1.0 point higher than the 1988 load factor. However, the Eastern Air Lines' strike is estimated to have added as much as 2.0 points to the 1989 domestic load factor.

The projected slowdown in the U.S. economy and subsequent slower traffic growth, combined with the large number of projected aircraft deliveries, is expected to result in a 1.5 point decline in the domestic load factor (60.5 percent) in fiscal year 1990. The load factor is expected to remain at or around this lower level (60.5 to 60.7 percent) through 1994. Starting in 1995, however, the domestic load factor is forecast to increase gradually over the remaining years of the forecast period, reaching 63.1 percent in the year 2001.

International Passenger Load Factor

U.S. scheduled international air carriers recorded a load factor of 66.6 percent in fiscal year 1989, down 0.3 points from the record high load factor achieved in 1988. The Eastern Air Lines' strike, affecting only its Latin American service, is thought to have had only minimal impact (adding approximately 0.5 points) on the overall international load factor.

The large increases projected in international capacity over the next several years are expected to result in declining international load factors throughout much of the first half of the forecast period. International load factors are forecast to decline to 66.0 percent in 1990 and to further fall to 65.4 percent by the year 1993, before beginning a gradual upturn in 1995. International load factors are expected to average 66.5 percent in the year 2001, 0.1 point lower than the load factor achieved in 1989.

Atlantic Routes

Load factors on the transatlantic routes averaged 65.7 percent in fiscal year 1989, 0.1 point below the 1988 load factor. Despite capacity increases averaging 8.7 percent annually over the past 3 years, load factors have averaged over 65.0 percent in each year.

Transatlantic load factors are expected to decline slightly to 65.5 percent (down 0.2 points) in 1990 then increase to 66.6 percent by 1994. Load factors are forecast to remain at or around this level (66.3 to 66.8 percent) through 1998. Thereafter, load factors are forecast to gradually increase to 67.3 percent by fiscal year 2001. The passenger load factor in the year 2001 is only 1.6 points higher than the load factor achieved in 1989.

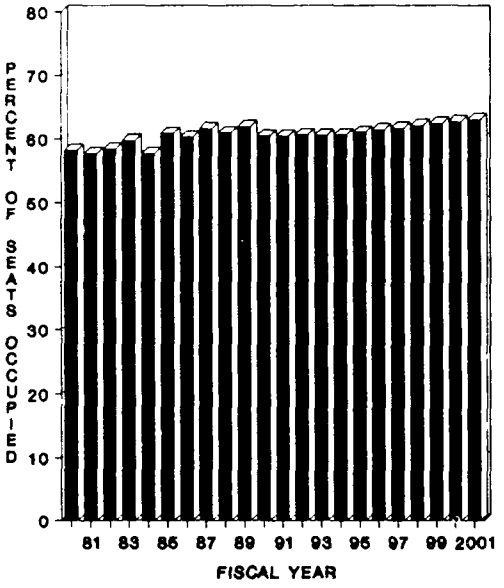
Latin American Routes

U.S. scheduled airlines achieved a 61.9 percent load factor on the Latin American routes in fiscal year 1989, a decline of 0.6 points. The strike at Eastern Air Lines, which accounted for 22.5 percent of Latin American capacity prior to the strike, is estimated to have added approximately 3.0 points to the 1989 load factor.

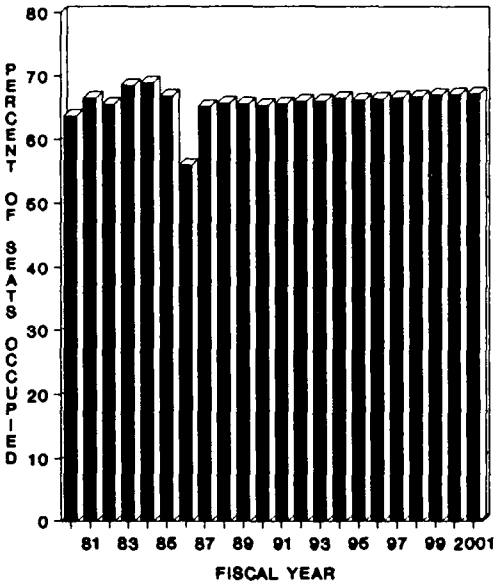
Latin American load factors are forecast to decline to 60.5 percent in

U.S. COMMERCIAL AIR CARRIERS
PASSENGER LOAD FACTOR

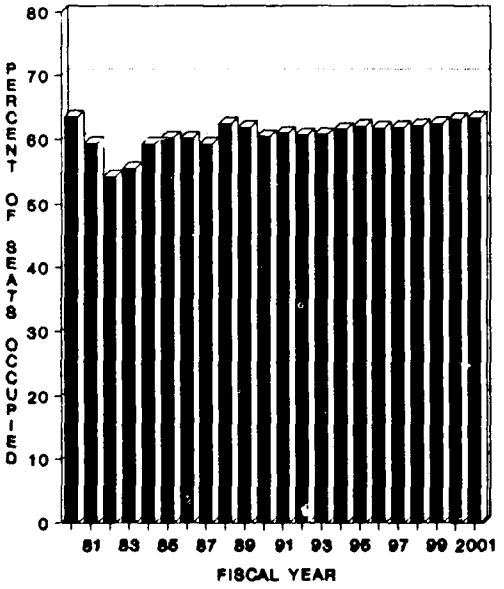
DOMESTIC ROUTES



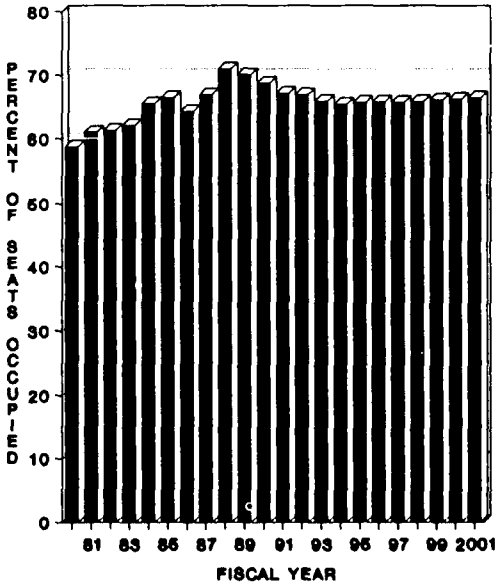
ATLANTIC ROUTES



LATIN AMERICA ROUTES



PACIFIC ROUTES



fiscal year 1990, then increase gradually over the remainder of the 12-year forecast period. By fiscal year 2001, Latin American load factors are projected to average 63.4 percent, 1.5 points higher than the 1989 load factor.

Pacific Routes

Despite a 23.6 percent increase in transpacific capacity in fiscal year 1989 (18.7 percent annually over the past three years), U.S. scheduled airlines achieved a load factor of 70.1 percent in fiscal year 1989. This is only 0.9 points below the record high load factor set the previous year.

Because of the projected large capacity increases on the transpacific routes, load factors are projected to decline significantly over the 12-year forecast period. Transpacific load factors are forecast to decline to 68.8 percent (down 1.3 points) in 1990, then fall to a low of 65.5 percent in 1994. Thereafter, load factors are expected to increase gradually over the remainder of the forecast period, averaging 66.5 percent in fiscal year 2001. However, the 2001 load factor is still 4.6 points lower than the load factor achieved in 1989.

AIR CARRIER FORECASTS

The forecasts of air carrier demand are based upon a specific set of assumptions, not the least of which are the economic and political climates in which they take place. There are a number of developments or events taking place which, depending on the outcome, could drastically alter the short- and/or long-term environment and cause the results to be significantly different from those forecast.

Some of the economic and/or political developments having the potential to alter the forecast results include, but are not limited to, the following:

(1) the 'perestroika' (restructuring) process currently underway in the Soviet Union and the subsequent general easing of tension between the U.S. and Soviet Russia;

(2) the possibility of large cuts in the U.S. military budget;

(3) the political upheaval now taking place among Eastern Bloc countries;

(4) the "tearing down" of the Berlin Wall and the potential for reunification of the two Germanies;

(5) the economic deregulation of the European Economic Community (EEC) scheduled to take place in 1992 and the impact that changes in Eastern Europe and Germany will have on this process.

In addition to the above, the network of bilateral pacts that the U.S. currently has in place in Europe, the Far East, and South America could inhibit the massive expansion plans of air carriers operating in these international regions and restrain traffic growth.

The labor strike at the Boeing Commercial Airplane Company, now settled, could, if there is any significant slippage in delivery dates, shift traffic growth from one year to the next.

In addition, there is the ever present possibility of renewed terrorism in Europe and the Middle East. To this must now be added the suspected drug cartel bombing of an Avianca aircraft in Columbia, South America in November. Any renewal of terrorism, especially against U.S. airlines, could result in traffic losses in that particular region and shifts in traffic to other

travel destinations.

In 1989, it was the bombing of Pan American flight 103 and the Eastern Air Lines strike that, among other factors, altered traffic results. Any of the factors discussed above have the potential to cause passenger traffic to be different from that forecast.

REVENUE PASSENGER MILES

U.S. scheduled air carriers recorded a total of 429.1 billion revenue passenger miles in fiscal year 1989. System passenger miles are forecast to increase to 451.4 billion (up 5.2 percent) in 1990 and to 477.4 billion (up 5.8 percent) in 1991. These increases result, in large part, from the relatively large increases forecast in international travel during the early years of the forecast period. Over the 12-year forecast period, system RPM's are projected to increase at an average annual rate of 4.9 percent, reaching 765.6 billion in fiscal year 2001.

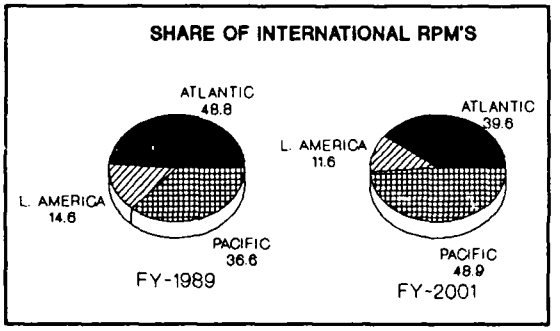
Domestic Revenue Passenger Miles

Scheduled domestic passenger miles totaled 328.4 billion in fiscal year 1989. Domestic RPM's are projected to increase to 341.0 billion (up 3.8 percent) in 1990 and to 358.1 billion (up 5.0 percent) in 1991. The slow traffic growth in 1990 is due, in large part, to the expected slowdown in the U.S. economy. Domestic passenger miles are forecast to total 551.1 billion by the year 2001, an average annual growth rate of 4.4 percent over the 12-year forecast period.

International Revenue Passenger Miles

After experiencing unprecedented growth the last 3 years (up 57.2 percent), the demand for international travel is expected to return to more normal rate of growth over the next 12 years. International RPM's are forecast to increase from 100.6 billion in 1989 to 110.4 billion (up 9.7 percent) in 1990 and to 119.3 billion (up 8.1 percent) in 1991. Although scheduled international traffic is expected to slow somewhat over the latter half of the forecast period (5.4 percent annually), international RPM's are forecast to more than double over the 12-year forecast period, increasing at an average annual rate of 6.5 percent. U.S. scheduled airlines are projected to record a total of 214.5 billion passenger miles in fiscal year 2001.

In 1989, transatlantic RPM's (48.8 percent of total international RPM's) accounted for the major share of international traffic. However, the volume of traffic on the transpacific routes

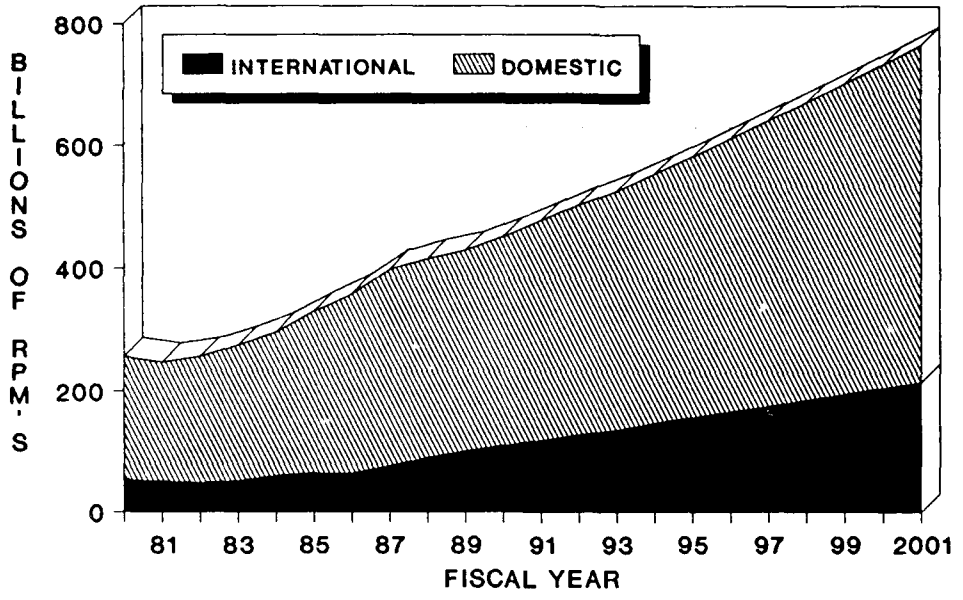


surpasses transatlantic traffic in fiscal year 1994 (65.4 billion compared to 62.8 billion RPM's). By the year 2001, transpacific RPM's are projected to account for the major share (48.9 percent) of total international traffic, up from a 36.6 percent share in 1989.

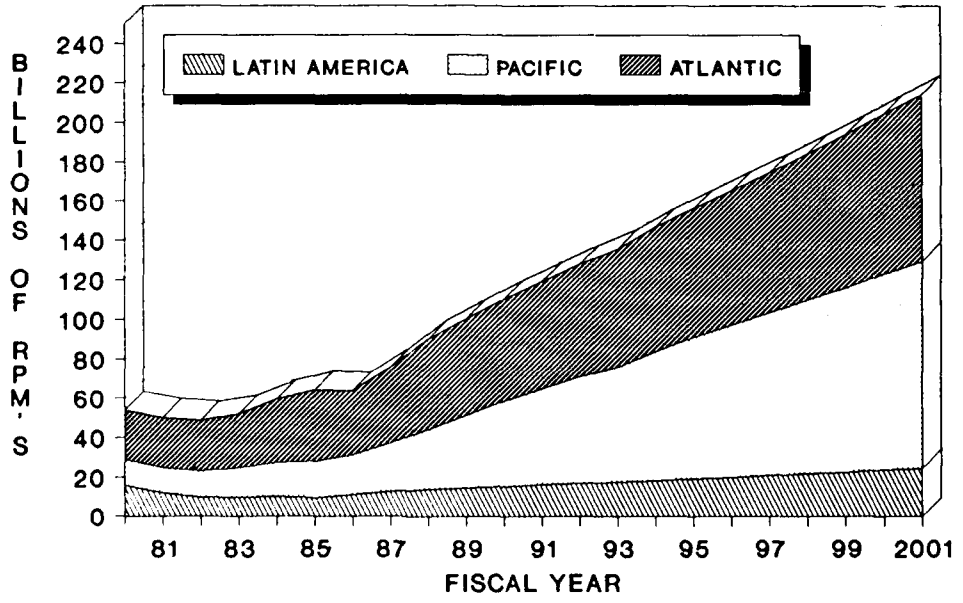
Atlantic Routes

Traffic growth on transatlantic routes slowed considerably in fiscal year 1989 (6.5 percent compared to an average of 19.0 percent in the two previous years), with U.S. scheduled airlines recording a total of 49.1 billion RPM's. Transatlantic passenger miles are expected to slow somewhat during

U.S. COMMERCIAL AIR CARRIERS
SCHEDULED REVENUE PASSENGER MILES



SCHEDULED INTERNATIONAL RPMS
BY TRAVEL REGION



the 12-year forecast period, increasing to 51.5 billion (up 4.9 percent) in 1990 and to 54.2 billion (up 5.2 percent) in 1991. Atlantic route RPM's are forecast to increase at an annual rate of 4.7 percent over the entire forecast period, with RPM's totaling 84.9 billion by the year 2001.

Latin American Routes

Latin American passenger miles totaled 14.7 billion in fiscal year 1989; however, traffic was heavily affected by the Eastern Air Lines' strike. Because of the anticipated recovery from the traffic lost to the strike in 1989, Latin American RPM's are projected to increase at a somewhat faster rate in 1990, up 6.1 percent to 15.6 billion. Traffic growth slows to a 5.1 percent annual rate in 1991 (16.4 billion) and averages 4.4 percent over the 12-year forecast period. In fiscal year 2001, Latin American RPM's are forecast to total 24.8 billion.

Pacific Routes

Growth in passenger demand between the United States and the Pacific has nearly doubled since 1985 (18.7 percent annual growth), with RPM's totaling 36.8 billion in fiscal year 1989. Passenger demand in the Pacific is expected to continue to exhibit strong growth throughout the entire forecast period (9.1 percent annually), although at somewhat lower rates than those observed over the past several years.

Three factors are largely responsible for the strong traffic growth projected for this international travel region over the next 12-years. The first of these factors is the relatively large growth that has been forecast for the economies (real GDP up 4.2 percent annually) of the Far East/Pacific Basin countries. A second factor is the large increases in capacity (ASM's up 9.6 percent annually) that have been forecast to take place on the transpacific routes. A third factor is the decline of the U.S. dollar (41.2 percent) relative to the Japanese yen over the 12-year forecast period. It is estimated that between 60 and 65 percent of U.S. traffic on the transpacific originates in the Far East countries. Therefore, as the U.S. dollar declines relative to the yen, all other thing being equal, the cost of travel to the United States becomes cheaper.

Transpacific RPM's are projected to increase to 43.3 billion (up 17.7 percent) in 1990, to 48.7 billion (up 12.5 percent) in 1991, and to 54.1 billion (up 11.0 percent) in 1992. With the exception of 1994, (up 12.0 percent) traffic growth is projected to slow considerably over the remainder of the forecast period (7.6 percent annual growth), the higher growth in 1994 reflecting the opening of a new air carrier airport in Osaka, Japan. Growth over the 12-year forecast period is expected to average 9.1 percent annually, with RPM's reaching 104.8 billion by the year 2001.

PASSENGER ENPLANEMENTS

In fiscal year 1989, U.S. scheduled air carriers enplaned a total of 452.4 million passengers. The uncertainty with regard to U.S. economic growth is expected to slow the demand for air travel in 1990. System passenger enplanements are forecast to increase to 470.5 million (up 4.0 percent) in 1990 and to 493.8 million (up 5.0 percent) in 1991. Over the 12-year forecast period, system enplanements are forecast to increase by an average of 4.2 percent per year, totaling 743.5 million passengers in fiscal year 2001.

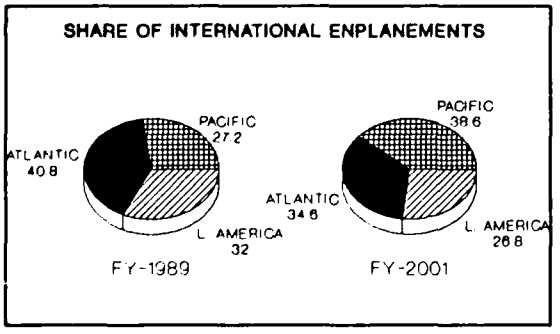
Domestic Passenger Enplanements

U.S. scheduled domestic air carriers enplaned a total of 415.6 million passengers in fiscal year 1989. The slowdown in U.S. economic growth in 1990 is expected to slow the growth in domestic passenger demand in 1990. Domestic passenger enplanements are forecast to total 430.6 million (up 3.6 percent) in 1990 and 451.0 million (up 4.8 percent) in 1991. The projected growth in domestic enplanements is expected to average 4.1 percent annually over the 12-year forecast period, with the number of domestic enplanements reaching 670.4 million in fiscal year 2001.

International Passenger Enplanements

A total of 36.8 million passengers was enplaned by U.S. scheduled international airlines in fiscal year 1989. International enplanements are forecast to increase to 39.9 million (up 8.5 percent) in 1990 and to 42.8 million (up 7.3 percent) in 1991. The increase in the number of passenger enplanements is expected to average 5.4 percent annually over the 12-year forecast period. International passenger enplanements are expected to total 73.1 million in fiscal year 2001.

In 1989, passenger enplanements on transatlantic routes accounted for the major share (40.8 percent) of total international passengers. By the year 1998, however, the number of transpacific enplanements is projected to surpass the number of transatlantic enplanements (23.9 million compared to 22.3 million). In the final year of the forecast period, the transpacific routes are projected to account for 38.6 percent of total international passengers, up from a share of only 27.2 percent in 1989.



Atlantic Routes

Passenger enplanements on the Atlantic routes totaled 15.0 million in fiscal year 1989. U.S. air carrier passenger enplanements on the transatlantic routes are forecast to reach 15.7 million (up 4.6 percent) in 1990 and 16.4 million (up 4.5 percent) in 1990. The projected annual rate of growth over the 12-year forecast period is 4.4 percent, with passenger enplanements on the Atlantic routes expected to total 25.3 million in fiscal year 2001.

Latin American Routes

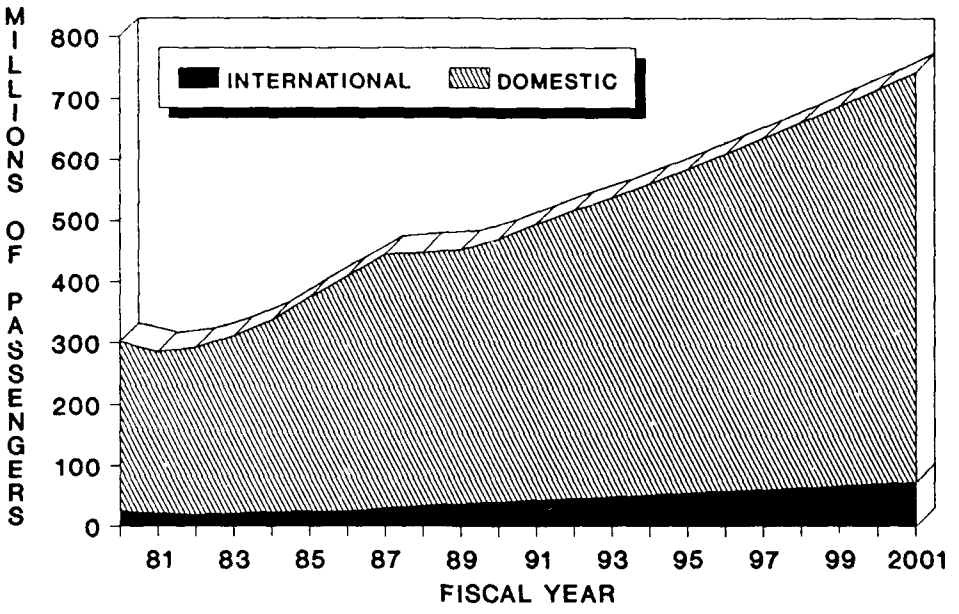
U.S. scheduled airlines operating on the Latin American routes enplaned a total of 11.8 million passengers in fiscal year 1989, although traffic was impacted by the Eastern Air Lines' strike. The number of passenger enplanements is projected to increase to 12.5 million (up 4.4 percent) in 1990 and to 13.2 million (up 3.4 percent) in 1991.

Between 1989 and 2001, the number of enplaned passengers traveling between the United States and Latin American destinations is forecast to increase by 4.3 percent annually, reaching a total of 19.6 million in fiscal year 2001.

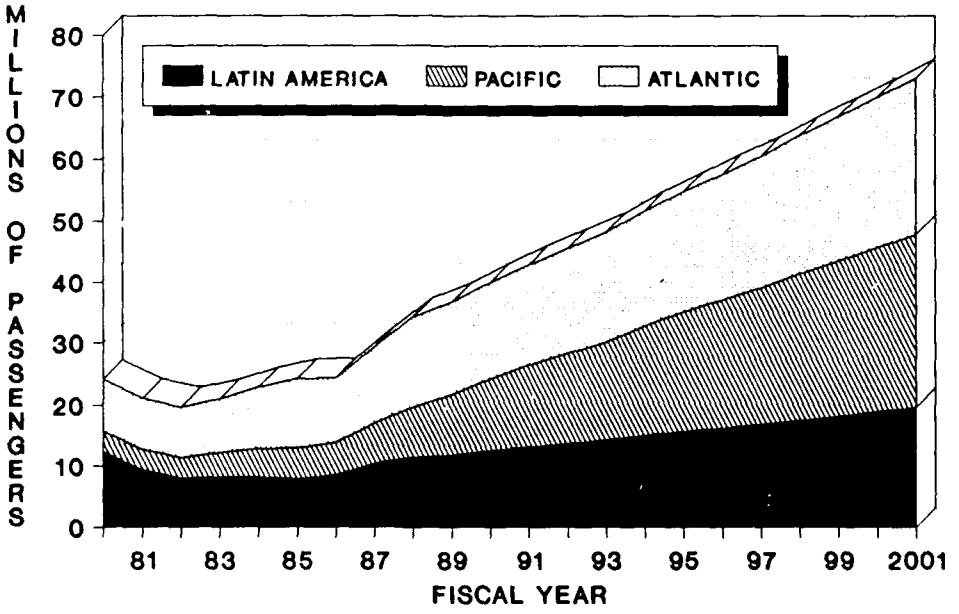
Pacific Routes

Passenger enplanements on routes between the United States and Pacific destinations totaled 10.0 million in fiscal year 1989. Passenger enplane-

U.S. COMMERCIAL AIR CARRIERS
SCHEDULED PASSENGER ENPLANEMENTS



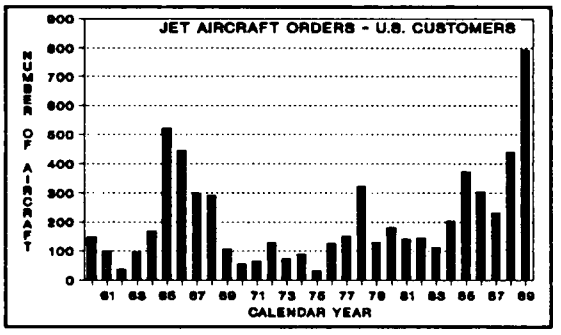
SCHEDULED INTERNATIONAL ENPLANEMENTS
BY TRAVEL REGIONS



ments are forecast to increase to 11.8 million (up 18.0 percent) in 1990, to 13.3 million (up 12.7 percent) in 1991, and to 14.7 million (up 10.5 percent) in 1992. Over the 12-year forecast period, transpacific passenger enplanements are projected to increase at an average annual rate of 9.0 percent, totaling 28.2 million in fiscal year 2001.

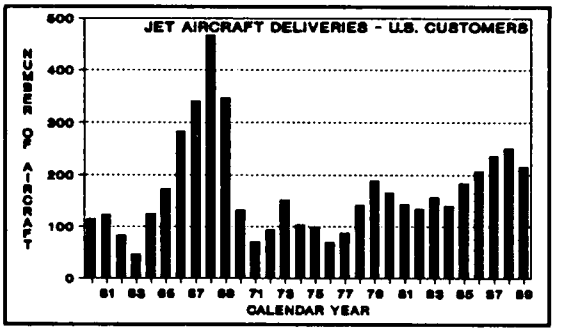
AIR CARRIER FLEET

Over the past 2 years, world airlines placed a total of 2,936 orders for large jet aircraft with U.S. and foreign aircraft manufacturers--2,204 of these orders occurring in 1989 alone. Of this 2-year total, 1,744 (75.1 percent) were for two-engine narrowbody (B-737, B-757, MD-80, and F-100) aircraft. As of September 30, 1989, aircraft manufacturers had a total backlog of 3,059 aircraft on order. Of the total backlog, 2,318 (75.8 percent) were for two-engine narrowbody aircraft. U.S. customers have ordered a total of 1,236 aircraft over the past



2 years--795 in 1989 alone. Of the 2-year total, 84.6 percent (1,046 aircraft) were for two-engine narrowbody aircraft.

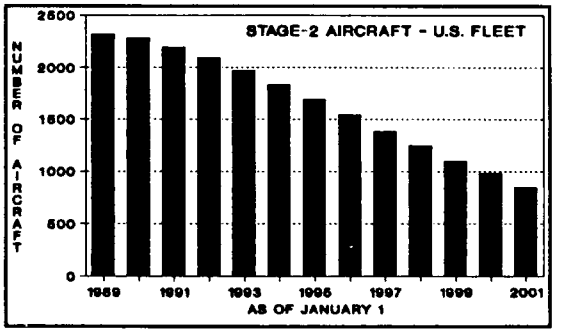
Also, over the past 2 years, aircraft manufacturers delivered a total of 1,073 jet aircraft world-wide--560 aircraft in 1989 alone. Of the 2-year total, 757 (70.6 percent) were two-engine narrowbody aircraft. Deliveries to U.S. customers totaled 466 over the past 2 years--215 in 1989 alone. Of this 2-year total, 80.5 percent



(375 aircraft) were two-engine narrowbody aircraft.

It is important to note that aircraft deliveries to U.S. customers over the past 2 years were, for all intents and purposes, net additions to the U.S. fleet. Very few of the older stage-2 aircraft have been retired during this time period. If this trend continues, it will put intense pressure on both the Air Traffic Control and the National Airspace System.

At the end of fiscal year 1989 there were approximately 2,304 stage-2 aircraft in the U.S. air carrier jet fleet. Because of the projected slowdown in passenger demand in 1990, it is anticipated that U.S. air carriers will 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 being those aircraft considered likely candidates for retrofit. At the end of the 12-year forecast period, it is projected that there will be approximately 849 stage-2 aircraft remaining in the U.S. airline jet fleet. (This assumes no mandatory phase-out of stage-2 aircraft by the

year 2000, as is currently being considered.)

Based on 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 an inventory of 3,870 large jet aircraft in 1989 to 4,949 aircraft by the year 2001. This assumes the delivery of almost 214 aircraft annually and results in the net addition (after retirements) of approximately 90 aircraft (2.1 percent) to the U.S. fleet each year. Over the next 2 years, a total of 463 aircraft are expected to be delivered to U.S. commercial airlines fleet.

To absorb this expected increase in capacity in 1990 and 1991 and still maintain the high load factors discussed earlier in the Forecast Assumptions section, significant reductions have been assumed in the utilization rates of the older stage-2 aircraft. Conversely, the industry could decide to maintain current utilization rates and allow load factors to decline below 60.0 percent, or decide to retire even more stage-2 aircraft than we are predicting.

By far, the largest increase, in terms of number of aircraft, is projected to occur in the two-engine narrowbody aircraft category, which is expected to grow by an average of 96 aircraft (4.3 percent) annually. By the year 2001, two-engine narrowbody aircraft are expected to total 2,912 units and to account for 58.8 percent of the total fleet, up from 45.6 percent in fiscal year 1989. This trend reflects the fact that the continued expansion and development of hub airports increases 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 1,191 aircraft in 1989 to only 488 aircraft in the year 2001. The number of four-engine narrowbody (DC-8, B-707 and BA-146) aircraft is also expected to decline in absolute numbers over the forecast period, from 257 in 1989 to 107 in the year 2001.

Widebody aircraft, which accounted for only 17.0 percent of the fleet in 1989, are expected to account for 29.2 percent of the U.S. air carrier large jet fleet by the year 2001. Two-engine widebody (A-300, A-310, and B-767) aircraft, the fastest growing of all the aircraft groupings, are expected to increase by an average of approximately 40 aircraft (11.1 percent) annually, from 187 aircraft in 1989 to 661 aircraft in the year 2001.

The second fastest growing aircraft category are the four-engine widebody (B-747 and A-340) aircraft, which are expected to increase from 171 aircraft in 1989 to 362 by the year 2001, an annual increase of 6.4 percent. The three-engine widebody category (MD-11, DC-10 and L-1011) is projected to grow from 300 aircraft in 1988 to 419 aircraft in the year 2001, an average annual increase of 2.8 percent (10 aircraft).

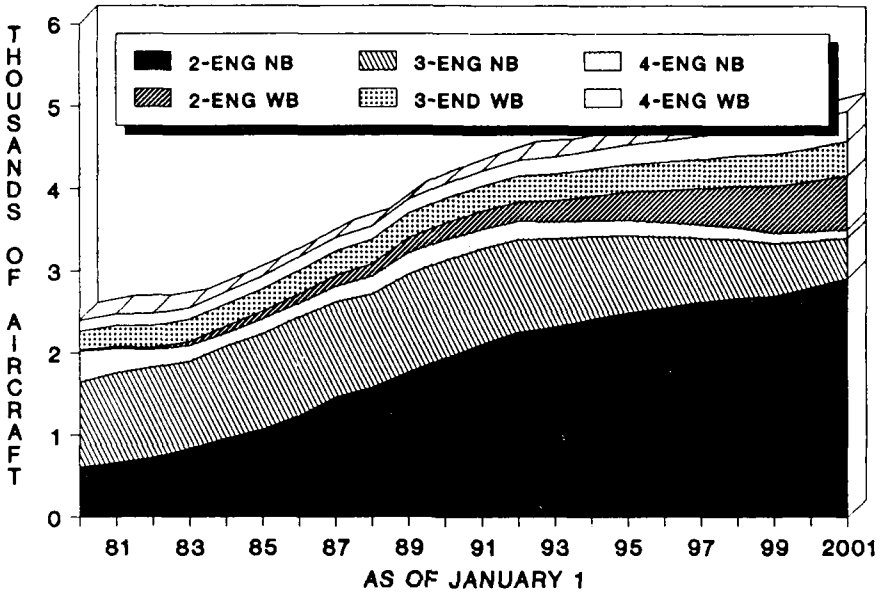
AIRBORNE HOURS

U.S. commercial air carriers flew a total of 10.1 million hours in fiscal year 1989, an increase of 2.6 percent over 1988. Two aircraft categories accounted for the majority of these airborne hours: two-engine narrowbody aircraft (46.1 percent) and three-engine narrowbody aircraft (26.5 percent). By the year 2001, the number of airborne hours is forecast to increase to 13.4 million, an average annual increase of 2.4 percent.

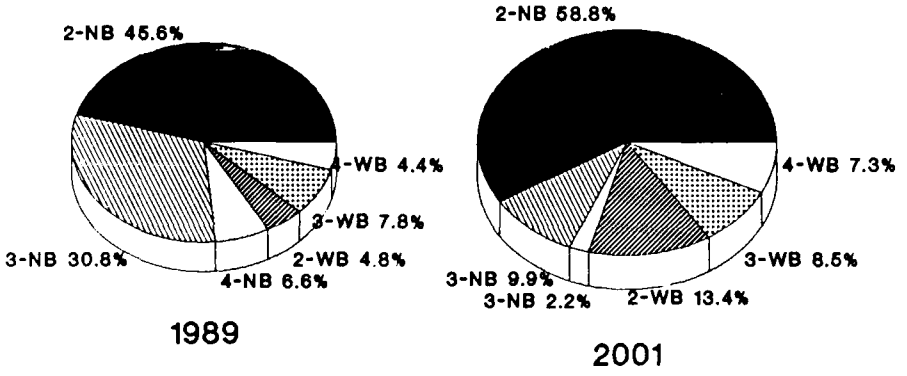
A large part of the growth in airborne hours (43.2 percent) is expected to occur during the first 3 years of the forecast period, reflecting the large numbers of smaller aircraft scheduled to be delivered to U.S. airlines during

U.S. COMMERCIAL AIR CARRIERS

LARGE JET AIRCRAFT

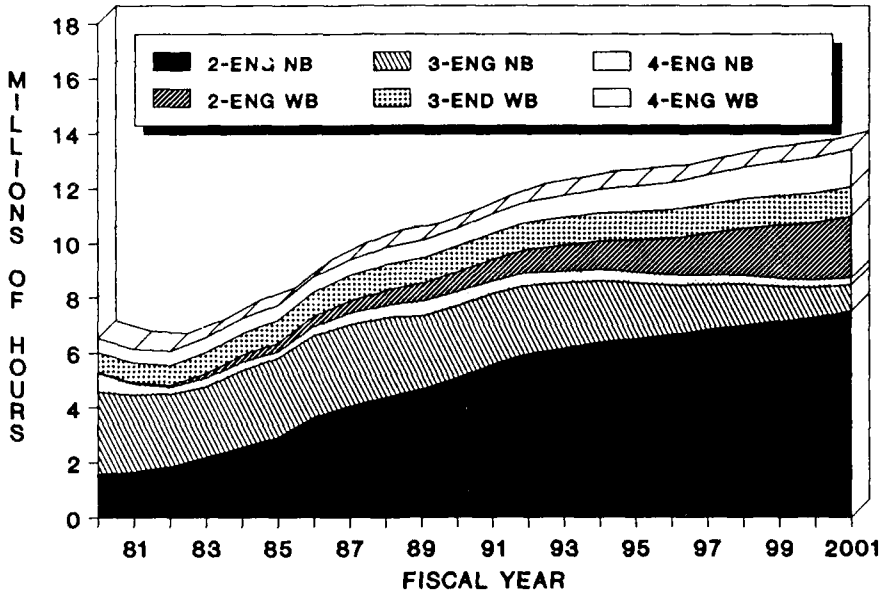


PERCENT BY AIRCRAFT TYPE

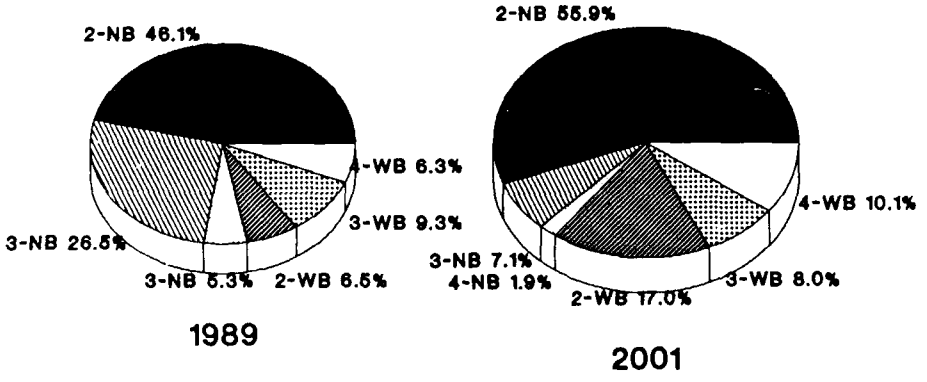


U.S. COMMERCIAL AIR CARRIERS

AIRBORNE HOURS



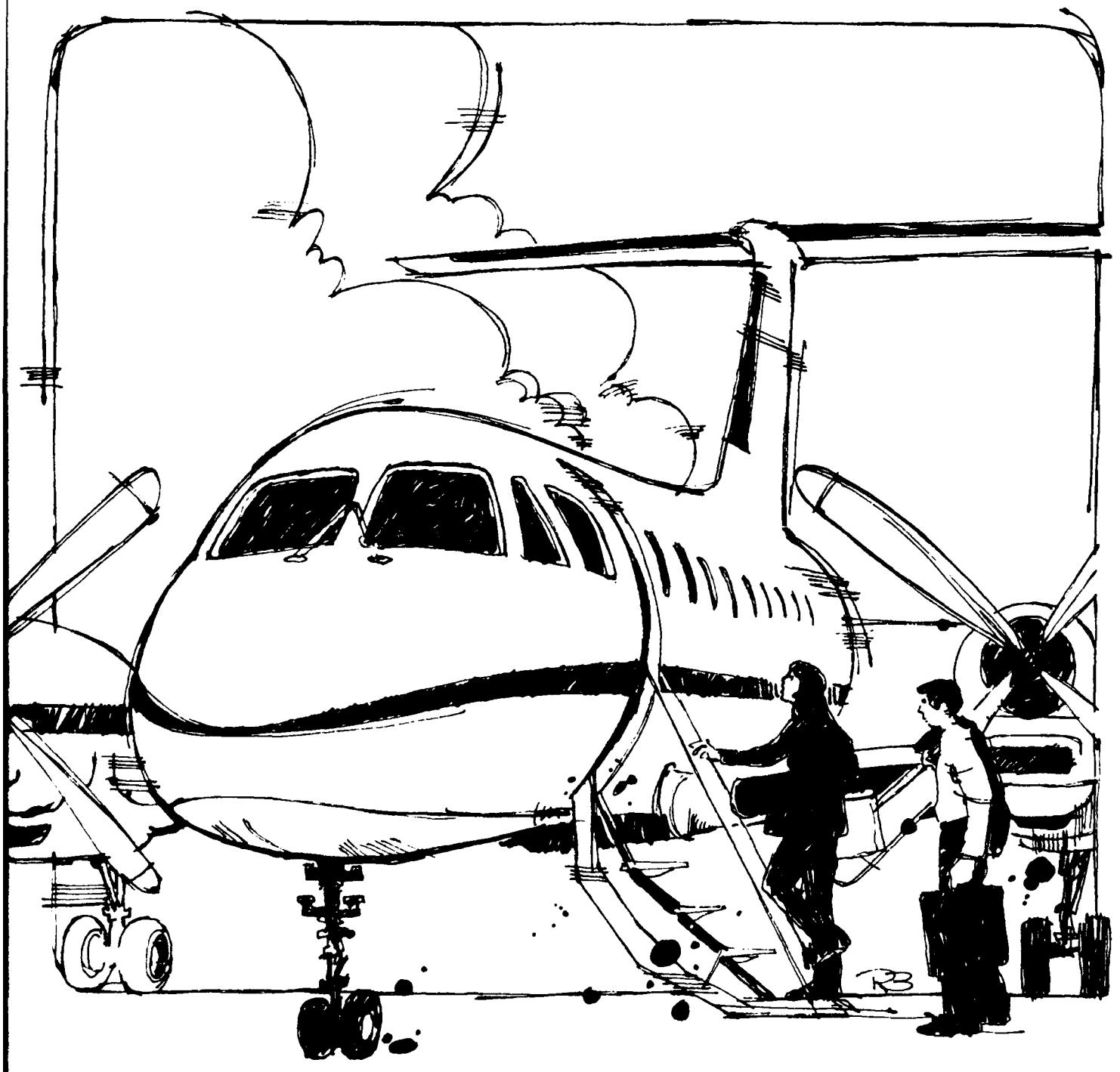
PERCENT BY AIRCRAFT TYPE



this period. In addition, hubbing activity is expected to continue to increase at many large and medium hub airports. The number of air carrier airborne hours is forecast to increase by 4.6 percent in 1990, 5.0 percent in 1991, and 4.1 percent in 1992.

Two-engine narrowbody aircraft are expected to account for 55.9 percent of total airborne hours in the year 2001, increasing at an average annual rate of 4.1 percent over the 12-year forecast period. Airborne hours flown by two-engine widebody aircraft are expected to grow at an average annual rate of 11.0 percent over the same time period and account for 17.0 percent of total airborne hours in fiscal year 2001, up from only 6.5 percent in 1989. The number of airborne hours flown by three-engine narrowbody aircraft is expected to decline by 64.3 percent between 1989 and the year 2001. This decline reflects not only the retirement of many of the older stage-2 aircraft but also the declining utilization rates of those aircraft still in service, many of which have been shifted to cargo service.

CHAPTER IV
REGIONALS/COMMUTERS



CHAPTER IV

REGIONALS/COMMUTERS

The regional/commuter airline industry, for the purpose of this forecast, is defined as those air carriers that provide regularly scheduled passenger service and whose fleets are composed predominantly of aircraft having 60 seats or less. During 1989, 159 regional/commuter airlines reported traffic data to RSPA on Form 298-C. A listing of these carriers is presented in Appendix F. The FAA historical data base includes activity for all regional/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 commercial 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 at the beginning of Chapter X for Table 7 and Table 15).

REVIEW OF 1989

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. These action have resulted in a process of industry consolidation, increasing concentration, and increasing integration with the large commercial air carriers that has continued through 1989.

INDUSTRY SUMMARY

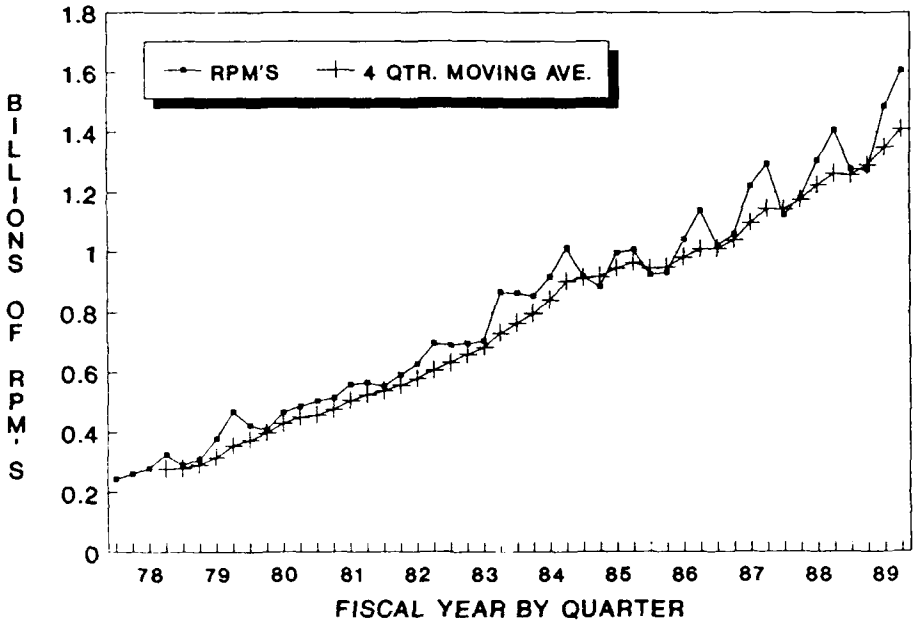
During fiscal year 1989, the number of regional/commuter airlines totaled 159, down from 179 in 1988. While the number of reporting airlines declined, industry growth continued to out-pace the growth of the major and national air carriers.

REVENUE PASSENGER ENPLANEMENTS

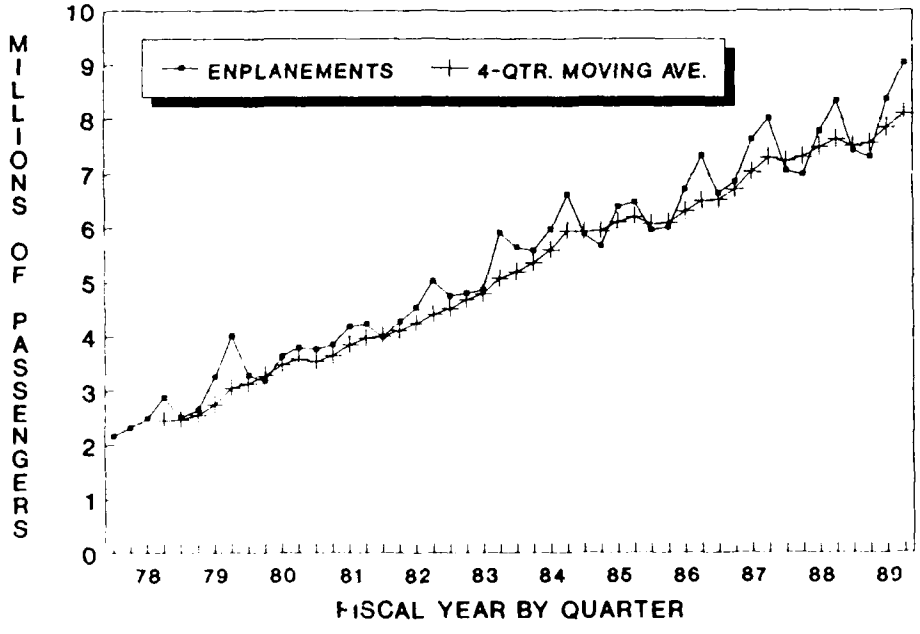
At the industry level, total revenue passenger enplanements for the regional/commuter airlines totaled 33.5 million, an increase of 6.5 percent compared to 1988. As noted earlier, the data presented in this forecast include only activity for those carriers operating in the contiguous 48 states, Hawaii, Puerto Rico, and the U.S. Virgin Islands.

U.S. REGIONALS/COMMUTERS TRAFFIC TRENDS

REVENUE PASSENGER MILES



PASSENGER ENPLANEMENTS



Not included is the traffic for carriers operating in Alaska and foreign territories. Excluding this traffic, enplanements totaled 32.1 million, up 6.6 percent over 1988.

For the 48 states, enplanements increased 7.4 percent to 30.5 million. During 1989 it is estimated that the Eastern Airlines strike reduced the level of enplanements by approximately 300 to 400 thousand passengers. However, enplanements in Hawaii, Puerto Rico, and the U.S. Virgin Islands declined to 1.6 million - a drop of 6.5 percent compared to the previous year. This third year-over-year decline was due to the first full year's absence of Mid-Pacific Airlines in Hawaii where enplanements declined by 31.5 percent. This does not reflect an actual decline in traffic, but rather a shift from the commuter carrier group to the large commercial carriers. However, This decline was partially offset by growth in traffic in Puerto Rico and the Virgin Islands where enplanements increased by 7.3 percent. While not included in the forecast base, enplanements in Alaska and foreign territories totaled 1.3 million, an increase of 3.0 percent compared to 1988. Enplanements in Alaska were up 4.6 percent and all other areas increased 1.0 percent.

REVENUE PASSENGER MILES

Industry level revenue passenger miles totaled just over 5.8 billion in 1989, an increase of 11.7 percent from 1988. For the 48 states revenue passenger miles increased 12.8 percent in 1989 to just over 5.5 billion. The average passenger trip length increased by 8.7 miles to 180.3 miles. Passenger miles in Hawaii, Puerto Rico, and the Virgin Islands declined 13.3 percent to 124.3 billion. The large differential drop in passenger miles compared to enplanements reflects the shorter average passenger trip length for the Caribbean traffic. In Alaska and other areas, revenue passenger miles totaled 185.7 million, an increase of 1.7 percent compared to 1988.

INDUSTRY COMPOSITION

During the mid 1980's and through today, the fundamental character of the industry has changed; from the relative size and sophistication of airline operations, the players involved (especially the dominant industry operators), and aircraft fleets, to the industry's relationship with the large commercial air carriers in the national air transportation system. While the role of the industry, in the past and today, is to provide feeder service to the large hubs served by the large commercial air carriers, the scope and formality of this role has changed dramatically.

In 1989 the composition of the regional/commuter airline industry continues to evolve. The factors contributing to this change include economic/competitive influences and marketing strategies and alliances. Since the mid 1980's two distinct but interrelated trends underlie the changing character and composition of the industry. They are industry consolidation and increasing integration of operations with the major and national air carriers.

INDUSTRY CONSOLIDATION

From a high of about 250 carriers in 1981, the number of regional/commuter operators has declined to 159 in 1989. The 159 operators in 1989 is a significant drop compared to 1988

TOP 50

REGIONAL/COMMUTER AIRLINES

FISCAL YEAR 1989

1. Atlantic Southeast
2. Henson
3. WestAir
4. Simmons
5. Horizon
6. Comair
7. Bar Harbor
8. Express Airline I
9. SkyWest
10. Wings West
11. Pan Am Express
12. Air Midwest
13. CCAir
14. Business Express
15. Aspen
16. Metro-Flight
17. Jetstream International
18. Rocky Mountain
19. Pennsylvania
20. Executive Air Charter
21. Britt
22. Mesaba
23. Command
24. Nashville Eagle
25. Suburban
26. Chaparral
27. NPA
28. Trans States
29. Chautauqua
30. Eastern Metro Express
31. Mesa
32. Sunaire
33. Crown Airways
34. Metro Northeast (CAP)
35. Scenic
36. Aloha IslandAir
37. Metro Northeast (ANA)
38. Precision
39. ERA Aviation
40. Midway Commuter
41. Virgin Islands Seaplane
42. Chalks/PIA
43. Air Molokai
44. Aero Coach
45. Viequies Air Link
46. Big Sky
47. StatesWest
48. Southcentral Air
49. Air Cape
50. Wings Airways

Source: RSPA Form 298-C and Form 41 enplanement data

TOP 30 CORPORATE STRUCTURES

Carrier/ Carrier Group	Percent of Industry Enplanements	Carrier/ Carrier Group	Percent of Industry Enplanements
1. American	13.2	16. Chautauqua	1.3
2. Delta	12.8	17. Mesa	1.1
3. USAir	11.5	18. Crown Airways	.9
4. Metro	7.7	19. Scenic	.9
5. Texas Air	7.4	20. Aloha/Aloha IslandAir	.7
6. WestAir	6.7	21. Precision	.6
7. Alaska	4.5	22. ERA Aviation	.6
8. Express Airline I	3.0	23. Midway/Midway Commuter	.5
9. Business Express	2.9	24. Virgin Island Seaplane	.5
10. Pan Am/Pan Am Express	2.9	25. Chalks(PIA)	.5
11. Air Midwest	2.8	26. Air Molokai	.4
12. CCAir	2.8	27. Aero Coach	.4
13. Aspen	2.4	28. Viequies Air Link	.4
14. Northwest/Mesaba	1.9	29. Big Sky	.4
15. Trans States	1.3	30. StatesWest	.3

when 179 carriers reported traffic data to RSPA. It should be noted that these counts are for all carriers which reported traffic during any part of 1988 and 1989, and thus include carriers which ceased operation at some point during both years. Of the 179 carriers which reported traffic data in 1988, approximately 155 were in operation at the end of the year. Of the 24 carriers no longer operating, 4 were merged into their parent carriers and 2 reemerged under new names. The remaining 18 carriers ceased scheduled operations, the most notable being Mid-Pacific. In 1989, of the total of 159 carriers, approximately 150 were still in operation at the end of the year. At the present time there is no reason to assume that this trend towards consolidation will not continue.

INDUSTRY CONCENTRATION

While the number of carriers has declined, the size of the dominant industry carriers has increased dramatically. This has resulted in increased industry concentration with the top 50 carriers accounting for approximately 94.1 percent of total industry passenger enplanements in 1989, up from 91.2 percent in 1988. At the industry level, enplanements increased by 6.5 percent in 1989, but the top 50 carries grew by just under 11.8 percent. The top 50 carries for 1989 are listed in the table on page 76. The relative ranks have changed for many carriers, but the composition of this group is relatively unchanged from 1988.

The above data are based on RSPA Form

AIR CARRIER/COMMUTER AIRLINES CODE-SHARING AGREEMENTS

Air Carrier Program Name	Designated Commuter Carrier	Hubs Served
1. Alaska Airlines	Horizon*	Portland Seattle
2. Aloha Airlines	Aloha IslandAir	Honolulu
3. American Eagle	Chaparral	Dallas/Ft. Worth
	Command	Boston New York
	Executive Air Charter	San Juan
	Metro	Dallas/Ft. Worth
	Nashville Eagle	Miami Nashville Raleigh/Durham
	Simmons	Chicago
	Wings West	Los Angeles San Francisco San Jose
4. Continental Express	Britt	Cleveland Houston
	Bar Harbor	Boston Cleveland Newark
	Rocky Mountain	Denver
	Southern Jersey	Philadelphia
5. Delta Connection	Atlantic Southeast	Atlanta Dallas/Ft. Worth
	Business Express	Boston New York
	Comair	Cincinnati Dayton Florida
	SkyWest	Los Angeles Salt Lake City
6. Eastern Express	Eastern Metro Express	Atlanta
	Aviation Associates	San Juan
	Southern Jersey	Philadelphia
7. Midway Connection	Midway Commuter	Chicago Philadelphia
	Iowa Airways	Chicago
8. Northwest Airlink	Big Sky	Billings Helena

AIR CARRIER/ COMMUTER AIRLINES
CODE-SHARING AGREEMENTS(Continued)

Air Carrier Program Name	Designated Commuter carrier	Hubs Served
8. Northwest Airlink (Continued)	Express Airline I	Memphis Minneapolis/St. Paul
	Horizon*	Portland Seattle
	Mesaba	Detroit Minneapolis/St. Paul
	Precision	Boston
9. Pan Am Express	Pan Am Express	New York Philadelphia
	Resort Commuter	Los Angeles
10. Trans World Express	Air Midwest	St. Louis
	Metro Northeast	Boston New York
	Pocono	New York
	Trans States	St. Louis
	Jet Express	New York
11. United Express	Aspen*	Denver
	NPA	Boise Portland Seattle
	WestAir*	Los Angeles San Francisco Washington, D.C.
12. Allegheny Commuter (USAir)	CCAir	Charlotte
	Chautauqua	Orlando Pittsburgh
	Commutair	Boston Newark Syracuse
	Crown	Pittsburgh
	Henson	Baltimore Charlotte Florida
	Jetstream	Baltimore Dayton
	Pennsylvania	Pittsburgh Philadelphia
	Allegheny Commuter	Pittsburgh Philadelphia

* Carrier operates both large jet and commuter aircraft.

298-C and Form 41 reporting entities. However, looking at the industry only in this manner does not reflect the true level of industry consolidation, concentration, and integration with the major and national air carriers. Many of the carriers are owned, totally or in part, by their larger code-sharing partners, and still others are owned by other regionals. A better picture of the current industry composition is presented by looking at the industry from a corporate structure point of view.

A total of 20 regionals are owned, totally or in part, by nine major and national air carriers, and six more are owned by two other regionals. The table on page 77 presents the top 30 corporate structures and their percent share of 1989 industry enplanements. Viewed in this manner, it can be seen that there is a much higher level of industry concentration, and also points out the degree of integration with the major/national airlines. In 1989, enplanements for these carriers grew by 11.4 percent, and accounted for 93.3 percent of total industry enplanements.

FORECAST ASSUMPTIONS

Industry growth will continue to outpace that of the larger commercial air carriers and be driven by increased demand placed on a stable, mature regional/commuter airline industry. The introduction of new state-of-the-art aircraft offering amenities similar to those found on large jet aircraft will contribute to greater public acceptance and stimulate higher growth. Increasing integration of service with the majors and nationals, together with the introduction of new aircraft, will lead to further route rationalization programs by the majors opening new opportunities for growth for the regional/commuter airline industry. The average passenger trip length is expected to increase over the forecast period, but the industry will continue to serve primarily short-haul markets, with emphasis on improved quality and schedule frequency in the markets best suited to their operations.

It is expected that the aircraft fleet will continue to grow over the forecast period and the average seats per aircraft is expected to increase from 20.4 in 1989 to 33.8 in 2001, an average annual growth of 4.3 percent. The average passenger trip length in the 48 States is projected to increase from 180.3 miles in 1989 to 212.0 miles in 2001, an average annual growth rate of 1.4 percent. The average trip length for Hawaii, Puerto Rico, and the Virgin Islands is expected to increase slightly from 77.2 miles in 1989 to 80.0 in 1996 and remain constant through the balance of the forecast period. The average industry load factor is expected to increase only slightly from 47.8 in 1989 to 48.5 in 2001 reflecting continued emphasis on frequency of service. A year-by-year detail of the above assumptions is presented in Table 14.

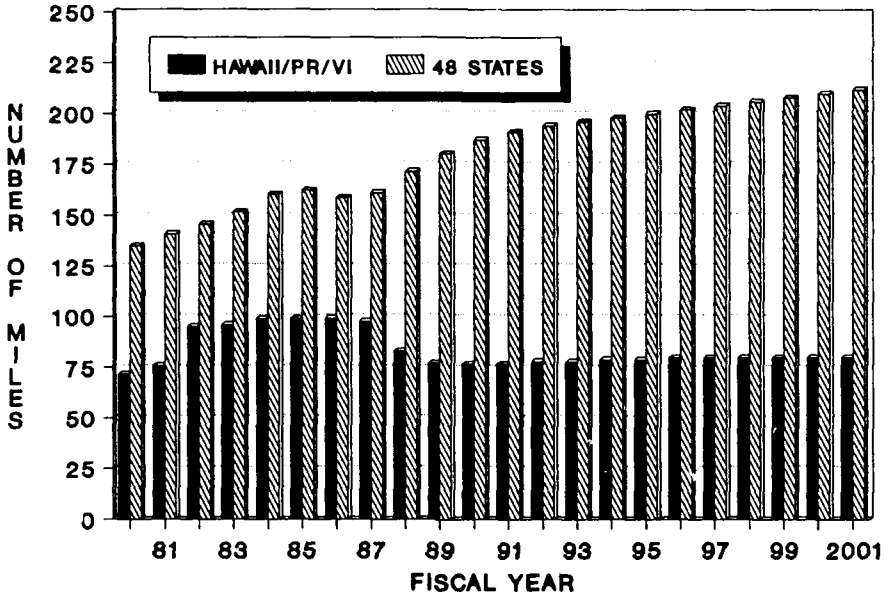
REGIONAL/COMMUTER FORECASTS

REVENUE PASSENGER MILES

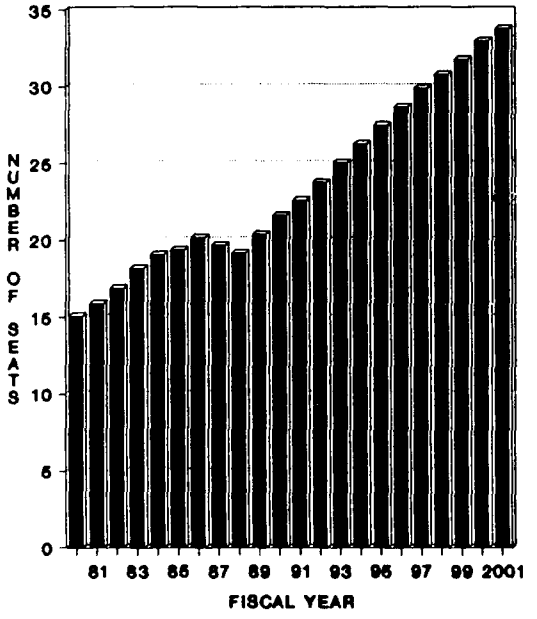
Revenue passenger miles are expected to total 14.5 billion in 2001. Passenger miles are projected to increase 12.1 percent in 1990 and 9.4 percent in 1991, and average 8.0 percent over the 12-year forecast period. In the 48 contiguous states, passenger miles

U.S. REGIONALS/COMMUTERS FORECAST ASSUMPTIONS

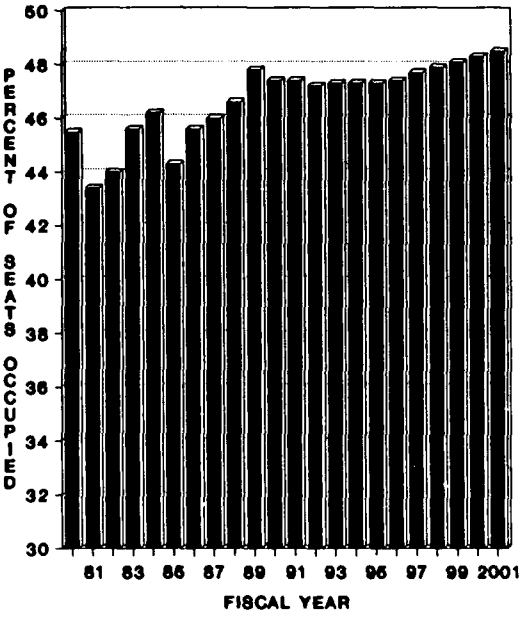
PASSENGER TRIP LENGTH



AVERAGE AIRCRAFT SIZE



PASSENGER LOAD FACTOR



are forecast to total 14.1 billion in 2001, increasing 11.8 percent in 1990 and 9.3 percent in 1991, and averaging 8.1 percent between 1989 and 2001. Traffic in Hawaii, Puerto Rico, and the Virgin Islands is forecast to increase by 23.9 percent in 1990 and by 15.0 percent in 1991, and average 9.9 percent growth over the forecast period, and totaling 384.0 million passenger miles in 2001.

REVENUE PASSENGER ENPLANEMENTS

Passenger enplanements are forecast to reach 71.2 million in 2001, more than double the 1989 enplanements. Overall, passenger enplanements are expected to increase by 8.7 percent in 1990 and 7.5 percent in 1991, and average 6.9 percent over the forecast period. In the 48 states, passenger enplanements are projected to increase 7.9 percent in 1990, 7.0 percent in 1991, and average 6.7 percent growth between 1989 and 2001, totaling 66.4 million in 2001. Passenger enplanements in Hawaii, Puerto Rico, and the Virgin Islands are expected to total 4.8 million in 2001, increasing by 25.0 percent in 1990 and 15.0 percent in 1991, and averaging 9.6 percent over the 12-year forecast period.

REGIONAL/COMMUTER FLEET

The current composition of the regional/commuter fleet underscores the growth of the industry and quality of service provided. From a fleet once composed predominantly of GA type aircraft, today's fleet is increasingly composed of new state-of-the-art aircraft offering amenities similar to those found on large jet aircraft. Today, regional/commuter airlines have a large variety of aircraft to choose from to create a fleet tailored to the specific markets they serve. While there are numerous models to choose from in the categories presented in this forecast, the most significant are the new aircraft in the larger seat size categories, primarily "20-40 seats" and "greater than 40 seats." The impact of the introduction of the larger new aircraft is reflected in the growth of the average seats per aircraft from 11.9 in 1980 to 20.4 in 1989, an increase of 71.4 percent while the fleet grew by 26.1 percent during the same time period.

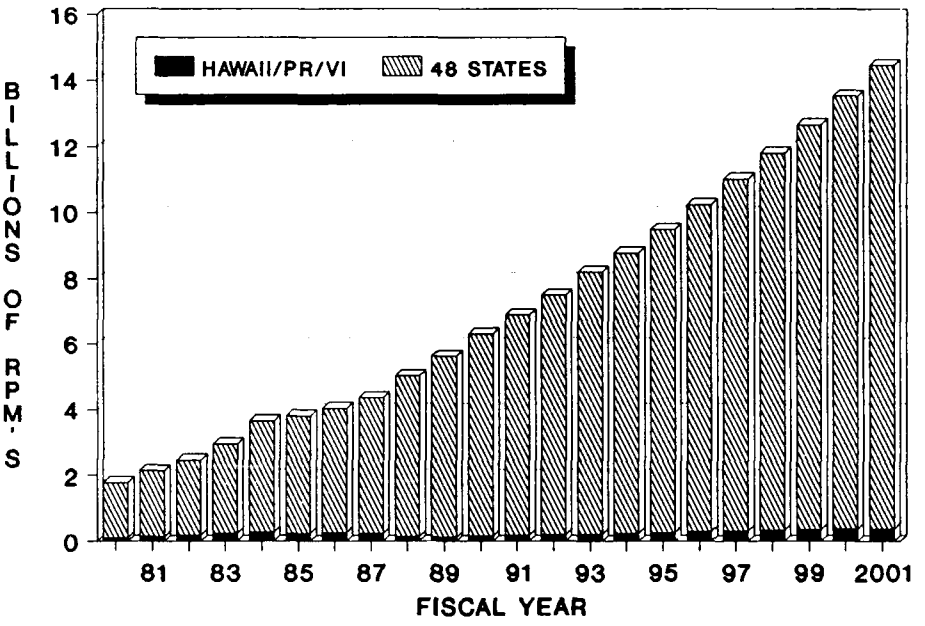
Over the forecast period, it is projected that the average seats per aircraft will grow at a rate more than twice that of the fleet, reflecting the continued introduction of larger aircraft. The fleet is projected to grow at an average annual rate of 1.9 percent, increasing from 1782 units in 1989 to 2229 in 2001. During this time the average seats per aircraft is projected to increase at an average annual rate of 4.3 percent, increasing from 20.4 in 1989 to 33.8 in 2001.

The number of aircraft having under 15 seats, which once made up the bulk of the fleet, continues to decline. In 1989 this group made up 30.2 percent of the fleet. This decline is projected to continue throughout the forecast period. Between 1989 and 2001, the number of aircraft in this category is expected to decline from 538 to 153, a drop of 71.6 percent. By the year 2001 it will represent only 6.9 percent of the total fleet.

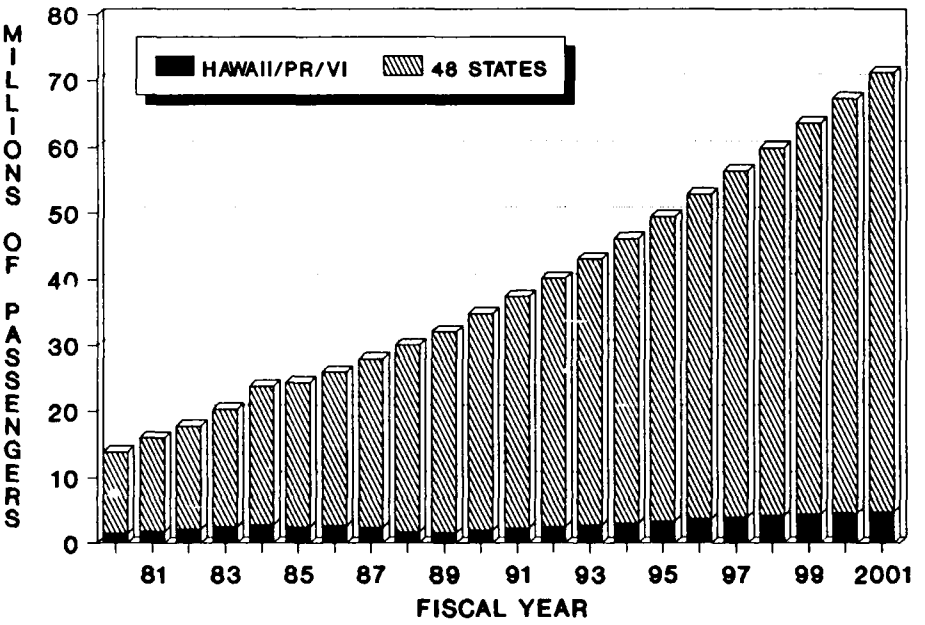
In 1989, the "15-20 seats" category accounted for the largest portion of the fleet at 45.0 percent. Over the last 10 years, most of the growth of the regional/commuter fleet has been in this group of aircraft. During the forecast period, this group is expected to continue to grow through 1992 and decline thereafter. It is projected that the "15-19 seats" category will then drop approximately

U.S. REGIONALS/COMMUTERS

SCHEDULED REVENUE PASSENGER MILES

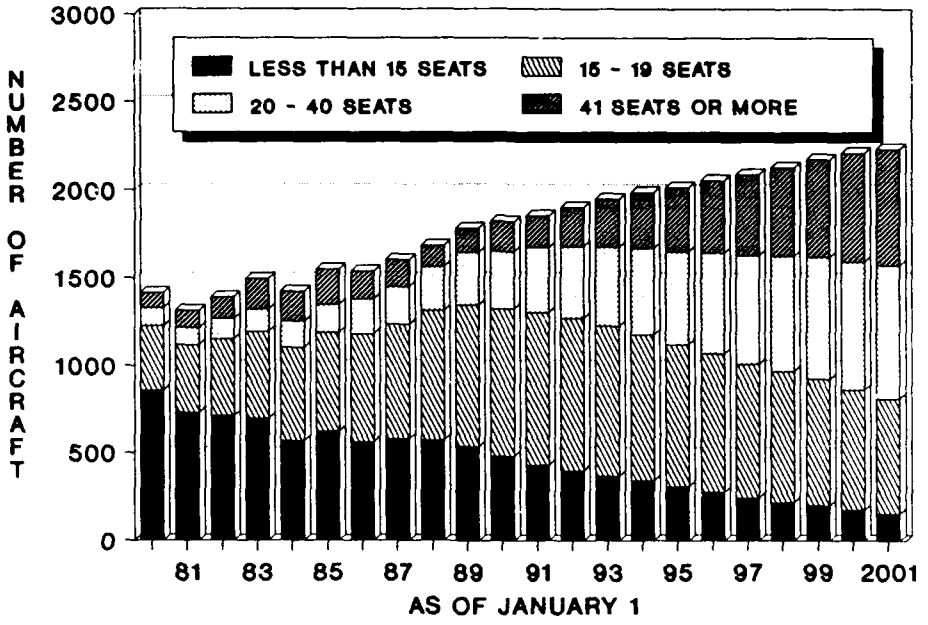


SCHEDULED PASSENGER ENPLANEMENTS

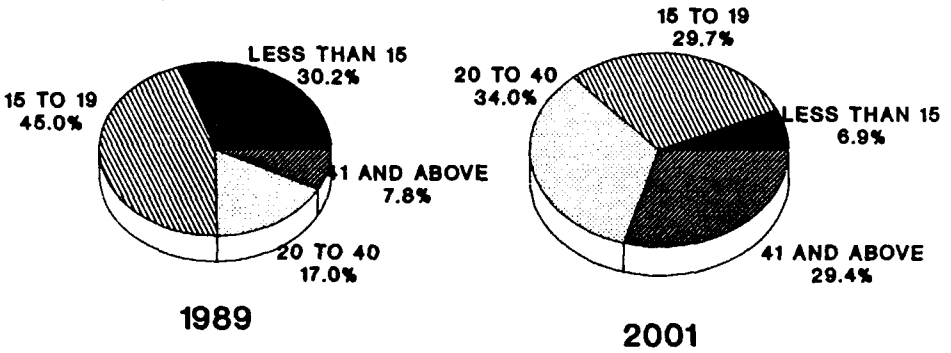


U.S. REGIONALS/COMMUTERS

PASSENGER AIRCRAFT



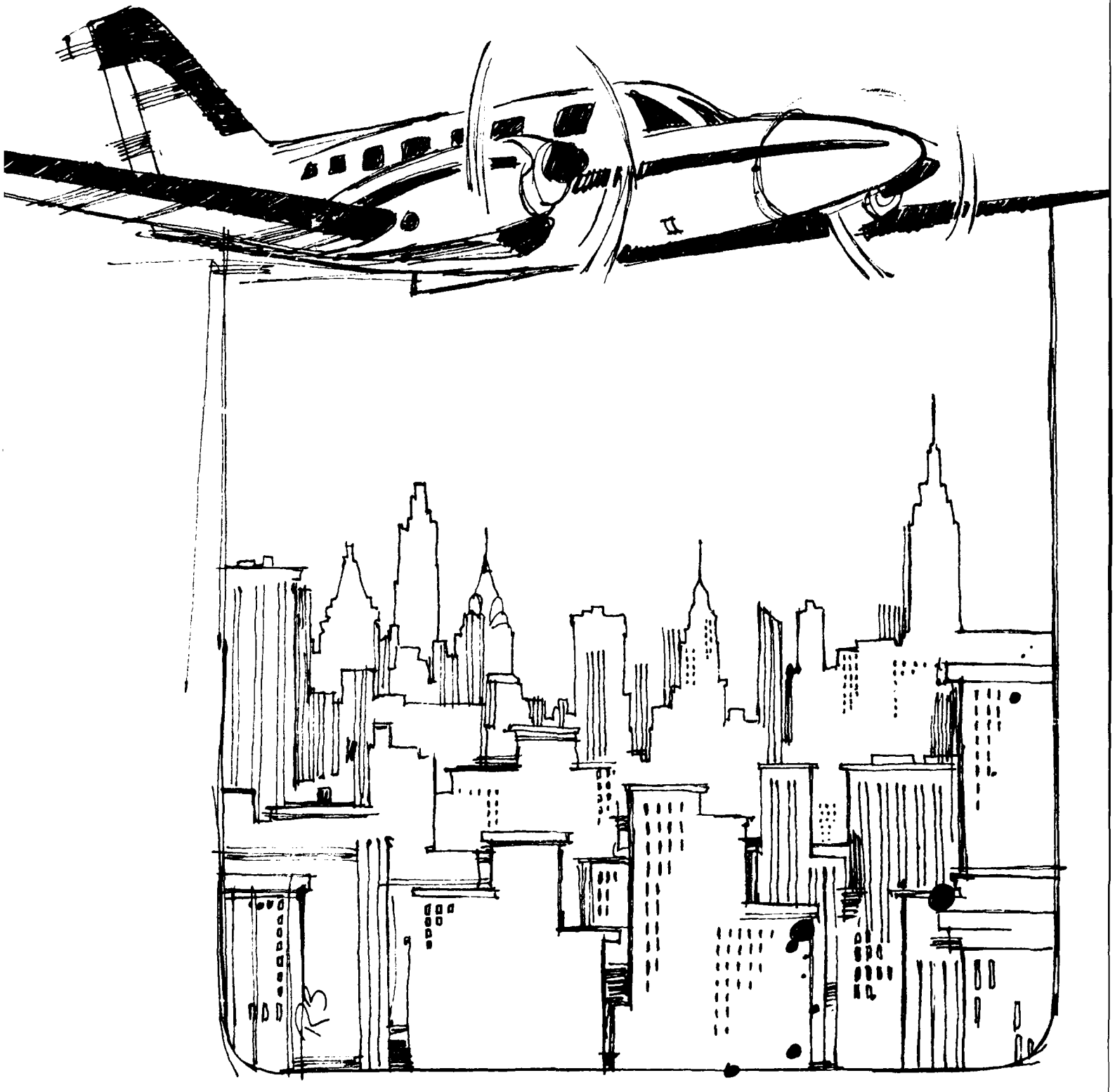
PERCENT BY AIRCRAFT SEAT SIZE



17.5 percent by 2001 compared to 1989, but will still account for just under 30 percent of the fleet.The greatest growth in the fleet will be in the "20-40 seats" and "greater than 40 seats" categories. In 1989, the "20-40 seats" category accounted for 17.0 percent of the fleet while the "greater than 40 seats" accounted for 7.8 percent. By the year 2001, these two categories are expected to account for 63.4 percent of the total fleet, with 34.0 percent being in the "20-40 seats" category and 29.4 percent in the "greater than 40 seats" category. During the forecast period, aircraft in the "20-40 seats" category are expected to increase from 303 aircraft in 1989 to 758 in 2001, an average annual increase of 7.9 percent. Aircraft in the "greater than 40 seats" category are expected to increase from 139 in 1989 to 656 in 2001, an average annual growth of 13.8 percent.

CHAPTER V

GENERAL AVIATION



CHAPTER V

GENERAL AVIATION

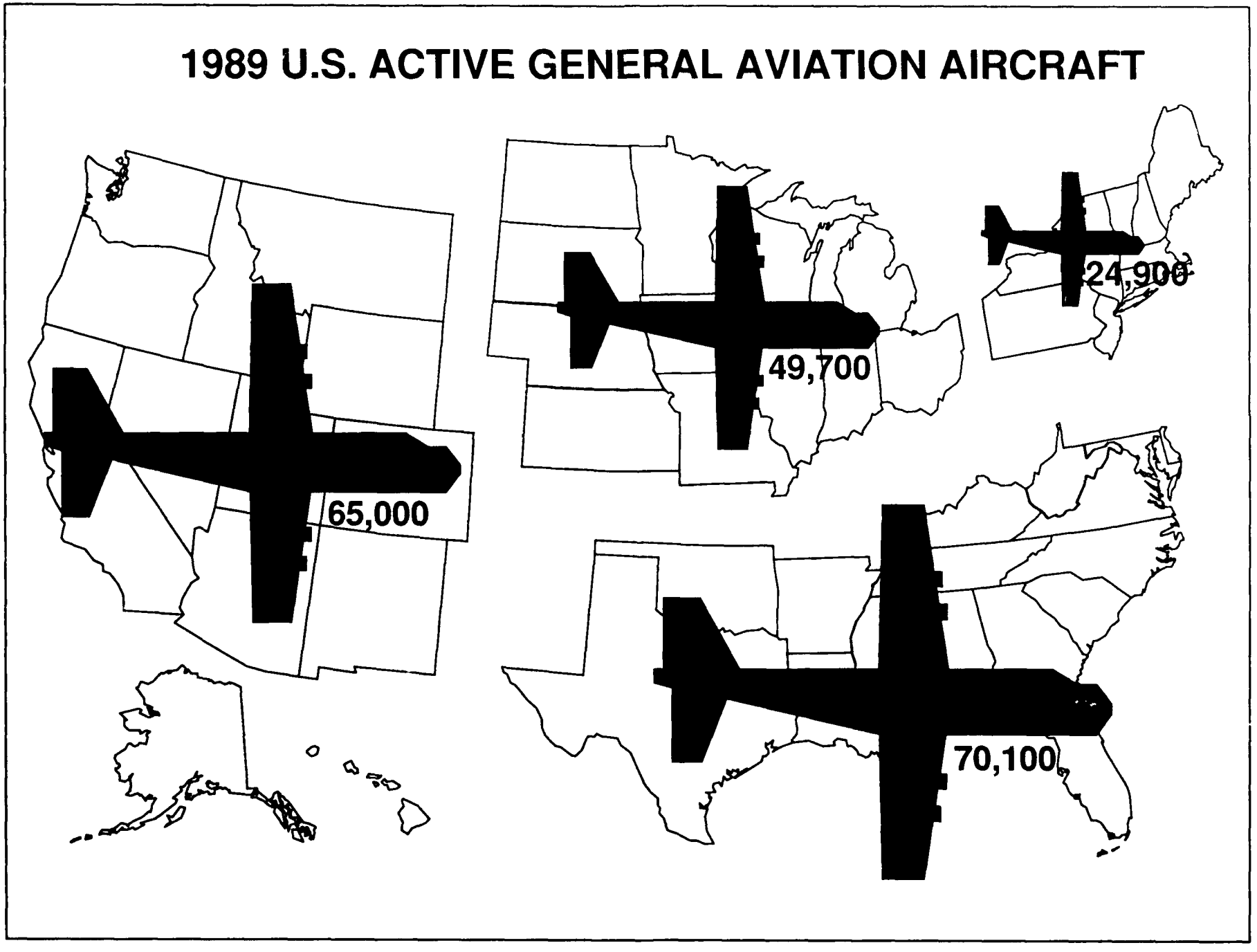
General aviation exhibited mixed signs this past year. Increasing were shipments of piston aircraft (both single and multi-engine) and hours flown. Declining were the total active fleet, shipments of turboprop aircraft, and the student and private pilot populations. Shipments of turbojet aircraft remained the same. Given these mixed signals and data sampling errors, it is difficult to say with any certainty that the long-awaited general aviation recovery is finally occurring. However, it does appear that at least partial recovery is taking place.

The increase for single engine piston aircraft in 1989 was substantial (up 62.9 percent), and it does mark the second increase since shipments reached a high of 14,398 in 1978. Similarly, multi-engine piston shipments recorded their first increase since shipments reached a high of 2,843 in 1979. Turbojet aircraft shipments were constant in 1989 after increasing 28.7 percent in 1988. In 1989 turboprop aircraft shipments were down 7.9 percent after being up 10.6 percent in 1988. (Previously, small increases were recorded for turboprop shipments in 1985 and turbojet shipments increased slightly in 1984.)

REVIEW OF 1989

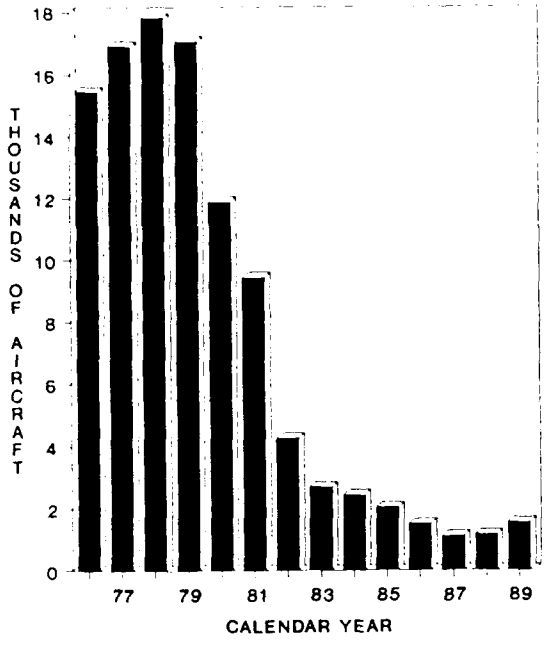
FLEET COMPOSITION AND AIRCRAFT SHIPMENTS

The total active fleet decreased over the last year. (The "active fleet" consists of any aircraft flown at least one hour during the previous year, as reported by the registered owner in a sample survey of general aviation activity.) Some of this decrease may be due to the export of used aircraft; some may be due to increased costs of flying. As of January 1, 1989, the general aviation active fleet consisted of 210,266 aircraft, 3.2 percent less than a year earlier, when it was 217,183. The single engine piston active fleet decreased from 171,035 to 164,760 a decrease of 3.7 percent; the multi-engine piston active fleet decreased from 23,419 to 22,797, a decrease of 2.7 percent; the turboprop active fleet decreased from 5,274 to 5,259 a decrease of 0.3 percent; and the turbojet active fleet decreased from 4,338 to 4,187, a decrease of 3.5 percent. Other aircraft (e.g., rotorcraft piston, rotorcraft turbine) were up 1.2 percent, from 6,333 to 6,406. (Active general aviation aircraft for January 1, 1989, are depicted in the accompanying graph.)

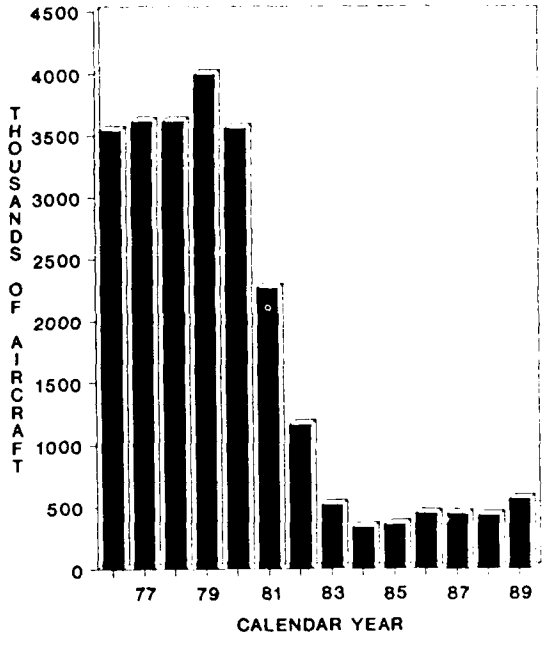

1989 U.S. ACTIVE GENERAL AVIATION AIRCRAFT
65,000
49,700
24,900
70,100

GENERAL AVIATION SHIPMENT TRENDS

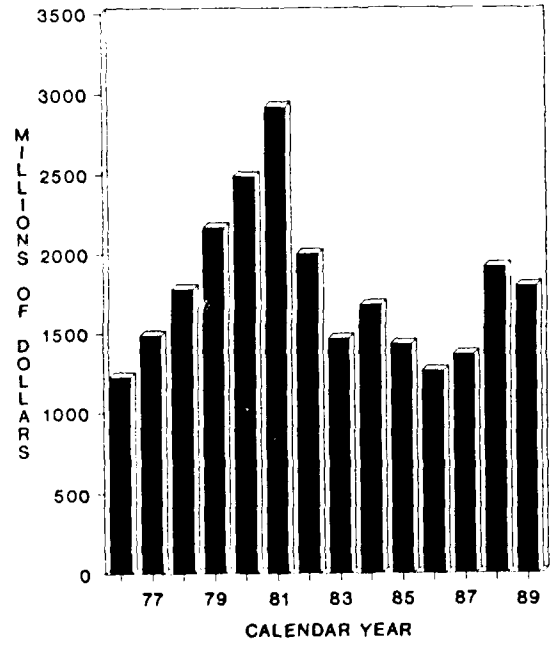
TOTAL UNITS SHIPPED



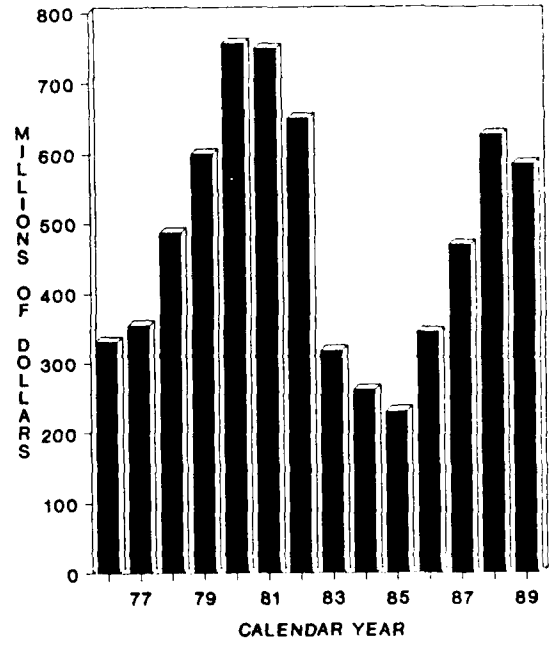
UNITS EXPORTED



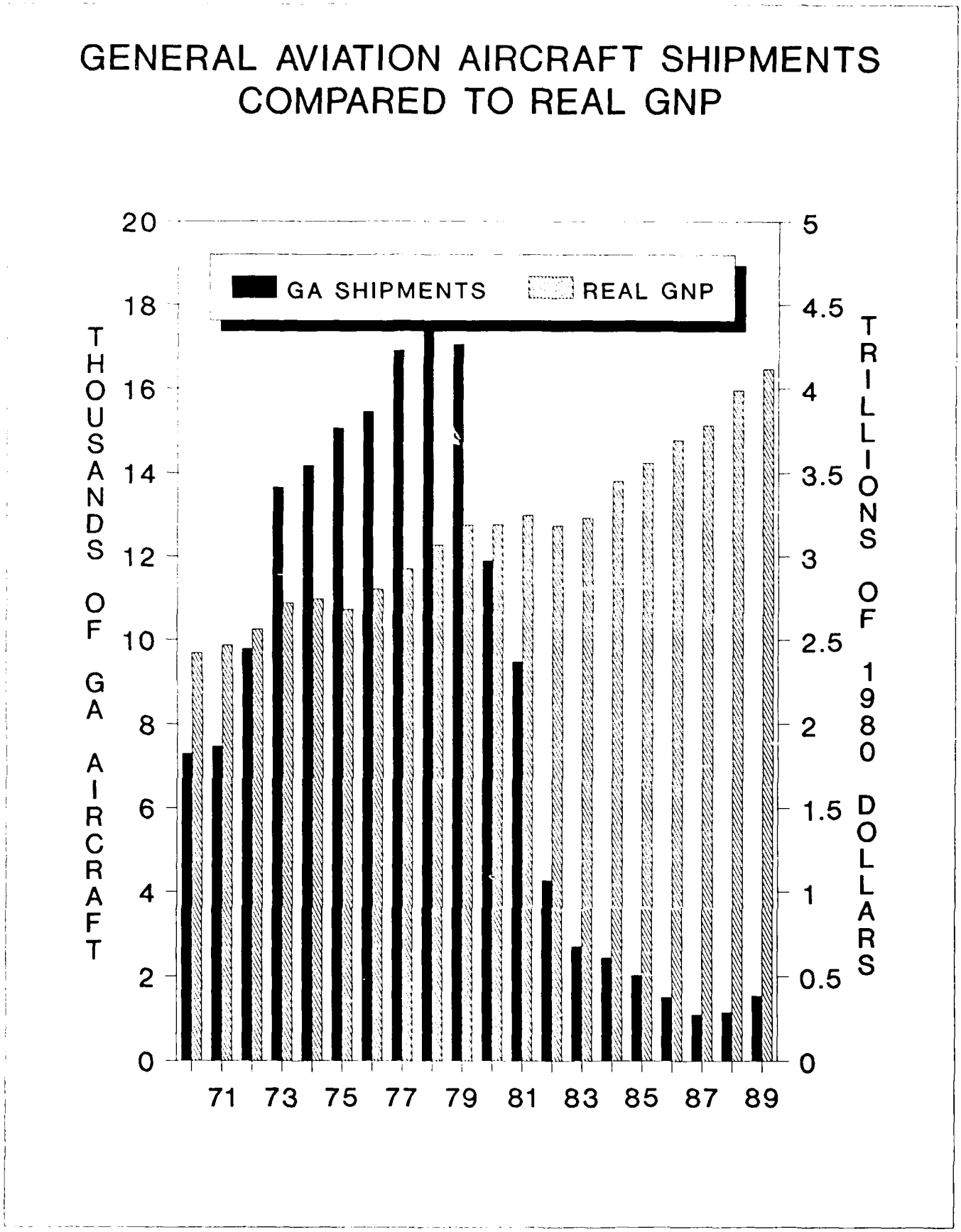
TOTAL FACTORY NET BILLINGS



FACTORY NET EXPORT BILLINGS



GENERAL AVIATION AIRCRAFT SHIPMENTS COMPARED TO REAL GNP



Total shipments increased substantially over the last year. In 1988 shipments equaled 1,143 and in 1989 they equalled 1,535, an increase of 34.3 percent. Single engine piston aircraft shipments increased from 628 to 1,023, an increase of 62.9 percent; multi-engine piston aircraft shipment increased from 67 to 87, a increase of 29.9 percent; turboprop shipments declined from 291 to 268, an decrease of 7.9 percent; and turbojet shipments remained unchanged at 157.

Exports of new aircraft increased. In 1989, exports increased from 425 to 559 units, an increase of 31.5 percent. This reverses a trend begun in 1979, when exports were 3,995 units (although there had been minor increases in 1985 and 1986). Conversely, however, net billings from exports fell in 1989, falling from $626.8 million in 1988 to $585.0 million in 1989, a decline of 6.7 percent. These opposite trends in 1989--exports up, billings down--suggest that the per unit value of aircraft exported in 1989 was declining. As always, exports and their value are highly dependent on the price of aircraft, the rates of exchange with the U.S. dollar, and national and international economic growth.

With the total active fleet decreasing and total shipments increasing, it appears clear that more aircraft were retired from service (either temporarily or permanently) or were exported. Furthermore, since total hours flown increased (see next section), it appears that the existing active fleet was probably used more extensively.

HOURS FLOWN

Total hours flown were up over the previous year by 1.2 percent. In fiscal year 1988, total hours flown equalled 33.5 million; in fiscal year 1989, they equalled 33.9 million. Hours flown in single-engine piston aircraft increased from 22.0 to 22.1 million, an increase of 0.5 percent; hours flown in multi-engine piston aircraft decreased from 4.4 to 4.3 million, a decrease of 2.0 percent; hours flown in turboprop aircraft increased from 2.3 to 2.4 million, an increase of 4.3 percent; and hours flown in turbojet aircraft increased from 1.6 to 1.7 million, an increase of 6.2 percent. We believe that the increases in hours flown in turboprop and turbojet aircraft reflect an increased business usage of general aviation aircraft, as well as increased commuter and taxi operations.

It is also important to note that hours flown by turbine powered rotorcraft increased from 2.0 to 2.25 million a hefty 12.5 percent increase. This follows on extraordinary growth in the previous year of 25.0 percent. Clearly, these statistics indicate a strong and growing market for turbine powered rotorcraft--a market that we believe will continue.

PILOT POPULATION

As of January 1, 1989, the total pilot population was 694,016. This was 5,637 fewer pilots than a year earlier when the pilot population was 699,653, a decrease of 0.8 percent. The pilot population consists of four major groups: student, private, commercial, and airline transport. Three of the four groups declined during the previous year; only the airline transport category grew. Student pilots declined from 146,016 to 136,913, a decrease of 6.2 percent; private pilots declined from 300,949 to 299,786, a decrease of 0.4 percent; commercial pilots decreased from 143,645 to 143,030, a decrease of 0.4 percent; and airline transport increased from 91,287 to 96,968, an increase of 6.2 percent. These changes follow the trends of previous years, when (generally) student, private, and commercial pilot populations have been declining, while the airline transport pilot population has been increasing. These trends, unchanged in 1989, reflect the increased demand for air transport pilots

and the declining interest in or ability to afford recreational and private flying. These declines in recreational and private pilots bodes poorly for the commercial air carriers in the future, as their demand for pilots is estimated to increase. Where these seasoned, experienced pilots will come from remains a question, especially since the military is expected to make increased efforts to retain its experienced pilots. (In the short-run, however, this may change if significant reductions are made in the military budget, especially in areas affecting military pilots.)

DISCUSSION OF FACTORS AFFECTING GENERAL AVIATION

This section discusses four factors which affect general aviation: general growth in the economy; cost factors; the deregulation of air carriers; and consumer preferences.

GENERAL ECONOMIC GROWTH

Fundamental changes may be taking place in the general aviation industry. During previous economic cycles, changes in the general aviation industry have generally paralleled changes in business activity. If business activity was up, so was general aviation. If down, so was general aviation. Empirical evidence suggested that if GNP increased 1.0 percent, general aviation shipments would increase about 4.0 percent.

However, since the long and precipitous decline of aircraft shipments began in the late 1970s, this expected result has not occurred. For example, in 1983--an especially good year for the economy--GNP increased 3.4 percent, but shipments fell 37.0 percent. Clearly, the old model has not been working well.

The accompanying figure shows this historical relationship between real GNP and general aviation shipments. Prior to 1980 the two moved in tandem. However from 1980 through 1987, the relationship was reversed, with GNP growing and shipments declining. In 1987 we begin to see signs of recovery in total shipments.

A portion of these declines during years of generally robust economic growth probably can be attributed to higher costs for purchasing, operating, and insuring aircraft, as well as increased product liability by the manufacturers.

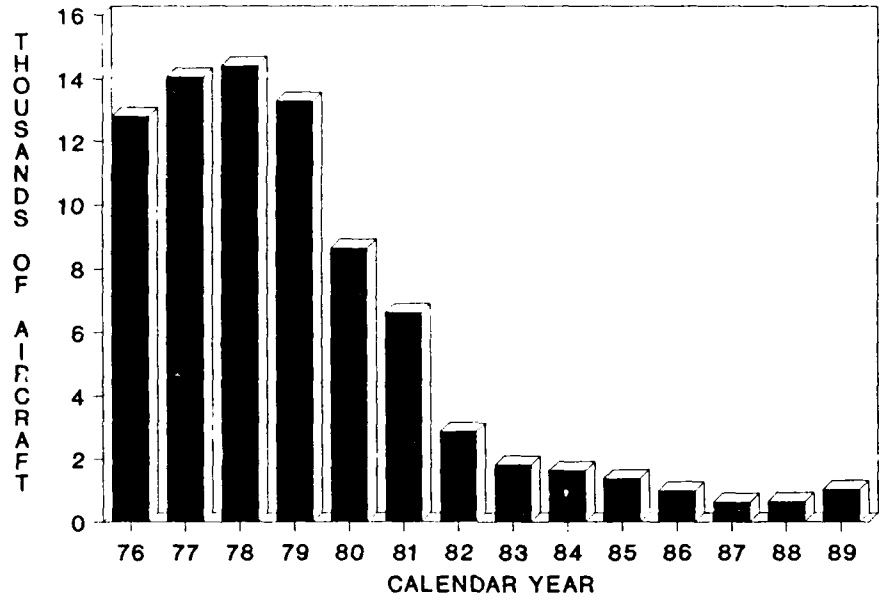
COST FACTORS

The total cost of owning (maintenance and operating) single-engine piston, multi-engine piston, turboprop, and turbojet has been steadily increasing. As detailed in Appendix G, the total nominal cost of owning and operating an aircraft has increased between 62 and 73 percent since 1978. (This compares to a 90 percent increase in the CPI over these same years.) Last year, however, the increases were much less, rising by only one percent or less. A single-engine piston aircraft has increased by 73.2 percent since 1978 and by 0.7 percent last year; a multi-engine piston aircraft by 65.2 percent and 1.0 percent; a turboprop aircraft by 62.1 percent and 0.8 percent; and a turbojet aircraft by 64.0 percent and by 0.7 percent.

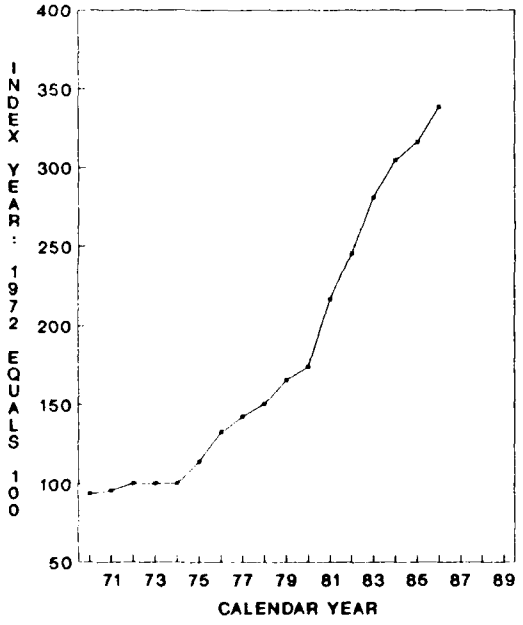
In addition (and as also detailed in Appendix G), the nominal cost of purchasing aircraft has also risen dramatically. Since 1978, the cost of purchasing a single engine piston aircraft has increased by 126 percent (through 1986, the last year for which data are

SINGLE ENGINE PISTON AIRCRAFT TRENDS

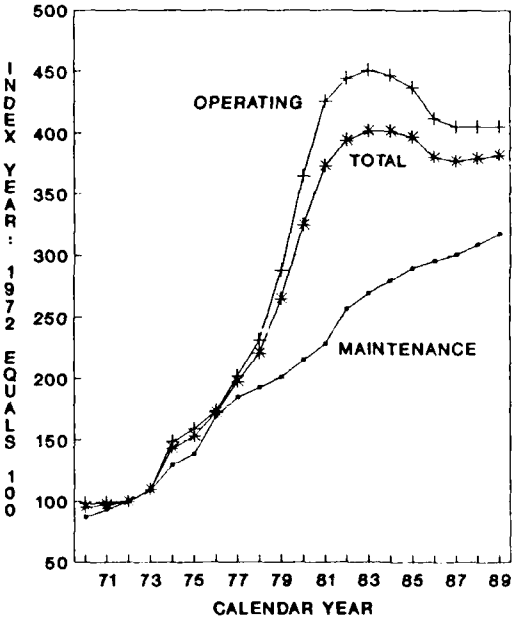
AIRCRAFT SHIPMENTS



AIRCRAFT PRICES

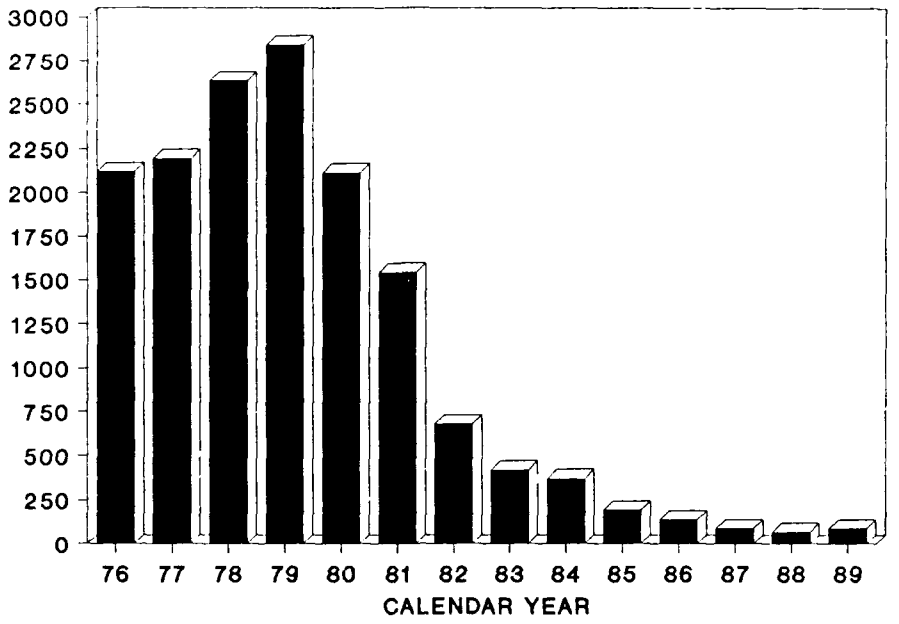


OPERATING AND MAINTENANCE COSTS

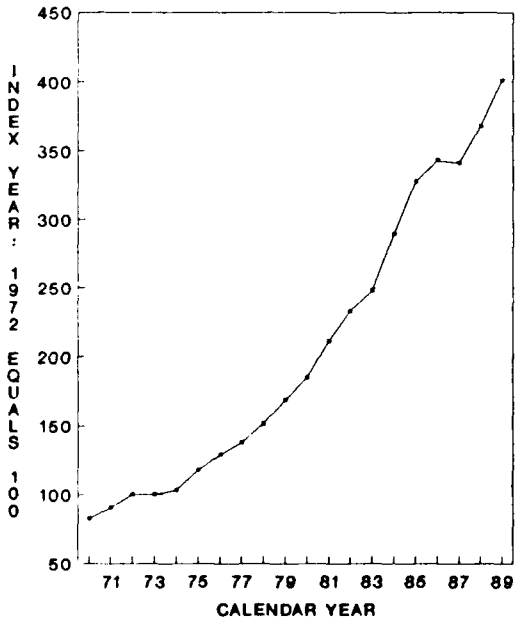


MULTI-ENGINE PISTON AIRCRAFT TRENDS

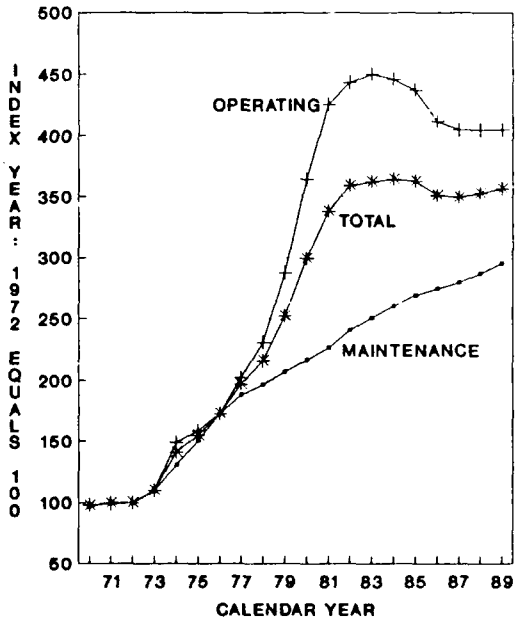
AIRCRAFT SHIPMENTS



AIRCRAFT PRICES

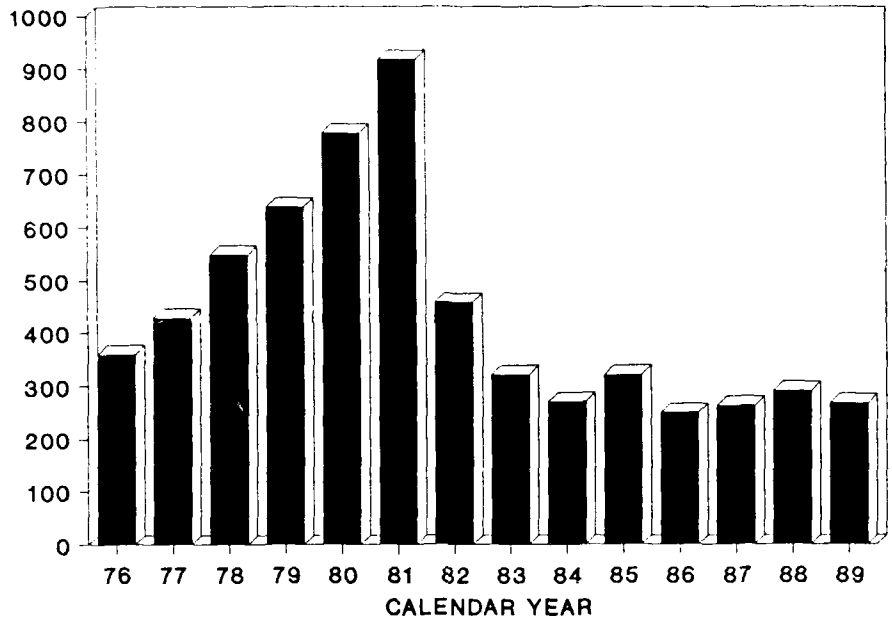


OPERATING AND MAINTENANCE COSTS



TURBOPROP AIRCRAFT TRENDS

AIRCRAFT SHIPMENTS



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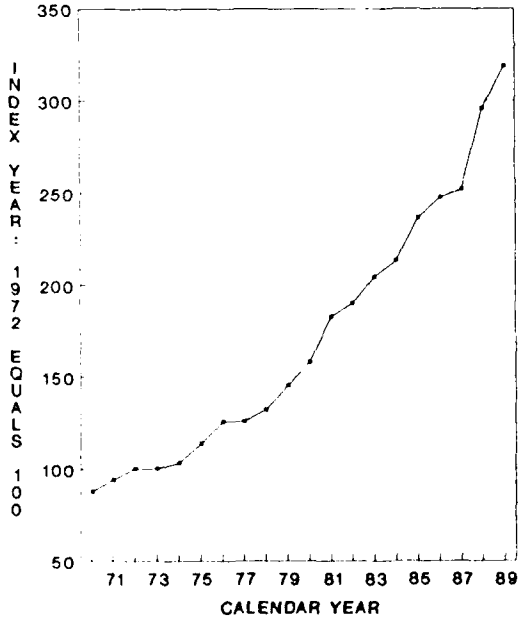
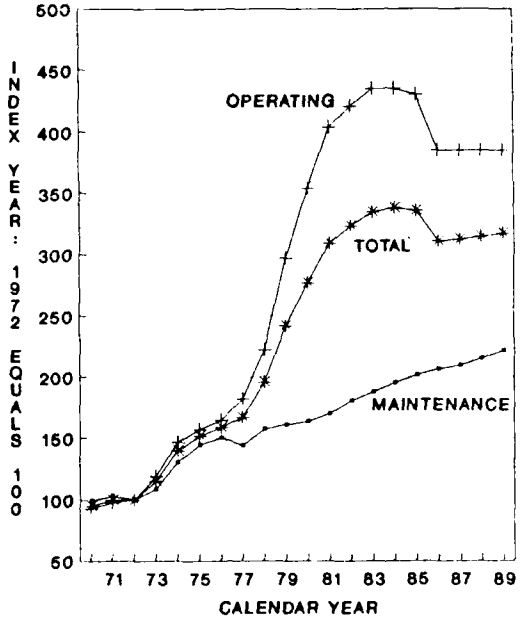
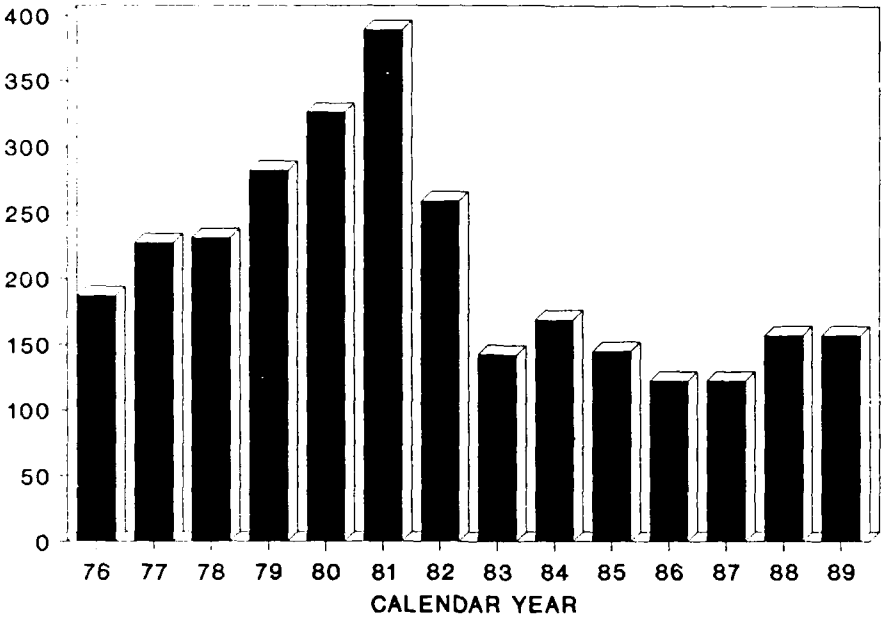


OPERATING AND MAINTENANCE COSTS

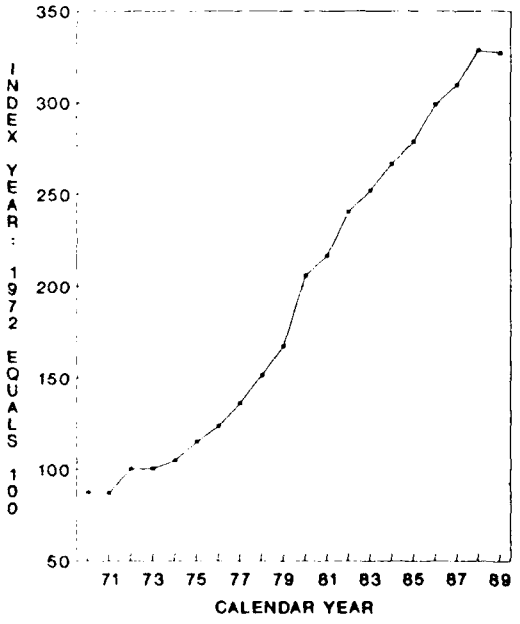


TURBOJET AIRCRAFT TRENDS

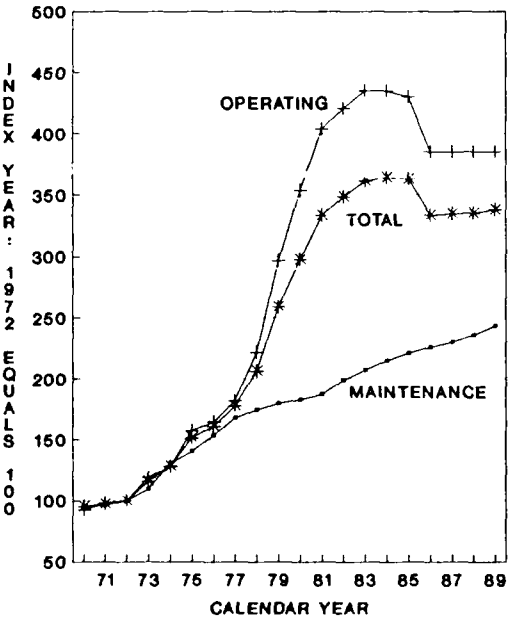
AIRCRAFT SHIPMENTS



AIRCRAFT PRICES



OPERATING AND MAINTENANCE COSTS



available); the cost of purchasing a multi-engine piston aircraft has risen by 164 percent; the cost of purchasing a turboprop aircraft has risen by 141 percent; and the cost of purchasing a turbojet has risen by 115 percent. However, over the last year, these increases have moderated, with the purchase price of multi-engine piston aircraft and turboprop aircraft increasing by only 9.0 percent and 7.7 percent, respectively, while the cost of purchasing a turbojet aircraft actually declined by 0.4 percent. (Data for single engine piston aircraft are unavailable.)

Clearly, these increases, both in maintenance and operating costs and in the purchase price, have negatively affected general aviation. However, the price increases since 1978 appear to be moderating in 1989, and these moderate increases (and, in the case of purchasing a turbojet, a decline) are a good omen for the future of general aviation.

However, these economic and cost factors may not explain the total change we are witnessing, especially since the real cost of operating an aircraft has declined since 1978.

DEREGULATION OF THE AIR CARRIERS

The deregulation of the airlines has also likely affected general aviation. Increased service and better connections by air carriers and commuters has likely reduced the desirability of using private, general aviation aircraft when planning business or pleasure trips. On the other hand, as fares increase (as they have been for the last couple of years) and as air carrier delays and congestion mount, one could expect that the general aviation alternative becomes more attractive. Testing and measuring these hypotheses remain to be done, although they do seem to be intuitively correct.

CONSUMER PREFERENCES

Although the economic changes and the impact of deregulation are important, 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 equal to or more destabilizing to general aviation than the economic and cost factors. Changing tastes could upset the historic economic relationship, as people elected to spend their discretionary time and money on activities other than general aviation. If this is the case, then falling prices, reduced operating costs, and a solution to the liability issue may not be sufficient to revive the general aviation sector.

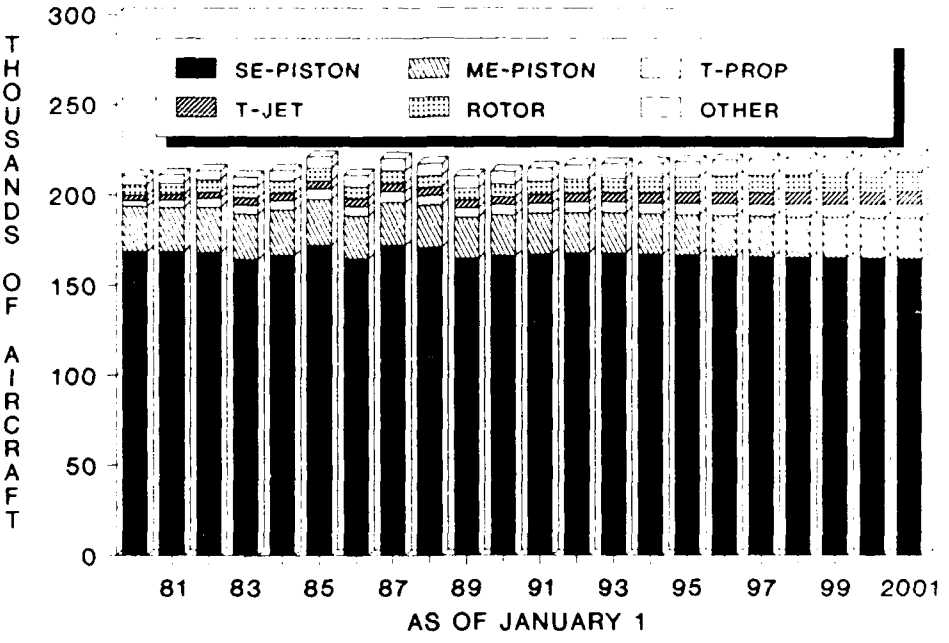
Combining these factors--general economic trends, cost factors, the deregulation of air carriers, and consumer preferences--is very difficult and needs more work. As we work with the industry to improve the general aviation forecast model, all these factors are being considered.

GENERAL AVIATION FORECASTS

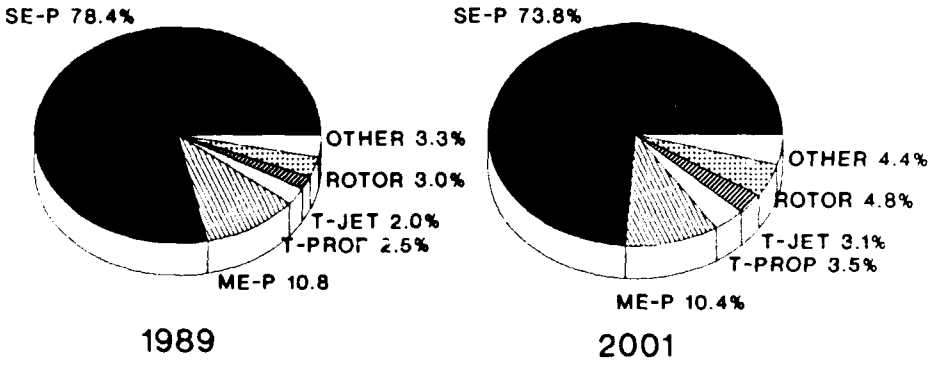
FLEET COMPOSITION AND AIRCRAFT SHIPMENTS

In this area, we forecast only active aircraft. As shown in Table 17, the active general aviation fleet will grow slowly over the entire forecast period. The population of active aircraft is forecast to increase 0.5 percent over the 12-year forecasting period. There will be annual growth of 0.6 percent from 1990 to 1995 and annual growth of 0.3 percent from 1996 through 2001.

ACTIVE GENERAL AVIATION AIRCRAFT



PERCENT BY AIRCRAFT TYPE



Active ingle engine piston aircraft is projected to decline at an annual rate of less than 0.1 percent, falling from 164,800 in 1989 to 164,400 in 2001. The number of multi-engine piston aircraft is expected to decline through 1994 and then to increase at about 100 units per year until the total reaches the level of 23,100 in 2001, an annual growth rate of 0.1 percent. Turbine-powered aircraft is projected to increase from 9,500 in 1989 to 14,600 in 2001, an annual growth rate of approximately 3.6 percent. The forecast of the turbine rotorcraft fleet shows an annual rate of increase of 4.3 percent.

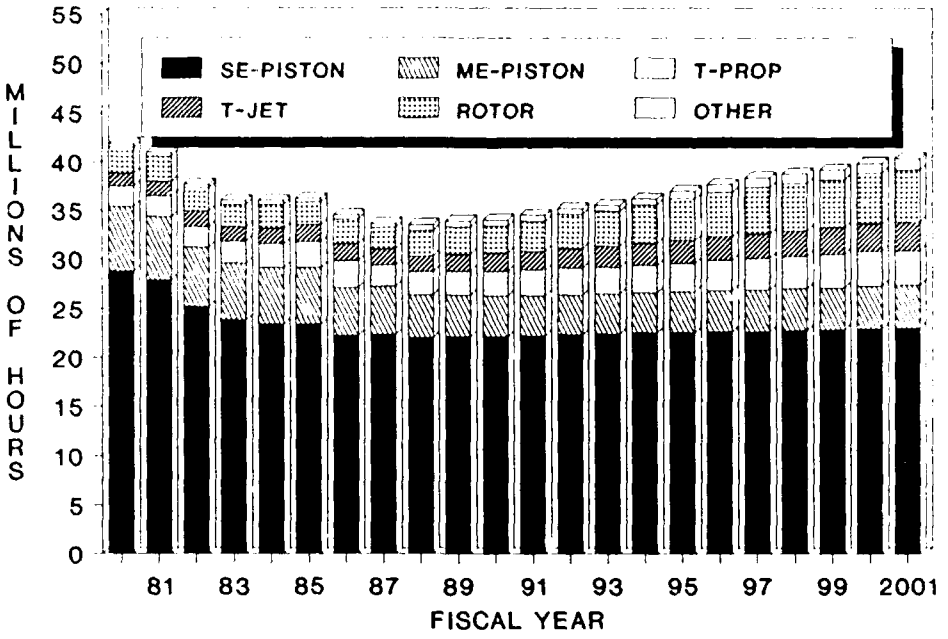
HOURS FLOWN

As shown in Table 19, growth over the entire forecast period for general aviation hours is expected to average only 1.5 percent a year, resulting in an estimated 40.4 million hours flown in 2001. (By contrast, the average annual growth rate in hours flown was about 6.0 percent in the 1960's and 1970's.) Single engine piston aircraft hours flown is forecast to increase from 22.1 million hours in 1989 to 23.0 million in 2001. Turbine-powered aircraft hours flown is projected to increase from 4.1 million in 1988 to 6.4 million in 2001, an annual growth rate of 3.8 percent. Turbine rotorcraft hours flown is expected to increase at an annual rate of 6.5 percent over the forecast period.

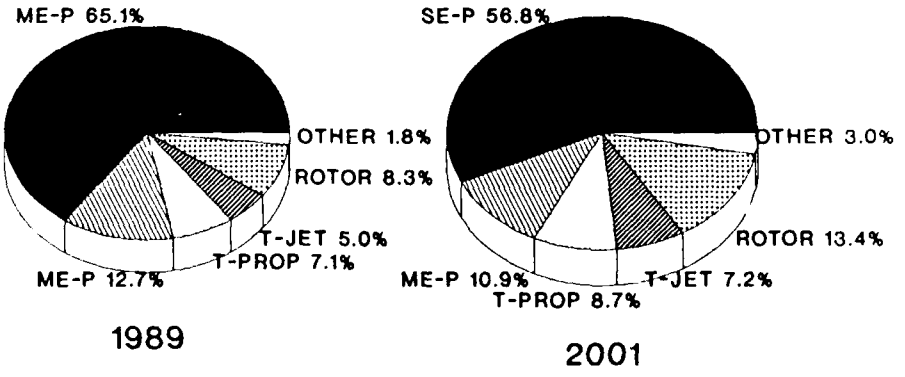
PILOT POPULATION

As shown in Table 20 and as based on the expected strong demand for airline transport pilots, the downward trend in the pilot population is expected to turn around in 1990. The total pilot population will increase by 1.5 percent to 704,300 pilots in 1990. The pilot population will increase by 1.2 percent annually through the first half of the forecast period and then decline by 0.8 percent annually in the last half of the forecast period. Student pilots will increase 2.0 percent in 1990. Over the entire forecast period student pilots will increase 1.4 percent annually over the first half of the forecast period and then fall by 0.4 percent annually over the latter half of the forecast period. Private pilots should increase by 0.3 percent annually over the whole forecast period. The airline transport pilot population are expected to increase by 4.6 percent to 101,500 airline transport pilots in 1990. Over the entire forecast period, the airline pilot population will increase 3.1 percent annually through 1995 and then fall by 2.4 percent annually in the latter half of the forecast period.

GENERAL AVIATION HOURS FLOWN

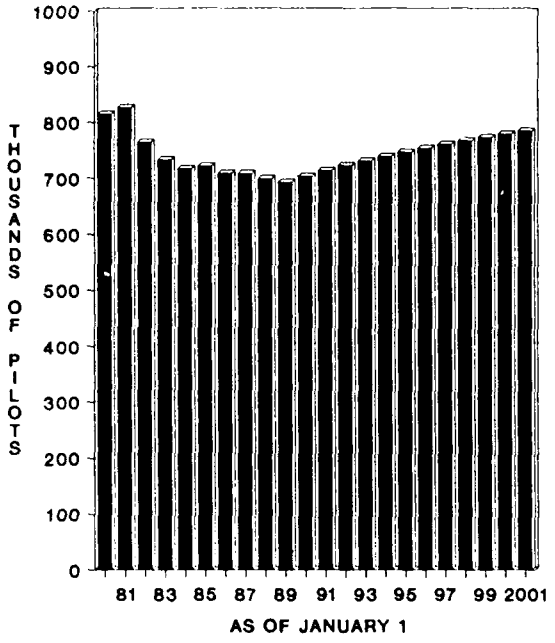


PERCENT BY AIRCRAFT TYPE

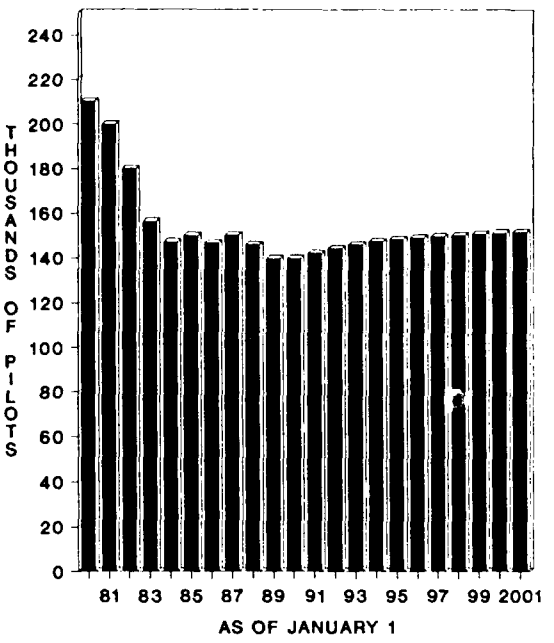


ACTIVE PILOT TRENDS AND FORECASTS

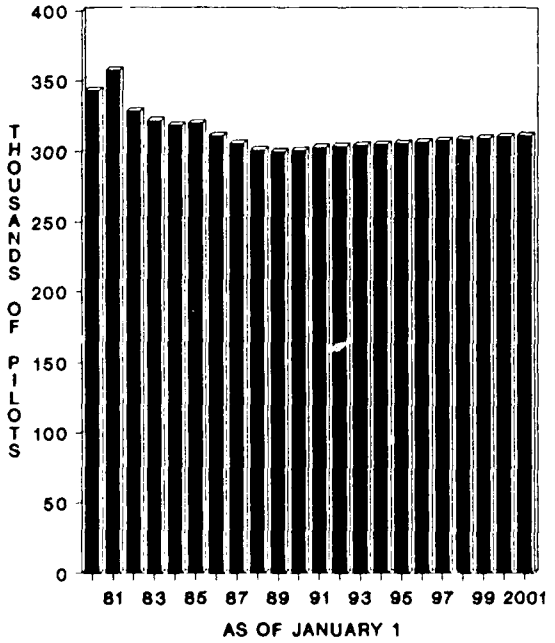
TOTAL PILOTS



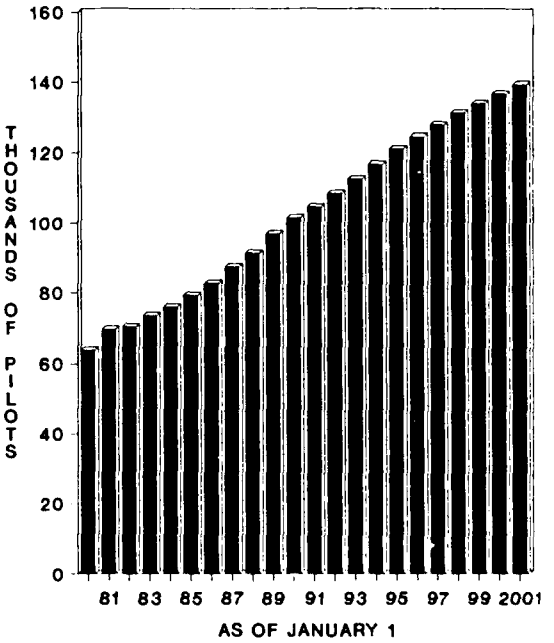
STUDENT PILOTS



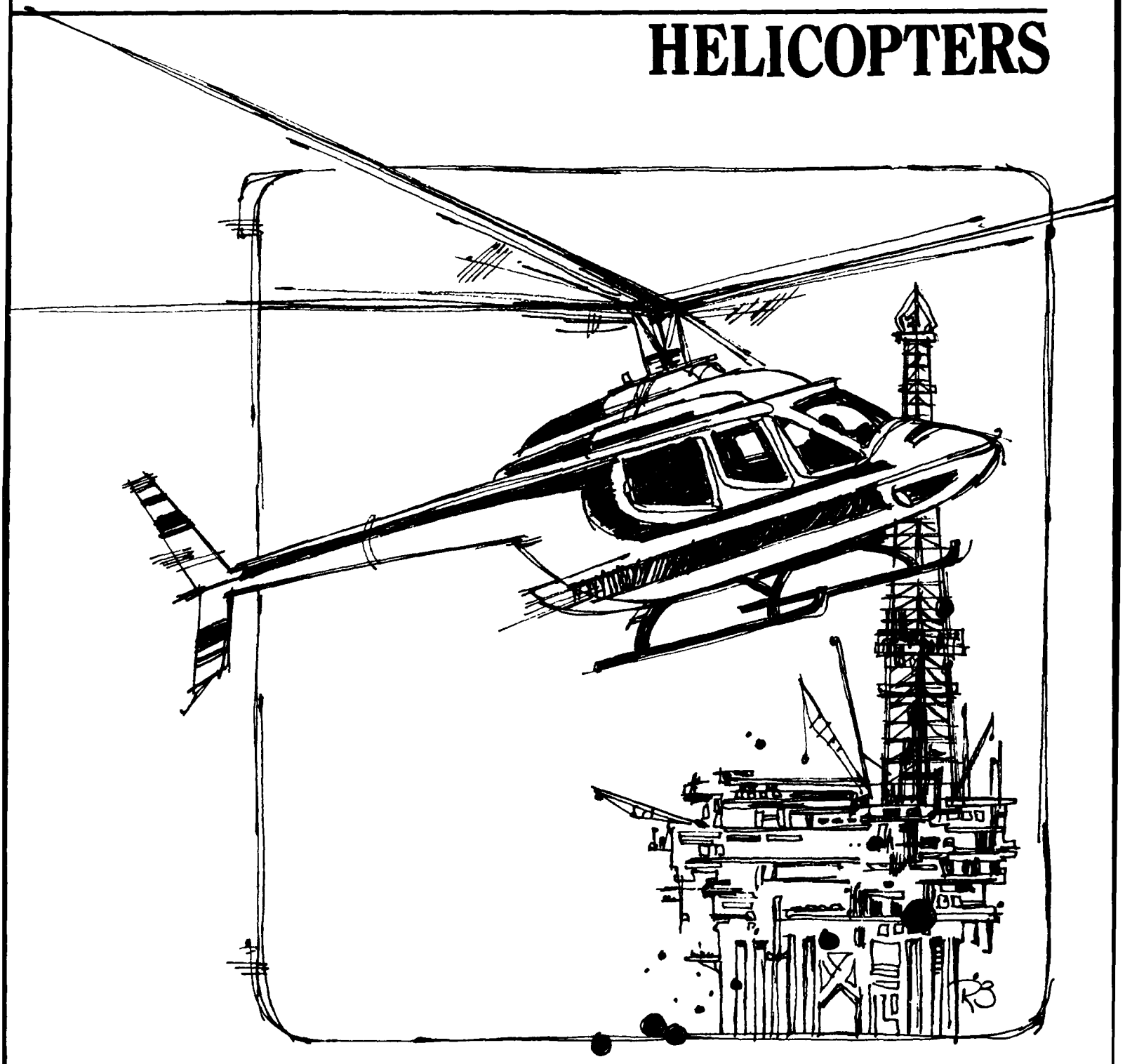
PRIVATE PILOTS



AIRLINE TRANSPORT PILOTS



CHAPTER VI
HELICOPTERS



CHAPTER VI

HELICOPTERS

REVIEW OF 1989

SHIPMENTS

Preliminary data for calendar year 1989 indicate that shipments of United States civil helicopters will total 499 units that will be valued at $243 million. Compared to 1988, the number of helicopters shipped increased by 30.3 percent but the value of the shipments decreased significantly (down 27.2 percent) due largely to the production of a number of smaller training units.

In 1989, the value of complete helicopters exported declined by 19.6 percent to $176 million. Imports increased by 5.8 percent to $110 million. Thus, production for export in the helicopter industry made a net contribution of $66 million in reducing the trade deficit. This net contribution was lower than the previous year's $115 million.

The recent increase in the number of units shipped and industry expectations of further increases for 1990 combine with decreases in the value of these shipments to emit mixed signals about the possible recovery of the industry.

The technology for a military tiltrotor aircraft has been demonstrated successfully and may be ordered by the armed forces. Because of budgetary constraints, there are uncertainties about future developments of this program. However, it is possible that a tiltrotor aircraft may be introduced into the civilian market by the turn of the century. The aircraft functions as a helicopter on takeoffs and landings, but is capable of flying at a cruising speed of 300 knots per hour at an altitude of 20,000 to 25,000 feet as a conventional fixed-wing aircraft.

It appears that the use of the tiltrotor aircraft in significant numbers has the potential to enhance the capacity of currently congested airports and airspace such as the Northeast Corridor of the United States. However, the tiltrotor aircraft, with its unique operating capabilities, may require extensive specialized communications, surveillance, and navigation equipment in order to realize its potential for providing significant capacity enhancement. FAA is investigating various scenarios or environments that may be conducive to the introduction of the tiltrotor aircraft in the civilian market.

The development and deployment of the specialized equipment required by tiltrotor aircraft, coupled with the construction of additional heliports, would stimulate the use of helicopters in the transportation industry. The relatively high operating costs of both tiltrotor aircraft and helicopters have imposed constraints on operations growth. Technological improvements are

reducing operating costs; this may foster additional research and, eventually, increase the deployment of vertical lift aircraft for civilian use.

FLEET AND HOURS FLOWN

As of January 1, 1989, there were approximately 6,400 active civil rotorcraft in the United States, about 100 more than the 6,300 active helicopters in January 1988. Year-to-year fluctuations in the active rotorcraft fleet are largely the results of national economic conditions and statistical estimating procedures. During recessionary periods, specific helicopter units (for example, those that might be used marginally during economic growth and recovery conditions) are relegated to the inactive category. Such shifts are responsible, in part, for the observed variations in the active fleet. In addition, fluctuations in the number and accuracy of responses to the helicopter section of the general aviation survey introduce statistical variations in the estimates of fleet and hours flown.

Active turbine helicopters numbered 3,800 in 1989, approximately 59.4 percent of the active fleet. The proportion of active turbine helicopters increased slightly in 1989 relative to the 1988 proportion of 55.6 percent. In contrast, the number of active piston-powered rotorcraft (2,600) declined slightly in 1988. The number of piston-powered helicopters has decreased by 21.2 percent relative to the peak of 3,300 observed in 1982.

Rotorcraft flew an estimated 2.8 million hours in 1988. Turbine-powered rotorcraft flew 2.3 million hours, 82.1 percent of the total number of hours flown. The number of hours flown by both turbine-powered and piston-powered rotorcraft increased by about 7.7 percent in 1989 relative to the final estimates for 1988.

HELICOPTER FORECASTS

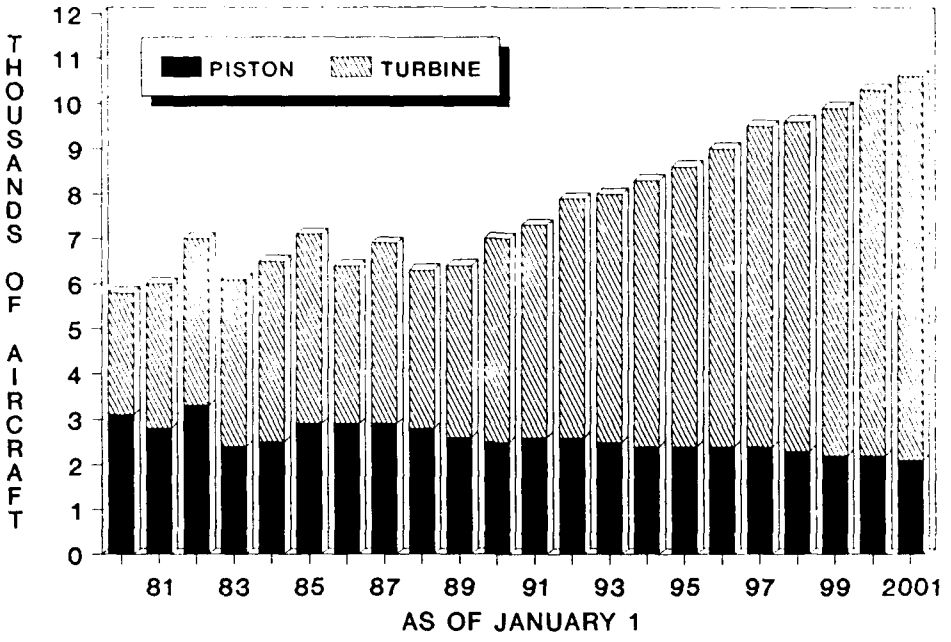
The forecasts of rotorcraft fleet and hours flown presented in this section are based on econometric models and time series analyses which were developed last year. These models and analyses were developed by user category (executive, business, personal, etc.). Forecasts of helicopter activity were generated by user category from these models and were added to obtain the national forecasts. The independent variables used in developing the estimates included the cost of owning a helicopter, total employment, and the cost of oil and gas relative to other prices. One of the underlying assumptions made last year was that the real cost of fuel would increase. As this occurred, increased petroleum production and exploration would be profitable, leading to increased rotorcraft usage, particularly in off shore drilling operations. This, together with increased use of helicopters in the general economy, would lead to an increase in the fleet and in hours flown.

This year's forecasts maintain these assumptions and their rationale, by simply updating last year's effort to reflect data for calendar year 1988 and revised economic conditions in the industry.

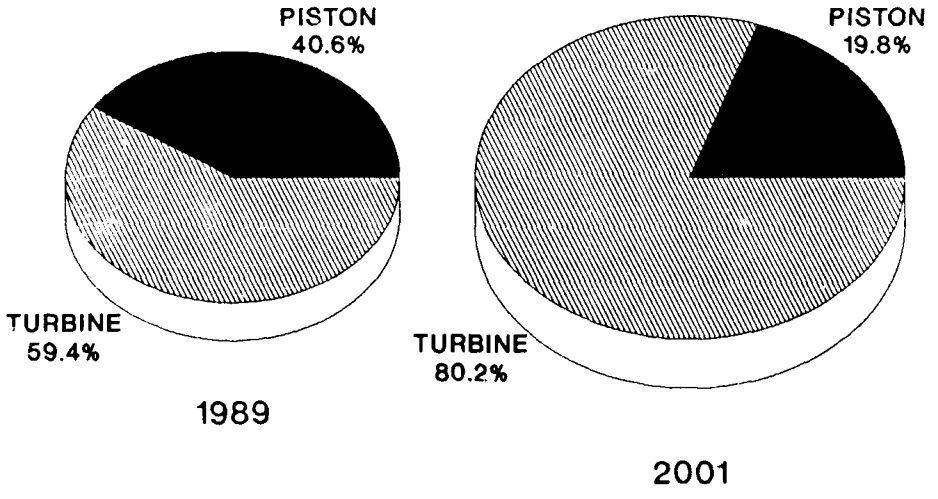
FLEET AND HOURS FLOWN

The active rotorcraft fleet is expected to reach 10,600 in the year 2001, an annual average increase of 4.3 percent over the 1989 level. In 2001, the turbine-powered portion of the fleet will number 8,500. This portion of the fleet will increase to 80.2 percent from the 1989 proportion of 59.4 percent. The piston-powered fleet will decrease to 2,100 from its current level of 2,600 helicopters.

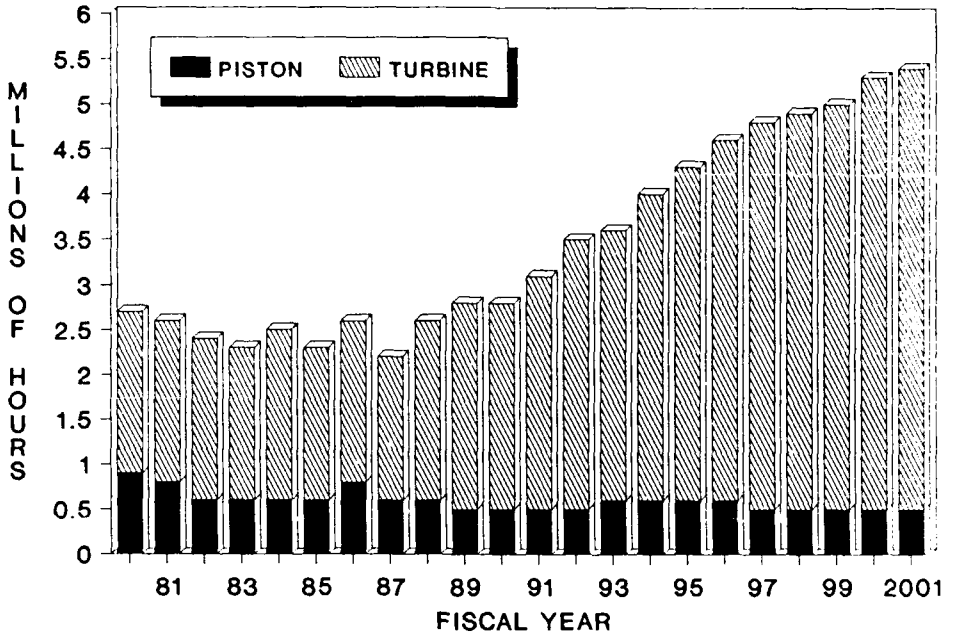
ACTIVE ROTORCRAFT



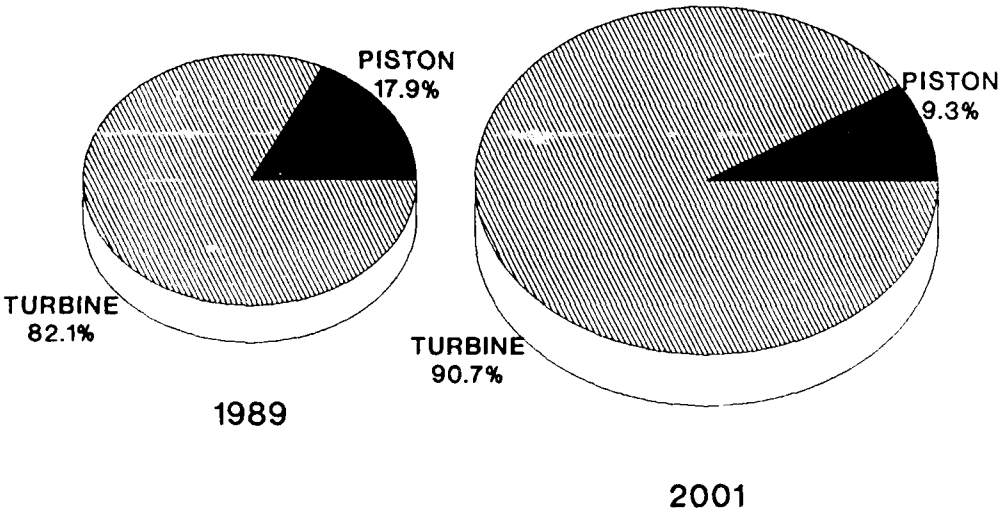
PERCENT BY AIRCRAFT TYPE



ROTORCRAFT HOURS FLOWN



PERCENT BY AIRCRAFT TYPE



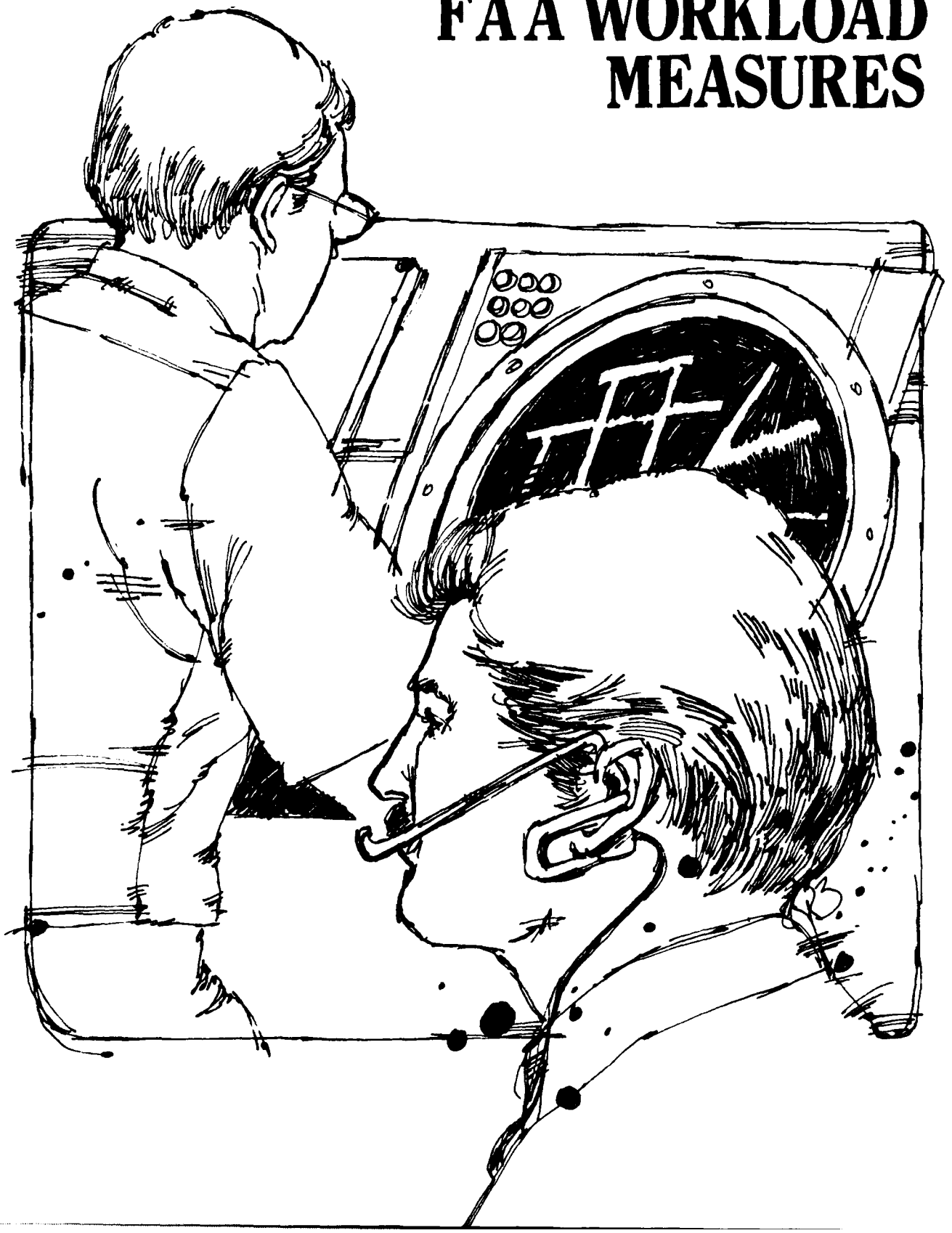
The anticipated growth in the fleet will be accompanied by growth in hours flown which will reach 5.4 million in 2001. This represents an annual average growth of 5.6 percent. Hours flown by turbine-powered helicopters will increase by approximately 113.0 percent and will reach 4.9 million by 2001. In contrast, hours flown by piston-powered rotorcraft will remain virtually constant (500,000 hours) during the forecast period.

FUEL CONSUMED

In 1989, fuel consumed by rotorcraft totaled 86.8 million gallons. By 2001, fuel consumed will increase to about 176.7 million gallons, an average annual increase of 6.1 percent. More than 95.9 percent of the fuel consumed in 2000 will be used by turbine-powered rotorcraft compared with approximately 91.7 percent in 1989.

CHAPTER VII

FAA WORKLOAD MEASURES



CHAPTER VII

FAA WORKLOAD MEASURES

The FAA provides the aviation community with three distinct operational services: (1) air traffic control service at selected airports, (2) traffic surveillance and aircraft separation by Air Route Traffic Control Centers, and (3) flight planning and pilot briefings at Flight Service Stations. All four aviation system user groups--air carriers, commuters/air taxis, general aviation, and military--utilize these FAA operational services to enhance aviation traffic safety.

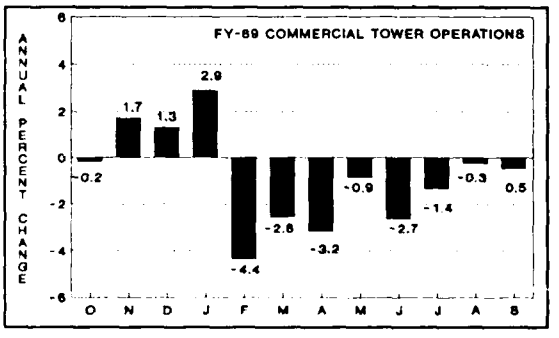
Multiple indicators are used to describe the total FAA operational workload. The four aviation system user groups differ in the demands they impose on the air traffic system. Consequently, no single measure typifies past trends or future demand for the services provided by the FAA. There have been, and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

REVIEW OF 1989

FAA TOWER ACTIVITY

Aircraft activity at the 399 FAA towered airports totaled 61,383,300 in fiscal year 1989, a slight increase (0.1 percent) over the 61,299,017 operations recorded in fiscal year 1988. The increase in 1989 represents the seventh consecutive year of growth, a period during which aircraft activity at FAA towers has increased by 21.2 percent (2.8 percent annually). Despite the strong growth that has occurred since 1982, the level of activity recorded at FAA towered airports in 1989 remains 4.1 percent below the operation counts of the 12-month period immediately preceding the August 1981 air traffic controllers' strike (hereafter referred to as the pre-strike period).

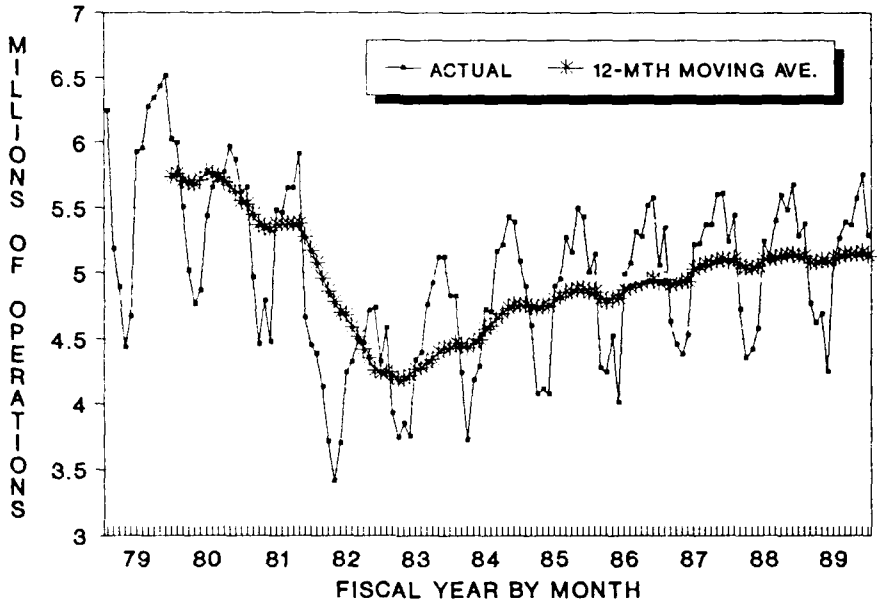
The majority of the growth in activity occurring since 1982 has been the result of strong demand for commercial aviation services. Commercial activity (defined herein as the sum of air carrier and commuter/air taxi operations) has increased by 31.7 percent since 1982. However, this combined user category declined by 0.9 percent in fiscal year 1989, due, in large part, to the lengthy Eastern Air Lines' strike which began on March 4. Based



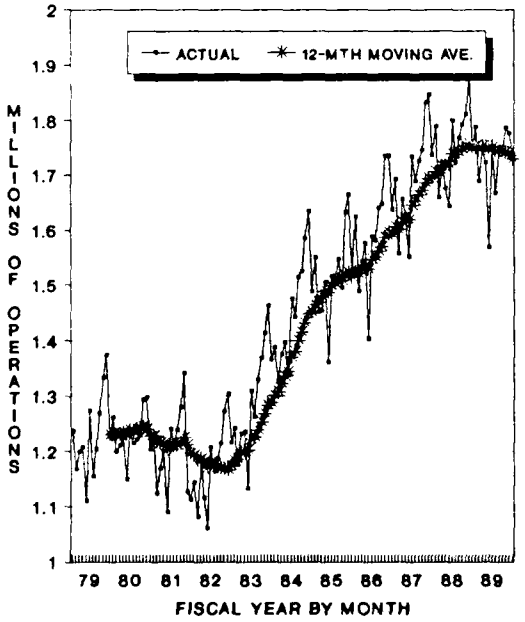
upon Eastern Air Lines' pre-strike activity level (approximately 1,100 daily departures), it is estimated that the Eastern strike reduced air carrier activity by approximately 380,000

TOWERED AIRPORT OPERATIONS

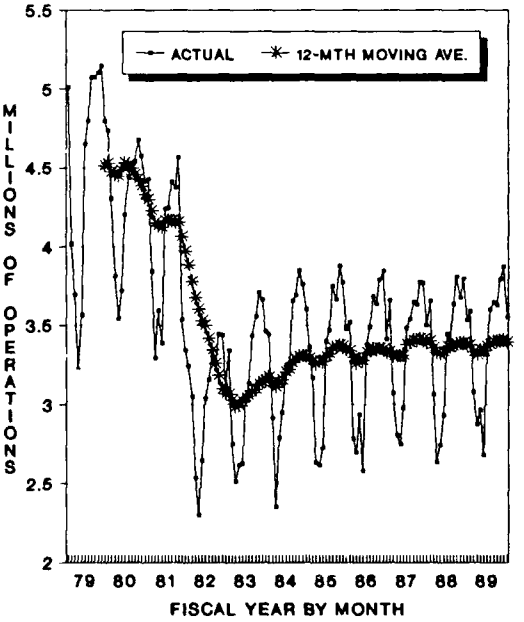
TOTAL OPERATIONS



COMMERCIAL OPERATIONS



NONCOMMERCIAL OPERATIONS



operations (3.0 percent) in 1989. If Eastern had operated at its 1989 pre-strike activity level throughout the March-September period, commercial operations would have increased approximately 1.0 percent in fiscal year 1989.

Noncommercial activity (the sum of general aviation and military operations), on the other hand, has increased by only 11.1 percent between 1982 and 1989. However, activity by this combined user category increased by 0.7 percent in fiscal year 1989.

Air carrier activity at FAA towered airports declined for a second consecutive year in fiscal year 1989, totaling 12,533,400 operations. This activity level represents a 1.7 percent decline from 1988 (12,752,997 operations) and a decline of 4.6 percent from the operation counts recorded in fiscal year 1987. The decline in 1989 was, however, largely the result of the Eastern Airlines' strike. Had the strike not occurred, air carrier operations would have totaled approximately 12.9 million in 1989, 1.3 percent above 1988 activity tower counts.

The fastest growing user group continues to be the commuter/air taxi carriers, this despite the fact that its activity levels increased slightly (almost 0.5 percent) in fiscal year 1989. Commuter/air taxi activity has increased in every year but one (down 3.3 percent in 1986) since the user category was first designated in 1972. Over the past decade, commuter/air taxi activity at FAA towered airports has grown at an average annual rate of 6.6 percent, from 3,657,696 operations in fiscal year 1979 to 8,295,000 operations in 1989. Much of the growth by this user group is the direct result of commuter code-sharing and schedule tie-in agreements with the larger commercial air carriers. It is believed that the Eastern strike did affect the operations of its code-sharing partners somewhat in 1989, especially at Atlanta, Boston, New York, Philadelphia and San Juan, thereby depressing the fiscal year 1989 commuter/air taxi activity counts.

General aviation activity at FAA towered airports (37,749,600 operations) increased by 0.7 percent in fiscal year 1989. General aviation traffic activity has increased in five of the eight years since the 1981 air traffic controller's strike. However, the number of operations recorded in 1989 is equal to only 80.2 percent of general aviation's pre-strike level of operations.

The number of local general aviation operations (15,674,500) increased by 1.8 percent in fiscal year 1989. Itinerant general aviation operations (22,075,100) declined slightly from 1988 activity levels. Based on fiscal year 1989 operation counts, itinerant operations are at 80.3 percent of pre-strike activity levels, while local operations, are at 81.2 percent of the pre-strike level.

Military operations totaled 2,805,300 in fiscal year 1989, 0.6 percent above 1988 levels. Local military operations (1,392,700) increased by 1.6 percent in 1989 while itinerant military operations (1,412,600) declined by 0.3 percent.

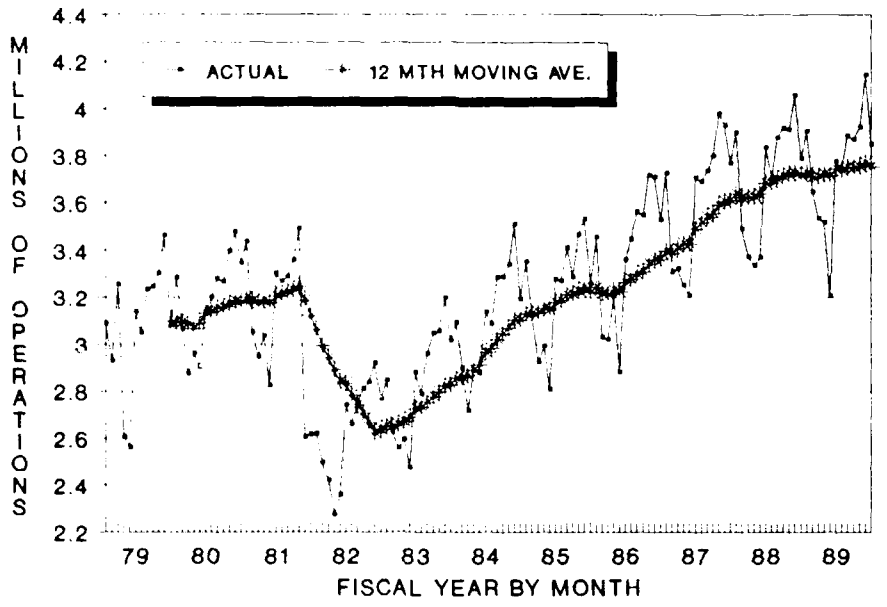
INSTRUMENT OPERATIONS

Instrument operations handled at FAA towers totaled 44,988,100 in fiscal year 1989, 1.0 percent above the 1988 activity level and 16.0 percent above the level of activity recorded in the pre-strike period. A large part of the increase since 1982 can be attributed to the increase in commercial aircraft activity (up 54.9 percent), particularly to commuter code-sharing and schedule tie-in agreements with the larger commercial air carriers.

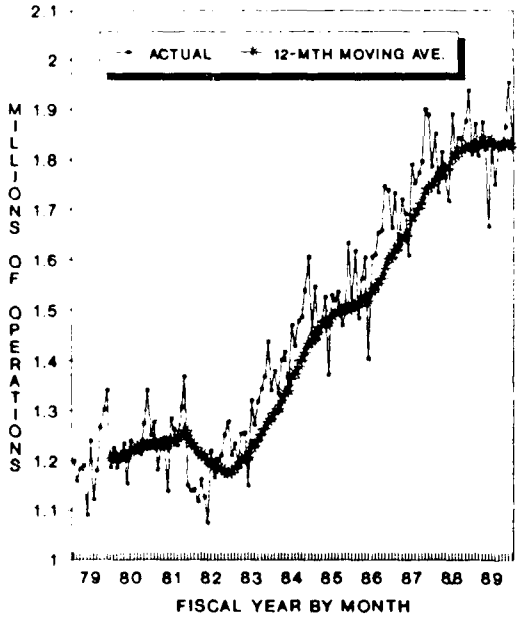
Commercial aircraft operations were, however, significantly affected by the Eastern Air Lines' strike and, as a

INSTRUMENT OPERATIONS

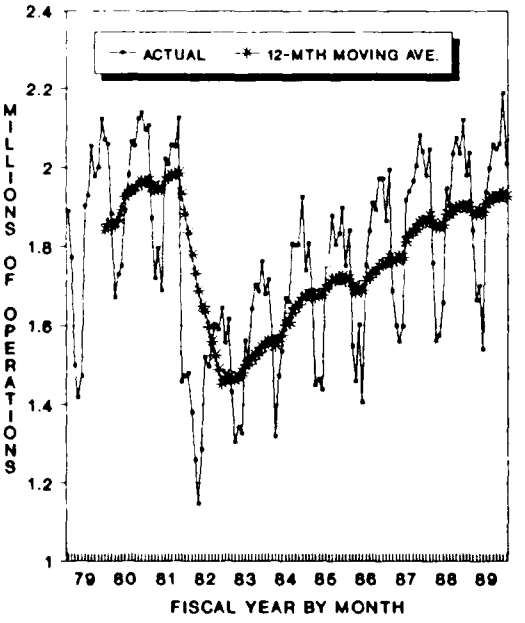
TOTAL OPERATIONS

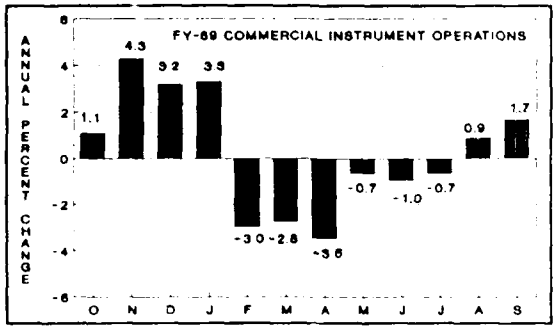


COMMERCIAL OPERATIONS



NONCOMMERCIAL OPERATIONS





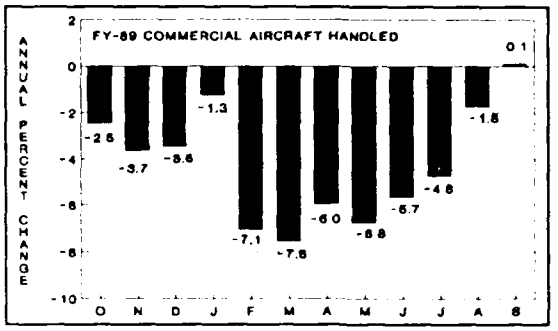
consequence, registered only a 0.2 percent increase in 1989. Air carrier operations totaled 13,497,100 (up 0.6 percent) in 1988; however, commuter/air taxi instrument operations totaled only 8,427,000 (down 0.3 percent) over the same time period.

Noncommercial instrument operations (up 31.7 percent since 1982) increased by 1.7 percent in fiscal year 1989. General aviation activity totaled 18,613,200, up 33.8 percent and 1.9 percent, respectively, over 1982 and 1988 activity levels. Most of the increase in general aviation activity can be attributed to the formation of Airport Radar Service Areas (ARSA's) at 137 locations in the United States. Under the previous Terminal Radar Service Area (TRSA) concept, general aviation aircraft could enter the TRSA without communicating with Air Traffic Control (ATC). Under the ARSA concept all aircraft must be in contact with ATC.

Military instrument operations totaled 4,450,800 in fiscal year 1989, an increase of 1.1 percent over 1988 operation counts.

CENTER ACTIVITY

In fiscal year 1989, the number of aircraft flying under instrument rules handled by FAA Air Traffic Control Centers totaled 36,613,000, an increase of 0.7 percent over 1988. With the exception of the current year, most of the increase that has occurred at the Centers since 1982 (up 31.4 percent) can be attributed to the growth in commercial aviation activity (up 41.6 percent). Commercial aircraft handled at the Centers declined by 4.2 percent in 1989. The number of air



carrier aircraft handled totaled 17,524,400 (down 2.0 percent), while the number of commuter/air taxi aircraft handled totaled 5,191,500 (down 11.0 percent). While the Eastern Air Lines' strike can explain most of the downturn in air carrier activity, it may not account for all of the large decline in the number of commuter/air taxi aircraft handled.

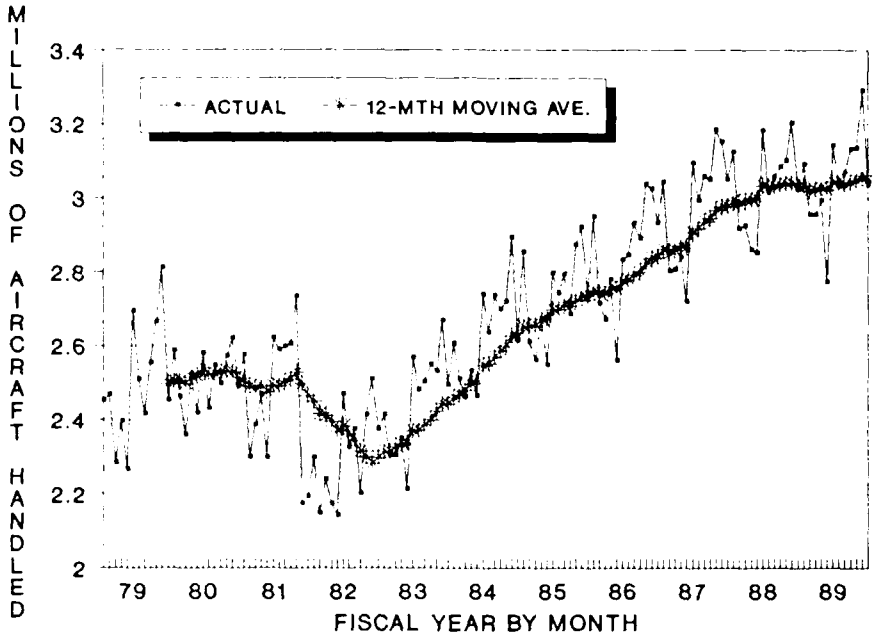
Noncommercial aircraft handled (up 17.6 percent since 1982) increased by 10.0 percent in fiscal year 1989. Most of the growth in 1989 is the direct result of a 24.6 percent increase in the number of military aircraft handled (5,701,400), the unexpected high growth thought to be an aberration. The number of general aviation aircraft handled totaled 8,195,700, up 1.8 percent over 1988 activity levels.

FLIGHT SERVICE STATION ACTIVITY

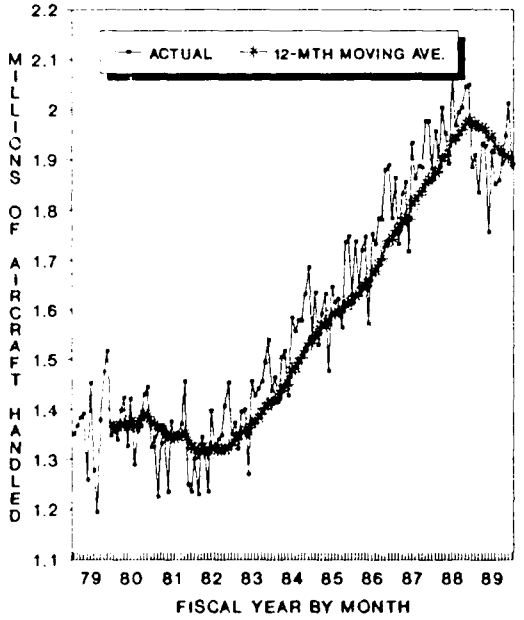
User demand at Flight Service Stations (FSS's)--pilot briefings, flight plans, and aircraft contacted--increased by 0.5 percent in fiscal year 1989, totaling 44,982,500, the first annual increase since 1984. However, user demand increased in only one of the three flight service categories in 1989. The number of pilot briefs totaled 12,013,700 in 1989, up 2.6 per-

IFR AIRCRAFT HANDLED

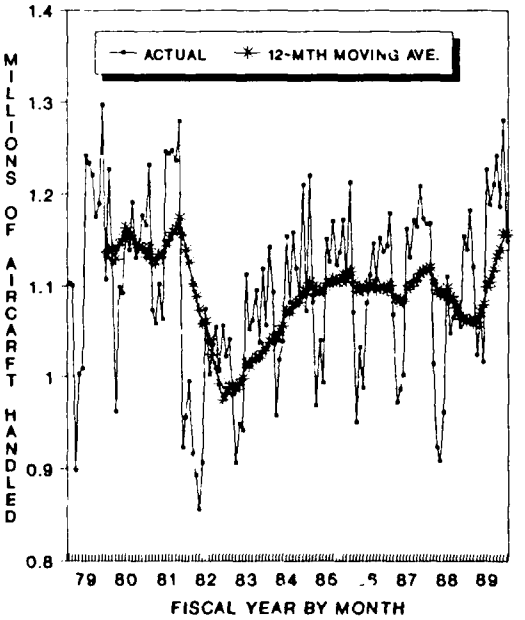
TOTAL AIRCRAFT HANDLED

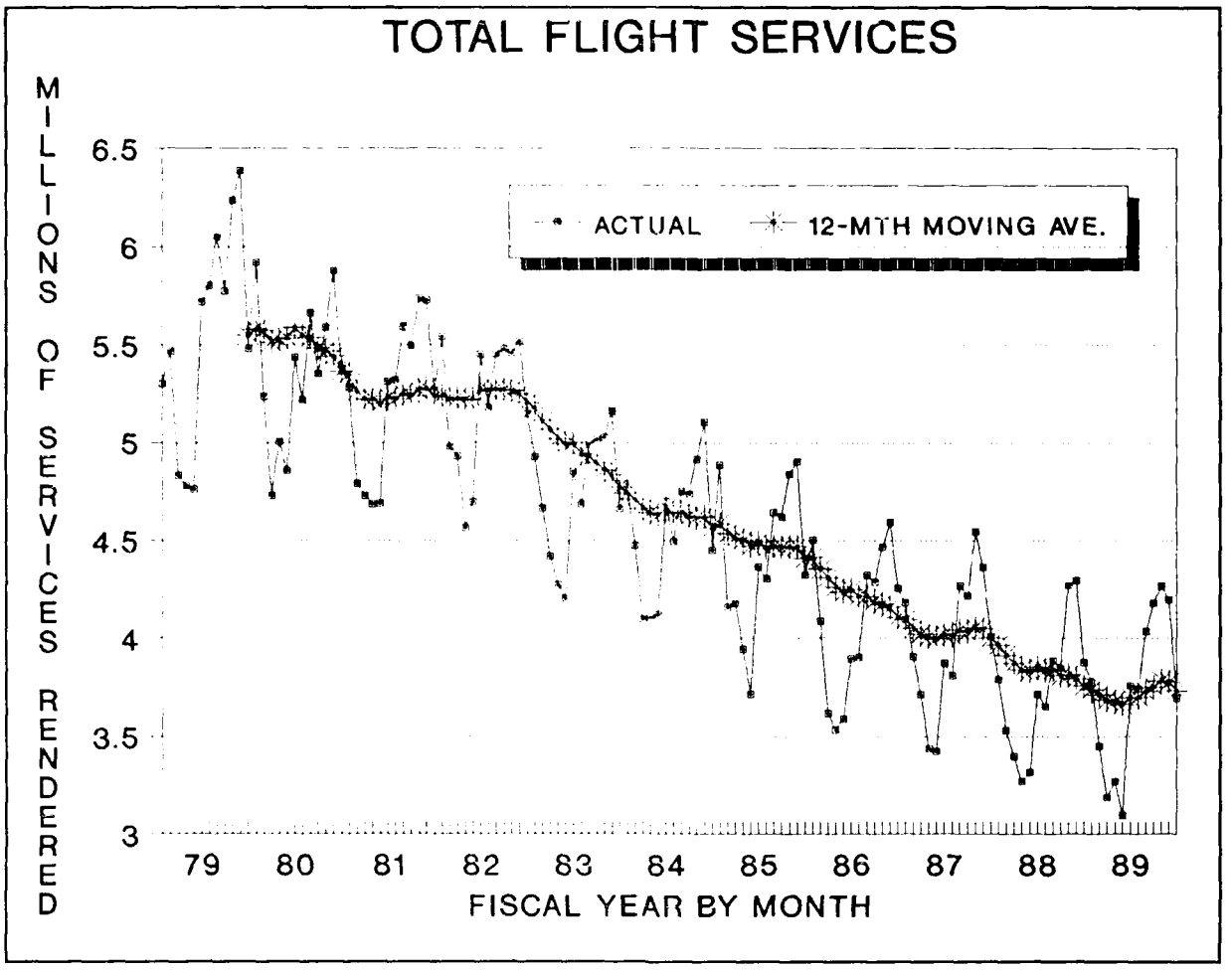


COMMERCIAL AIRCRAFT HANDLED



NONCOMMERCIAL AIRCRAFT HANDLED





cent over the number of pilot briefings given in 1988. Conversely, the number of aircraft contacted (6,156,700) declined by 3.6 percent and the number of flight plans originated (7,399,200) declined by 2.6 percent.

During fiscal year 1989, one Automated Flight Service Station (AFSS) was commissioned, bringing the total to 45. Also in 1989, 21 FSS's were consolidated into the automated FSS's for a total of 202 facilities at the end of the year.

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 21 contract towers in operation during fiscal year 1989, 4 more than in operation in 1988. However, two of these contract towers were in operation for only one month in fiscal year 1989.

Operations at contract towers totaled 1,211,200 in fiscal year 1989, an increase of 38.2 percent over the number of operations recorded at contract towers in 1988. General aviation accounted for the vast majority (87.4 percent) of the activity at these contract towers, up 41.3 percent to 1,058,100 operations. Commuter/air taxi operations totaled 90,700 (up 18.4 percent) while military operations totaled 55,400 (up 19.8 percent). Air carrier operations at contract towers increased by 57.0 percent in fiscal year 1989. However, the 7,000 air carrier operations in 1989 represent only 0.6 percent of the total contract tower activity.

A listing of the current contract towers can be found in Appendix I, beginning on page 249. Operation counts for the 399 FAA towered airports and the 21 contract towers, by user group, can be found in the publication FAA Air Traffic Activity FY 1988, compiled by the FAA's Office of Management Systems (AMS-420).

FORECAST ASSUMPTIONS

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

NUMBER OF FAA FACILITIES

The current forecast assumes that the number of FAA towered airports will increase by one (to 400) in fiscal year 1990 and remain at this level throughout the remainder of the forecast period. There are currently 24 Terminal Control Areas (TCA's) and 125 ARSA's. This forecast assumes that there will be 10 additional TCA's and 5 additional ARSA's added to the system over the next two years. This expansion of controlled airspace is reflected in the forecast for instrument operations at airports with FAA traffic control service.

The number of flight service stations and automated flight service stations totaled 202 at the end of fiscal year 1989, 45 AFSS's and 157 FSS's. During the first quarter of fiscal year 1990 eight more FSS's have been closed and consolidated into their respective AFSS's. The current schedule calls for all 61 automated AFSS's to be commissioned by 1991, and the closing of the last flight service station by 1994.

WORKLOAD FORECASTS

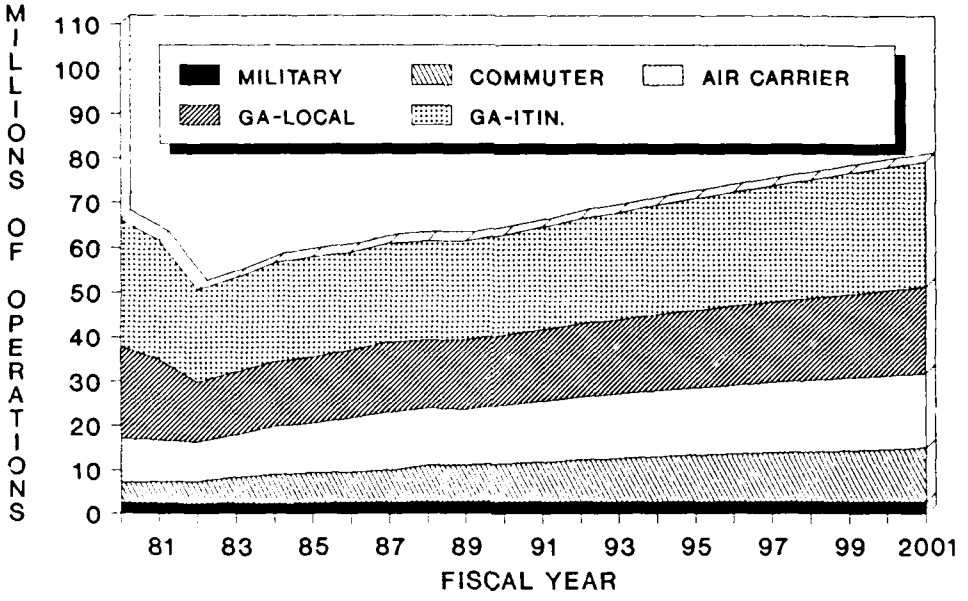
FAA TOWER ACTIVITY

Activity at FAA towered airports is expected to surpass the pre-strike level of 64.0 million in 1991 and will exceed the 1979 peak (69.0 million) in 1994. Operations at FAA towered airports are forecast to increase by 2.3 percent in 1990 and by 2.7 percent in 1991, and to average 2.1 percent over the 12-year forecast period. In absolute numbers, towered operations are projected to increase from 61.4 million in 1989 to 79.2 million in the year 2001.

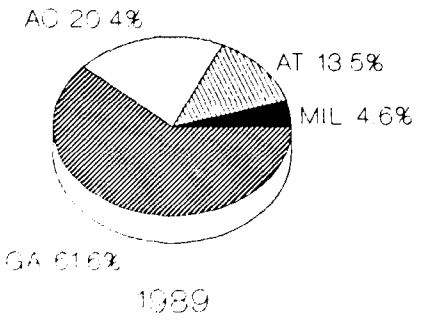
The mix of aircraft using FAA towered airports is expected to remain fairly stable over the forecast period. This results from the fact that the combined total of general aviation and commuter/air taxi operations (i.e., operations performed by smaller aircraft) is expected to grow only at a slightly slower pace than the number of air carrier operations (29.59 percent compared with 33.6 percent). The combined activities of general aviation and commuters/air taxis are expected to account for 75.4 percent of total tower operations in fiscal year 2001, up slightly from 75.1 percent in 1989. Air carrier operations' share of towered airport activity is also expected to increase slightly, from 20.4 percent in 1989 to 21.1 percent in fiscal year 2001.

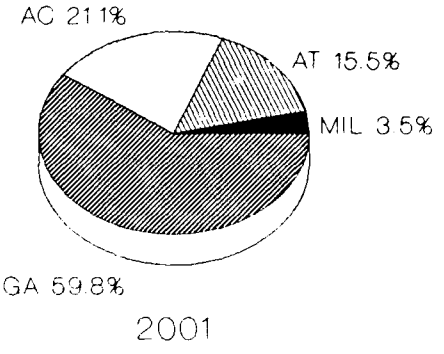
The forecasted average annual growth rate and activity levels for each aviation user group from the year 1989 to the year 2001 is: commuter/air taxi, 3.3 percent (from 8.3 to 12.3 million); air carrier, 2.4 percent (from 12.5 to

AIRCRAFT OPERATIONS AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE



DISTRIBUTION OF WORKLOAD BY USER GROUP





16.7 million); and general aviation, 1.9 percent (from 37.8 to 47.4 million). Military operations are expected to remain constant at the 1989 level of activity (2.8 million). Commercial aircraft activity at FAA towered airports is expected to grow at an average annual rate of 2.9 percent over the 12-year forecast period, from 20.8 to 29.0 million. Noncommercial activity is forecast to increase from 40.6 million in 1989 to 50.2 million in fiscal year 2001, an average annual increase of 1.9 percent.

INSTRUMENT OPERATIONS

An increase in the number of TCA's and TRSA's in both 1990 and 1991 is expected to result in a fairly rapid increase in the number of instrument operations in the short-term. Instrument operations are forecast to grow by 3.1 percent in 1990 and by 3.5 percent in 1991. Over the entire 12-year forecast period, instrument operations are expected to increase at an average annual rate of 2.4 percent, growing from a total of 45.0 million operations in 1989 to 59.6 million in fiscal year 2001.

The mix of instrument operations is expected to change over the forecast period. The number of commuter/air taxi and general aviation operations performed by smaller aircraft is expected to increase at a faster rate than the number of operations performed by the larger, more sophisticated air carrier aircraft (38.5 versus 31.1 percent). By the year 2001, 62.8 percent of all instrument operations are expected to be performed by commuter/air taxi and general aviation aircraft, up from 60.0 percent in fiscal year 1989.

The projected average annual growth rate and activity levels for each user group from the year 1989 to 2001 is: commuter/air taxi, 3.3 percent (from 8.4 to 12.4 million); general aviation, 2.5 percent (from 18.6 to 25.0 million); and air carrier, 2.3 percent (from 13.5 to 17.7 million). Military operations are expected to remain constant at 4.5 million throughout the forecast period.

Over the 12-year forecast period, commercial activity is expected to increase at an average rate of 2.8 percent annually, from 21.9 to 30.1 million. Noncommercial activity is forecast to increase from 23.1 million in 1989 to 29.5 million in the year 2001, an annual rate of 2.0 percent.

CENTER ACTIVITY

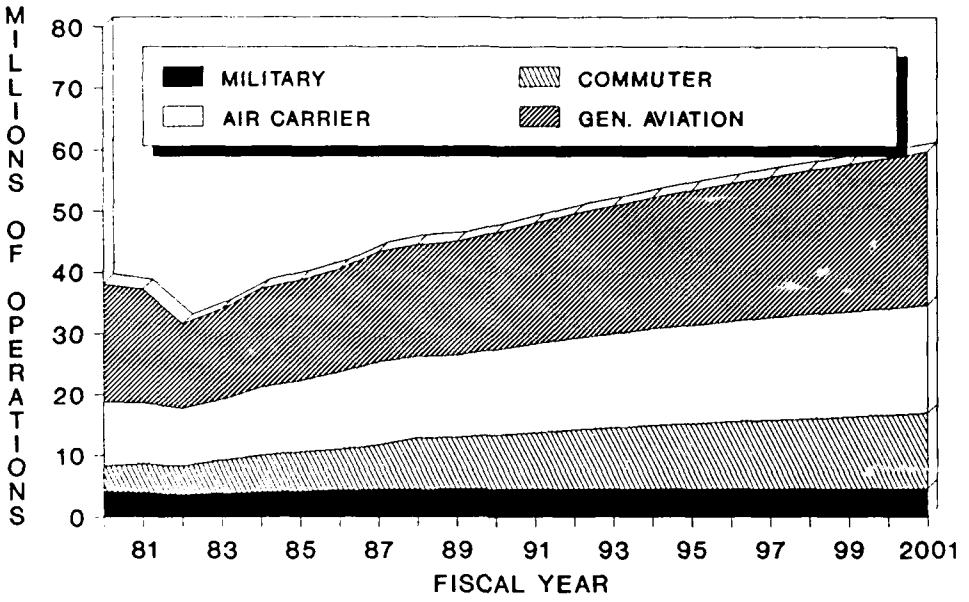
The workload at FAA Air Route Traffic Control Centers is expected to exhibit strong growth throughout the forecast period, increasing by 3.3 percent in 1990 and by 3.4 percent in 1991, and averaging 2.2 percent over the 12-year forecast period. In absolute numbers, the Center workload is forecast to increase from 36.6 million aircraft handled in 1989 to 47.6 million in the year 2001.

Commercial activities share of Center workload is forecast to increase over the 12-year forecast period, from 60.0 percent to 65.6 percent. Between 1989 and the year 2001, air carrier's share is forecast to increase from 47.8 percent to 49.0 percent. Commuter/air taxi's share is expected to increase from 14.2 percent to 16.6 percent over the same time period.

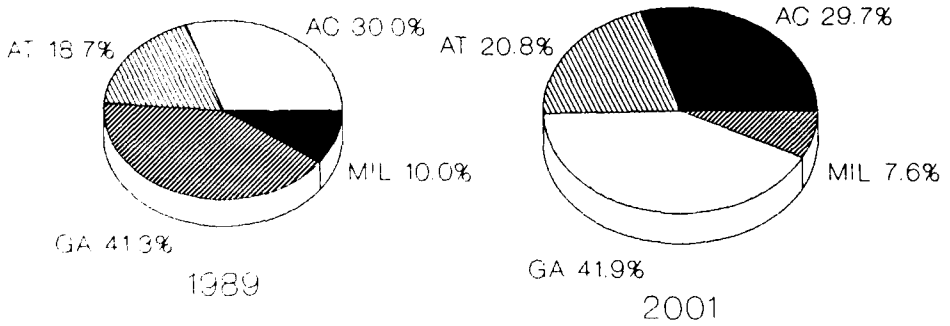
The projected average annual growth rate and activity levels for each user group from 1989 to 2001 is: commuter/air taxi, 3.6 percent (from 5.2 to 7.9 million); air carrier, 2.4 percent (from 17.5 to 23.3 million); and general aviation, 2.2 percent (from 8.2 to 10.7 million). The number of military operations is expected to remain constant at the 1988 level of activity (5.7 million).

Commercial activity is expected to grow at an average annual rate of 2.8 percent over the 12-year forecast period,

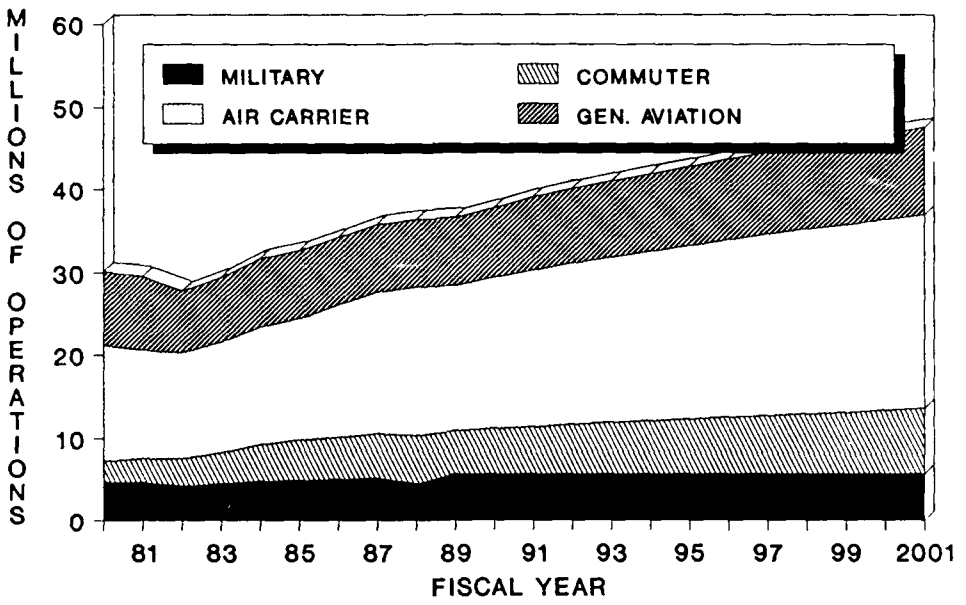
INSTRUMENT OPERATIONS AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE



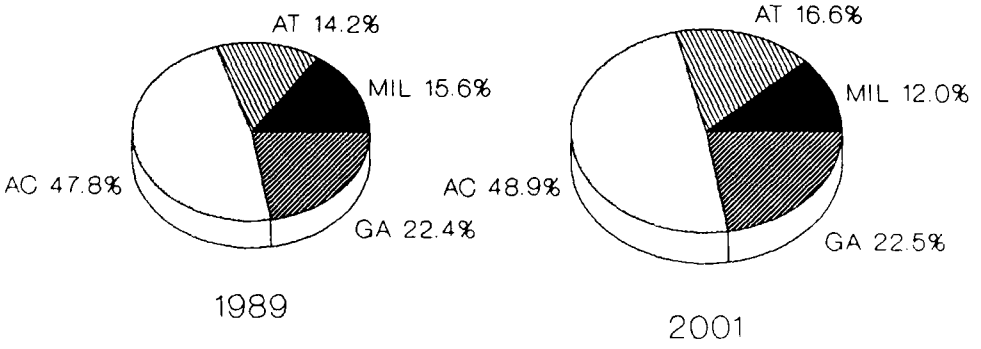
DISTRIBUTION OF WORKLOAD BY USER GROUP



IFR AIRCRAFT HANDLED AT FAA AIR ROUTE TRAFFIC CONTROL CENTERS



DISTRIBUTION OF WORKLOAD BY USER GROUP



from 22.7 to 31.2 million. Noncommercial activity is forecast to increase by 1.5 percent annually, from 13.9 million in 1989 to 16.4 million in the year 2001.
Forecasts for individual Centers are available upon request from the Forecast Branch, Office of Aviation Policy and Plans (APO-110).

FLIGHT SERVICE STATION ACTIVITY

Total flight services originating at FAA Flight Service Stations are projected to decline to 44.9 million (down 0.2 percent in fiscal year 1990 and then increase to 45.0 million (up 0.2 percent) in 1991. Total flight services are expected to increase at an average annual rate of 0.4 percent over the 12-year forecast period. In actual numbers, flight services rendered are forecast to increase from 45.0 million in 1989 to 47.3 million in fiscal year 2001.

The number of pilot briefings is expected to increase from 12.0 million in 1989 to 12.5 million in the year 2001, an average annual growth rate of 0.3 percent. The number of flight plans originated is forecast to increase at an average annual rate of 0.8 percent between 1989 and fiscal year 2001, from 7.4 million to 8.1 million. The number of aircraft contacted is projected to decline over the 12-year forecast period, from 6.2 million in 1989 to 6.1 million in the year 2001.

The introduction of new technology to flight service applications has significantly changed the operating environment of the flight service system. Viewed in the larger context of the total NAS system, the recent workload trends do not necessarily indicate declining demand for flight planning services. Rather they may indicate that demand is being met through increased use of automation. That is, demands of general aviation are being met through new system capabilities resulting in increased system efficiencies and productivity.

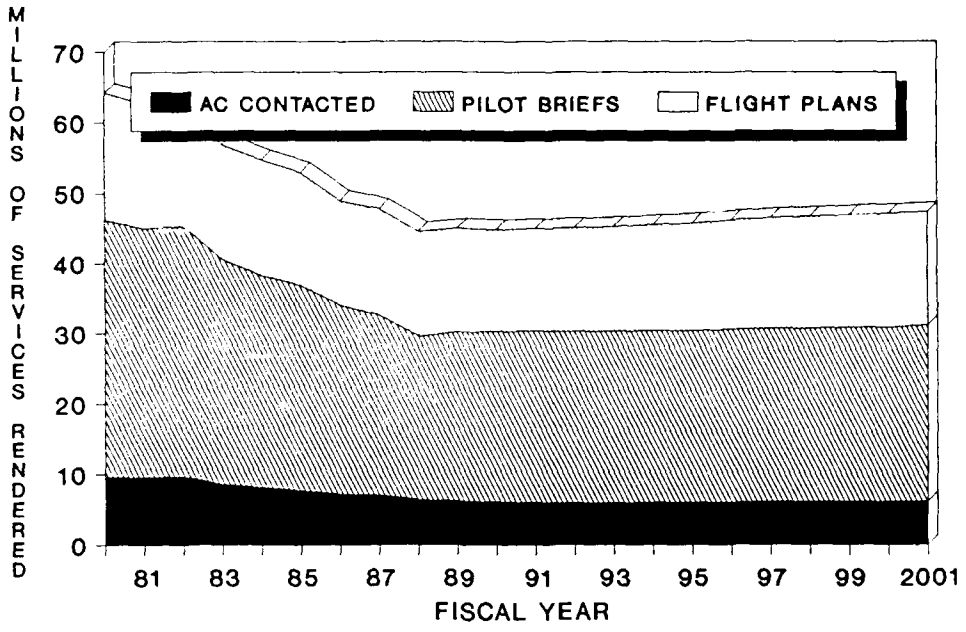
Specifically, several factors resulting from automation will tend to dampen the growth in FSS workload measures, as currently defined. First, pilots can now obtain weather briefings through the Telephone Information Briefing System (TIBS), which does not require contact with a flight service specialist, and is not included in the FSS pilot briefings count. Second, private weather briefing vendors, participating in recently implemented memorandums of agreement, can also file flight plans for their customers without going through an FSS. Third, starting sometime during 1990, the Direct User Access Terminal System (DUATS) will become operational. Utilizing DUATS, pilots with access to a computer, modem and telephone will be able to directly access a national weather data base for self briefings and file flight plans without ever going through an FSS.

This automated access may be through the pilots' own computer or through those of field based operators offering the service to their customers. None of the flight planning services provided through the above sources will be included in the FSS workload measures.

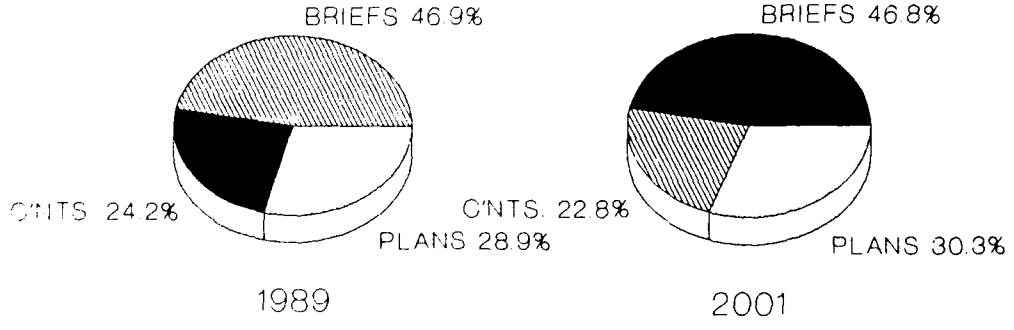
Additionally, the process of consolidation will, by definition, continue to reduce the aircraft contact counts at FSS's. As flight service areas expand through consolidation, the number of contacts with multiple facilities during a single flight will be reduced significantly. This decline will continue at least until the FSS system is fully consolidated.

Increasingly, the current FSS workload measures no longer fully reflect the functions performed and level of services provided in an increasingly automated environment. In this regard, the FAA initiated a 12-month effort to develop new staffing standards for the modernized FSS system which is scheduled to be completed by June 1990.

FLIGHT SERVICES ORIGINATED AT FAA FLIGHT SERVICE STATIONS



DISTRIBUTION BY TYPE OF SERVICE RENDERED

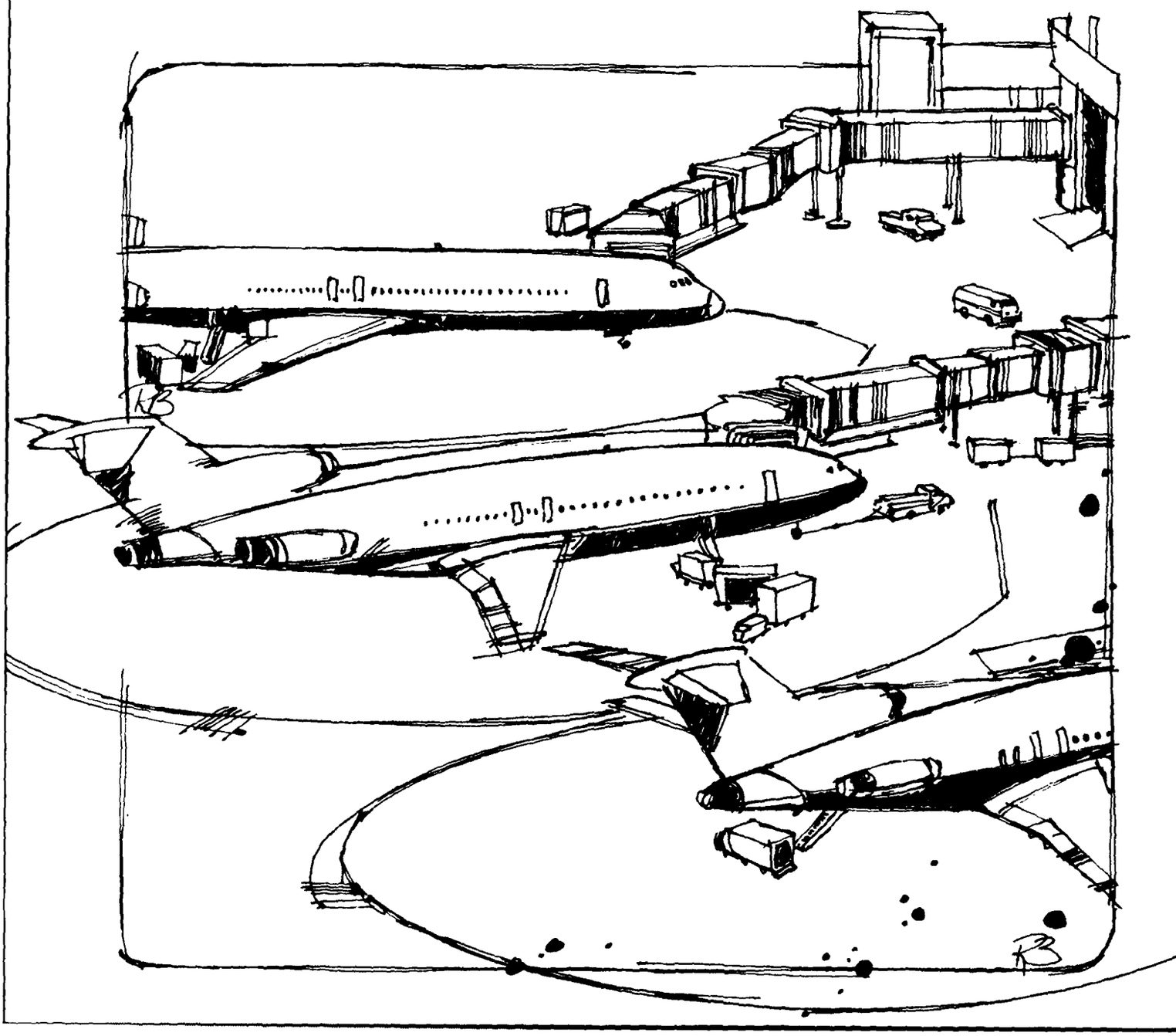


Forecasts for individual Flight Service Stations are available upon request from the Forecast Branch, Office of Aviation Policy and Plans (APO-110).

CHAPTER VIII

TERMINAL AREA FORECASTS

LARGE HUBS



CHAPTER VIII

TERMINAL AREA FORECASTS

LARGE HUBS

This chapter discusses: (1) the top 50 airports in the United States ranked by total enplanements in fiscal year 1988; (2) the top 50 airports ranked by total operations in 1988; (3) forecasts of total enplanements and total operations at 31 large hub airports; (4) summary data for large, medium, and small hub airports; and (5) selected data by user category for five airports where special studies were conducted for the metropolitan areas in 1989. For analytical purposes, airport hub size is consistent with the enplanement percentages indicated in the definition for air traffic hubs on page 213 of the Glossary of Terms.

The preliminary forecasts in this chapter are currently undergoing regional review. The final forecasts will be available in FAA Terminal Area Forecasts FY 1990-2005 (TAF) during the summer of 1990 from the FAA Office of Aviation Policy and Plans.

REVIEW OF 1988

TOP 50 AIRPORTS

In fiscal year 1988, Chicago O'Hare and Atlanta were the busiest airports in the United States when ranked by total enplanements (air carrier, commuter, and air taxi) and total aircraft operations. Chicago O'Hare had 28.9 million passenger enplanements and 795,700 aircraft operations. Atlanta Hartsfield had 23.6 million enplanements and 782,700 operations. Thus, Chicago and Atlanta ranked first and second, respectively, in both total enplanements and total operations. In 1987, Atlanta was ranked ahead of Chicago in total aircraft operations.

Other airports among the top five ranked by total enplanements in 1988 were Dallas Fort/Worth, Los Angeles International, and John F. Kennedy International Airport. In 1987, these airports were ranked fourth, third, and sixth in total enplanements. By comparison, when ranked by total operations in 1988, these airports were third, fourth, and 30th, respectively.

International travel through John F. Kennedy International Airport has recovered considerably from the decrease observed in previous years. Consequently, Kennedy rose from eighth in total enplanements in 1986 to fifth in 1988. Prior to 1985, Van Nuys, a general aviation only airport, was ranked among the top five in total operations. In 1986 and 1987, Van Nuys was ranked seventh and in 1988 it was ranked eighth; it was surpassed in

TOP 50 AIRPORTS

BY TOTAL ENPLANEMENTS IN 1988

(IN THOUSANDS)

Airport	Total Enplanements*	Percent**	Cumulative Percent	FY-87 Rank
1. Chicago O'Hare	28,850	5.84	5.84	1
2. Atlanta	23,573	4.77	10.61	2
3. Dallas/Ft. Worth	23,029	4.66	15.27	4
4. Los Angeles Int'l	22,179	4.49	19.76	3
5. New York Kennedy	19,415	3.93	23.69	6
6. Denver	15,015	3.04	26.73	5
7. San Francisco Int'l	14,683	2.97	29.70	7
8. Miami	14,316	2.90	32.60	10
9. Boston	11,802	2.39	34.99	11
10. New York LaGuardia	11,790	2.39	37.38	9
11. Newark	11,580	2.34	39.72	8
12. Honolulu	11,081	2.24	41.96	14
13. St. Louis Int'l	10,139	2.05	44.01	12
14. Detroit	10,044	2.03	46.04	13
15. Phoenix	9,559	1.94	47.98	16
16. Pittsburgh	8,971	1.82	49.80	17
17. Minneapolis/St. Paul	8,939	1.81	51.61	15
18. Houston Intercont'l	8,142	1.65	53.26	20
19. Orlando	8,122	1.64	54.90	22
20. Washington National	7,888	1.60	56.50	18
21. Philadelphia	7,789	1.58	58.08	19
22. Seattle-Tacoma	7,659	1.55	59.63	23
23. Las Vegas	7,658	1.55	61.18	21
24. Charlotte	7,613	1.54	62.72	24
25. Baltimore	5,363	1.09	63.81	31
26. San Diego	5,328	1.08	64.89	27
27. Salt Lake City	4,977	1.01	65.90	28
28. Memphis	4,947	1.00	66.90	25
29. Washington Dulles Int'l	4,771	.97	67.87	26
30. Kansas City	4,726	.96	68.83	30

(Continued on next page)

TOP 50 AIRPORTS

BY TOTAL ENPLANEMENTS IN 1988

(IN THOUSANDS)
(continued)

Airport	Total Enplanements*	Percent**	Cumulative Percent	FY-87 Rank
31. Tampa	4,719	.96	69.79	29
32. Ft. Lauderdale	4,456	.90	70.69	32
33. Cincinnati	4,069	.82	71.51	36
34. Houston Hobby	3,894	.79	72.30	33
35. Cleveland	3,848	.78	73.08	37
36. Raleigh/Durham Int'l	3,705	.75	73.83	44
37. Nashville	3,447	.70	74.53	38
38. New Orleans	3,323	.67	75.20	35
39. Chicago Midway	3,266	.66	75.86	43
40. Portland	3,019	.61	76.47	40
41. San Jose	2,818	.57	77.04	39
42. Indianapolis	2,595	.53	77.57	45
43. West Palm Beach	2,560	.52	78.09	50
44. San Antonio	2,549	.52	78.61	41
45. Dallas Love Field	2,481	.50	79.11	42
46. Hartford	2,469	.50	79.61	48
47. Dayton	2,421	.49	80.10	46
48. Ontario	2,375	.48	80.58	51
49. Albuquerque	2,238	.45	81.03	49
50. Santa Ana	2,201	.45	81.48	52

Source: FAA TERMINAL AREA FORECASTS FY 1990-2005.

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

** Based on 493.840 million passenger enplanements.

TOP 50 AIRPORTS

BY TOTAL OPERATIONS IN 1988

(IN THOUSANDS)

Airport	Total Operations	Percent*	Cumulative Percent	FY-87 Rank
1. Chicago O'Hare	795.7	1.30	1.30	2
2. Atlanta	782.7	1.28	2.58	1
3. Dallas/Ft. Worth	664.3	1.08	3.66	4
4. Los Angeles Int'l	631.9	1.03	4.69	3
5. Orange C'ty/John Wayne	528.2	.86	5.55	5
6. Denver Stapleton	511.3	.83	6.38	6
7. San Francisco Int'l	461.2	.75	7.13	8
8. Van Nuys	459.7	.75	7.88	7
9. Phoenix	455.3	.74	8.62	11
10. Boston	445.2	.73	9.35	10
11. Long Beach	435.3	.71	10.06	9
12. St. Louis Int'l	429.4	.70	10.76	12
13. Fort Worth Meacham	425.0	.69	11.45	31
14. Philadelphia	415.6	.68	12.13	13
15. Seattle Boeing Field	414.1	.68	12.81	22
16. Charlotte Douglas	405.2	.66	13.47	26
17. Oakland	402.3	.66	14.13	15
18. Pittsburgh	386.9	.63	14.76	23
19. Detroit	380.2	.62	15.38	14
20. Minneapolis/St. Paul	379.8	.62	16.00	20
21. Pontiac	379.5	.62	16.62	18
22. Newark	376.8	.61	17.23	21
23. Las Vegas	372.6	.61	17.84	17
24. Denver/Centennial	371.8	.61	18.45	28
25. Honolulu	367.1	.60	19.05	16
26. New York LaGuardia	364.2	.59	19.64	24
27. Memphis	358.8	.59	20.23	19
28. Miami Int'l	358.4	.58	20.81	25
29. San Jose	355.6	.58	21.39	27
30. New York Kennedy	328.6	.54	21.93	30

(Continued on next page)

TOP 50 AIRPORTS

BY TOTAL OPERATIONS IN 1988

(IN THOUSANDS)
(continued)

Airport	Total Operations	Percent*	Cumulative Percent	FY-87 Rank
31. Washington National	327.6	.53	22.46	29
32. Seattle Tacoma Int'l	311.5	.51	22.97	37
33. Baltimore	304.0	.50	23.47	36
34. Houston Intercont'l	297.3	.48	23.95	32
35. Chicago Midway	296.2	.48	24.43	43
36. Miami Tamiami	292.8	.48	24.91	33
37. Orlando	290.3	.47	25.38	44
38. Salt Lake City	289.2	.47	25.85	35
39. Raleigh Durham	273.5	.45	26.30	70
40. Cincinnati	271.3	.44	26.74	61
41. Melbourne	270.0	.44	27.18	42
42. Portland	270.0	.44	27.62	50
43. Nashville	262.9	.43	28.05	41
44. Houston Hobby	261.3	.43	28.48	39
45. Hayward	250.5	.41	28.89	40
46. Anchorage Merrill	249.5	.41	29.30	38
47. Chicago Palwaukee	249.4	.41	29.71	80
48. Torrance	248.8	.41	30.12	54
49. Morristown	248.3	.41	30.53	52
50. Atlanta DeKalb	248.1	.40	30.93	53

Source: FAA TERMINAL AREA FORECASTS FY 1990-2005.

* Based on 61.299 million operations at 398 FAA-operated airport traffic control towers in FY 1988.

total operations by both Orange County/John Wayne (previously, Santa Ana) and Denver and, in 1988, by San Francisco.

In fiscal year 1988, the top 50 commercial airports accounted for 81.5 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, Dallas/Fort Worth, Los Angeles, and Kennedy) accounted for 23.7 percent of total passenger enplanements. The top 20 airports had 56.5 percent of total enplanements. These percentages are slightly higher than those reached in 1987.

LARGE/MEDIUM/SMALL HUB AIRPORTS

In fiscal year 1988, there were 31 large hub airports, 39 medium hub airports, and 64 small hub airports. The large hub airports accounted for 344.6 million enplanements, 69.8 percent of the approximately 493.8 million air carrier/commuter/air taxi passengers enplaned nationally. The medium hub airports enplaned 91.5 million passengers and the small hubs enplaned 36.0 million, 18.5 percent and 7.3 percent of the total, respectively. Based on total passengers, the large hub airports grew by 6.0 percent in 1988. The medium hub airports grew by 4.9 percent and the small hubs grew by 1.9 percent.

Aircraft operations at the large hub airports totaled 12.4 million in 1988, about 0.8 percent above the 1987 level. At the medium and small hub airports, there were 8.5 million and 8.8 million operations, respectively. The 1988 operations at medium and small hub airports were virtually unchanged from the 1987 levels.

LARGE HUB FORECASTS

Using fiscal year 1988 as the base year, forecasts for airports in the TAF were generated for each year to 2005. The total enplanements and related operations forecasts for the 31 large hub airports for fiscal years 1995, 2000, and 2005 are presented on pages 139 and 141. By 2005, Chicago O'Hare is expected to reach nearly 46.7 million enplanements and Atlanta is expected to reach 34.2 million. It is anticipated that both Dallas/Fort Worth and Denver (with 40.8 million and 38.1 million enplanements, respectively) will have surpassed Atlanta in terms of total enplaned passengers by the year 2005.

Total aircraft operations will reach 842,000 at Chicago O'Hare and 962,000 at Atlanta by the year 2005. In comparison, total aircraft operations at Dallas/Fort Worth is expected to surpass 1.1 million, making Dallas/Fort Worth the busiest airport in the United States. Denver is expected to be the third busiest airport. The increases in aviation activity at these and other airports will come from growth in the United States economy, as a whole, and local airport and airline developments. These developments may include the addition of new airline 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 Salt Lake City, Orlando, and Phoenix) will continue to have reasonably high enplanement growth resulting from general economic conditions and from 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.

TOTAL PASSENGER ENPLANEMENTS AT LARGE HUB AIRPORTS*

(IN THOUSANDS)

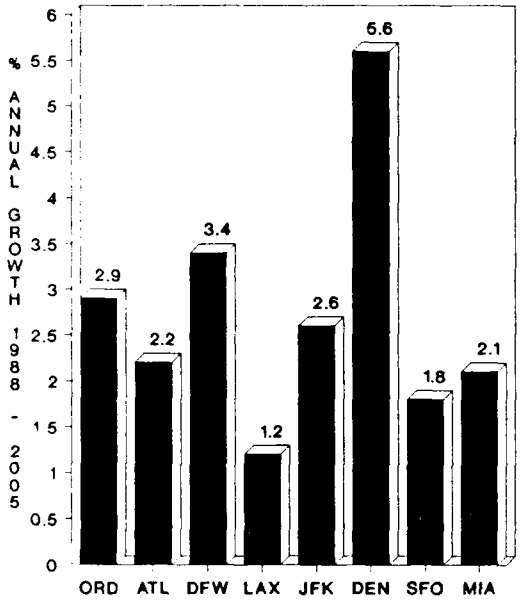
Airport	FY 1988	FY 1995	FY 2000	FY 2005
Chicago O'Hare	28,850	38,635	42,301	46,660
Atlanta**	23,537	27,884	31,270	34,174
Dallas/Ft. Worth	23,029	29,676	35,073	40,829
Los Angeles	22,179	23,641	25,808	27,307
New York Kennedy	19,415	23,484	26,742	30,000
Denver	15,015	27,419	33,197	38,060
San Francisco	14,683	17,250	18,584	19,917
Miami	14,316	15,728	18,079	20,432
Boston	11,802	14,469	16,584	18,978
New York LaGuardia	11,790	13,949	15,382	16,809
Newark	11,580	16,567	20,616	23,558
Honolulu	11,081	13,629	15,148	16,435
St. Louis	10,139	13,671	16,192	18,896
Detroit	10,044	14,493	17,284	20,074
Phoenix	9,559	15,147	19,406	23,663
Pittsburgh	8,971	14,566	17,313	20,138
Minneapolis	8,939	13,577	16,447	19,309
Houston	8,142	11,667	14,173	15,991
Orlando	8,122	12,732	19,349	17,411
Washington National	7,888	8,888	9,116	9,345
Philadelphia	7,789	11,598	13,930	16,389
Seattle	7,659	10,374	11,379	12,386
Las Vegas	7,658	12,289	15,967	19,369
Charlotte	7,613	10,019	12,029	14,039
Baltimore	5,363	8,147	10,414	12,680
San Diego	5,328	7,506	9,012	10,799
Salt Lake City	4,977	8,106	9,895	11,686
Memphis	4,947	7,803	9,481	11,159
Washington Dulles	4,771	7,647	9,238	10,830
Kansas City	4,726	6,488	7,747	9,005
Tampa	4,719	6,961	8,704	10,449

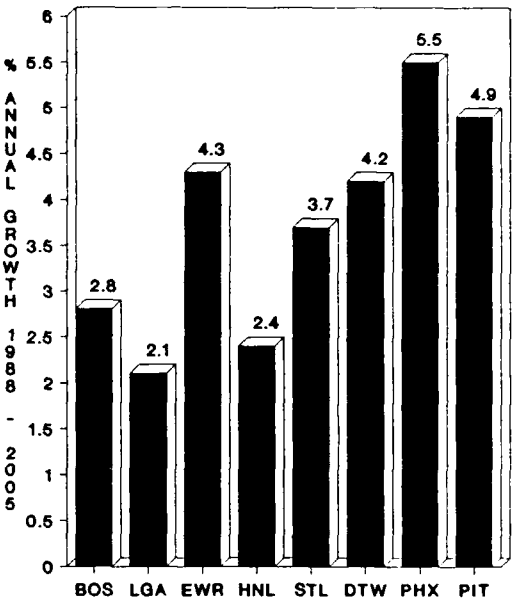
Source: FAA TERMINAL AREA FORECASTS FY 1990-2005.

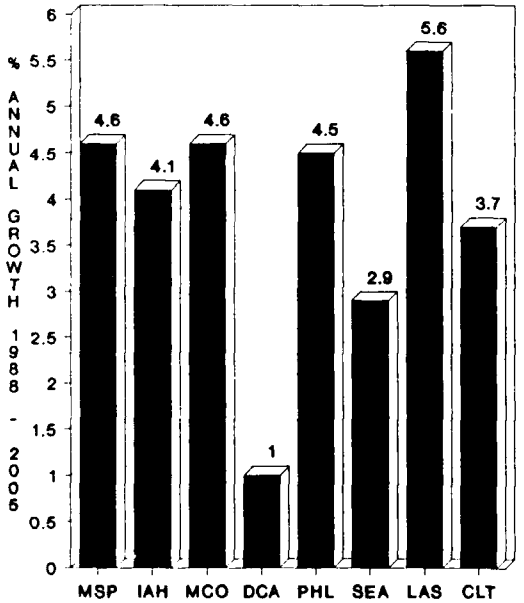
* Includes U.S. certificated route air carriers, foreign flag carriers, supplementals, air commuters and air taxis.

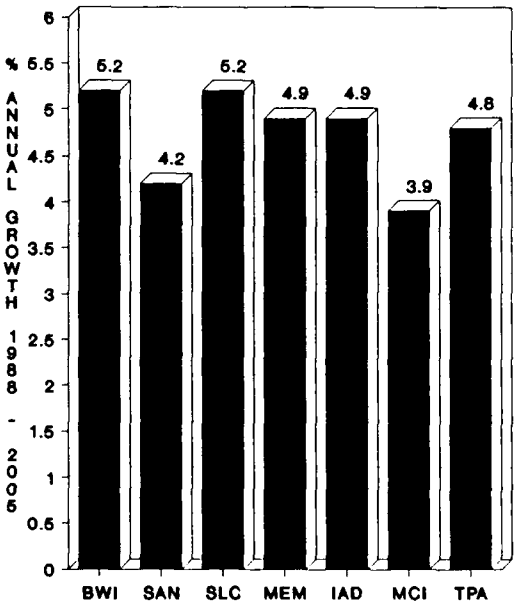
** Forecasts as shown in individual hub forecast reports (or as adjusted).

PASSENGERS ENPLANEMENTS AT LARGE HUB AIRPORTS









TOTAL AIRCRAFT OPERATIONS AT LARGE HUB AIRPORTS*

(IN THOUSANDS)

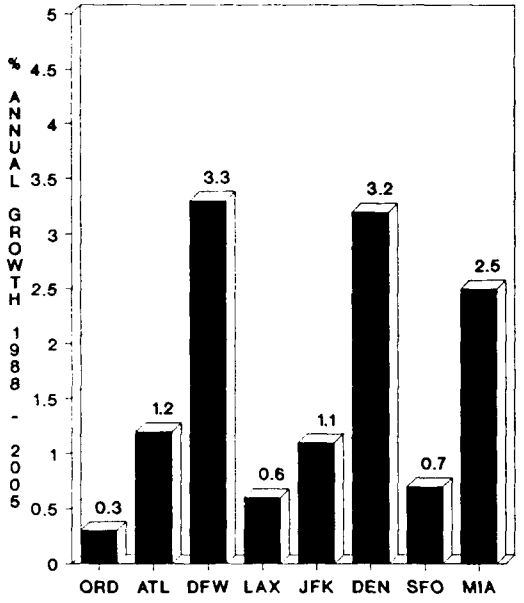
Airport	FY 1988	FY 1995	FY 2000	FY 2005
Chicago O'Hare	796	813	827	842
Atlanta**	783	883	932	962
Dallas/Ft. Worth	664	924	1031	1145
Los Angeles	632	657	666	702
New York Kennedy	329	359	377	396
Denver	511	748	816	867
San Francisco	461	486	494	523
Miami	358	440	490	540
Boston	445	475	521	568
New York LaGuardia	363	382	382	382
Newark	377	427	445	464
Honolulu	367	461	484	512
St. Louis	429	468	503	538
Detroit	380	485	514	543
Phoenix	455	551	599	647
Pittsburgh	387	487	573	664
Minneapolis	380	466	527	589
Houston Intercont'l	297	363	408	454
Orlando	290	429	527	626
Washington National	328	366	385	401
Philadelphia	416	496	564	643
Seattle-Tacoma	311	356	384	405
Las Vegas	373	490	533	561
Charlotte	405	496	540	585
Baltimore	304	370	425	479
San Diego	206	240	266	290
Salt Lake City	289	413	474	536
Memphis	359	457	505	552
Washington Dulles	241	408	452	490
Kansas City	226	288	341	395
Tampa	245	303	335	366

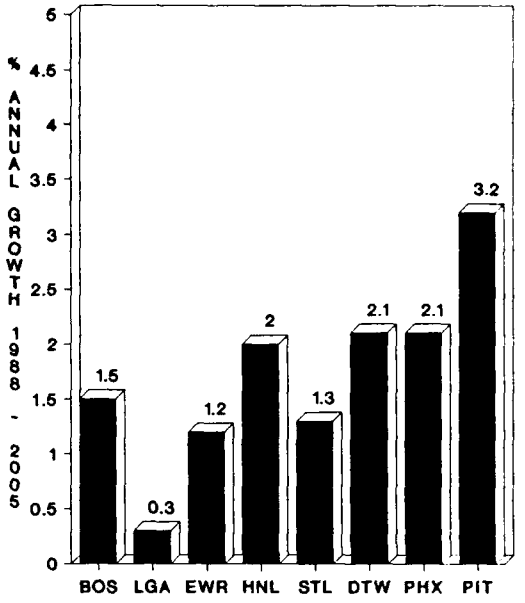
Source: FAA TERMINAL AREA FORECASTS FY 1990-2005.

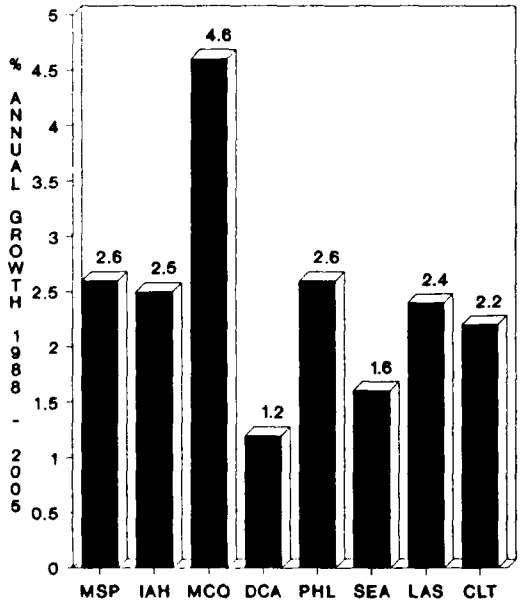
* Includes total itinerant and local operations performed by commercial air carriers, air taxis, military, and general aviation.

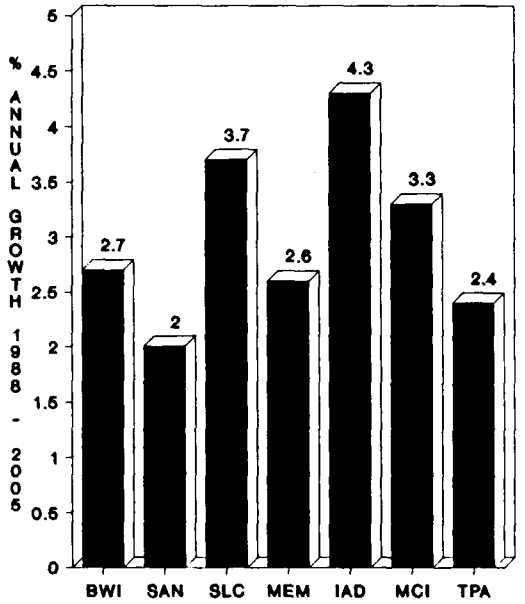
** Forecasts as shown in individual hub forecast reports (or as adjusted).

TOTAL AIRCRAFT OPERATIONS AT LARGE HUB AIRPORTS









The average annual growth rates expected for the large hub airports for enplanements and operations for the 1988 to 2005 period are shown in the graphs on pages 140 and 142. Because of differences in the growth rates among airports, the relative ranks of these 31 hub airports in 2005 will differ from the rankings in 1988. For example, Dallas/Fort Worth will rank second in total enplanements in the year 2005 and Denver will rank third. These airports were ranked third and sixth, respectively, in 1988. The most significant increase in rank is exemplified by Phoenix which is expected to rise from 15th in 1988 to seventh place in 2005. At the other end of the spectrum, Washington National Airport is expected to fall from 20th place in 1988 to 33rd in 2005 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 grew significantly following United Airlines' decision to use this airport as a hub. Nashville and Raleigh-Durham may experience similar shifts following American Airlines' decisions 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 FORECASTS

The growth of enplanements and operations at the 39 medium and 64 small hub airports (relative to growth at the large hub airports) are compared in the tables on page 144. The first table shows that passenger enplanements at the medium hub airports are expected to increase somewhat faster than at the large hub airports. It is anticipated that some carriers will continue to develop or establish hubs at medium or small hubs as alternatives to the larger more congested hubs. Enplanements are forecast to grow at an annual average rate of 6.8 percent during the 1988-1995 period and at 4.0 percent between 1995 and 2005. Passenger enplanements at the small hub airports are expected to increase at a slower rate than the medium hubs during the forecast period. The expected increases are 4.9 percent per year between 1988 and 1995 and 3.7 percent between 1995 and 2005.

As indicated in the second table, aircraft operations at both the medium and small hub airports are expected to grow faster than the large hubs during the 17-year period. Between 1988 and 1995, operations are expected to grow at 3.8 percent at the medium hubs and 3.4 percent at the small hubs. During the 1995-2005 period, the growth rates are expected to be 2.4 percent at both the medium and small hubs. The medium and small hub airports are listed alphabetically by cities in Appendices K and L on pages 255 and 257.

SPECIAL HUB FORECASTS

Continuing the individual hub forecasting effort begun in 1978, FAA sponsored five studies in 1988: Atlanta, Cincinnati, Dayton, Nashville, and Raleigh/Durham. These studies were conducted in conjunction with FAA regions, state and local planners, chambers of commerce, universities, and other interested parties.

These groups 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,

SUMMARY OF PASSENGER ENPLANEMENTS AT HUB AIRPORTS
(Millions)

	1988	1995	2005	AVERAGE ANNUAL PERCENT CHANGE 1988-1995	1995-2005
Large Hubs	344.6	464.0	616.8	4.3%	2.9%
Medium Hubs	91.5	144.8	215.0	6.8	4.0
Small Hubs	36.0	50.2	72.5	4.9	3.7

SUMMARY OF AIRCRAFT OPERATIONS AT HUB AIRPORTS
(Millions)

	1988	1995	2005	AVERAGE ANNUAL PERCENT CHANGE 1988-1995	1995-2005
Large Hubs	12.4	15.0	17.7	2.8%	1.7%
Medium Hubs	8.5	11.0	13.9	3.8	2.4
Small Hubs	8.8	11.1	14.1	3.4	2.4

enhances the final product.

The hub forecast studies examine the metropolitan statistical areas or standard consolidated statistical areas comprehensively. The areas generally have 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 traffic and general aviation activity and the development of reliever or satellite airports.

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

ATLANTA HUB

In 1987, Atlanta was the 13th largest metropolitan statistical area (MSA) in the United States. The Atlanta Hub presently comprises 5,140 square miles in the foothills of the Blue Ridge Mountains in northwestern Georgia and extends over 18 counties with a population of more than 2.6 million. By the year 2005, the population of the hub is expected to surpass 3.6 million, an increase of 39 percent over the 1987 level. From its humble beginnings as a railroad terminal, Atlanta has become the capital of the State of Georgia and has grown to be an important center for manufacturing, financial, cultural, educational, transportation, and tourist activities.

There are 22 public-use airports in the Atlanta Hub. Of these, three airports have FAA-operated air traffic control towers. Located 10 miles southwest of the downtown area, Atlanta Hartsfield International Airport is the hub's only air carrier airport. Hartsfield and the other public use airports provide takeoff and landing services to general aviation and military aircraft in the Atlanta area. Atlanta is served by 16 domestic and international airlines, including Delta and Eastern Air Lines which utilize Hartsfield as the center of their hub and spoke route networks.

Total passenger enplanements in the Atlanta Hub are projected at approximately 34.2 million in the year 2005. This number is 45 percent higher than the 23.6 million passengers recorded in 1987. Commercial aircraft operations in the Hub are expected to reach 946,300 by the year 2005, about 22 percent more than the 774,100 operations handled in 1987. Itinerant general aviation aircraft operations in the Atlanta Hub are forecast to increase by an annual average of 4.6 percent during the 1987-2005 period. Local general aviation operations are expected to grow by 2.8 percent annually.

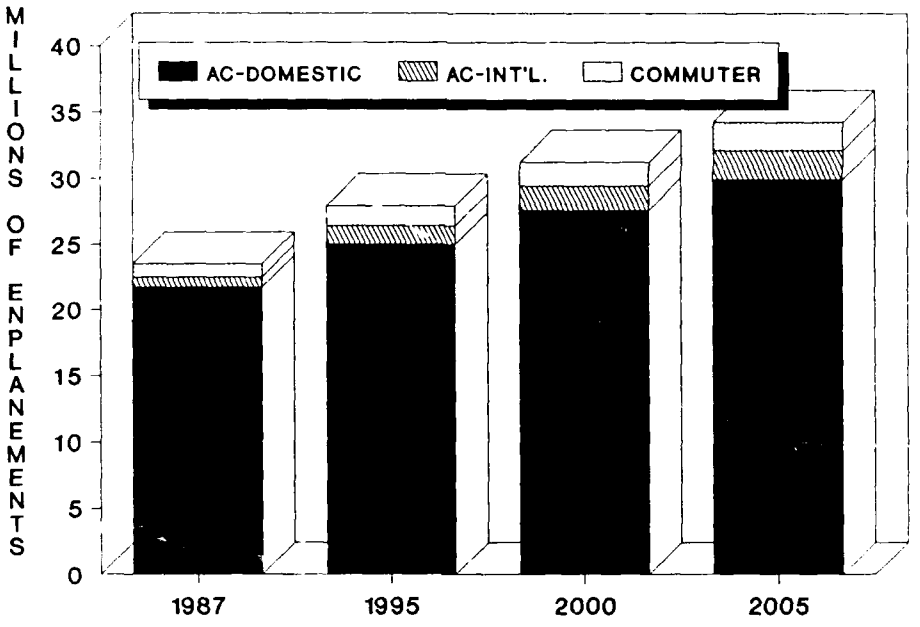
CINCINNATI HUB

The Cincinnati Hub encompasses portions of southwestern Ohio, northern Kentucky, and southeastern Indiana. The Cincinnati Metropolitan Statistical Area (CMSA) is comprised of 8 counties and the City of Cincinnati. It extends over 2,620 square miles. The population of the CMSA was estimated at 1.69 million in 1988. By 2005, the population is expected to reach 1.73 million, an increase of only 2.4 percent over the 1988 total. Cincinnati was settled in 1788 and was incorporated in 1819. In its early years, river trade and commerce enhanced the growth of the city. Later, the construction of a southern rail system to Chattanooga assured further development in manufacturing and commercial activities by maintaining access to southern markets. Today, Cincinnati is a major manufacturing center with many cultural, recreational, and educational facilities.

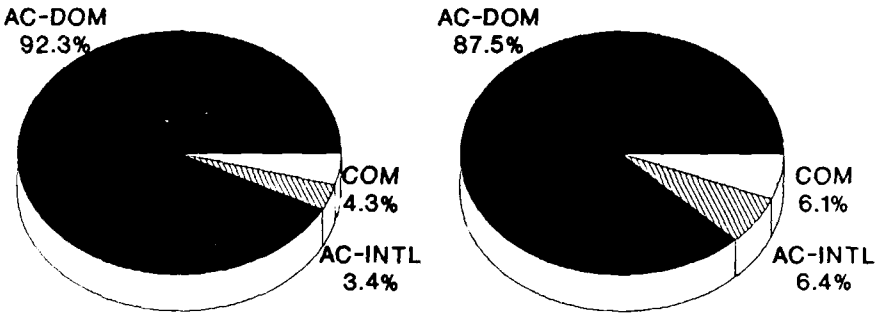
There are 12 public-use airports in the Cincinnati Hub. Of these, two (Greater Cincinnati International and Lunken Field) are FAA air route traffic control tower airports. Greater Cincinnati International Airport is located in northern Kentucky just 13 miles southwest of downtown Cincinnati. It is the hub's only air carrier airport. The area's 12 public use airports provide takeoff and landing services to general aviation and military aircraft in the Cincinnati area. The CMSA is served by 10 domestic and international airlines. The airport serves as a connecting hub for Delta Air Lines.

ATLANTA HARTSFIELD INTERNATIONAL

PASSENGER ENPLANEMENTS



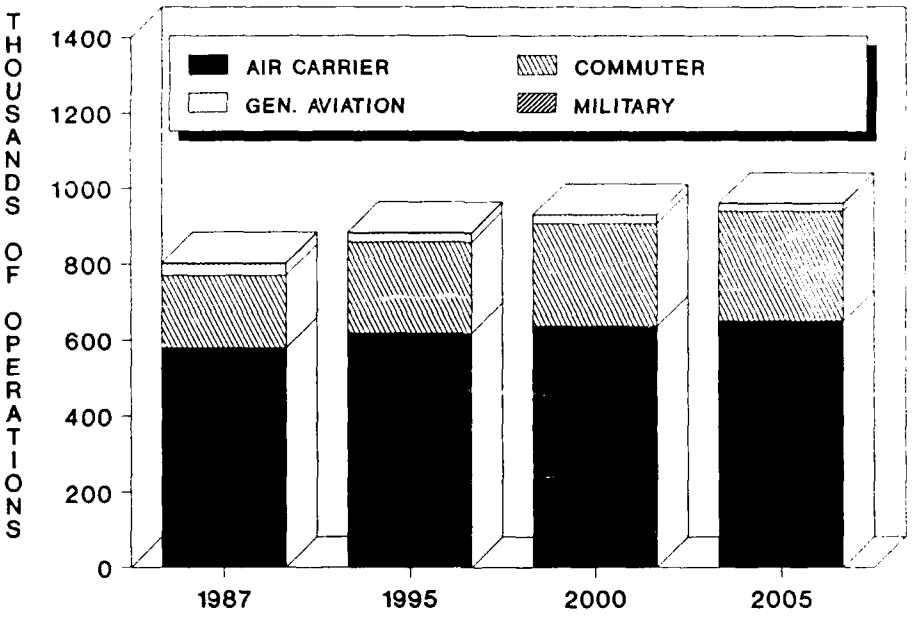
PERCENT OF TOTAL ENPLANEMENTS



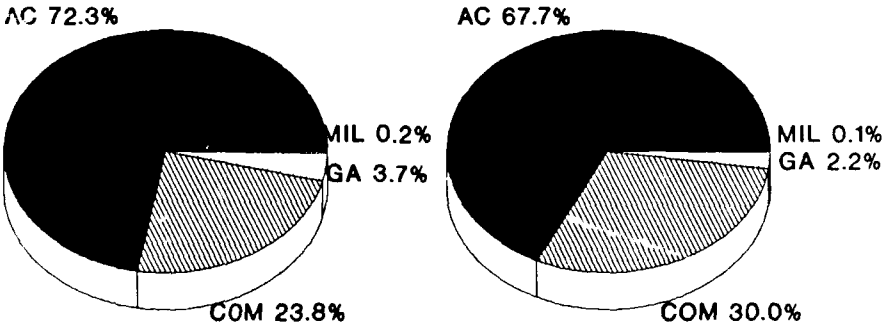
1987 2005

ATLANTA HARTSFIELD INTERNATIONAL

TOTAL OPERATIONS

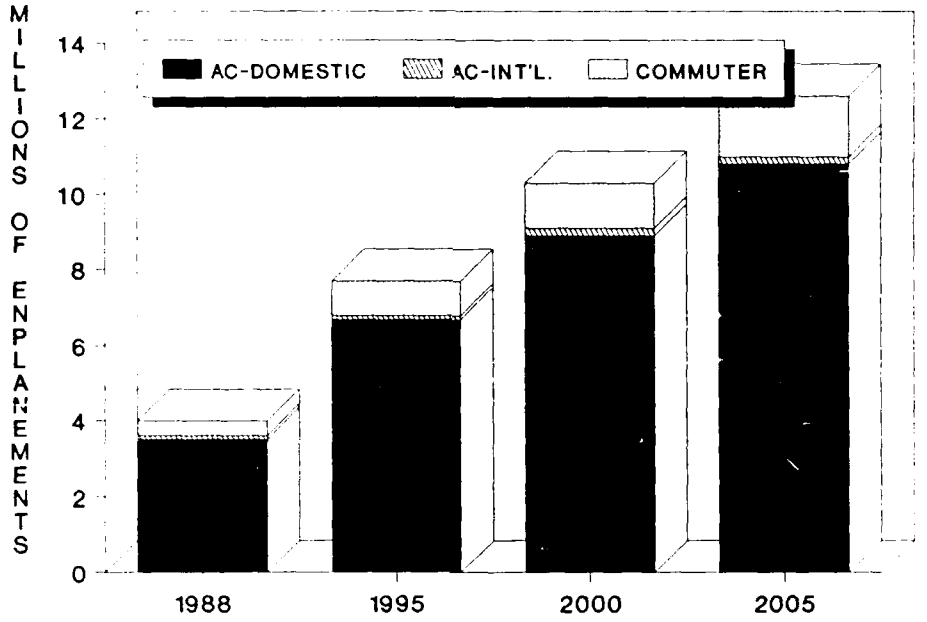


PERCENT OF TOTAL OPERATIONS

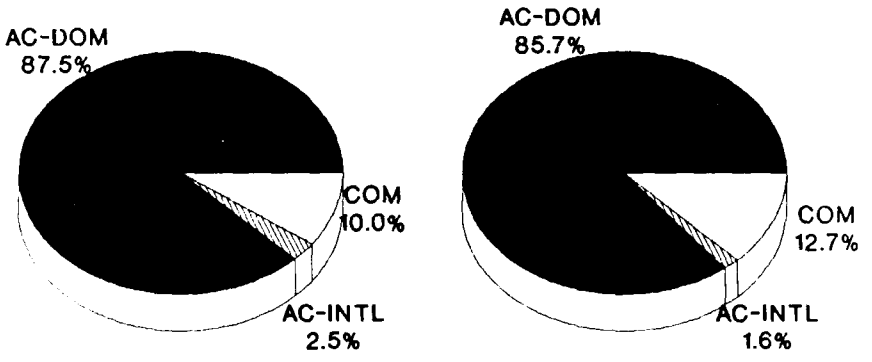


GREATER CINCINNATI INTERNATIONAL AIRPORT

PASSENGER ENPLANEMENTS



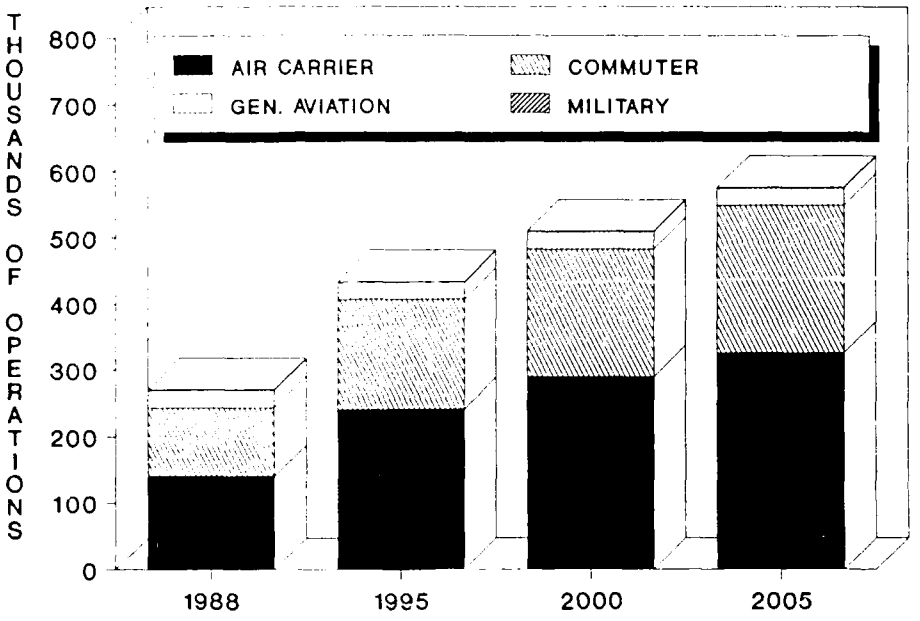
PERCENT OF TOTAL ENPLANEMENTS



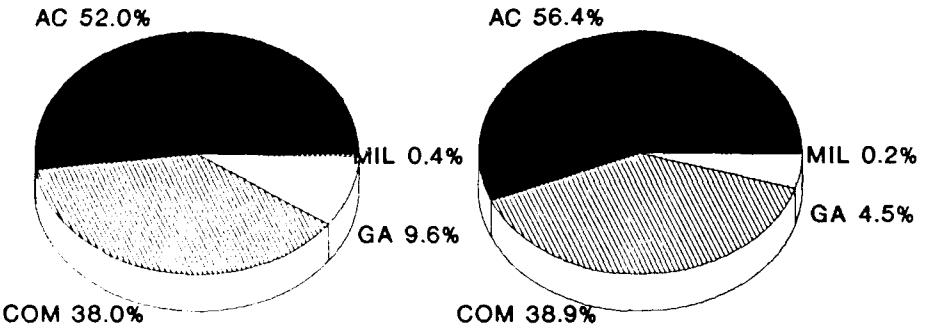
1988 2005

GREATER CINCINNATI INTERNATIONAL AIRPORT

TOTAL OPERATIONS



PERCENT OF TOTAL OPERATIONS



1988 2005

Total passenger enplanements in the Cincinnati Hub are projected to reach nearly 12.6 million in the year 2005. This number is 215 percent higher than the 4.0 million passengers recorded in 1988. Commercial aircraft activity in the Hub is expected to reach 560,600 operations by the year 2005, approximately 124 percent more than the 250,200 operations handled in 1987. Itinerant general aviation aircraft operations in the Cincinnati Hub are forecast to increase by an annual average of 2.4 percent between the 1987 and 2005 period. In comparison, local general aviation operations are expected to grow by 1.9 percent annually.

DAYTON HUB

The Dayton Hub is located in the Miami River Valley of Southwestern Ohio. Dayton is an integral part of the Dayton/Springfield Metropolitan Statistical Area. This MSA is a 4-county area that covers 1,692 square miles. The MSA had a population of 929,300 in 1988. By the year 2005, the population is estimated to reach approximately 943,800, an increase of only 1.6 percent above the 1988 level. Dayton's early economic development included service as a river port and an exporter of agricultural products. Later, a series of manufacturing inventions and advances (cash register, automobile ignition and self-starter systems, and powered flight) laid the groundwork for the area's development as a manufacturing center. Today, Dayton is the headquarters of many of the nation's largest manufacturing companies as well as the home of several divisions of General Motors and a division of The Chrysler Corporation.

There are 19 public use airports in the Dayton MSA. Of these, only the James M. Cox Dayton International Airport has an FAA-operated air traffic control tower. Domestic commercial air carrier services are provided at the Dayton Airport which is located north of the city near the intersection of Interstates 70 and 75. The Dayton Airport and the area's 18 other public use airports provide takeoff and landing services to general aviation and military aircraft. Including USAir which hubs from Dayton, six scheduled air carriers and three all cargo carriers serve the MSA.

Total passenger enplanements in the Dayton Hub are projected to reach 5.1 million in 2005. This represents an increase of 113 percent over the 2.4 million passengers enplaned in 1988. Commercial aircraft operations are forecast to reach 282,100 by 2005, representing a 62 percent increase over the 173,800 commercial aircraft operations that occurred in 1988. During the period 1988 through 2005, both general aviation itinerant operations and general aviation local operations at the 19 airports in the Dayton Hub, as a whole, are forecast to grow at an average annual rate of 1.7 percent.

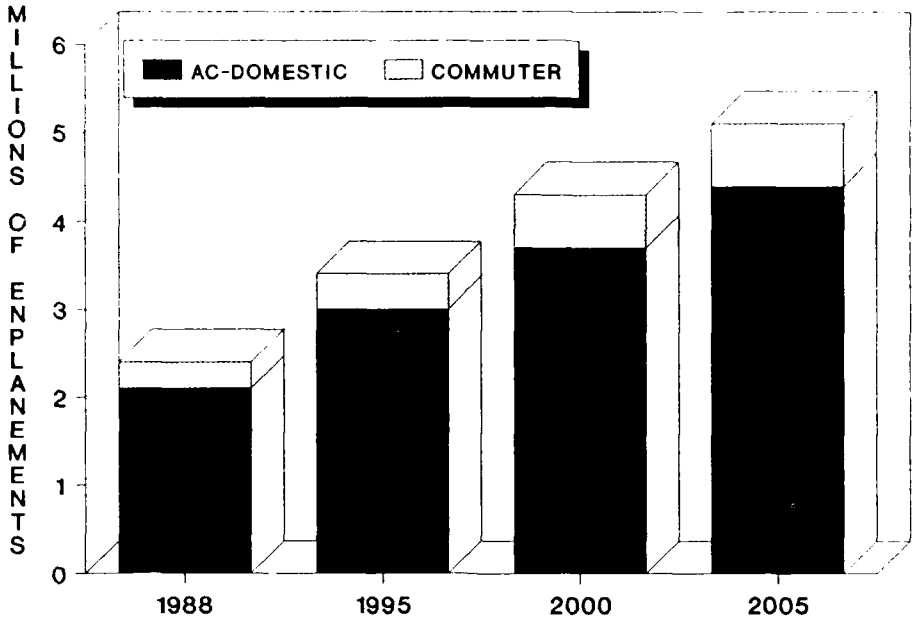
NASHVILLE HUB

The Nashville Hub is located in the north central part of Tennessee on the Cumberland River. The Nashville MSA is an 8-county area that covers 4,135 square miles. The MSA had a population of 973,900 in 1988. By the year 2005, the population is estimated to reach approximately 1,118,400 an increase of 15 percent above the 1988 level. In its early development, Nashville flourished as a result of the river trade along the Cumberland, Ohio, and Mississippi rivers. Later, agricultural products and rail transportation were significant in the development of the city. Today, Nashville has a diversified economy in which its music industry, educational centers, and financial institutions are major contributors.

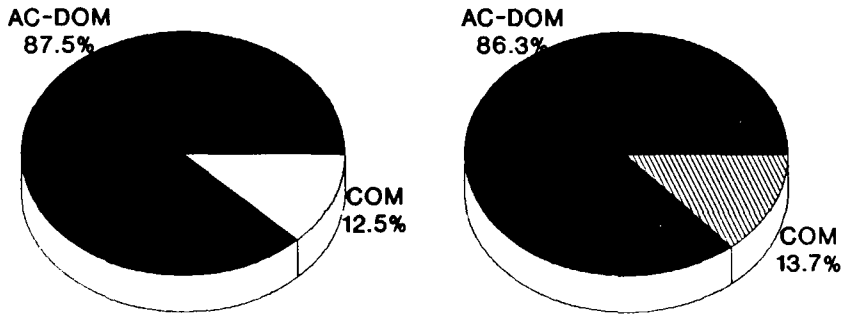
There are 12 public use airports in the Nashville MSA. This number includes the Nashville International Airport;

DAYTON INTERNATIONAL AIRPORT

PASSENGER ENPLANEMENTS



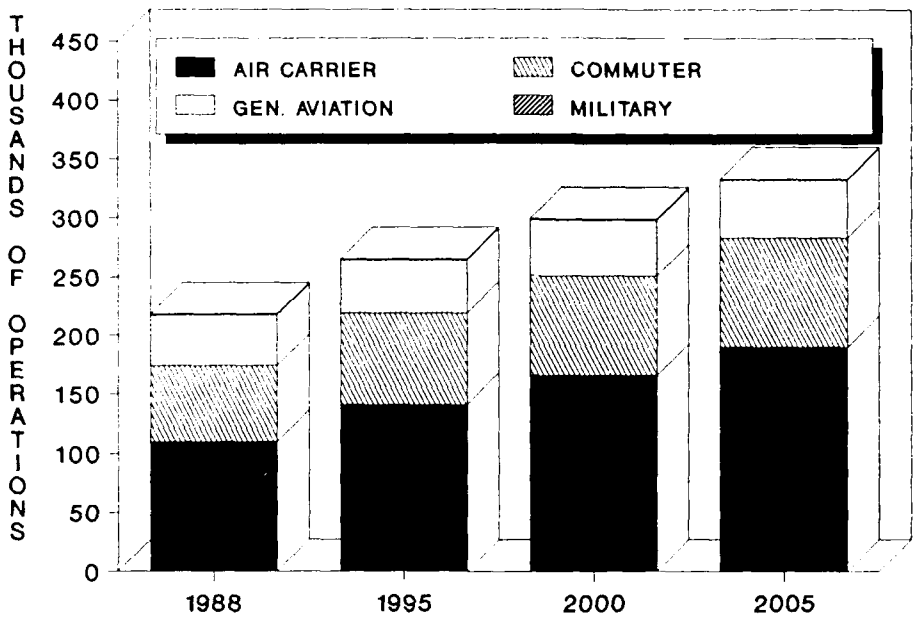
PERCENT OF TOTAL ENPLANEMENTS



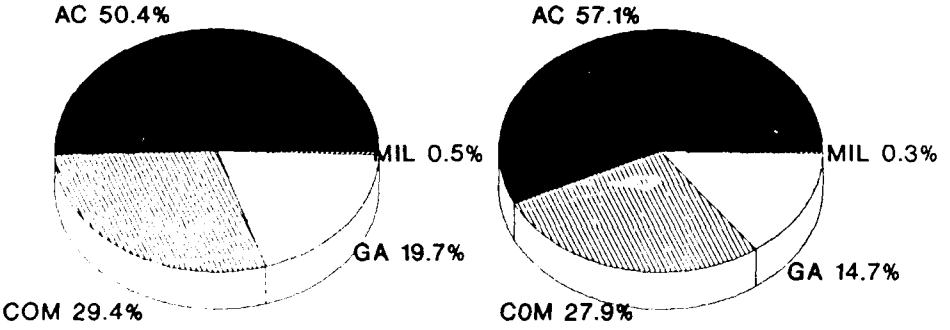
1988 2005

DAYTON INTERNATIONAL AIRPORT

TOTAL OPERATIONS



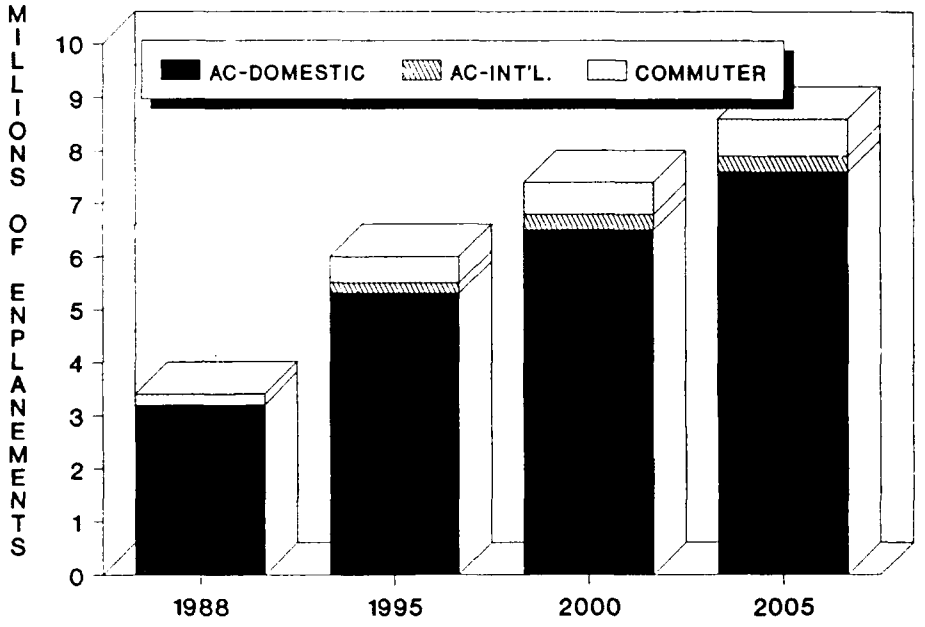
PERCENT OF TOTAL OPERATIONS



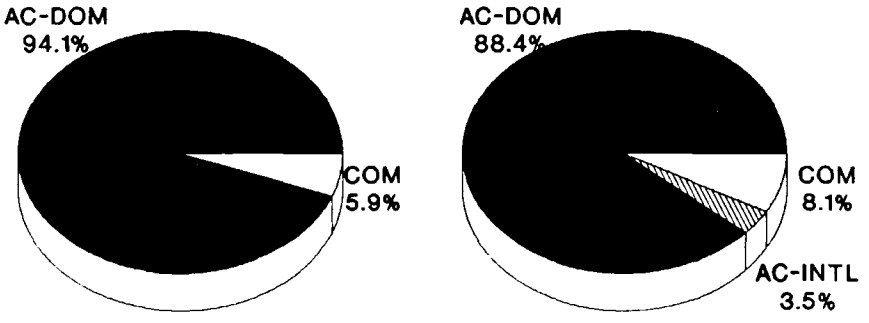
1988 2005

NASHVILLE INTERNATIONAL AIRPORT

PASSENGER ENPLANEMENTS



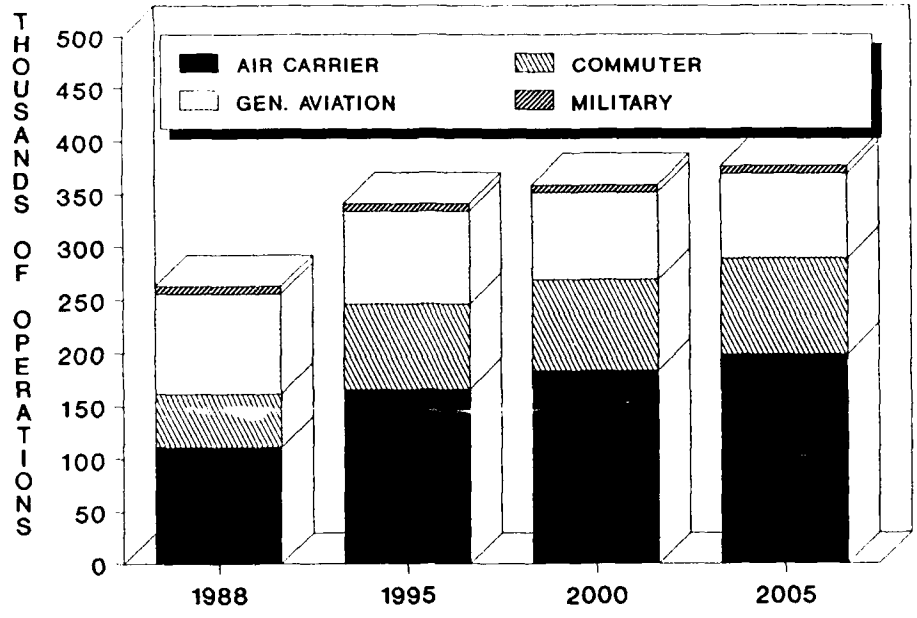
PERCENT OF TOTAL ENPLANEMENTS



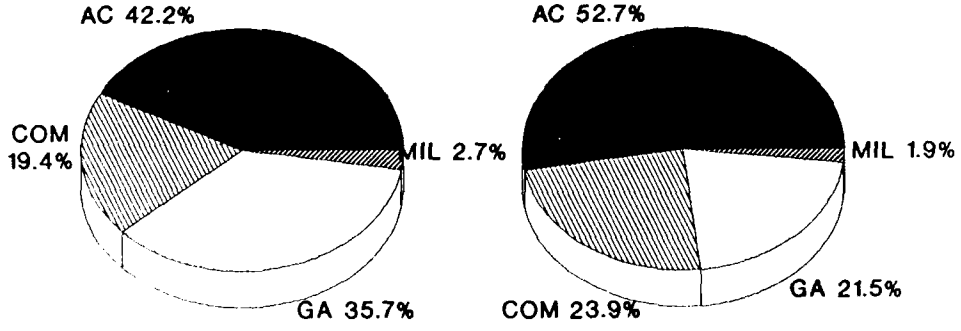
1988 2005

NASHVILLE INTERNATIONAL AIRPORT

TOTAL OPERATIONS



PERCENT OF TOTAL OPERATIONS



1988 2005

this is the only airport with an FAA operated air traffic control tower. International, domestic, and commuter air carrier services are provided at the Nashville Airport which is located 6 miles southeast of downtown Nashville. The Nashville International Airport as well as the other public use airports provide takeoff and landing services to general aviation and military aircraft. Ten scheduled air carriers and seven all cargo carriers serve the Nashville MSA. American Airlines utilizes the Nashville airport as part of its hub and spoke route system.

Total passenger enplanements in the Nashville Hub are projected to reach 8.6 million in 2005. This represents an increase of 153 percent over the 3.4 million passengers enplaned in 1988. Commercial aircraft operations are forecast to reach 288,800 by 2005, representing a 78 percent increase over the 162,300 commercial aircraft operations that occurred in 1988. From 1988 through 2005, general aviation itinerant operations at the Nashville Hub are forecast to grow at an annual average rate of 3.2 percent. Similarly, general aviation local operations are expected to increase by an average annual rate of 3.0 percent.

RALEIGH/DURHAM HUB

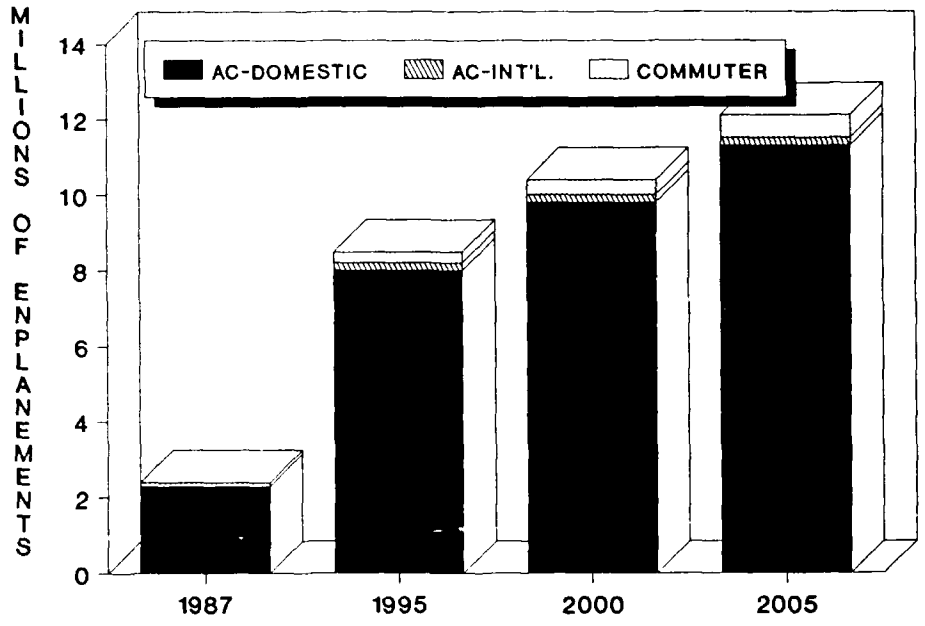
The Raleigh/Durham Hub is located in the central Piedmont section of North Carolina. The hub's estimated population for 1987 was 665,700. By the year 2005, the population is expected to reach 903,600, an increase of 36 percent over the 1987 level. Raleigh was named after Sir Walter Raleigh, the founder of the first English settlement on the North Carolina coast. Durham is located 20 miles north of Raleigh. The four counties which comprise the Raleigh/Durham MSA extend over an area of 2,046 square miles. During the 19th century, the railroads helped foster the economic development of the area. The region's climate and soil are ideally suited for the growth of tobacco and for the processing and manufacturing of tobacco products. This led to the establishment of the American Tobacco Company by the Duke family of Durham in 1881. The economy is quite diversified and includes the manufacture of cotton textiles, chemicals, medicines, and lumber products. The MSA is the home of one of the nation's largest research centers, Research Triangle Park, a planned research development center established in 1959.

There are 8 public use airports in the Raleigh/Durham MSA. This includes the FAA air traffic controlled Raleigh/Durham International Airport, the only airport with an FAA control tower. International, domestic, and commuter air carrier services are provided at the Raleigh/Durham International Airport which is located midway between Raleigh and Durham. The Raleigh/Durham International Airport and the other public use airports provide takeoff and landing services to general aviation and military aircraft. Including American Airlines which uses Raleigh/Durham as a hub, eight scheduled air carriers and nine all cargo carriers serve the area.

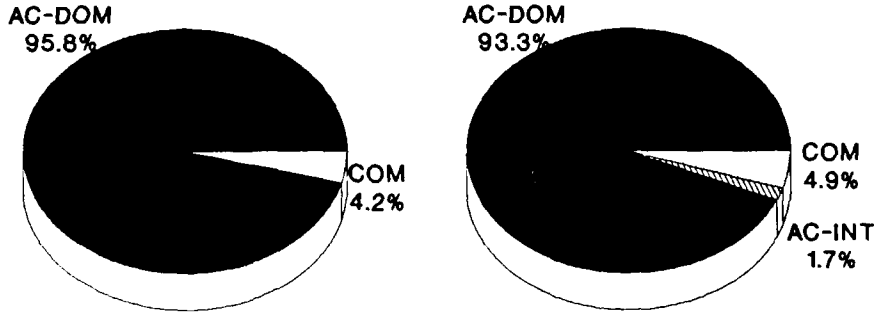
Total passenger enplanements in the Raleigh/Durham Hub are projected to reach 12.2 million in 2005. This represents an increase of 408 percent over the 2.4 million passengers enplaned in 1987. Commercial aircraft operations are forecast to reach 439,800 by 2005, representing a 287 percent increase over the 113,500 commercial aircraft operations that occurred in 1987. During the period 1987 through 2005, general aviation itinerant operations at the Raleigh/Durham Hub are forecast to grow at an annual average rate of 1.9 percent. General aviation local operations are expected to increase by an average annual rate of 3.8 percent.

RALEIGH/DURHAM INTERNATIONAL AIRPORT

PASSENGER ENPLANEMENTS



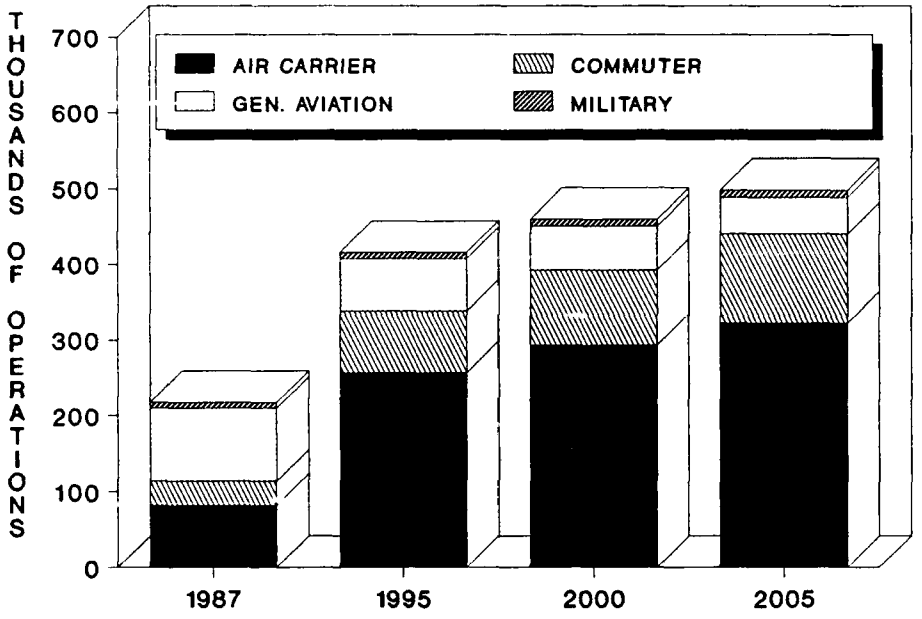
PERCENT OF TOTAL ENPLANEMENTS



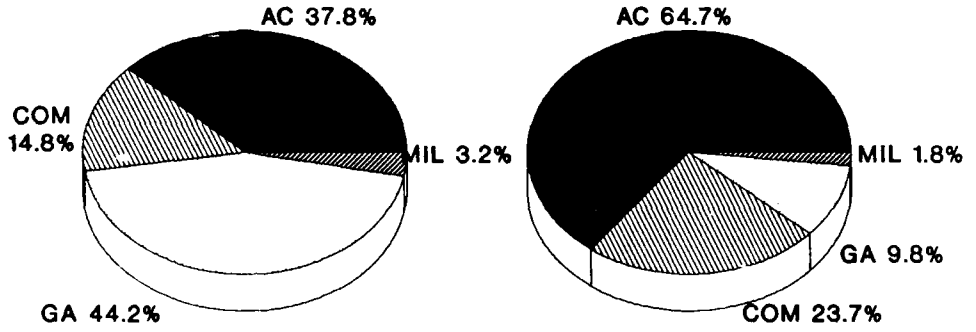
1987 2005

RALEIGH/DURHAM INTERNATIONAL AIRPORT

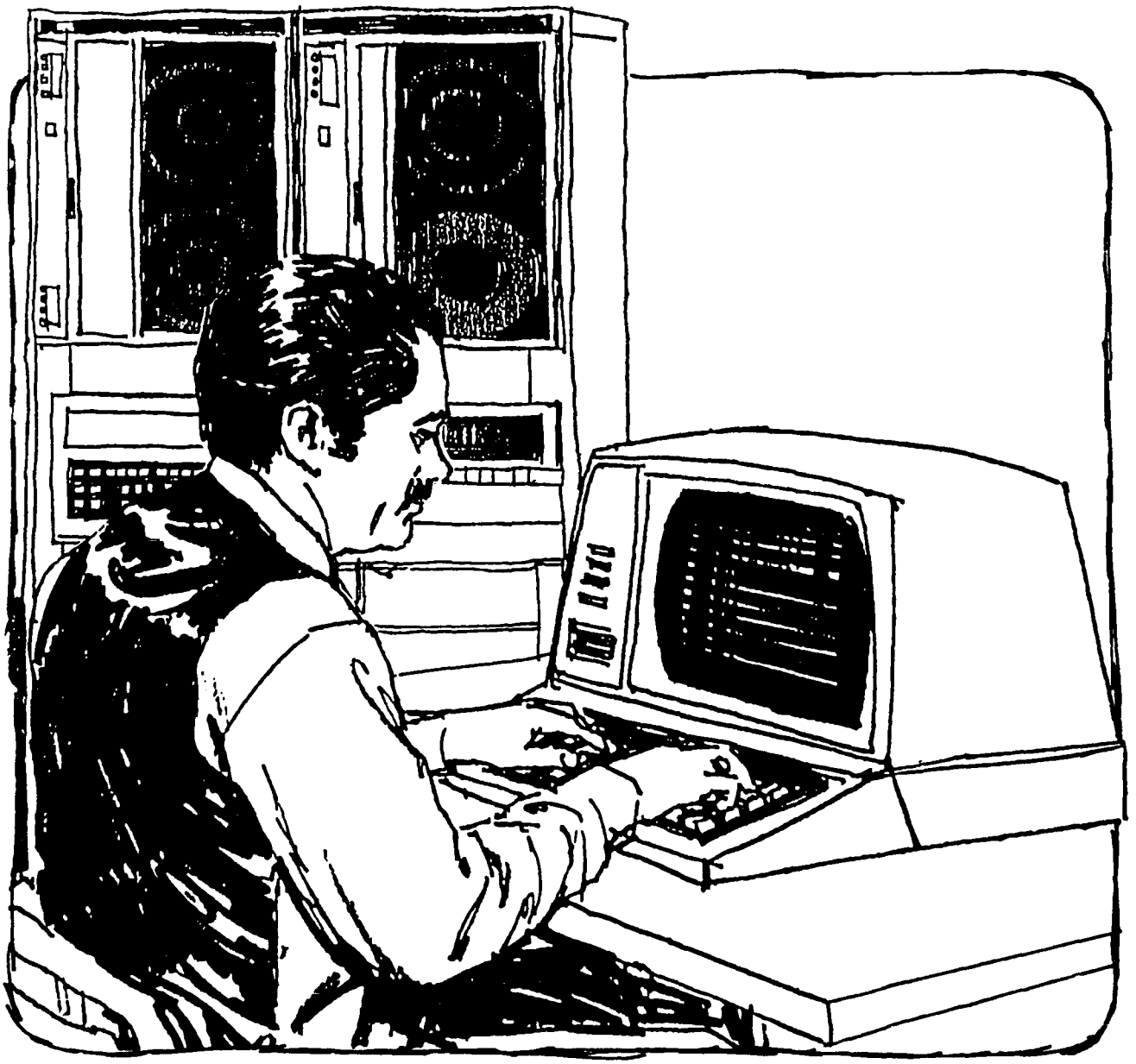
TOTAL OPERATIONS



PERCENT OF TOTAL OPERATIONS



CHAPTER IX
FORECAST ACCURACY



CHAPTER IX

FORECAST ACCURACY

The Federal Aviation Administration (FAA) provides 12-year forecasts of workload measures annually for manpower and facility planning. The FAA has devloped forecast models and established a forecast process that attempts to anticipate external events that may affect the industry. For example, the National Academy of Sciences, Transportation Research Board (TRB) organized a special workshop on aviation forecasting methodology in the spring of 1989. This workshop was sponsored by the FAA for the purpose of examining techniques and practices currently used by the FAA and other aviation forecasters and to explore other methodological approaches. The workshop focused on the forecasting process and ways to improve the reliability and utility of forecasting results. The seven major conclusions of the workshop were:

(1) The present FAA forecast procedure appears to produce results that are satisfactory for the purposes intended--anticipation of workload and facilities requirements ten years ahead.

(2) While past FAA forecasts, particularly in the years since airline deregulation, have underestimated traffic growth, inaccurate forecasting is not a primary cause of the present shortage of capacity in the air transport system. The chief reasons are lack of funding and inability to achieve consensus on the need and timing for airport and air traffic control system expansion.

(3) The FAA forecasting process can be used for a wider range of purposes than it is now--for example, exploring contingencies, alternative scenarios, and prospective policies and programs.

(4) For longer-term forecasts, FAA may wish to consider (a) expanded use of demographic and employment data, (b) use of megatrends to assess the role of aviation in a more comprehensive view of society, and (c) predictions of fossil fuel supply and demand.

(5) For its short-term models FAA may wish to explore ways to utilize variables such as airline yield, price, unit costs, and market segmentation.

(6) There is a need for broader and better data on market developments and travel behavior.

(7) In developing its forecasts FAA may wish to expand its program to obtain a broad consensus on critical assumptions from a cross-section of industry representatives (airlines, other airspace users, aircraft manufactureres, and airports).

Copies of the proceedings of this workshop are available from the TRB (Circular Number 348, August 1989).

It should be recognized, however, that no forecast model or forecasting process is absolutely accurate and that there will always be unanticipated events that could alter our forecasts.

The following two tables provide some measure of the accuracy of FAA workload forecasts. They compare forecast data for both the short-term, 1 to 5 years, which is the critical period for manpower planning, and for ten years out. Instrument operations and aircraft handled are two key FAA workload measures. The forecast error in the short term tends to be minimal while the ten year out forecasts are high due to two external events that had not been anticipated but had long-term impacts on the aviation system--the more than doubling of fuel prices due to the OPEC actions taken in 1979-1980 and the failure of general aviation to respond to the economic recovery. Also, actual 1989 activity was affected by the Eastern Air Line strike which lowered air carrier operations by almost 400,000.

THE FAA AVIATION FORECASTING PROCESS

INTRODUCTION

The FAA's forecasting process is a continuous and interactive one that involves the FAA Forecast Branch, other FAA Offices and Services, other Government agencies, and aviation industry groups. In addition, the process uses various economic and aviation data bases, econometric models and equations, and other analytical techniques.

Forecasting aviation activity is an essential component of the FAA's planning process. The forecasts are used to determine staffing levels and capital expenditures that will be needed to accommodate growth of activity in a safe and efficient environment. The forecasts are also used for short-term budget preparation, cost-benefit analyses, and safety analyses. The relative importance of the forecasting function in the planning process can be gauged by examining the major changes being made to the National Airspace System during the next 10 years. These changes are being made, in large part, to accommodate the projected growth in air traffic.

In rebuilding the air traffic control and air navigation systems, the FAA is installing new aircraft landing systems, developing new radar and communication systems, and upgrading weather services to aircraft operators. Because of the sizeable investments being made in the National Airspace System, it is essential that the FAA develop and utilize the most accurate and reliable forecasts possible. Consistently large forecast errors will lead to inefficient allocation of scarce resources. Thus, review and evaluation of the FAA forecasting procedures, models, forecast assumptions, and forecast results constitute an essential part of the process.

SYSTEM BACKGROUND

As part of the need for ensuring safe and efficient operation of the National Airspace System, FAA operates 399 airports with air traffic control towers, 22 air route traffic control centers, and, as of late fiscal year 1989, 199 flight service stations. Many of the nonautomated flight service stations will be absorbed into 61 new automated facilities by 1992. Thus, the FAA facilities perform a large and diverse number of services for the aviation community.

FAA INSTRUMENT OPERATIONS FORECAST EVALUATION

(Millions)

		Forecast - Years Out					
Year	Actual	1	2	3	4	5	10
1986	40.5	40.6	40.9	40.8	42.6	44.8	46.2
1987	43.4	41.7	42.3	42.3	42.4	44.3	45.9
1988	44.5	45.4	43.0	43.8	43.6	44.2	49.9
1989	45.0	45.8	47.2	44.2	45.7	45.5	53.9
1990		46.4	47.7	49.1	45.4	47.3	54.2
1991			48.0	49.5	50.7	46.4	52.4
1992				49.6	51.3	51.8	51.5
1993					50.8	52.5	50.3
1994						52.2	52.0
1999							57.6

PERCENT ERROR
(Forecast/Actual)

1986		0.3	1.0	0.7	5.2	10.6	14.1
1987		(3.9)	(2.5)	(2.5)	(2.3)	2.1	5.8
1988		2.0	(3.4)	(1.6)	(2.0)	(0.7)	12.1
1989		1.8	4.9	(1.8)	1.6	1.1	19.8

FAA ARTCC AIRCRAFT HANDLED FORECAST EVALUATION

(Millions)

		Forecast - Years Out					
Year	Actual	1	2	3	4	5	10
1986	34.2	34.0	33.9	33.1	32.8	33.6	36.3
1987	35.8	35.4	35.1	35.0	34.0	34.0	39.6
1988	36.4	37.0	36.6	36.1	36.1	35.1	42.8
1989	36.6	37.2	38.0	37.6	37.2	37.4	42.0
1990		37.8	38.2	39.2	38.7	38.4	42.2
1991			39.1	39.7	40.3	39.6	40.3
1992				40.1	40.8	41.4	39.3
1993					41.0	41.6	40.7
1994						41.9	43.6
1999							46.0

PERCENT ERROR
(Forecast/Actual)

1986		(0.6)	(0.9)	(3.2)	(4.1)	(1.7)	6.1
1987		(1.1)	(2.0)	(2.2)	(5.0)	(5.0)	10.6
1988		1.6	0.5	(0.8)	(0.8)	(3.6)	17.6
1989		1.6	3.8	2.7	1.6	2.2	14.7

The FAA towers provide sequencing and separation services to pilots and aircraft arriving at or departing from individual airport facilities. These services are provided to various categories of aircraft: air carriers, commuters, air taxis, general aviation, and military. The arrivals and departures (landings and takeoffs) are generally referred to as aircraft operations. The arrivals and departures are further classified as itinerant or local operations depending on the purpose of the flight or the distance between the airports from which the landings and takeoffs were made. These operations are measures of workload or activity at individual airports. The sum of these operations at all towered airports constitute the national counts of aircraft operations.

Another important workload measure at FAA tower airports is the number of instrument operations. This is essentially an aircraft operation performed in accordance with an instrument flight rule (IFR) flight plan or an aircraft flight where IFR separation between aircraft is provided by the facility. At times, advisory services may be offered to aircraft flying under visual flight rules (VFR). Instrument operations are further subdivided into (1) primary instrument operations (separation and sequencing services provided to aircraft landing at the airport providing the service), (2) secondary instrument operations (services provided to aircraft landing at a nearby airport), and (3) overs (services provided to aircraft which are transiting the facility's controlled airspace without landing in the area).

Each air route traffic control center (ARTCC) controls aircraft which are flying under instrument flight rules in the center's designated geographic control area. The workload measures for the centers are the numbers of IFR aircraft handled. The IFR counts are categorized by user groups.

Flight service stations provide a variety of services to the aviation community. They collect and disseminate meteorological and weather information, provide briefings to pilots, and provide assistance in emergencies to lost, disoriented, or downed airmen. The workload measures at flight service stations are weighted sums of the number of flight plans filed, pilot briefings provided, and aircraft contacted.

This document, "FAA Aviation Forecasts, Fiscal Years 1990-2001, March 1990," contains 133 distinct time-series variables. (The number does not include derived subtotals and totals.) Of these, four economic independent variables are obtained from sources external to the FAA. The FAA analysts or forecasters have no control over these truly exogenous variables. There are 12 quantifiable air carrier forecast assumptions and four quantifiable commuter carrier forecast assumptions. Within justifiable limits, these forecast assumptions are under the control of the analysts. There are 83 aviation variables that, strictly speaking, are not FAA workload measures; but these influence the true workload measures in one way or another. Finally, there are 30 aviation variables which are the workload measures used by the FAA for policy and planning considerations and for manpower and investment planning.

The table at the end of this chapter contains a list of the variables and the sources for the historical data and their relationship to different aspects of the forecast process. Forecasts of the economic variables and the military fleet and hours flown are developed outside the FAA. All other forecasts are developed by the FAA. From the preceding discussion, it follows that the FAA must explicitly consider at least 133 variables when producing a set of national forecasts.

Research undertaken in the early- and

mid-1970's indicated that some measures of economic activity (such as gross national product or total employment) and some measures of prices (for example, aircraft prices and aviation fuel prices) were useful predictors of aviation activity. Some unique events (including the strike in August 1981 and the prolonged depressed state of the general aviation manufacturing industry) have altered the relationships between the key aviation variables and the economic variables used previously. It has been difficult, therefore, to produce economic or econometric models which predict aviation activity with the same degree of reliability as the models which were developed in earlier periods. Thus, for the present, the forecasters must rely to a greater degree on subjective judgment, evaluation, and expertise than was required previously.

THE FAA FORECASTING PROCESS

The FAA forecasting process is an interactive system that combines econometric and time series model results with aviation industry forecasts, expert opinions, and anticipated policy impacts to derive a set of FAA aviation forecasts that are used in the decisionmaking process. The following flow diagram shows a generalized version of the FAA aviation forecasting process.

The first step in developing the forecasts is to enter the economic and demographic variables into a set of econometric models or equations that represents a simplified version of the real world. The economic and demographic variables (the truly independent and exogenous variables) are developed outside the FAA and, therefore, are not within the analysts' control. It is evident that the degree of accuracy of the forecasts of aviation activities depends on both the accuracy of the forecasts of the independent variables and the ability of the models to portray activities in the real world.

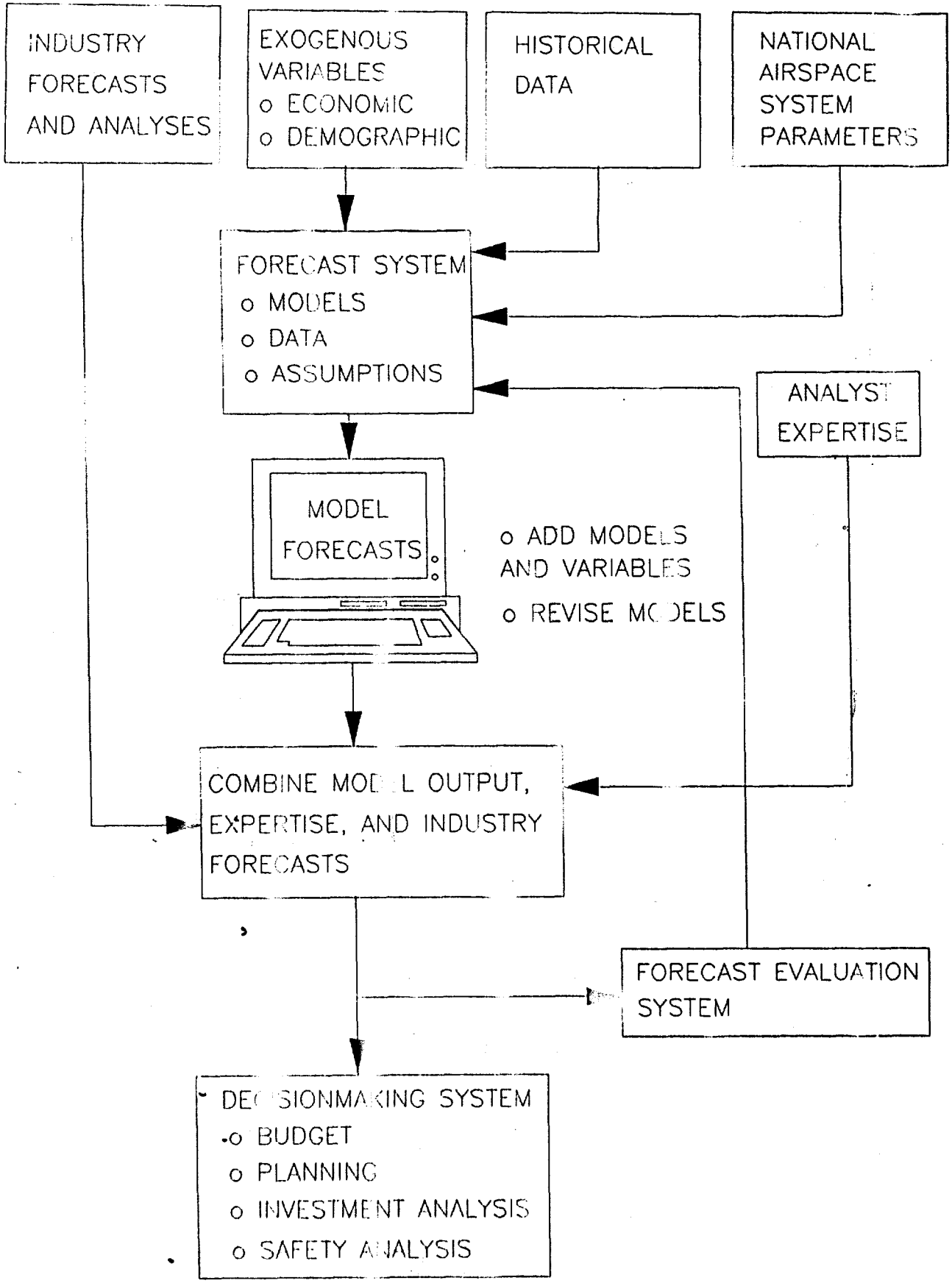
The mechanical execution of forecast models is only the first step in producing a set of forecasts. In general, these models and equations are simple portrayals of a complex system. They cannot account for a number of political, social, psychological, and economic variables and all the interrelated actions and reactions that eventually lead to a particular set of results. Consequently, the initital model results are reviewed, revised, and adjusted to reflect the analysts' best judgment of the impacts of the events which are occurring or are expected to occur during the forecast period.

The FAA forecasting process is both continuous and iterative. As such, it is important to evaluate the forecast results and to determine the basis of the deviations of the forecast values from the actual values observed in the real world. The analysis of the errors generally identifies the causes of the deviations and helps in determining the proportion due to improper model specifications, erroneous forecasts of independent variables, erroneous forecast assumptions, or incorrect analysts' judgments and opinions. If warranted, the forecast error analysis may lead to a reformultation of the model and to additions or deletions of independent variables, revisions of forecast assumptions, and/or changes in analysts' opinions and judgments about future events.

FORECAST EVALUATION

It is essential that the FAA forecasts of the demand for services at the FAA towers, air route traffic control centers, and the flight service stations be accurate. Large forecast errors can lead to inefficient allocation of resources which,

FAA FORECASTING SYSTEM



in turn, could lead to capacity constraints and delays or to excess capacity in the National Airspace System. For this reason, FAA must continuously evaluate the forecasting process and its results.

The evaluation of the forecast process proceeds on several fronts. On a monthly basis, FAA tracks its short-term forecasts of aircraft operations, instrument operations, aircraft handled, and flight services vis-a-vis the actual counts at the facilities. This tracking system alerts FAA management to unexpected deviations from the trends suggested by the forecasts. Inquiries are then initiated to determine the cause(s) of the differences and revised short-term forecasts may be generated, if necessary.

To help the analysts make correct decisions and informed judgments when developing the forecast assumptions, FAA holds a series of meetings with industry representatives to discuss industry trends, recent developments, and possible future courses of events. Every 2 years, for example, FAA, in cooperation with the the National Academy of Sciences, Transportation Research Board (TRB), sponsors a "forecast assumptions workshop." This workshop is attended by 70 to 80 industry planners and forecasters representing the airlines, aircraft manufacturers, engine manufacturers, and other industry groups.

The participants in various subgroups identify specific assumptions about the short-term and long-term future trends of the economic and aviation variables that are important to their segments of the industry, indicate why these are considered important, and show why specific trends are anticipated. After discussing the assumptions, the entire group attempts to reach a consensus about the key variables affecting the industry and the most likely future courses of these variables. Finally, the TRB prepares and publishes a workshop report. The participants benefit from the discussions and the analysts have the TRB workshop report as a benchmark for preparing forecasts or for evaluating forecasts prepared by other organizations. FAA uses this forum and the workshop report in preparing and in evaluating its aviation forecasts.

Formal and informal meetings with individuals and representatives of specific industry groups represent other avenues used by the FAA to promote dialogue and discussion with the aviation community and to solicit input and comments. Separate meetings are regularly held with the aircraft manufacturers, as a group, with members of the Air Transport Association, and with members of the General Aviation Manufacturers Association. In addition, FAA analysts maintain one-on-one contact with industry representatives.

Another intermediate step in the FAA aviation forecast process is the public dissemination of the forecast results, solicitation of industry comments, and critique of the forecasts. The main avenue used for this purpose is the "FAA Aviation Forecast Conference" held annually in February or March. The 500 to 600 participants at the conference generally include airline executives, aircraft and engine manufacturers, consumer groups and other industry representatives, and the news media. To the maximum extent possible, FAA responds to questions raised about the forecasts both during and after the conference.

An important part of the conference is the opportunity for various segments of the aviation community to make technical presentations on a variety of topics of interest to the aviation community. The FAA aviation forecast conference establishes avenues of communication through which FAA releases its forecast to the aviation community and the public and receives comments, criticisms,

and feedback about the forecasts. The FAA also receives valuable information and insights through the papers presented at the forecast conferences.

FAA also seeks to improve the forecast accuracy and credibility by inviting FAA regional and state participation in the forecast process. For example, facility level terminal area forecasts and flight service station forecasts are circulated to FAA regions for review and comments. The comments and suggested changes are incorporated in the final facility level reports. In the case of the terminal area forecasts, the FAA regions have the capability to make changes by computer. The final facility level forecasts derived by this procedure must be consistent with the national forecasts.

Periodically, FAA prepares a technical report that compares the accuracy of the forecasts of key workload measures with the accuracy of forecasts of economic variables prepared by major forecasting services. Based on the results of these studies, the FAA forecasts compare quite favorably with those produced by these major forecasting services. (For details, see APO Bulletin, "Accuracy of FAA Forecasts," APO-88-1, May 1988.)

FAA AVIATION FORECAST VARIABLES AND DATA SOURCES

TYPES OF VARIABLES AND VARIABLE NAMES	DATA SOURCES
ECONOMIC:	
Gross national product (GNP)	OMB, DRI, Evans, WEFA
Consumer price index (CPI)	OMB, DRI, Evans, WEFA
Oil and gas deflator	OMB, DRI, Evans, WEFA
Fuel price index	OMB, DRI, Evans, WEFA
AIR CARRIER:	
FORECAST ASSUMPTIONS	
Domestic Operations:	
Average seats per aircraft	RSPA
Average passenger trip length	RSPA
Revenue per passenger mile (current $)	RSPA
Revenue per passenger mile (1982-84 $)	Computed
Average jet fuel prices (current $)	RSPA
Average jet fuel prices (1982-84 $)	Computed
International Operations:	
(Same as Domestic)	(Same)
SCHEDULED PASSENGER TRAFFIC	
Domestic:	
Revenue passenger miles (RPM's)	RSPA
Revenue passenger enplanements	RSPA
Available seat miles	RSPA
Load factors	RSPA
International:	
Revenue passenger miles by Regions	RSPA
Revenue passenger enplanements by Regions	RSPA
Available seat miles	RSPA
Load factors	RSPA
FLEET	
2-Engine narrowbody	FAA/AVN-120
3-Engine narrowbody	FAA/AVN-120
4-Engine narrowbody	FAA/AVN-120
2-Engine widebody	FAA/AVN-120
3-Engine widebody	FAA/AVN-120
4-Engine widebody	FAA/AVN-120

FAA AVIATION FORECAST VARIABLES AND DATA SOURCES (Continued)

TYPES OF VARIABLES AND VARIABLE NAMES	DATA SOURCES
HOURS FLOWN BY EQUIPMENT	
(Same as Fleet)	RSPA
FUEL CONSUMED	
Jet:	
Domestic air carriers	RSPA
International air carriers	RSPA
General aviation	FAA/APO-110
Aviation Gasoline:	
Air carriers	FAA/APO-110
General aviation	FAA/APO-110
REGIONAL/COMMUTER:	
FORECAST ASSUMPTIONS	
Average seats per aircraft	RSPA
Average passenger trip length (48 states)	RSPA
Average passenger trip length (Hawaii, Puerto Rico, Virgin Islands)	RSPA
Average load factor	RSPA
PASSENGER TRAFFIC	
Revenue passenger enplanements (48 states)	RSPA
Revenue passenger enplanements (Hawaii, Puerto Rico, Virgin Islands)	RSPA
Revenue passenger miles (48 states)	RSPA
Revenue passenger miles (Hawaii, Puerto Rico, Virgin Islands)	RSPA
FLEET	
Less than 15 seats	FAA/AVN-120
15 to 19 seats	FAA/AVN-120
20 to 40 seats	FAA/AVN-120
More than 40 seats	FAA/AVN-120
GENERAL AVIATION:	
FLEET	
Single engine piston aircraft	FAA/AMS-420
Multi-engine piston aircraft	FAA/AMS-420
Turboprop aircraft	FAA/AMS-420
Turbojet aircraft	FAA/AMS-420
Piston-powered rotorcraft	FAA/AMS-420
Turbine-powered rotorcraft	FAA/AMS-420
Other general aviation aircraft	FAA/AMS-420

FAA AVIATION FORECAST VARIABLES AND DATA SOURCES (Continued)

TYPES OF VARIABLES AND VARIABLE NAMES	DATA SOURCES
NUMBER OF AIRCRAFT BY REGION	
Total aircraft in each of nine FAA Regions	FAA/AMS-420
HOURS FLOWN	
Hours flown by equipment type (See general aviation fleet)	FAA/AMS-420
FUEL CONSUMED	
Fuel consumed by equipment type (See general aviation fleet)	FAA/APO-110
ACTIVE PILOTS:	
Students	FAA/AMS-420
Private pilots	FAA/AMS-420
Commercial	FAA/AMS-420
Airline transport	FAA/AMS-420
Helicopter	FAA/AMS-420
Glider	FAA/AMS-420
Other	FAA/AMS-420
Instrument rated	FAA/AMS-420
FAA WORKLOAD MEASURES:	
FAA TOWERS	
Number of FAA Towers	FAA/AMS-420
Aircraft Operations:	
Air carrier itinerant operations	FAA/AMS-420
Air taxi/commuter itinerant operations	FAA/AMS-420
General aviation itinerant operations	FAA/AMS-420
Military itinerant operations	FAA/AMS-420
General aviation local operations	FAA/AMS-420
Military local operations	FAA/AMS-420
Instrument Operations:	
Air carrier	FAA/AMS-420
Air taxi/commuter	FAA/AMS-420
General aviation	FAA/AMS-420
Military	FAA/AMS-420
Non-IFR Instrument Operations:	
Terminal control areas	FAA/AMS-420
Expanded radar service areas	FAA/AMS-420

FAA AVIATION FORECAST VARIABLES AND DATA SOURCES (Continued)

TYPES OF VARIABLES AND VARIABLE NAMES	DATA SOURCES
AIR ROUTE TRAFFIC CONTROL CENTERS	
IFR Departures:	
Air carrier	FAA/AMS-420
Air taxi/commuter	FAA/AMS-420
General aviation	FAA/AMS-420
Military	FAA/AMS-420
IFR Overs:	
(Same as IFR departures)	FAA/AMS-420
FLIGHT SERVICE STATIONS	
IFR-DVFR flight plans originated	FAA/AMS-420
VFR flight plans originated	FAA/AMS-420
Pilot briefings	FAA/AMS-420
Air carrier aircraft contacted	FAA/AMS-420
Air taxi/commuter aircraft contacted	FAA/AMS-420
General aviation aircraft contacted	FAA/AMs-420
Military aircraft contacted	FAA/AMS-420
IFR-DVFR aircraft contacted	FAA/AMS-420
VFR aircraft contacted	FAA/AMs-420
MILITARY:	
FLEET	
Jet	DOD
Turboprop	DOD
Piston	DOD
Helicopter	DOD
HOURS	
Hours flown by equipment (See Fleet)	DOD

CHAPTER X

YEAR-BY-YEAR DATA FOR FAA AVIATION FORECASTS FISCAL YEARS 1990–2001

CHAPTER X

YEAR-BY-YEAR DATA FOR FAA AVIATION FORECASTS

FISCAL YEARS 1990 - 2001

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:

- o Table 7 - 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 8 - San Juan and Virgin Islands traffic is reported as domestic, beginning January 1, 1981.

  - Those carriers contained in the Air Carrier forecast data base are listed in Appendices A and B.

  - Includes the following traffic which is also reported as commuters/regionals traffic in Table 15.

	ENPLANEMENTS (Millions)	RPM'S (Millions)		ENPLANEMENTS (Millions)	RPM'S (Millions)
1980	4.199	627.4	1985	4.666	844.2
1981	5.642	906.2	1986	6.537	1,079.0
1982	4.478	732.1	1987	4.100	683.6
1983	2.410	455.4	1988	3.117	581.3
1984	3.153	615.6	1989E	4.072	861.2

- o Table 15 - 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 16 - Includes only aircraft with 60 seats or less. Aircraft also included with general aviation fleet shown in Tables 17 and 18.

o Table 22 - Includes the rotorcraft fleet and hours flown shown in Tables 17 and 18.

TABLE 1

ECONOMIC FORECASTS USED IN DEVELOPING FAA FORECASTS

FISCAL YEAR	GROSS NATIONAL PRODUCT (Billions 1982$)	CONSUMER PRICE INDEX (1982-84 = 100)	OIL AND GAS DEFLATOR (1982 = 100)
Historical			
1985	3,559.7	106.6	95.5
1986	3,693.1	109.2	82.4
1987	3,799.9	111.2	75.8
1988	3,991.0	115.7	79.4
1989E	4,116.7	121.2	85.0
Forecast			
1990	4,216.0	126.1	87.7
1991	4,343.2	131.2	89.1
1992	4,485.1	136.3	92.8
1993	4,626.9	141.4	96.5
1994	4,768.6	146.1	99.6
1995	4,911.7	150.7	103.2
1996	5,046.2*	158.9*	110.4*
1997	5,176.4*	167.5*	118.2*
1998	5,309.7*	176.6*	126.4*
1999	5,445.9*	186.3*	135.1*
2000	5,582.2*	196.4*	144.5*
2001	5,723.1*	207.1*	155.0*

Source: Office of Management and Budget, November 1989

* Based on consensus growth rates of DRI, Evans, and The WEFA Group contained in Table 2.

TABLE 2

ALTERNATIVE ECONOMIC FORECASTS

CALENDAR YEAR	GROSS NATIONAL PRODUCT (Billions 1982$)			CONSUMER PRICE INDEX (1982-84 = 100)			FUEL PRICE INDEX (1982 = 100)		
	DRI	EVANS	WEFA	DRI	EVANS	WEFA	DRI	EVANS	WEFA
Historical									
1985	3,618.7	3,618.7	3,618.7	107.6	107.6	107.6	96.0	96.0	96.0
1986	3,721.7	3,721.7	3,721.7	109.6	109.6	109.6	75.3	75.1	75.3
1987	3,847.0	3,847.0	3,847.0	113.6	113.6	113.6	79.5	79.4	79.4
1988	3,996.0	4,024.4	3,996.1	118.2	118.3	118.3	79.1	79.1	79.1
1989E	4,143.7	4,144.3	4,142.7	124.1	124.2	124.3	86.5	89.5	87.5
Forecast									
1990	4,211.5	4,249.2	4,225.5	129.1	130.2	129.4	86.4	96.7	87.3
1991	4,344.7	4,328.0	4,329.5	135.1	137.5	135.4	89.6	101.5	92.9
1992	4,446.7	4,391.2	4,454.7	142.1	146.3	142.5	94.2	106.7	97.8
1993	4,498.9	4,470.2	4,574.1	149.1	155.7	149.3	99.3	112.3	102.4
1994	4,620.7	4,578.6	4,696.0	156.7	165.4	156.9	105.6	118.3	109.7
1995	4,761.7	4,716.5	4,809.2	165.0	175.4	164.8	113.2	124.6	118.7
1996	4,871.1	4,878.7	4,925.0	173.8	185.6	173.3	121.8	131.2	128.3
1997	4,964.4	5,047.6	5,034.7	183.1	196.3	182.2	131.7	138.1	139.0
1998	5,070.3	5,210.8	5,155.2	192.9	207.8	191.4	142.8	145.4	148.5
1999	5,176.6	5,379.3*	5,275.3	203.5	220.0*	200.9	155.6	153.1*	158.0
2000	5,270.2	5,553.2*	5,400.9	214.5	232.9*	211.0	169.9	161.2*	168.4
2001	5,375.6*	5,732.7*	5,527.7	226.1*	246.5*	221.7	185.2*	169.7*	180.9

Source: Data Resources, Inc., Fall, 1989; Evans Economics, Inc., October 1989; and The WEFA Group, 3rd Quarter 1989

* Extrapolated to 2000 for forecast purposes

TABLE 3

INTERNATIONAL ECONOMIC FORECASTS

(In Billions of 1980 U.S. Dollars)

CALENDAR YEAR	GROSS DOMESTIC PRODUCT EUROPE/ AFRICA/ MIDDLE EAST	LATIN AMERICA	JAPAN/ PACIFIC BASIN/ AUSTRALIA/N. ZEALAND	WORLD
Historical*				
1985	4,938.1	969.2	1,883.0	13,375.0
1986	5,043.9	1,005.2	1,944.7	13,761.6
1987	5,193.8	1,017.2	2,050.7	14,224.5
1988	5,391.2	1,026.4	2,177.9	14,838.2
1989E	5,596.3	1,032.5	2,291.6	15,371.3
Forecast				
1990	5,759.2	1,062.5	2,395.7	15,830.2
1991	5,917.2	1,128.4	2,515.1	16,386.0
1992	6,109.1	1,183.8	2,631.1	16,984.5
1993	6,308.5	1,240.6	2,747.2	17,593.9
1994	6,512.3	1,280.3	2,873.2	18,227.2
1995	6,731.0	1,338.1	3,004.5	18,852.7
1996	6,936.3	1,378.2	3,138.2	19,442.9
1997	7,166.1	1,442.0	3,270.5	20,088.2
1998	7,399.7	1,505.8	3,407.3	20,754.0
1999	7,645.5	1,577.1	3,524.8	21,421.7
2000	7,883.9	1,639.9	3,637.1	21,077.8
2001	8,141.3	1,716.7	3,746.5	22,751.7

Source: The WEFA Group, World Economic Outlook, January 1990

TABLE 4

BASELINE AIR CARRIER FORECAST ASSUMPTIONS

TOTAL SYSTEM OPERATIONS

FISCAL YEAR	AVERAGE SEATS PER AIRCRAFT (Seats)	AVERAGE PASSENGER TRIP LENGTH (Miles)	REVENUE PER PASSENGER MILE CURRENT $ (Cents)	REVENUE PER PASSENGER MILE 1982-84 $ (Cents)	AVERAGE JET FUEL PRICE CURRENT $ (Cents)	AVERAGE JET FUEL PRICE 1982-84$ (Cents)
Historical*						
1985	166.9	881.6	11.77	11.04	81.5	76.5
1986	167.4	874.8	11.02	10.09	64.6	59.2
1987	166.6	894.8	10.93	9.82	52.0	46.2
1988	168.4	927.8	11.81	10.21	56.2	48.6
1989E	168.7	948.4	12.43	10.26	56.4	46.5
Forecast						
1990	171	960	12.31	9.77	58.2	46.2
1991	173	967	12.60	9.60	59.1	45.1
1992	175	974	13.00	9.54	61.6	45.2
1993	176	980	13.47	9.52	64.1	45.3
1994	179	989	13.98	9.57	66.1	45.2
1995	181	996	14.56	9.66	68.5	45.5
1996	184	1,002	15.23	9.58	73.2	46.1
1997	187	1,008	15.93	9.51	78.5	46.9
1998	190	1,014	16.69	9.45	83.9	47.5
1999	194	1,020	17.49	9.39	89.7	48.1
2000	198	1,025	18.33	9.33	95.9	48.8
2001	202	1,030	19.21	9.28	102.8	49.7

* Source: RSPA, Form 41

TABLE 5

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 1982-84 $ (Cents)	AVERAGE JET FUEL PRICE CURRENT $ (Cents)	AVERAGE JET FUEL PRICE 1982-84 $ (Cents)
Historical*						
1985	152.3	758.6	12.36	11.59	80.7	75.7
1986	153.0	764.1	11.33	10.38	63.5	58.2
1987	152.5	775.4	11.20	10.07	50.8	45.7
1988	153.0	785.9	12.23	10.57	55.1	47.6
1989E	151.9	790.2	13.05	10.77	55.4	45.7
Forecast						
1990	154	792	12.95	10.27	57.2	45.3
1991	155	794	13.30	10.14	58.1	44.3
1992	156	796	13.75	10.09	60.5	44.4
1993	157	798	14.26	10.08	63.0	44.5
1994	159	801	14.86	10.17	64.9	44.4
1995	161	804	15.50	10.29	67.3	44.6
1996	163	807	16.26	10.23	71.9	45.3
1997	166	810	17.05	10.18	77.1	46.0
1998	169	813	17.91	10.14	82.4	46.7
1999	172	816	18.80	10.09	88.0	47.3
2000	176	819	19.74	10.05	94.2	48.0
2001	180	822	20.73	10.01	101.0	48.8

* Source: RSPA, Form 41

TABLE 6

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 1982-84 $ (Cents)	AVERAGE JET FUEL PRICE CURRENT $ (Cents)	AVERAGE JET FUEL PRICE 1982-84 $ (Cents)
Historical*						
1985	292.2	2,636.2	9.38	8.80	84.9	79.6
1986	291.8	2,605.7	9.63	8.82	69.1	63.1
1987	283.0	2,583.9	9.76	8.78	56.9	51.2
1988	278.9	2,644.2	10.31	8.91	60.2	52.0
1989E	275.8	2,735.1	10.36	8.55	59.9	49.4
Forecast						
1990	276	2,766	10.35	8.21	61.8	49.0
1991	278	2,786	10.50	8.00	62.8	47.8
1992	279	2,807	10.80	7.93	65.4	48.0
1993	280	2,822	11.19	7.91	68.0	48.1
1994	283	2,844	11.55	7.91	70.2	48.0
1995	285	2,859	11.99	7.95	72.7	48.2
1996	288	2,877	12.45	7.84	77.7	48.9
1997	290	2,891	12.95	7.73	83.3	49.7
1998	293	2,904	13.49	7.64	89.1	50.4
1999	295	2,916	14.07	7.55	95.2	51.1
2000	298	2,923	14.68	7.47	101.8	51.8
2001	300	2,934	15.31	7.39	109.2	52.7

* Source: RSPA, Form 41

TABLE 7

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*						
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
1987	441.2	29.4	470.6	325.8	76.0	401.8
1988	441.2	34.3	475.5	329.9	90.5	420.4
1989E	443.6	36.8	480.4	333.2	100.6	433.8
Forecast						
1990	461.2	40.0	501.2	346.3	110.4	456.7
1991	483.9	42.9	526.8	363.9	119.3	483.2
1992	506.3	45.6	551.9	381.3	128.2	509.5
1993	526.5	48.2	574.7	396.8	135.9	532.7
1994	548.9	51.7	600.6	414.5	146.8	561.3
1995	573.3	54.7	628.0	433.8	156.4	590.2
1996	599.2	57.6	656.8	454.5	165.7	620.2
1997	625.2	60.4	685.6	475.2	174.8	650.0
1998	651.3	63.7	715.0	496.3	184.6	680.9
1999	678.1	66.8	744.9	518.0	194.6	712.6
2000	705.1	70.0	775.1	540.0	202.5	742.5
2001	733.7	73.1	806.8	563.4	214.5	777.9

* Source: RSPA, Forms 41 and 298-C

1/ Sum of Table's 8 and 15 less duplicated traffic. See note on page 123.

TABLE 8

UNITED STATES COMMERCIAL AIR CARRIERS

SCHEDULED PASSENGER TRAFFIC

FISCAL YEAR	REVENUE PASSENGER ENPLANEMENTS (Millions)			REVENUE PASSENGER MILES (Billions)		
	DOMESTIC	INTERNATIONAL	TOTAL	DOMESTIC	INTERNATIONAL	TOTAL
Historical*						
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
1987	415.5	29.4	444.9	322.1	76.0	398.1
1988	414.2	34.3	448.5	325.5	90.5	416.0
1989E	415.6	36.8	452.4	328.4	100.6	429.0
Forecast						
1990	430.6	40.0	470.6	341.0	110.4	451.4
1991	451.0	42.9	493.9	358.1	119.3	477.4
1992	471.0	45.6	516.6	374.9	128.2	503.1
1993	488.6	48.2	536.8	389.9	135.9	525.8
1994	508.2	51.7	559.9	407.1	146.8	553.9
1995	529.6	54.7	584.3	425.8	156.4	582.2
1996	552.4	57.6	610.0	445.8	165.7	611.5
1997	575.2	60.4	635.6	465.9	174.8	640.7
1998	598.2	63.7	661.9	486.3	184.6	670.9
1999	621.7	66.8	688.5	507.3	194.6	701.9
2000	645.3	70.0	715.3	528.5	204.5	733.0
2001	670.4	73.1	743.5	551.1	214.5	765.6

* Source: RSPA, Form 41

TABLE 9

UNITED STATES COMMERCIAL AIR CARRIERS

SCHEDULED INTERNATIONAL PASSENGER TRAFFIC

	REVENUE PASSENGER ENPLANEMENTS (MIL)				REVENUE PASSENGER MILES (BIL)			
FISCAL YEAR	ATLANTIC	LATIN AMERICA	PACIFIC	TOTAL	ATLANTIC	LATIN AMERICA	PACIFIC	TOTAL
Historical*								
1985	11.4	7.9	5.0	24.3	36.1	9.7	18.6	64.4
1986	10.5	8.5	5.4	24.4	32.6	11.1	20.3	64.0
1987	12.4	10.4	6.6	29.4	38.5	13.0	24.5	76.0
1988	14.6	11.5	8.2	34.3	46.1	14.2	30.2	90.5
1989E	15.0	11.8	10.0	36.8	49.1	14.7	36.8	100.6
Forecast								
1990	15.7	12.5	11.8	40.0	51.5	15.6	43.3	110.4
1991	16.4	13.2	13.3	42.9	54.2	16.4	48.7	119.3
1992	17.2	13.7	14.7	45.6	57.1	17.0	54.1	128.2
1993	18.0	14.3	15.9	48.2	59.8	17.7	58.4	135.9
1994	18.9	15.0	17.8	51.7	62.8	18.6	65.4	146.8
1995	19.6	15.7	19.4	54.7	65.3	19.5	71.6	156.4
1996	20.5	16.2	20.9	57.6	68.3	20.2	77.2	165.7
1997	21.3	16.8	22.3	60.4	71.3	21.0	82.5	174.8
1998	22.3	17.5	23.9	63.7	74.5	21.9	88.2	184.6
1999	23.3	18.1	25.4	66.8	77.9	22.8	93.9	194.6
2000	24.2	19.0	26.8	70.0	81.3	23.9	99.3	204.5
2001	25.3	19.6	28.2	73.1	84.9	24.8	104.8	214.5

* Source: RSPA, Form 41

TABLE 10

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*						
1985	436.8	265.8	60.9	98.6	64.8	65.8
1986	488.4	294.4	60.3	108.3	64.1	59.2
1987	521.9	322.1	61.7	117.5	76.0	64.7
1988	533.3	325.5	61.0	135.4	90.5	66.9
1989E	529.5	328.4	62.0	151.1	100.6	66.6
Forecast						
1990	564.0	341.0	60.5	167.3	110.4	66.0
1991	592.0	358.1	60.5	181.9	119.3	65.6
1992	617.9	374.9	60.7	195.2	128.2	65.7
1993	643.6	389.9	60.6	207.9	135.9	65.4
1994	670.3	407.1	60.7	224.4	146.8	65.4
1995	696.8	425.8	61.1	238.7	156.4	65.5
1996	724.8	445.8	61.5	252.5	165.7	65.6
1997	753.8	465.9	61.8	266.2	174.8	65.7
1998	782.0	486.3	62.2	280.5	184.6	65.8
1999	811.5	507.3	62.5	294.5	194.6	66.1
2000	841.9	528.5	62.8	308.6	204.5	66.3
2001	873:5	551.1	63.1	322.7	214.5	66.5

* Source: RSPA, Form 41

TABLE 11

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*							
1985	1,074	1,161	179	91	277	156	2,938
1986	1,238	1,195	171	111	293	160	3,168
1987	1,460	1,160	193	130	298	160	3,401
1988	1,578	1,135	221	153	296	159	3,542
1989E	1,764	1,191	257	187	300	171	3,870
Forecast							
1990	1,938	1,183	253	204	300	177	4,055
1991	2,112	1,158	238	219	306	187	4,220
1992	2,258	1,122	225	237	317	197	4,356
1993	2,318	1,071	211	259	324	207	4,390
1994	2,421	1,008	197	296	332	223	4,477
1995	2,490	936	186	349	338	242	4,541
1996	2,555	856	176	396	349	260	4,592
1997	2,621	773	163	449	360	280	4,646
1998	2,672	707	147	509	376	302	4,713
1999	2,692	637	130	573	392	323	4,747
2000	2,791	564	117	615	405	343	4,835
2001	2,912	488	107	661	419	362	4,949

* Source: FAA Aircraft Utilization and Propulsion Reliability Report

TABLE 12

UNITED STATES COMMERCIAL AIR CARRIERS

TOTAL AIRBORNE HOURS

(In Thousands)

	NARROW BODY			WIDE BODY			
FISCAL YEAR	2 ENGINE	3 ENGINE	4 ENGINE	2 ENGINE	3 ENGINE	4 ENGINE	TOTAL
Historical*							
1985	2,915	2,887	239	309	829	539	7,718
1986	3,644	2,985	323	381	890	551	8,774
1987	4,051	2,968	412	458	943	565	9,397
1988	4,392	2,884	439	557	957	613	9,842
1989E	4,656	2,678	532	655	941	635	10,097
Forecast							
1990	5,083	2,628	513	712	955	673	10,564
1991	5,579	2,557	482	779	980	714	11,091
1992	5,977	2,479	461	858	1,011	756	11,542
1993	6,163	2,371	434	950	1,025	794	11,737
1994	6,395	2,218	412	1,055	1,039	856	11,975
1995	6,497	2,047	395	1,182	1,047	929	12,097
1996	6,658	1,794	380	1,346	1,053	992	12,223
1997	6,826	1,642	359	1,539	1,057	1,062	12,485
1998	6,993	1,503	331	1,734	1,064	1,140	12,765
1999	7,133	1,277	301	1,962	1,070	1,213	12,956
2000	7,275	1,107	276	2,112	1,075	1,286	13,131
2001	7,508	956	256	2,280	1,080	1,357	13,437

* Source: RSPA, Form 41

TABLE 13

TOTAL JET FUEL AND AVIATION GASOLINE FUEL CONSUMPTION

UNITED STATES CIVIL AVIATION AIRCRAFT

(In 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*									
1985	9,906	2,387	12,293	702	12,995	5	437	442	13,437
1986	10,733	2,525	13,258	738	13,996	5	411	416	14,412
1987	11,487	2,765	14,252	662	14,914	4	395	399	15,313
1988	11,902	3,192	15,094	654	15,748	4	394	398	16,146
1989E	12,087	3,537	15,624	712	16,336	3	374	377	16,713
Forecast									
1990	12,652	3,872	16,524	746	17,270	3	371	374	17,644
1991	13,065	4,131	17,196	790	17,986	2	369	371	18,357
1992	13,413	4,346	17,759	838	18,597	2	370	372	18,969
1993	13,776	4,538	18,314	863	19,177	2	373	375	19,552
1994	14,082	4,816	18,898	911	19,809	2	374	376	20,185
1995	14,358	4,999	19,357	955	20,312	2	377	379	20,691
1996	14,642	5,147	19,789	1,007	20,796	2	378	380	21,176
1997	14,855	5,279	20,134	1,052	21,186	2	380	382	21,568
1998	15,035	5,412	20,447	1,089	21,536	2	381	383	21,919
1999	15,221	5,528	20,749	1,126	21,875	2	382	384	22,259
2000	15,328	5,637	20,965	1,170	22,135	2	386	388	22,523
2001	15,442	5,734	21,176	1,199	22,375	2	387	389	22,764

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

TABLE 14

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*				
1985	19.4	162.4	98.9	44.3
1986	20.2	158.9	99.1	45.6
1987	19.7	161.2	97.6	46.0
1988	19.2	171.6	83.3	46.6
1989E	20.4	180.3	77.2	47.8
Forecast				
1990	21.6	187.0	77.0	47.4
1991	22.6	191.0	77.0	47.4
1992	23.8	194.0	78.0	47.2
1993	25.1	196.0	78.0	47.3
1994	26.3	198.0	79.0	47.3
1995	27.5	200.0	79.0	47.3
1996	28.7	202.0	80.0	47.4
1997	29.9	204.0	80.0	47.7
1998	30.8	206.0	80.0	47.9
1999	31.8	208.0	80.0	48.1
2000	33.0	210.0	80.0	48.3
2001	33.8	212.0	80.0	48.5

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

TABLE 15

UNITED STATES REGIONALS/COMMUTERS

SCHEDULED PASSENGER TRAFFIC

(In Millions)

	REVENUE PASSENGER ENPLANEMENTS			REVENUE PASSENGER MILES		
FISCAL YEAR	48 STATES	HAWAII/ PUERTO RICO/ VIRGIN ISLANDS	TOTAL	48 STATES	HAWAII/ PUERTO RICO/ VIRGIN ISLANDS	TOTAL
Historical*						
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)
1987	25.6	2.4	28.0	4,127.2	234.2	4,361.4
1988	28.4	1.7	30.1	4,875.3	143.3	5,018.6
1989E	30.5	1.6	32.1	5,501.1	124.3	5,625.4
Forecast						
1990	32.9	2.0	34.9	6,152.3	154.0	6,306.3
1991	35.2	2.3	37.5	6,723.2	177.1	6,900.3
1992	37.7	2.5	40.2	7,313.8	195.0	7,508.8
1993	40.3	2.8	43.1	7,898.8	218.4	8,117.2
1994	43.1	3.1	46.2	8,533.8	244.9	8,778.7
1995	46.1	3.4	49.5	9,220.0	286.6	9,488.6
1996	49.2	3.7	52.9	9,938.4	296.0	10,234.4
1997	52.5	4.0	56.5	10,710.0	320.0	11,030.0
1998	55.7	4.2	59.9	11,474.2	336.0	11,810.2
1999	59.2	4.4	63.6	12,313.6	352.0	12,665.6
2000	62.7	4.6	67.3	13,167.0	368.0	13,535.0
2001	66.4	4.8	71.2	14,076.8	384.0	14,460.8

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

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

TABLE 16

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*					
1985	624	561	162	204	1,551
1986	564	615	200	159	1,538
1987	581	652	213	158	1,604
1988	573	740	251	120	1,684
1989E	538	802	303	139	1,782
Forecast					
1990	481	842	329	169	1,821
1991	432	868	372	184	1,856
1992	400	869	411	222	1,902
1993	370	854	453	273	1,950
1994	344	830	494	319	1,987
1995	312	808	530	364	2,014
1996	279	789	576	410	2,054
1997	245	766	619	458	2,088
1998	221	749	655	502	2,127
1999	200	726	691	555	2,172
2000	177	689	728	616	2,210
2001	153	662	758	656	2,229

* Source: FAA Aircraft Utilization and Propulsion Reliability Report

TABLE 17

ACTIVE GENERAL AVIATION AIRCRAFT

(In Thousands)

AS OF JANUARY 1	FIXED WING				ROTORCRAFT			
	PISTON							
	SINGLE ENGINE	MULTI-ENGINE	TURBOPROP	TURBOJET	PISTON	TURBINE	OTHER	TOTAL
Historical*								
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
1987	171.8	23.9	6.0	4.5	2.9	4.0	7.0	220.0
1988	171.0	23.4	5.3	4.4	2.8	3.5	6.8	217.2
1989E	164.8	22.8	5.3	4.2	2.6	3.8	6.9	210.3
Forecast								
1990	166.2	22.8	5.5	4.3	2.5	4.5	7.1	212.9
1991	167.0	22.6	5.7	4.6	2.6	4.7	7.4	214.6
1992	167.7	22.5	5.8	4.8	2.6	5.3	7.7	216.4
1993	167.7	22.4	5.9	5.0	2.5	5.5	8.0	217.0
1994	167.0	22.4	6.1	5.3	2.4	5.9	8.3	217.4
1995	166.5	22.5	6.4	5.6	2.4	6.2	8.6	218.2
1996	166.0	22.6	6.7	5.9	2.4	6.6	8.9	219.1
1997	165.5	22.7	6.9	6.1	2.4	7.1	9.0	219.7
1998	165.2	22.8	7.1	6.3	2.3	7.3	9.2	220.2
1999	165.0	22.9	7.3	6.5	2.2	7.7	9.3	220.9
2000	164.7	23.0	7.5	6.7	2.2	8.1	9.5	221.7
2001	164.4	23.1	7.7	6.9	2.1	8.5	9.7	222.4

* Source: FAA Statistical Handbook of Aviation

Note: Detail may not add to total because of independent rounding.
An active aircraft must have a current registration and it must have been flown at least one hour during the previous calendar year.

TABLE 18

ACTIVE GENERAL AVIATION AIRCRAFT

BY FAA REGION

(In Thousands)

AS OF JANUARY 1	FAA REGION ANE	AEA	ASO	AGL	ACE	ASW	AWP	ANM	AAL	TOTAL
Historical*										
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
1987	9.0	25.5	33.5	37.8	13.1	32.7	38.8	22.0	7.6	220.0
1988	9.1	24.1	34.8	38.6	13.2	30.5	38.0	21.2	7.6	217.1
1989E	9.6	23.9	34.6	37.4	12.2	29.5	36.8	19.9	6.3	210.3
Forecast										
1990	9.7	24.0	35.5	37.1	12.0	30.1	37.5	20.3	6.7	212.9
1991	9.7	24.0	36.1	36.7	11.9	30.6	38.1	20.6	7.0	214.6
1992	9.8	24.1	36.4	36.5	11.8	31.0	38.6	20.9	7.3	216.4
1993	9.8	24.1	36.7	36.3	11.7	31.2	38.9	21.0	7.4	217.0
1994	9.9	24.2	36.8	36.1	11.6	31.3	39.1	21.1	7.5	217.4
1995	9.9	24.2	37.0	36.1	11.6	31.5	39.3	21.2	7.6	218.2
1996	10.0	24.2	37.1	36.2	11.6	31.7	39.4	21.3	7.7	219.1
1997	10.0	24.3	37.2	36.2	11.6	31.9	39.5	21.4	7.7	219.7
1998	10.1	24.3	37.3	36.3	11.6	32.0	39.5	21.4	7.8	220.2
1999	10.1	24.3	37.4	36.3	11.7	32.2	39.6	21.5	7.8	220.9
2000	10.2	24.4	37.5	36.4	11.7	32.4	39.7	21.6	7.9	221.7
2001	10.2	24.4	37.7	36.4	11.8	32.6	39.8	21.7	7.9	222.4

* Source: FAA Statistical Handbook of Aviation

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

TABLE 19

GENERAL AVIATION HOURS FLOWN

(In Millions)

	FIXED WING							
	PISTON				ROTORCRAFT			
FISCAL YEAR	SINGLE ENGINE	MULTI-ENGINE	TURBOPROP	TURBOJET	PISTON	TURBINE	OTHER	TOTAL
Historical*								
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
1987	22.3	4.9	2.2	1.6	0.6	1.6	0.4	33.6
1988	22.0	4.4	2.3	1.6	0.6	2.0	0.6	33.5
1989E	22.1	4.3	2.4	1.7	0.5	2.3	0.6	33.9
Forecast								
1990	22.1	4.2	2.5	1.8	0.5	2.3	0.6	34.0
1991	22.2	4.1	2.6	1.9	0.5	2.6	0.6	34.5
1992	22.3	4.1	2.7	2.0	0.5	3.0	0.6	35.2
1993	22.4	4.1	2.7	2.1	0.6	3.0	0.6	35.5
1994	22.5	4.1	2.8	2.2	0.6	3.4	0.6	36.2
1995	22.5	4.2	2.9	2.3	0.6	3.7	0.8	37.0
1996	22.6	4.2	3.1	2.4	0.6	4.0	0.8	37.7
1997	22.6	4.3	3.2	2.5	0.5	4.3	1.0	38.4
1998	22.7	4.3	3.3	2.6	0.5	4.4	1.0	38.8
1999	22.8	4.3	3.4	2.7	0.5	4.5	1.0	39.2
2000	22.9	4.4	3.5	2.8	0.5	4.8	1.0	39.9
2001	23.0	4.4	3.5	2.9	0.5	4.9	1.2	40.4

* Source: FAA Statistical Handbook of Aviation

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

TABLE 20

ACTIVE PILOTS BY TYPE OF CERTIFICATE

(In Thousands)

AS OF JANUARY 1	STUDENTS	PRIVATE	COMMERCIAL	AIRLINE TRANSPORT	HELICOPTER	GLIDER	LIGHTER-THAN-AIR	TOTAL	INSTRUMENT RATED 1/
Historical*									
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
1987	150.3	305.7	147.8	87.2	8.6	8.4	1.1	709.1	262.4
1988	146.0	300.9	143.6	91.3	8.7	7.9	1.2	699.7	266.1
1989E	136.9	299.8	143.0	97.0	8.6	7.6	1.1	704.8	273.8
Forecast									
1990	139.6	300.7	145.0	101.5	8.7	7.7	1.1	704.3	278.7
1991	142.0	302.8	146.5	104.7	9.0	8.3	1.2	714.5	280.7
1992	144.1	303.7	148.0	108.6	9.1	8.4	1.2	723.1	284.9
1993	145.9	304.3	149.4	112.6	9.2	8.5	1.2	731.1	289.2
1994	147.3	304.9	150.9	116.7	9.4	8.6	1.3	739.1	293.5
1995	148.4	305.8	152.4	121.0	9.5	8.7	1.4	747.2	297.0
1996	149.1	306.8	154.0	124.4	9.6	8.8	1.5	754.2	300.6
1997	149.7	307.7	155.5	127.8	9.7	8.9	1.6	760.9	304.2
1998	150.2	308.6	157.1	131.3	9.8	9.0	1.7	767.7	307.9
1999	150.7	309.5	158.6	133.9	9.9	9.1	1.8	773.5	310.4
2000	151.2	310.5	160.2	136.6	10.0	9.2	1.9	779.6	312.0
2001	151.7	311.4	161.8	139.3	10.1	9.3	2.0	785.6	313.6

* 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 21

GENERAL AVIATION AIRCRAFT FUEL CONSUMPTION

(In Millions of Gallons)

	FIXED WING							
	PISTON				ROTORCRAFT			
FISCAL YEAR	SINGLE ENGINE	MULTI-ENGINE	TURBOPROP	TURBOJET	PISTON	TURBINE	OTHER	TOTAL
Historical*								
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
1987	236.5	148.5	197.3	409.4	10.1	55.4	0.1	1,057.3
1988	235.4	148.5	189.1	409.4	10.1	55.4	0.1	1,048.0
1989E	236.5	130.3	197.3	435.0	7.2	79.6	0.2	1,086.0
Forecast								
1990	236.5	127.3	205.5	460.6	7.2	79.6	0.2	1,116.8
1991	237.5	124.2	213.7	486.2	7.2	90.0	0.2	1,159.0
1992	238.6	124.2	221.9	511.8	7.2	103.8	0.2	1,207.7
1993	239.7	124.2	221.9	537.4	8.6	103.8	0.2	1,235.8
1994	240.7	124.2	230.2	563.0	8.6	117.6	0.2	1,248.6
1995	240.7	127.3	238.4	588.6	8.6	128.0	0.2	1,331.8
1996	241.8	127.3	254.8	614.2	8.6	138.4	0.2	1,385.3
1997	241.8	130.3	263.0	639.8	7.2	148.8	0.3	1,431.1
1998	242.9	130.3	271.3	665 3	7.2	152.2	0.3	1,469.5
1999	244.0	130.3	279.5	690.9	7.2	155.7	0.3	1,507.8
2000	245.0	133.3	287.7	716.8	7.2	166.1	0.3	1,556.1
2001	246.1	133.3	287.7	742.1	7.2	169.5	0.3	1,586.3

* Source: FAA APO Estimates

TABLE 22

ACTIVE ROTORCRAFT FLEET AND HOURS FLOWN

AS OF JANUARY 1	ACTIVE FLEET (Thousands) PISTON	TURBINE	TOTAL	HOURS FLOWN (1) (Millions) PISTON	TURBINE	TOTAL
Historical*						
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
1987	2.9	4.0	6.9	0.6	1.6	2.3
1988	2.8	3.5	6.3	0.6	2.0	2.6
1989E	2.6	3.8	6.4	0.5	2.3	2.8
Forecast						
1990	2.5	4.5	7.0	0.5	2.3	2.8
1991	2.6	4.7	7.3	0.5	2.6	3.1
1992	2.6	5.3	7.9	0.5	3.0	3.5
1993	2.5	5.5	8.0	0.6	3.0	3.6
1994	2.4	5.9	8.3	0.6	3.4	4.0
1995	2.4	6.2	8.6	0.6	3.7	4.3
1996	2.4	6.6	9.0	0.6	4.0	4.6
1997	2.4	7.1	9.5	0.5	4.3	4.8
1998	2.3	7.3	9.6	0.5	4.4	4.9
1999	2.2	7.7	9.9	0.5	4.5	5.0
2000	2.2	8.1	10.3	0.5	4.8	5.3
2001	2.1	8.5	10.6	0.5	4.9	5.4

* Source: FAA Statistical Handbook of Aviation

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

TABLE 23

TOTAL AIRCRAFT OPERATIONS

AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE

(In Millions)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL	NUMBER OF FAA TOWERS
Historical*						
1985	11.3	6.9	37.2	2.5	57.9	398
1986	12.3	6.9	37.1	2.6	59.0	399
1987	13.1	7.3	37.8	2.7	61.0	399
1988	12.8	8.3	37.5	2.8	61.3	399
1989E	12.5	8.3	37.8	2.8	61.4	399
Forecast						
1990	13.1	8.7	38.2	2.8	62.8	400
1991	13.6	9.1	39.0	2.8	64.5	400
1992	14.1	9.6	40.0	2.8	66.5	400
1993	14.5	9.9	40.5	2.8	67.7	400
1994	14.9	10.3	41.4	2.8	69.4	400
1995	15.2	10.6	42.3	2.8	70.9	400
1996	15.5	10.9	43.2	2.8	72.4	400
1997	15.8	11.2	44.0	2.8	73.8	400
1998	16.1	11.4	44.8	2.8	75.1	400
1999	16.3	11.7	45.8	2.8	76.6	400
2000	16.5	12.0	46.7	2.8	78.0	400
2001	16.7	12.3	47.4	2.8	79.2	400

* 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 rounding.

TABLE 24

ITINERANT AIRCRAFT OPERATIONS

AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE

(In Millions)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL
Historical*					
1985	11.3	6.9	22.4	1.3	41.9
1986	12.3	6.9	21.9	1.4	42.5
1987	13.1	7.3	22.1	1.4	43.9
1988	12.8	8.3	22.1	1.4	44.5
1989E	12.5	8.3	22.1	1.4	44.3
Forecast					
1990	13.1	8.7	22.3	1.4	45.5
1991	13.6	9.1	22.8	1.4	46.9
1992	14.1	9.6	23.4	1.4	48.5
1993	14.5	9.9	23.7	1.4	49.5
1994	14.9	10.3	24.3	1.4	50.9
1995	15.2	10.6	24.9	1.4	52.1
1996	15.5	10.9	25.4	1.4	53.2
1997	15.8	11.2	25.9	1.4	54.3
1998	16.1	11.4	26.4	1.4	55.3
1999	16.3	11.7	27.0	1.4	56.4
2000	16.5	12.0	27.5	1.4	57.4
2001	16.7	12.3	27.9	1.4	58.3

* Source: FAA Air Traffic Activity.

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

TABLE 25

LOCAL AIRCRAFT OPERATIONS

AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE

(In Millions)

FISCAL YEAR	GENERAL AVIATION	MILITARY	TOTAL
Historical*			
1985	14.8	1.2	16.0
1986	15.2	1.3	16.4
1987	15.8	1.3	17.1
1988	15.4	1.4	16.8
1989E	15.7	1.4	17.1
Forecast			
1990	15.9	1.4	17.3
1991	16.2	1.4	17.6
1992	16.6	1.4	18.0
1993	16.8	1.4	18.2
1994	17.1	1.4	18.5
1995	17.4	1.4	18.8
1996	17.8	1.4	19.2
1997	18.1	1.4	19.5
1998	18.4	1.4	19.8
1999	18.8	1.4	20.2
2000	19.2	1.4	20.6
2001	19.5	1.4	20.9

* Source: FAA Air Traffic Activity.

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

TABLE 26

INSTRUMENT OPERATIONS

AT AIRPORTS WITH FAA TRAFFIC CONTROL SERVICE

(In Millions)

FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL	
Historical*						
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)
1987	13.7	7.3	17.9	4.4	43.4	(9.2)
1988	13.4	8.4	18.3	4.4	44.5	(9.5)
1989E	13.5	8.4	18.6	4.5	45.0	(9.4)
Forecast						
1990	14.1	8.8	19.0	4.5	46.4	(9.7)
1991	14.6	9.2	19.7	4.5	48.0	(10.0)
1992	15.1	9.7	20.3	4.5	49.6	(10.3)
1993	15.5	10.0	20.8	4.5	50.8	(10.3)
1994	15.9	10.4	21.4	4.5	52.2	(10.3)
1995	16.2	10.7	22.0	4.5	53.4	(10.3)
1996	16.5	11.0	22.5	4.5	54.5	(10.3)
1997	16.8	11.3	23.0	4.5	55.6	(10.3)
1998	17.1	11.5	23.5	4.5	56.6	(10.3)
1999	17.3	11.8	24.0	4.5	57.6	(10.3)
2000	17.5	12.1	24.5	4.5	58.6	(10.3)
2001	17.7	12.4	25.0	4.5	59.6	(10.3)

* 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 (See Table 25). The data include instrument operations at FAA operated military radar approach control facilities. Detail may not add because of rounding.

TABLE 27

NON-IFR INSTRUMENT OPERATIONS

(In Millions)

FISCAL YEAR	TERMINAL CONTROL AREAS	AIRPORT RADAR SERVICE AREAS	TOTAL
Historical*			
1985	2.0	6.0	8.0
1986	1.7	6.7	8.4
1987	1.7	7.5	9.2
1988	1.7	7.8	9.5
1989E	1.6	7.8	9.4
Forecast			
1990	1.7	8.0	9.7
1991	1.8	8.2	10.0
1992	1.9	8.4	10.3
1993	1.9	8.4	10.3
1994	1.9	8.4	10.3
1995	1.9	8.4	10.3
1996	1.9	8.4	10.3
1997	1.9	8.4	10.3
1998	1.9	8.4	10.3
1999	1.9	8.4	10.3
2000	1.9	8.4	10.3
2001	1.9	8.4	10.3

* Source: FAA

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

TABLE 28

IFR AIRCRAFT HANDLED

AT FAA AIR ROUTE TRAFFIC CONTROL CENTERS

(In Millions)

FISCAL YEAR	IFR AIRCRAFT HANDLED				
	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	TOTAL
Historical*					
1985	14.6	4.8	8.3	5.0	32.7
1986	16.0	5.0	8.1	5.1	34.2
1987	17.1	5.3	8.1	5.3	35.8
1988	17.9	5.8	8.1	4.6	36.4
1989E	17.5	5.2	8.2	5.7	36.6
Forecast					
1990	18.2	5.5	8.4	5.7	37.8
1991	18.9	5.7	8.8	5.7	39.1
1992	19.4	6.0	9.0	5.7	40.1
1993	19.9	6.2	9.2	5.7	41.0
1994	20.4	6.4	9.4	5.7	41.9
1995	20.9	6.6	9.6	5.7	42.8
1996	21.4	6.8	9.8	5.7	43.7
1997	21.9	7.0	10.0	5.7	44.6
1998	22.3	7.2	10.1	5.7	45.3
1999	22.6	7.4	10.3	5.7	46.0
2000	23.0	7.7	10.5	5.7	46.9
2001	23.3	7.9	10.7	5.7	47.6

* Source: FAA Air Traffic Activity.

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

TABLE 29

IFR DEPARTURES AND OVERS

AT FAA AIR ROUTE TRAFFIC CONTROL CENTERS

(In 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*										
1985	5.3	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
1987	6.0	5.0	2.5	0.4	3.4	1.3	1.9	1.5	13.8	8.3
1988	6.1	5.6	2.7	0.4	3.4	1.3	1.6	1.5	13.8	8.7
1989E	6.0	5.4	2.5	0.3	3.4	1.4	1.9	1.9	13.8	9.0
Forecast										
1990	6.3	5.6	2.6	0.3	3.5	1.4	1.9	1.9	14.3	9.2
1991	6.6	5.7	2.7	0.3	3.7	1.4	1.9	1.9	14.9	9.3
1992	6.8	5.8	2.8	0.4	3.8	1.4	1.9	1.9	15.3	9.5
1993	7.0	5.9	2.9	0.4	3.9	1.4	1.9	1.9	15.7	9.6
1994	7.2	6.0	3.0	0.4	4.0	1.4	1.9	1.9	16.1	9.7
1995	7.4	6.1	3.1	0.4	4.1	1.4	1.9	1.9	16.5	9.8
1996	7.6	6.2	3.2	0.4	4.2	1.4	1.9	1.9	16.9	9.9
1997	7.8	6.3	3.3	0.4	4.2	1.4	1.9	1.9	17.3	10.0
1998	8.0	6.3	3.4	0.4	4.3	1.5	1.9	1.9	17.6	10.1
1999	8.1	6.4	3.5	0.4	4.4	1.5	1.9	1.9	17.9	10.2
2000	8.3	6.4	3.6	0.5	4.5	1.5	1.9	1.9	18.3	10.3
2001	8.4	6.5	3.7	0.5	4.6	1.5	1.9	1.9	18.6	10.4

* Source: FAA Air Traffic Activity.

TABLE 30

TOTAL FLIGHT SERVICES

AT FAA FLIGHT SERVICE STATIONS AND COMBINED STATIONS/TOWERS

(In Millions)

FISCAL YEAR	FLIGHT PLANS ORIGINATED	PILOT BRIEFS	AIRCRAFT CONTACTED	TOTAL FLIGHT SERVICES
Historical*				
1985	8.0	14.6	7.7	52.9
1986	7.5	13.4	7.2	49.0
1987	7.6	12.8	7.0	47.7
1988	7.6	11.7	6.4	44.8
1989E	7.4	12.0	6.2	45.0
Forecast				
1990	7.3	12.1	6.1	44.9
1991	7.3	12.2	6.0	45.0
1992	7.4	12.2	5.9	45.1
1993	7.5	12.2	5.9	45.3
1994	7.6	12.2	6.0	45.6
1995	7.7	12.2	6.0	45.8
1996	7.8	12.3	6.0	46.2
1997	7.9	12.3	6.1	46.5
1998	8.0	12.3	6.1	46.7
1999	8.0	12.4	6.1	46.9
2000	8.1	12.4	6.1	47.1
2001	8.1	12.5	6.1	47.3

* 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 31

FLIGHT PLANS ORIGINATED

AT FAA FLIGHT SERVICE STATIONS AND COMBINED STATIONS/TOWERS

(In Millions)

	FLIGHT PLANS ORIGINATED		
FISCAL YEAR	IFR-DVFR	VFR	TOTAL
Historical*			
1985	6.3	1.7	8.0
1986	5.9	1.6	7.5
1987	5.9	1.7	7.6
1988	5.8	1.7	7.6
1989E	5.7	1.7	7.4
Forecast			
1990	5.6	1.7	7.3
1991	5.6	1.7	7.3
1992	5.7	1.7	7.4
1993	5.7	1.8	7.5
1994	5.8	1.8	7.6
1995	5.9	1.8	7.7
1996	5.9	1.9	7.8
1997	6.0	1.9	7.9
1998	6.0	2.0	8.0
1999	6.0	2.0	8.0
2000	6.1	2.0	8.1
2001	6.1	2.0	8.1

* Source: FAA Air Traffic Activity.

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

TABLE 32

AIRCRAFT CONTACTED

AT FAA FLIGHT SERVICE STATIONS AND COMBINED STATIONS/TOWERS

(In Millions)

	USER CATEGORY				FLIGHT RULES		
FISCAL YEAR	AIR CARRIER	AIR TAXI/ COMMUTER	GENERAL AVIATION	MILITARY	IFR-DVFR	VFR	TOTAL
Historical*							
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
1987	0.4	1.0	5.2	0.4	2.1	4.9	7.0
1988	0.3	0.9	4.8	0.4	1.9	4.6	6.4
1989E	0.3	0.8	4.7	0.4	1.9	4.3	6.2
Forecast							
1990	0.3	0.8	4.6	0.4	1.9	4.2	6.1
1991	0.3	0.8	4.5	0.4	1.9	4.1	6.0
1992	0.3	0.8	4.4	0.4	1.9	4.0	5.9
1993	0.3	0.8	4.4	0.4	1.9	4.0	5.9
1994	0.3	0.8	4.5	0.4	1.9	4.1	6.0
1995	0.3	0.8	4.5	0.4	1.9	4.1	6.0
1996	0.3	0.8	4.5	0.4	1.9	4.1	6.0
1997	0.3	0.8	4.6	0.4	2.0	4.1	6.1
1998	0.3	0.8	4.6	0.4	2.0	4.1	6.1
1999	0.3	0.8	4.6	0.4	2.0	4.1	6.1
2000	0.3	0.8	4.6	0.4	2.0	4.1	6.1
2001	0.3	0.8	4.6	0.4	2.0	4.1	6.1

* Source: FAA Air Traffic Activity.

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

TABLE 33

ACTIVE U.S. MILITARY AIRCRAFT

IN THE CONTINENTAL UNITED STATES [1/]

FISCAL YEAR	FIXED WING AIRCRAFT			HELICOPTER	TOTAL
	JET	TURBOPROP	PISTON		
Historical*					
1985	9,640	1,881	408	7,404	19,333
1986	9,730	1,803	386	8,238	20,157
1987	9,819	1,865	370	8,460	20,514
1988	9,954	2,222	305	8,529	21,210
1989E	9,576	2,098	264	7,803	19,741
Forecast					
1990	9,461	1,968	264	7,417	19,110
1991	9,648	1,927	263	7,158	18,996
1992	9,721	1,930	264	6,857	18,772
1993	9,993	1,926	260	6,617	18,796
1994	10,131	1,898	255	6,301	18,585
1995	10,004	1,839	254	6,000	18,097
1996	10,107	1,824	254	6,005	18,190
1997	10,259	1,813	253	6,004	18,329
1998	10,465	1,816	252	6,015	18,548
1999	10,666	1,815	252	6,017	18,750
2000	10,842	1,815	252	6,014	18,023
2001	10,799	1,813	252	6,014	18,878

* 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.

TABLE 34

ACTIVE U.S. MILITARY AIRCRAFT

HOURS FLOWN IN THE CONTINENTAL UNITED STATES [1/]

(In Thousands)

	FIXED WING AIRCRAFT				
FISCAL YEAR	JET	TURBOPROP	PISTON	HELICOPTER	TOTAL
Historical*					
1985	3,350	739	126	1,567	5,782
1986	3,510	820	155	1,798	6,283
1987	3,268	753	140	1,879	6,040
1988	3,339	808	92	1,763	6,012
1989E	3,379	818	92	1,777	6,060
Forecast					
1990	3,340	803	85	1,809	6,037
1991	3,321	777	85	1,852	6,035
1992	3,347	772	84	1,812	6,015
1993	3,356	772	82	1,801	6,011
1994	3,416	775	82	1,781	6,054
1995	3,446	786	82	1,738	6,052
1996	3,528	749	82	1,734	6,093
1997	3,482	726	82	1,732	6,022
1998	3,627	744	82	1,735	6,188
1999	3,641	744	82	1,733	6,200
2000	3,664	744	82	1,730	6,220
2001	3,662	744	82	1,730	6,218

* 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.

GLOSSARY OF TERMS

Air Carrier Operations -- Arrivals and departures of 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 services 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 operates 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 -- Cities and Metropolitan Statistical Areas requiring aviation services. May include more than one airport. Communities fall into four classes as determined by the 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 (4,314,161 passengers and over in CY 1988).
2. Medium: 0.25 percent to 0.999 percent (between 1,078,740 and 4,314,160 passengers in CY 1988).
3. Small: 0.05 percent to 0.249 percent (between 215,708 and 1,078,539 passengers in CY 1988).
4. Nonhub: Less than 0.05 percent (fewer than 215,708 passengers in CY 1988).

Air Travel Club -- An operator certificated in accordance with FAR Part 123 to engage in the carriage of members who qualify 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 that:

   (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 and does not constitute an ATC clearance.

Airport Traffic Control Tower -- A terminal facility that 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 to conduct nonscheduled operations that 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, for enroute 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.

ASM's -- See AVAILABLE SEAT MILES.

Available Seat Miles (ASM's) -- The aircraft miles flown in a 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 transportation required by the business in which the individual 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 Radar Approach Control facility (TRACON).

CERAP -- See CENTER RADAR APPROACH CONTROL.

Commercial Air Carriers -- An air carrier certificated in accordance with FAR Part 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 between $100 million, and $1 billion.

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

4. MEDIUM REGIONALS: Air carriers with annual operating revenues 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 that accommodates instrument flight operations.

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

Commuter/Air Taxi Operations -- Arrivals and departures of air carriers certificated in accordance with FAR Part 135.

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

FAA -- Federal Aviation Administration.

Facility -- See AIR TRAFFIC CONTROL TOWER.

Flight Plan -- Prescribed 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 that 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 (NOTAM's); 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," 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. originate in a Center's area;
2. are extended by the Center; or
3. are accepted by the Center under sole enroute 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. An instrument approach 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 -- Arrivals and departures of 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, NOTAM's, 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 enroute aircraft; a complete interchange of information and a termination of the contact.

RAPCON -- See RADAR APPROACH CONTROL.

RATCF -- 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. Excludes are aircraft owned and operated in regularly scheduled, nonscheduled, or charter service by commercial air carriers and 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.

Research and Special Programs Administration (RSPA) -- The Research and Special Programs Administration of the U.S. Department of Transportation. Responsible for the collection of air carrier traffic and financial data on Form 41 that was collected formerly by the Civil Aeronautics Board.

Revenue Passenger Enplanements -- The total number of passengers boarding aircraft. 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 a flight stage, multiplied by the number of revenue passengers carried on that flight stage.

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

RPM -- See REVENUE PASSENGER MILE.

RSPA -- See Research and Special Program Administration

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. 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 -- Air carrier 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 United States (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. Also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. 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 America	S	LR		
4. Air Wisconsin (ZW)	S	N	7-79	
5. Air Transport Int'l.	F	MR	10-88	10-88
6. Alaska (AS) (4)	S	N	X	
7. Aloha (AQ) (5)	S	N	X	6-84
8. American (AA) (6)	S	M	X	X
9. Amerijet	C	MR	10-87	10-87
10. America West (HP)	S	N	8-83	
11. American Trans Air	S	N	X	X
12. Arrow (JW)	S	LR	11-82	6-83
13. Aspen (AP) (7)	S	LR	1-85	
14. Braniff (BN) (8)	S	N	3-84	
15. Buffalo	C	LR	4-84	9-88
16. Challenge Air Cargo	F	MR		7-86
17. Connor	F	MR	1-87	1-87
18. Connie Kalitta	F	LR	1-89	1-89
19. Continental (CO) (9)	S	M	X	X
20. Delta (DL) (10)	S	M	X	X
21. Eastern (EA)	S	M	X	X
22. Emerald (OD)	S	LR	7-82	
23. Evergreen (JO)	F	LR	X	X
24. Express One	F			1-89
25. Federal Express (FM) (11)	F	M	1-86	1-86
26. Five Star (12)	C	LR	12-85	
27 Florida West	F	MR	3-88	1-87
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

ACTIVE U.S. COMMERCIAL

AIR CARRIERS (Continued)

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. International Air Service	C	LR	7-88	
34. Jet Fleet (JL)	C	MR	6-83	
35. Key	C	LR	6-84	1-85
36. Markair (BF) (13)	S	LR	X	
37. Midway (ML)	S	N	11-79	
38. Midwest Express (YX)	S	LR	7-84	
39. Million	C	MR	10-87	1-86
40. MGM Grand (MG)	S	N	9-87	
41. Northern Air Cargo (HU)	F	LR	12-82	
42. Northwest (NW) (14)	S	M	X	X
43. Orion	F	MR	1-87	1-87
44. Pacific Interstate (QT)	S	LR	12-84	
45. Pan American (PA)	S	M	X	X
46. Reeve (RV)	S	LR	X	
47. Rich (XR)	C	MR	1-82	
48. Rosenbalm	F	MR	4-85	4-85
49. Royal West	S	LR	7-86	
50. Sky World	C	LR	10-85	10-85
51. Southern Air	F	LR	5-80	4-80
52. Southwest (WN)	S	N	2-79	
53. Sun Country (SC)	C	MR	1-83	3-83
54. Tower (FF)	S	LR		11-83
55. Trans Air-Link	F	MR	1-84	1-84
56. Trans Continental	F	MR	1-89	1-89
57. Trans World (TW) (15)	S	M	X	X
58. Trump Shuttle	S	M	7-89	
59. United (UA)	S	M	X	4-83
60. United Parcel Service	F	N	10-88	10-88

ACTIVE U.S. COMMERCIAL

AIR CARRIERS (Continued)

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	International
61. USAir (AL) (16)	S	M	X	
62. West Air	S	LR	4-88	
63. World (WO)	C	N	7-80	5-81
64. 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) Acquired Western Airlines.

(11) Acquired Flying Tiger.

(12) Operates as a seasonal carrier from the months of December through May.

(13) Formerly Alaska International.

(14) Acquired Republic Airlines.

(15) Acquired Ozark Airlines.

(16) Acquired Pacific Southwest and Piedmont.

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. Atlantic Gulf (ZY)	C	MR	9-85		7-86*
22. Best (IW)	S	MR	7-82		10-85**
23. Big Sky (GQ)	S	MR	6-79		9-82**
24. Blue Bell (BB)	C	MR	6-83		2-84*
25. Britt (RU)	S	LR	10-84		6-87**

CARRIERS NO LONGER INCLUDED

IN AIR CARRIER DATA BASE (Continued)

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	Int'l.	Date of Last Reported Traffic (4)
26. Cascade (CZ)	S	LR	1-85		11-85*
27. Capitol (CL)	S	N	7-80	7-81	9-84*
28. Challenge (CN)	F	MR		8-82	6-86*
29. Challenge Air Int'l.	S	MR		7-86	8-87*
30. Cochise (DP)	S	MR	1-79		12-81*
31. Coleman (CH)	S	MR	9-79		3-80*
32. Colgan (CJ)	S	MR	4-81		3-83**
33. Empire (UR)	S	LR	10-79		4-86m
34. Flight International	C	MR	4-84	6-84	9-85*
35. Florida Express (ZO)	S	LR	1-84	1-87	2-89m
36. Flying Tiger (FT)	F	M	X	X	8-89m
37. Frontier (FL)	S	N	X	X	8-86m
38. Frontier Horizon (FH)	S	LR	1-84		1-85*
39. Galaxy (GY)	C	MR	10-83	12-83	5-87*
40. Global (GL)	C	LR	X	X	12-84*
41. Golden Gate (GG)	S	MR	5-80		7-81*
42. Golden West (GW)	S	MR	2-79		7-82**
43. Guy America (HX)	S	MR		8-81	2-83*
44. Hawaii Express (LP)	S	LR	10-82		10-83*
45. Imperial (II)	S	MR	1-80		6-82**
46. Int'l. Air Service (IE)	C	LR	11-83		5-85*
47. Interstate	F	LR	5-85	5-85	10-87*
48. Jet America (SI)	S	N	1-82		8-87m
49. Jet Charter	C	MR	7-82	7-82	5-85*
50. Kodiak (KO)	S	MR	X		11-82**
51. L.A.B. (JF)	S	MR	1-82		8-82**
52. McClain (MU)	S	LR	11-86		2-87**
53. Mid-South (VL)	S	MR	6-80		2-84*
54 Midstate (IU)	S	MR	7-81		7-82**
55. Mid Pacific (HO)	S	LR	10-85		9-87*

CARRIERS NO LONGER INCLUDED

IN AIR CARRIER DATA BASE (Continued)

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	Int'l.	Date of Last Reported Traffic (4)
56. Midway Express	S	LR	10-84		7-85*
57. Mississippi Valley (XV)	S	MR	4-79		8-82**
58. Munz (XY)	S	MR	X		8-83*
59. New Air (NC)	S	MR	5-79		9-82**
60. New York Air (NY)	S	N	12-80		12-86m
61. New Wien (WC)	S	MR	9-85		10-85*
62. Northeastern (QS)	S	LR	7-84		2-85*
63. Overseas (OV)	C	LR	10-82		10-85*
64. Ozark (OZ)	S	N	X		9-86m
65. Pacific East (PR)	S	LR	9-82		3-84*
66. Pacific Express (VB)	S	LR	2-82		10-83*
67. Pacific Southwest (PS)	S	N	1-79		4-88m
68. Peninsula (KS)	S	MR	1-82		1-83**
69. People Express (PE)	S	N	5-81	5-83	12-86m
70. Piedmont (PI)	S	M	X	7-87	8-89m
71. Pilgrim (PM)	S	LR	9-85		12-86*
72. Ports of Call Travel Club	C	LR	9-85		1-86*
73. Presidential (XV)	S	LR	10-85	11-89*	
74. Pride Air (NI)	S	LR	10-85		11-85*
75. Republic (RC)	S	M	X		9-86m
76. Rocky Mountain (JC)	S	MR	7-81		9-82**
77. Royale (OQ)	S	LR	3-84		6-84**
78. Ryan	C	LR	4-84	4-84	5-86*
79. Sea Airmotive (KJ)	S	MR	1-80		6-82**
80. Sky Bus (FW)	S	MR	7-85		11-86*
81. Skystar	C	MR	1-85	3-85	1-87*
82. Sky West (QG)	S	MR	7-79		12-84**
83. Samoa (MB)	S	MR		2-85	6-85*
84. Southeast (NS)	S	MR	7-79		1-80*
85. South Pacific Island (HK)	S	LR		7-81	11-86*

CARRIERS NO LONGER INCLUDED

IN AIR CARRIER DATA BASE (Continued)

Air Carrier	Carrier Type (1)	Carrier Grouping (2)	Date of First Reported Traffic (3) Domestic	Int'l.	of Last Reported Traffic (4)
86. Sun Coast (WS)	C	MR		5-87	9-87*
87. Sunworld (JK)	S	LR	5-83		9-88
88. Swift Aire (WI)	S	MR	1-79		7-81*
89. T-Bird (DQ)	C	MR		4-82	8-84*
90. Total Air (TA)	C	MR	10-84	5-85	1-87*
91. Transamerica (TV)	S	N		5-79	9-86*
92. Trans International	F	MR	5-85	1-85	12-88*
93. Transtar (MA)	S	LR	8-81		8-87m
94. Wien (WC)	S	N	X		11-84*
95. Western (WA)	S	M	X	X	3-87m
96. Western Yukon (WX)	S	MR	7-81		6-82*
97. Worldwide	C	MR	10-84	10-84	3-86*
98. 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	38,754	24,733	63.8	8,450
1981	38,039	25,328	66.6	8,427
1982	39,217	25,713	65.6	8,253
1983	39,656	27,209	68.6	8,793
1984	46,347	31,963	69.0	10,079
1985	53,918	36,098	66.9	11,368
1986	58,248	32,602	56.0	10,515
1987	58,953	38,497	65.3	12,397
1988	70,123	46,144	65.8	14,588
1989E	74,768	49,122	65.7	15,012

LATIN AMERICA ROUTES

FISCAL YEAR	ASM'S (MIL)	RPM'S (MIL)	L.F. (%)	ENPLANEMENTS (000)
Historical*				
1980	25,689	16,335	63.6	12,272
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	18,410	11,076	60.2	8,539
1987	21,908	12,992	59.3	10,377
1988	22,748	14,212	62.5	11,475
1989	23,729	14,684	61.9	11,777

U.S. SCHEDULED AIR CARRIERS

SCHEDULED TRAFFIC AND CAPACITY

BY INTERNATIONAL TRAVEL REGION (Continued)

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	20,744	12,668	61.1	3,341
1982	21,703	13,331	61.4	3,440
1983	24,015	14,947	62.2	3,961
1984	26,689	17,499	65.6	4,645
1985	28,041	18,649	66.5	5,020
1986	31,482	20,276	64.4	5,406
1987	36,624	24,530	67.0	6,614
1988	42,533	30.190	71.0	8,180
1989E	52,572	36,834	70.1	10,007

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	6,345	75.5	4,856
1987	6,170	4,422	71.7	3,933
1988	6,651	4,954	74.5	4,490
1989E	6,722	5,016	74.6	4,763

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
1987	10,510	8,626	82.1	3,708
1988	11,062	9,113	82.4	3,894
1989E	11,949	9,299	77.8	4,460

U.S. AIR CARRIERS

NONSCHEDULED TRAFFIC AND CAPACITY (Continued)

	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	12,672	79.6	7,518
1987	16,680	13,048	78.2	7,641
1988	17,713	14,067	79.4	8,384
1989E	18,671	14,315	76.7	9,223

Source: RSPA Form 41

APPENDIX E

U.S. AIR CARRIERS

CARGO 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
1987	5,782	4,781	10,563
1988	6,699	5,702	12,401
1989E	7,398	6,742	14,140

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
1987	1,314	435	1,749
1988	1,423	463	1,886
1989E	1,462	488	1,950

U.S. AIR CARRIERS

CARGO REVENUE TON MILES (Continued)
(In Millions)

	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
1987	7,096	5,216	12,312
1988	8,122	6,165	14,287
1989E	8,860	7,230	16,090

Source: RSPA Form 41

APPENDIX F

ACTIVE U.S. REGIONALS/COMMUTERS

1. Action air
2. Aero Coach
3. Air Cape
4. Air Caribe International
5. Air Kentucky
6. Air LA
7. Air Midwest
8. Air Molokai
9. Air Nevada
10. Air Sedona
11. Air Sunshine
12. Air Vegas
13. Airways International
14. Alaska Island Air*
15. Aleutian Air*
16. Allegheny Commuter
17. Alliance
18. Aloha IslandAir
19. Alpha Air
20. Alpine Air
21. Aspen
22. Atlantic Southeast
23. Atlantis
24. Baker Aviation*
25. Bar Harbor
26. Barrow Air*
27. BAS Airlines
28. Bellair*
29. Bemidji
30. Bering Air*
31. Big Island Air
32. Big Sky
33. Britt Airways
34. Business Express
35. Cape Smythe*
36. Capitol Airlines
37. Catskill Airways
38. CCAir
39. Chalks/PIA
40. Channel Flying*
41. Chaparral
42. Chartair
43. Chautauqua
44. Chitna Air Service*
45. Christman Air System
46. Coastal Air Transport
47. Comair
48. Command
49. Commutair
50. Crown Airways
51. Cumberland
52. Direct Air
53. East Hampton Air
54. Eastern Metro Express
55. Empire Airways
56. Enterprise
57. ERA Aviation*
58. Executive Air Charter
59. Executive Express II
60. Express Airline I

ACTIVE U.S. REGIONALS/COMMUTERS(Continued)

61. Flamenco
62. Freedom Air*
63. Frontier Flying Service*
64. Galena Air Service*
65. GCS Air Service
66. GP Express
67. Grand Canyon Helicopter
68. Great Lakes Aviation
69. Gulkana Air Service*
70. Haines Airways*
71. Harbor Air Service*
72. Harbor Airlines
73. Havasu Airlines
74. Helitrans
75. Henson Aviation
76. Hermens Air*
77. Holiday Airlines
78. Horizon Airlines
79. Hub Express Airlines
80. Iliamna Air Taxi*
81. Inlet Airlines*
82. Iowa Airways
83. Jet Express
84. Jetstream International
85. Kenmore Air Service
86. Ketchikan Air Service*
87. LAB Flying Service*
88. Lake Union Air Service*
89. Laredo Air
90. Larry's Flying Service*
91. Long Island Airlines
92. Mall Airways
93. Manuia Air Transport*
94. Mesa Airlines
95. Mesaba Airlines
96. Metro Northeast(ANO)
97. Metro Northeast(CAP)
98. Metro-Flight Airlines
99. Michigan Airways
100. Midcontinent Airlines
101. Midway Commuter
102. Midstate Airlines
103. Midwest Aviation
104. MST Aviation
105. Nashville Eagle
106. New England Airlines
107. New York Helicopter
108. North Pacific/NPA
109. Olson Air Service*
110. Pan Am Express
111. Panama Aviation
112. Panorama Air Tours
113. Pearson Aviation
114. Peninsula Airways*
115. Pennsylvania Airlines
116. Pocono Airlines
117. Precision Airlines
118. Prime Air
119. Propheter Aviation
120. Resort Commuter Airlines
121. Rocky Mountain Airways
122. Ross Aviation
123. Royale Airlines
124. Ryan Air Service*
125. Samoa Air*
126. San Juan Airlines
127. Scenic Airlines
128. Seagull Air Service*
129. SFO Helicopter Airlines
130. Simmons Airlines
131. Skagway Air Service*
132. SkyWest Aviation
133. Southcentral Air*
134. Southern Jersey Airlines
135. Springdale Air
136. StatesWest Airlines
137. Sunaire
138. Tanana Air Service*
139. Taquan Air Service*
140. Tatonduk Flying Service*

ACTIVE U.S. REGIONALS/COMMUTERS(Continued)

141. Temsco Airlines*
142. Trans States Airlines
143. Tri Air
144. Trump Air
145. Valley Airlines
146. Viequies Air Link
147. Village Aviation*
148. Virgin Air Inc.
149. Virgin Island Seaplane
150. Walker's International
151. WestAir Airlines
152. Wilbur's Inc.*
153. Wings Airways(PA)
154. Wings of Alaska*
155. Wings West Airlines
156. WRA Inc.
157. Wrangell Air Service*
158. Wright Air Service*
159. 40-Mile Air*

* Carriers, primarily in Alaska, whose traffic is not included in the regional/commuter data base and forecast.

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	*	300.2	405.3	377.0
1988	*	308.3	405.3	379.3
1989	*	317.2	405.3	381.9

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

Source: FAA-APO Estimates

GENERAL AVIATION AIRCRAFT COST INDICES (CONTINUED)

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	279.4	405.0	349.8
1988	367.6	286.9	405.0	352.9
1989	400.7	295.3	405.0	356.5

Source: FAA-APO Estimates

GENERAL AVIATION AIRCRAFT COST INDICES (CONTINUED)

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	251.8	209.2	384.8	311.8
1988	295.6	214.8	384.8	314.0
1989	318.4	221.1	384.8	316.5

Source: FAA-APO Estimates

GENERAL AVIATION AIRCRAFT COST INDICES (CONTINUED)

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	266.2	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	230.0	384.8	335.1
1988	328.2	235.7	384.8	335.8
1989	326.9	243.0	384.8	338.2

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)

Valdez, AK (VDZ)
Deer Valley, AZ (DVT)
Falcon/Mesa, AZ (FFZ)
Goodyear, AZ (GYR)
Grand Canyon Municipal, AZ (GCN)

Phoenix Sky Harbor Int'l., AZ (PHX)
Prescott, AZ (PRC)
Scottsdale, AZ (SDL)
Tucson, 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 Franciso, 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)

FAA TOWERED AIRPORTS

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 Int'l., 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 Airpak, FL (PMP)
Sarasota Bradenton, 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 (PIN)

Twin Falls, ID (TWF)
Alton Civic Memorial, IL (ALN)
Aurora Municipal, IL (ARR)
Bloomington Normal, IL (BMI)
Carbondale, IL (MDH)

FAA TOWERED AIRPORTS

Champaign Univeristy 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)

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 Int'l., MN (MSP)
Rochester, MN (RST)
St. Paul, MN (STP)
Greenville Municipal, MS (GLH)

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)

FAA TOWERED AIRPORTS

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, (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 Int'l, OH (CLE)
Columbus International, OH (CMH)

Columbus Ohio State, OH (OSU)
Dayton, OH (DAY)
Mansfield Lahm Municipal, OH (MFD)
Toledo Express, OH (TDL)
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)

FAA TOWERED AIRPORTS

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 Int'l, UT (SLC)
Burlington International, VT (BTV)
Charlottesville Albemarle, VA (CHO)
Lynchburg, VA (LYH)
Newport News, VA (PHF)

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 (MWG)
Oshkosh Wittman Field, WI (OSH)
Casper, WY (CPR)
Cheyene, 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
Oceana NAS VA (NTU)

APPENDIX I

CONTRACT TOWERS

1. Flagstaff, Arizona (FLG)
2. Pacoima/Whitman, California (WHP)
3. Lakeland, Florida (LAL)
4. Marion Williamson County, Illinois (MWA)
5. Waukegan, Illinois (UGN)
6. Topeka-Phillip Ballard, Kansas (TOP)
7. Owensboro-Daviees County, Kentucky (OWB)
8. Paducah Barkley Field, Kentucky (PAH)
9. Martha's Vineyard, Massachusetts (MVY)
10. Cape Girardeau, Missouri (CGI)
11. Nashua, New Hampshire (ASH)
12. Farmington Municipal, New Mexico (FMN)
13. Hobbs Lea, New Mexico (HOB)
14. Cleveland-Cuyahoga County, Ohio (CGF)
15. Ardmore Municipal, Oklahoma (ADM)

CONTRACT TOWERS (Continued)

16. Enid Woodring Memorial, Oklahoma (WDG)
17. Pendleton, Oregon (PDT)
18. Myrtle Beach, South Carolina (CRE)
19. Laredo, Texas (LRD)
20. Bellingham, Washington (BLI)
21. Lewisburg-Greenbrier, West Virginia (LWB)

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 Int'l., AZ (PHX/P50*)
Tucson, AZ (TUS)
Fort Smith Municipal, AR (FSM)
Little Rock Adams Field, AR (LIT)
Burbank, CA (BUR/B90*)

El Toro, CA (NZJ)**
Fresno Air Terminal, CA (FAT)
Los Angeles Int'l, CA (LAX/L56*)
Monterey, CA (MRY)
Oakland International, CA (OAK/O90*)

Ontario, CA (ONT/O40*)
Palm Springs Municipal, CA (PSP)
San Jose International, CA (SJC)
Sacramento Metro, CA (SME/MCC*)
San Diego Lindberg, CA (SAN/NKX*)

Santa Barbara, CA (SBA)
San Francisco, CA (SFO)
Colorado Springs, CO (COS)
Denver Stapleton Int'l, CO (DEN/D84*)
Hartford Bradley Int'l, CT (BDL/Y90*)

Washington National, DC (DCA)
Daytona Beach, FL (DAB)
Fort Lauderdale, FL (FLL)
Fort Myers Regional, FL (RSW)
Jacksonville International, FL (JAX)

Miami International, FL (MIA)
Orlando Int'l Airport, FL (MCO)
Pensacola, FL (PNS/P31*)
Sarasota Bradenton, FL (SRQ)
Tallahassee, FL (TLH)

Tampa International, FL (TPA)
West Palm Beach, FL (PBI)
Atlanta International, GA (ATL)
Augusta, GA (AGS)
Columbus, GA (CSG)

Macon Lewis B. Wilson, GA (MCN)
Savannah Municipal, GA (SAV)
Honolulu, HI (HNL)
Honolulu, HI (ZHN)
Kahului, HI (OGG)

Boise, ID (BOI)
Champaign Univ. of Illinois, IL (CMI)
Chicago Midway, IL (MDW)
Chicago O'Hare Int'l, IL (ORD/C90*)
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)
Wichita Mid Continent, KS (ICT)

Cincinnati Greater, KY (CVG)
Lexington, KY (LEX)
Louisville Standiford, KY (SDF)
Baton Rouge Ryan Field, LA (BTR)
Lafayette, LA (LFT)

Lake Charles, LA (LCH)
Monroe, LA (MLU)
New Orleans Moisant, LA (MSY)
Shreveport, LA (SHV)
Bangor International, ME (BGR)

TERMINAL CONTROL AREAS AND AIRPORT RADAR SERVICE AREAS

Portland, ME (PWM)
Baltimore Washington Int'l, MD (BWI)
Camp Springs Andrews AFB, MD (ADW)
Boston Logan, MA (BOS/A90*)
Detroit Metro Wayne County, MI (DTW/D21*)

Flint Bishop, MI (FNT)
Grand Rapids, MI (GRR)
Kalamazoo, MI (AZO)
Lansing, MI (LAN)
Muskegon, MI (MKG)

Saginaw Tri City, MI (MBS)
Minneapolis St. Paul, MN (MSP/M98*)
Gulfport, MS (GPT)
Jackson Municipal Airport, MS (JAN)
Kansas City International, MO (MCI)

St. Louis International, MO (STL/T75*)
Billings, MT (BIL)
Great Falls, MT (GTF)
Lincoln Municipal, NE (LNK)
Omaha, NE (OMA/R90*)

Las Vegas McCarrna Int'l., 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)
Griffiss AFB, NY (RME)

John F. Kennedy Int'l, NY (JFK/N90*)
La Guardia, NY (LGA)
Rochester Monroe County, NY (ROC)
Syracuse Hancock Int'l, NY (SYR)
Asheville, NC (AVL)

Charlotte Douglas, NC (CLT)
Fayetteville Grannis, NC (FAY)
Greensboro Regional, NC (GSO)
Raliegh Durham, NC (RDU)
Wilmington New Hanover County, NC (ILM)

Fargo Hector Field, ND (FAR)
Akron Canton Regional, OH (CAK)
Cleveland Hopkins Int'l., 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/P80*)

Allentown, PA (ABE)
Capital City/Harrisburg, PA (CXY)
Erie, PA (ERI)
Philadelphia International, PA (PHL)
Pittsburgh Greater Int'l, PA (PIT)

Wilkes Barre, PA (AVP)
Providence, RI (PVD/G90*)
Charleston AFB Municipal, SC (CHS)
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)

TERMINAL CONTROL AREAS AND AIRPORT RADAR SERVICE AREAS

Dallas Love Field, TX (DAL)
Dallas/Ft. Worth Regional, TX (DFW/D10*)
El Paso International, TX (ELP)
Houston Hobby, TX (HOU)
Houston Intercontinental, TX (IAH)

Longview, TX (GCG)
Lubbock, TX (LBB)
Midland, TX (MAF)
San Antonio International, TX (SAT)
Salt Lake City Int'l., UT (SLC/S56*)

Burlington International, VT (BTV)
Norfolk Regional, VA (ORF)
Richmond Byrd International, VA (RIC)

Roanoke, VA (ROA)
Washington Dulles Int'l, VA (IAD)
Seattle Tacoma Int'l, WA (SEA/S46*)
Spokane International, WA (GEG)
Charleston, WV (CRW)

Huntington, WV (HTS)
Green Bay Austin Straubel, WI (GRB)
Madison, WI (MSN)
Milwaukee Mitchell, WI (MKE)
Agana NAS, SP (GUM)

San International, PR (SJU)
Guam, GU (ZUA)

*Indicates that airport has Terminal Radar Approach Control (TRACON)

APPENDIX K

MEDIUM HUB AIRPORTS

FY 1988

City	State	Region	Location Identifier
Albuquerque	NM	ASW	ABQ
Austin	TX	ASW	AUS
Buffalo	NY	AEA	BUF
Burbank	CA	AWP	BUR
Chicago Midway	IL	AGL	MDW
Cleveland	OH	AGL	CLE
Columbus	OH	AGL	CMH
Covington/Cincinnati	KY	ASO	CVG
Dallas Love Field	TX	ASW	DAL
Dayton	OH	AGL	DAY
El Paso	TX	ASW	ELP
Fort Myers	FL	ASO	RSW
Fort Lauderdale	FL	ASO	FLL
Hartford	CT	ANE	BDL
Houston Hobby	TX	ASW	HOU
Indianapolis	IN	AGL	IND
Jacksonville	FL	ASO	JAX
Kahului	HI	AWP	OGG
Lihue	HI	AWP	LIH
Milwaukee	WI	AGL	MKE
Nashville	TN	ASO	BNA
New Orleans	LA	ASW	MSY
Norfolk	VA	AEA	ORF
Oakland	CA	AWP	OAK
Oklahoma City	OK	ASW	OKC
Ontario	CA	AWP	ONT
Portland	OR	ANM	PDX
Raleigh/Durham	NC	ASO	RDU
Reno	NV	AWP	RNO
Rochester	NY	AEA	ROC

(continued on next page)

MEDIUM HUB AIRPORTS

FY 1988

City	State (continued)	Region	Location Identifier
Sacremento	CA	AWP	SMF
San Antonio	TX	ASW	SAT
San Jose	CA	AWP	SJC
San Juan	PR	ASO	SJU
Santa Ana	CA	AWP	SNA
Syracuse	NY	AEA	SYR
Tucson	AZ	AWP	TUS
Tulsa	OK	ASW	TUL
West Palm Beach	FL	ASO	PBI

Source: FAA TERMINAL AREA FORECASTS FY 1990-2005.

APPENDIX L

SMALL HUB AIRPORTS

FY 1988

City	State	Region	Location Identifier
Agana	SP	AWP	NGM
Akron	OH	AGL	CAK
Albany	NY	AEA	ALB
Allentown	PA	AEA	ABE
Amarillo	TX	ASW	AMA
Anchorage	AK	AAL	ANC
Baton Rouge	LA	ASW	BTR
Billings	MT	ANM	BIL
Birmingham	AL	ASO	BHM
Boise	ID	ANM	BOI
Burlington	VT	ANE	BTV
Cedar Rapids	IA	ACE	CID
Charleston	WV	AEA	CRW
Charleston	SC	ASO	CHS
Charlotte Amalie	VI	ASO	STT
Chattanooga	TN	ASO	CHA
Colorado Springs	CO	ANM	COS
Columbia	SC	ASO	CAE
Corpus Christi	TX	ASW	CRP
Daytona Beach	FL	ASO	DAB
Des Moines	IA	ACE	DSM
Eugene	OR	ANM	EUG
Fort Wayne	IN	AGL	FWA
Fresno	CA	AWP	FAT
Grand Rapids	MI	AGL	GRR
Greensboro	NC	ASO	GSO
Greer	SC	ASO	GSP
Harlingen	TX	ASW	HRL
Hilo	HI	AWP	ITO
Islip	NY	AEA	ISP
Jackson	MS	ASO	JAN
Kailua-Kona	HI	AWP	KOA
Knoxville	TN	ASO	TYS
Lexington	KY	ASO	LEX
Lincoln	NE	ACE	LNX

(continued on next page)

SMALL HUB AIRPORTS

FY 1988

City	State (continued)	Region	Location Identifier
Little Rock	AR	ASW	LIT
Long Beach	CA	AWP	LGB
Louisville	KY	ASO	SDF
Lubbock	TX	ASW	LBB
Madison	WI	AGL	MSN
Melbourne	FL	ASO	MLB
Middletown	PA	AEA	MDT
Midland	TX	ASW	MAF
Mobile	AL	ASO	MOB
Moline	IL	AGL	MLI
Myrtle Beach	SC	ASO	MYR
Omaha	NE	ACE	OMA
Palm Springs	CA	AWP	PSP
Pensacola	FL	ASO	PNS
Portland	ME	ANE	PWM
Providence	RI	ANE	PVD
Richmond	VA	AEA	RIC
Roanoke	VA	AEA	ROA
Saginaw	MI	AGL	MBS
Santa Barbara	CA	AWP	SBA
Sarasota/Bradenton	FL	ASO	SRQ
Savannah	GA	ASO	SAV
Shreveport	LA	ASW	SHV
Sioux Falls	SD	AGL	FSD
South Bend	IN	AGL	SBN
Spokane	WA	ANM	GEG
Tallahassee	FL	ASO	TLH
Toledo	OH	AGL	TOL
Wichita	KS	ACE	ICT

Source: FAA TERMINAL AREA FORECASTS FY 1990-2005.