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The General Aviation Industry

Introduction
General Aviation Statistics
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The Available Market—The Users

Chapter Checklist • You Should Be Able To:

- Define *general aviation* and describe its segments in terms of primary use
- Give a statistical summary of general aviation in terms of total aircraft, number of aircraft produced annually, type of aircraft, number of pilots, and number of airports
- Discuss the major factors affecting the general aviation industry in the postderegulation period
- Distinguish between business and executive uses and between various types of commercial and noncommercial uses of general aviation aircraft
- Distinguish between the various types of general aviation airports
- Explain several of the services provided by the FAA to general aviation pilots
- Describe the relationship between manufacturers, the service industry, and users
- List the major functions of a medium to large FBO
- Discuss the factors causing businesses to seek the benefits of their own transportation

INTRODUCTION

Ask people today what commercial aviation is, and they will undoubtedly tell you that it is the airlines. The public is aware of the existence and operation of what are commonly called the "commercial airlines" because of both representations of them in television and motion pictures and recurrent coverage in magazines and newspapers, including a vast advertising campaign by the air carrier industry. The millions of air travelers who pass through the major transportation centers of New York, Chicago, Atlanta, Los Angeles, and other cities have had personal experience with airlines.

As a result of these direct and vicarious exposures to air transportation, the huge role played by the airlines in the nation's transportation system is almost universally recognized. Unfortunately, most people regard the airlines as the only form of air transportation.

General aviation is the largest segment of aviation based on number of aircraft, number of pilots, and number of airports and communities served. It is a $40 billion industry that generates over $100 billion annually in economic activity. Because of its efficiency and productivity, general aviation has become an important business tool. The majority of hours flown by general aviation aircraft are for business and commercial purposes. It is truly an integral part of the national transportation system and the U.S. economy. But there is no legal definition of general aviation, and it is commonly described in relatively negative terms as "all civil aviation except that carried out by the commercial airlines."

The term was invented in the early 1950s by the then **Utility Airplane Council** (forerunner of GAMA) of the Aerospace Industries Association (AIA) to describe the operations of the "utility" aircraft produced by the light-plane manufacturers and to distinguish them from the airplanes made by the large-airplane manufacturers, the members of the AIA, who produce aircraft (missiles and space) equipment for the airlines and the military. With the passage of time, the term general aviation came to be applied to a heterogeneous group of close to 220,000 aircraft of vastly diverse usage, performance characteristics, and cost.

General aviation is the aerial application plane that treats one out of every five tillable acres of land, which facilitates greater food production and keeps the cost of food low. It is the land developer making survey flights and the police officer observing traffic. It is the family on a vacation trip and the air ambulance flying a mercy mission. It is the relaxation of a brief flight on a Sunday afternoon.

It is the air taxi bringing passengers to the airline or picking them up at the terminal to whisk them to a distant off-airline point. It is the business traveler who travels to and from many cities making deals and decisions affecting the welfare of thousands of employees. It is the spare part flown in to keep an assembly line running. It is the bush pilot in Alaska, ferrying people, mail, and supplies from towns to wilderness areas.

Unquestionably, general aviation is the dominant force in the sky, including as it does over 90 percent of the civil air fleet, 75 percent of civil operations at FAA-towered and untowered airports, and 80 percent of the total certificated pilots in the United States.

GENERAL AVIATION STATISTICS

General aviation has no reporting requirements comparable to those of the certificated air carrier industry. As is the case with operators of private automobiles, general aviation operators do not have to report to anyone on the specifics of their flights. The only statistics

gathered by the government (the FAA) are based on an annual survey requesting every aircraft owner to report the number of flight hours for the previous year by **primary-use category:** corporate, business, personal, instructional, aerial application, aerial observation, sightseeing, external load, air tour, air taxi, medical, and other.

As of December 31, 2004, there were 210,700 active general aviation aircraft on record with the FAA (see Table 4-1). Although this number still represents 90 percent of the total active aircraft in the United States, it also represents a decline from 1990 because fewer new aircraft entered the fleet and many older aircraft have been retired. The number of new aircraft entering the fleet dropped drastically, from a high of 17,048 in 1978 to a low of 1132 in 1994 (see Table 4-2). All categories experienced reductions, but particularly single-engine and multi-engine piston aircraft. The number of amateur-built experimental aircraft, formerly primarily included under the single-engine category, increased consistently over the past 30 years, from a total of 2,100 in 1970 to over 20,000 by early 2006. The popularity of the amateur-built aircraft stems from several factors, including affordability and performance.

Amateur-built aircraft are substantially less expensive than new-production aircraft (aircraft produced under a type and production certificate) because of the large amount of labor that the builder provides. Performance-wise, many amateur-built aircraft have superior speed, maneuverability, fuel economy, and/or handling characteristics compared to light-production aircraft. In many cases, the performance benefits are due to features and technologies not available or used on most new-production aircraft. These benefits include new-technology engines; low-drag, natural-laminar-flow wings; and carefully contoured fuselage aerodynamics and very smooth surfaces held to high tolerances and crafted from advanced composite technologies.

These aircraft represent the test-bed for new technologies that will eventually be introduced in the development and manufacture of the next generation of light-production general aviation aircraft.

TABLE 4-1 Active U.S. General Aviation Aircraft,[a] 1960–2004

Year	Total	Single-Engine	Multi-Engine	Rotorcraft[b]	Other[c]	Experimental[d]
1960	76,549	68,301	7,243	634	371	N/A
1965	95,442	81,153	11,977	1,503	809	N/A
1970	131,743	109,643	18,291	2,255	1,554	N/A
1975	168,475	137,011	24,559	4,073	2,832	N/A
1980	211,045	168,435	31,664	6,001	4,945	N/A
1985	210,654	164,385	33,588	6,418	6,263	N/A
1990	229,279	165,073	32,727	7,397	7,032	N/A
1995	181,341	129,550	25,013	5,117	5,279	16,382
2000	217,533	149,422	33,853	7,150	6,701	20,407
2004	210,700	144,000	32,825	6,890	6,185	20,800

Source: Federal Aviation Administration, *FAA Statistical Handbook of Aviation*, published annually.
[a]Before 1971, an "active aircraft" was one certified as eligible to fly. Currently, an "active aircraft" must have a current U.S. registration and have been flown during the previous calendar year.
[b]Includes autogiros.
[c]Includes gliders, dirigibles, and balloons.
[d]Includes home-built, exhibition, and other. Categorized separately after 1990.

Factors Affecting General Aviation

Fundamental changes have taken place in the general aviation industry. Before 1978, changes in the industry mirrored changes in the economy. If the economy was strong and growing, so was general aviation; if a slow-down occurred, general aviation lagged as well. However, since the long and precipitous decline of aircraft shipments began in the late 1970s, this expected relationship has not held.

General aviation took off in the 1960s as the economy grew at a rapid pace, fueled by the Vietnam War and President Lyndon Johnson's "Great Society" social programs. General aviation manufacturers enjoyed a heyday, introducing new models and producing an average of more than 9,000 airplanes per year. Four airplanes in particular that were introduced in the 1960s—the Cessna 172, the Piper Cherokee, the Beech King Air 90, and the Lear 23—proved to be bellwether designs for years to come. The general aviation fleet almost doubled during the 1960s, and new-aircraft shipments reached a high of 15,768 units in 1966.

The expansion of all segments of aviation continued into the 1970s, with more airplanes sold in this decade than before or since. The general aviation aircraft fleet increased from 131,743 to 211,045 aircraft, and production hit a high of 17,811 aircraft in 1978. New aircraft were introduced in record numbers, particularly trainers such as the Piper Cherokee and Tomahawk models, the Cessna 150 and 152, and the Beech Sierra and Sundowner, to name a few.

However, some clouds loomed on the horizon. As fuel prices soared during the 1970s, manufacturers began to focus on more fuel-efficient aircraft. Airspace congestion was another problem that the industry had been studying since the mid-1960s. As a result, the Airport and Airways Development Act was passed in 1970 to provide the funding to expand and improve the airport and airway system over a 10-year period. And terminal control areas (TCAs) were introduced to the country's busiest airports; these required two-way communications with air traffic control (ATC), VOR navigation capability, and altitude-reporting transponders. Increasing regulations affected the personal-pleasure pilot in particular.

During the 1970s, the general aviation industry also began focusing on the issue of product liability. The number of lawsuits and the size of awards were rising, and not surprisingly, so were insurance premiums—from $51 per new airplane in 1962 to $2,111 in 1972. This was a sign of things to come for the aircraft manufacturers and, no doubt, a key reason for the steep drop in the production of general aviation aircraft during the 1980s. Product liability insurance costs for the general aviation airframe builders totaled about $135 million in 1985, and based on unit shipments of 2,029 aircraft that year, the costs exceeded $70,000 per airplane. This was more than the selling price of many basic two- and four-place aircraft.

These phenomenal cost increases during the first five years of the 1980s came at a time when the industry's safety record continued to improve. Improved safety notwithstanding, the number of product liability suits continued to increase. Even more significant was the exponential growth in settlements, judgments, and legal costs. By 1986, Cessna Aircraft Company decided to drop its piston-aircraft production and self-insure up to $100 million. Piper decided to operate without the benefit of product liability coverage, and Beech insured the first $50 million annual aggregate exposure with its own insurance company.

TABLE 4-2 GAMA General Aviation Aircraft Shipments by Type of Aircraft, 1962–2005

Year	Total	Single-Engine	Multi-Engine	Total Piston	Turbo-Prop	Turbojet/ Turbofan	Total Turbine
1962	6,697	5,690	1,007	6,697	0	0	0
1963	7,569	6,248	1,321	7,569	0	0	0
1964	9,336	7,718	1,606	9,324	9	3	12
1965	11,852	9,873	1,780	11,653	7	112	199
1966	15,768	13,250	2,192	15,442	165	161	326
1967	13,577	11,557	1,773	13,330	149	98	247
1968	13,698	11,398	1,959	13,357	248	93	341
1969	12,457	10,054	2,078	12,132	214	111	325
1970	7,292	5,942	1,159	7,101	135	56	191
1971	7,466	6,287	1,043	7,330	89	47	136
1972	9,774	7,913	1,548	9,446	179	134	313
1973	13,646	10,788	2,413	13,193	247	198	445
1974	14,166	11,579	2,135	13,697	250	202	452
1975	14,056	11,441	2,116	13,555	305	194	499
1976	15,451	12,785	2,120	14,905	359	187	546
1977	16,904	14,054	2,195	16,249	428	227	655
1978	17,811	14,398	2,634	17,032	548	231	779
1979	17,048	13,286	2,843	16,129	639	282	921
1980	11,877	8,640	2,116	10,756	778	326	1,104
1981	9,457	6,608	1,542	8,150	918	389	1,307
1982	4,266	2,871	678	3,549	458	259	717
1983	2,691	1,811	417	2,228	321	142	463
1984	2,431	1,620	37	1,991	2	169	440
1985	2,029	1,370	193	1,563	32	145	466
1986	1,495	985	138	1,123	250	122	372
1987	1,085	613	87	700	263	122	385
1988	1,143	628	67	695	291	157	448
1989	1,535	1,023	87	1,110	268	157	425
1990	1,144	608	87	695	281	168	449
1991	1,021	564	9	613	22	186	408
1992	941	552	1	593	177	171	348
1993	964	516	9	555	211	198	409
1994	1,132	544	77	621	233	278	511
1995	1,251	605	61	666	285	300	585
1996	1,437	731	70	801	320	316	636
1997	1,840	1,043	80	1,123	279	438	717
1998	2,457	1,508	98	1,606	336	515	851
1999	2,808	1,689	112	1,801	340	667	1,007
2000	3,147	1,877	103	1,980	415	752	1,167
2001	2,997	1,645	147	1,792	421	784	1,205
2002	2,677	1,591	130	1,721	280	676	956
2003	2,686	1,825	71	1,896	272	518	790
2004	2,963	1,999	52	2,051	321	591	912
2005	3,580	2,326	139	2,465	365	750	1,115

Source: GAMA, General Aviation Statistical Databook, 2006.

Other factors were also working against the private business and pleasure flier. Airline deregulation in 1978 at first caused a decrease in the use of business aircraft, as the air carriers, including many new ones, served new markets and competed for customers by lowering fares. But as the airlines concentrated their flights at hub cities and merger mania struck the industry in the early 1980s, service to many smaller communities was dropped or severely cut back as competition decreased. The use of corporate aircraft started to rebound, and the major manufacturers focused more attention on turboprops and jets. By this time, these manufacturers had been purchased by larger conglomerates. In 1980, Beech Aircraft was acquired by Raytheon Company. Cessna was acquired by General Dynamics in 1985 and then sold to Textron in 1991. France's Euralair, an air charter, executive jet, and cargo operator, bought Mooney in 1984. Piper's owner, Bangor Punta Corporation, was bought by Lear-Siegler, which, in turn, was bought by investment banker Forstmann Little and then in 1987 by entrepreneur M. Stuart Millar. Unfortunately, the recession of the early 1990s and costly liability claims forced the company into Chapter 11 bankruptcy by 1992.

In the early 1980s, general aviation followed the rest of the economy into a recession. Interest rates were at an all-time high when President Ronald Reagan took office in 1980. Everything from housing starts to durable goods sales, including autos and general aviation aircraft sales, plummeted. The economy began to recover in 1983, but general aviation did not, for a number of reasons. No doubt the high interest rates of the late 1970s and early 1980s had an effect at the beginning of the slide. Acquisition costs, including those for avionics equipment, rose sharply during the early to mid-1980s, despite very little change in the design or features of the typical single-engine aircraft. Used aircraft were readily available, and prospective buyers were reluctant to purchase new equipment at considerably higher prices. Total operating expenses—including fuel, maintenance, and hangar charges, and insurance—all steadily increased during the 1980s, making it more expensive for the occasional flier.

Another major factor, discussed previously, was the sharp rise in product liability claims, which caused the light-aircraft manufacturers to concentrate on their higher-priced line of turbine equipment. The growth in number and availability of regional and commuter airline service to many smaller communities also likely reduced the desirability of using private general aviation aircraft when planning business or pleasure trips. And changing tastes and preferences among the traditional business and pleasure aircraft users may have contributed to the decline in the 1980s, even as interest in sports cars and boats seemed to peak. The level of professionalism required to fly even a light aircraft in today's air traffic environment has grounded many private pleasure fliers. Some of these individuals chose to fly much less expensive ultralights and kit planes in uncontrolled airspace.

Another financial pressure working against aircraft ownership resulted from passage of the Tax Reform Act of 1986, which eliminated the 10 percent investment tax credit. This was followed by a luxury tax on boats and planes, which only exacerbated the problem of declining new aircraft sales. Finally, foreign aircraft manufacturers entered the traditionally U.S.-dominated market in a much bigger way during the 1980s. In the 1970s, U.S. general aviation aircraft manufacturers held a dominant position worldwide. But since 1981, imports of general aviation airplanes have exceeded U.S. exports in dollar value. Many foreign governments supported their fledgling aviation industries through subsidization of research, development, production, and financing, and foreign manufacturers continued to gain an ever-increasing foothold in the U.S. market. Aircraft made abroad accounted for more than 50 percent of all aircraft delivered to U.S. customers.

Even in the high-end market, sales of foreign-manufactured business jets accounted for almost 40 percent of all business jets sold here in the early 1990s.

Meanwhile, shipments of new U.S.-manufactured general aviation aircraft continued to fall, reaching a low of 928 units in 1994. As a result of the industry's devastating decline, due largely to product liability lawsuits, Congress passed the General Aviation Revitalization Act (GARA) in 1994. The GARA ushered in a new wave of optimism in the general aviation industry.

With some exceptions, the GARA imposed an 18-year statute of repose, limiting product liability suits for aircraft having fewer than 20 passenger seats not engaged in scheduled passenger-carrying operations. Cessna immediately announced that it would resume production of single-engine aircraft in 1996. The New Piper Aircraft Corporation was formed, and in 1995, general aviation aircraft shipments finally increased after a 17-year decline.

In 1997, the optimism so prevalent in the industry since the passage of the GARA was evidenced by the release of new products and services, expansion of production facilities, increased student starts, increased aircraft shipments, and record-setting gains in aircraft billings. These conditions suggested continued improvement in the general aviation industry in 1998 and beyond. According to a poll of Aircraft Owners and Pilots Association (AOPA) members conducted in March 1992, only 41 percent said that they were optimistic about the future of general aviation. In response to a similar poll in January 1997, 51 percent responded optimistically, and by April 1998, the poll of certificated pilots reported that 74.5 percent of its members thought the state of aviation was the same or better than it had been. This renewed optimism among the pilot community, aircraft manufacturers, and the industry as a whole could be directly attributed to the strong economy and the passage of the GARA in 1994.

In January 1997, Cessna delivered its first new single-engine piston aircraft since 1986. In addition, Lancair International, Diamond Aircraft, and Mooney also produced new piston models. Galaxy Aerospace rolled out its new business jet in the fall of 1996. Aerospatiale and Renault joined forces to produce light-aircraft piston engines for certification in 1999. Piper announced plans to manufacture the Meridian, a single-engine turboprop which first flew in 1999.

New manufacturing facilities opened to support expanded production. Cirrus Design broke ground on two facilities to support production of the SR 20. Also, Sabreliner started a large expansion program at their Missouri facility.

In 1999, Cessna announced plans and orders for the new Citation models—the CJ1, CJ2, Sovereign, and Ultra Encore. Raytheon announced that it would begin deliveries of its Premier I, an entry-level jet that features a composite fuselage with metal wings, in 2000. Mooney delivered its first Eagle in 1999.

Boeing Business Jets announced its plan to build a larger version of its long-range corporate jet, the BBJ-2. Boeing Business Jets, a joint enterprise of Boeing and General Electric, entered the market in 1998 with the long-range BBJ, which was based on a hybrid of the 737-700/800 aircraft. Twenty-eight aircraft were delivered in 1999. Airbus and Fairchild are also marketing business jets that are based on aircraft originally designed for commercial operations.

During the 1990s, fractional ownership programs offered by Executive Jets' NetJets, Bombardier's Flexjet, Raytheon's Travel Air, Flight Options, and TAG Aviation grew at a rapid pace. From 1993 through the end of 1999, these five major fractional ownership providers increased their fleet size and shareholders at average annual rates above 65

percent. Despite this record growth, only a small percentage of this market has been developed.

Fractional ownership programs are filling the niche for corporations, celebrities, and businesspeople who do not fly enough to warrant having their own flight department. Fractional ownership providers offer the customer a more efficient use of time by providing a faster point-to-point travel time and the ability to conduct business while flying. In addition, shareholders of fractional ownership find the minimum start-up concerns and easier exiting options of great benefit.

The 1990s truly represented a revitalization of the industry. Total billings in 1999 soared 35.1 percent over 1998, reaching $7.9 billion, and units shipped increased from 2,200 to 2,504, or 12.6 percent. Put into perspective, general aviation sales in 1999 were quadruple those of 1991. The last year of the decade also marked the first time in the GAMA's history that both billings and shipments increased for five consecutive years. It marked the first full year of deliveries of the Cessna 206H Stationair and T206H Turbo Stationair. Deliveries of the composite-construction Cirrus Design SR 20 began, and Mooney Aircraft Corporation began production of the Ovation 2, a faster and more fuel-efficient version of the firm's best-selling model, the Ovation.

The biggest jump in 1999 sales revenue, similar to 1998, was in the turbofan aircraft segment. Sales rose 23.9 percent, in large part because of strong incremental growth and fractional ownership programs. The decade closed with across-the-board growth in general aviation activity, corporate flight departments, fractional programs, and charter flights.

The new millennium started out with a continuation of the 1990s. New manufacturing facilities were being built and old facilities expanded. Sales of general aviation aircraft continued to set new records for value of aircraft shipped. Much of this record sales value is for aircraft at the higher priced end of the general aviation fleet—turbine-powered aircraft—and is likely due in part to the increase in fractional ownership. More than 900 turbine aircraft were delivered in 2000 (see Table 4-2) as production capacity soared to keep up with record backlogs in manufacturers' order books. Cessna, for example, doubled the number of Excels it delivered and increased Bravo production by 50 percent. Dassault Falcon Jet deliveries reached 73, five more than in 1999, and its backlog of orders increased. Learjet 45 deliveries were up from 43 in 1999 to 71 in 2000. Even deliveries of the venerable Raytheon Hawker 800 XP increased by 22 percent.

Piston-aircraft shipments grew by almost 11 percent, buoyed by an infusion of new technology from Lancair and Cirrus Design and by increased piston deliveries from Cessna's Independence, Kansas, plant. The year 2000 saw the first deliveries of Lancair's Columbia 3000. Cirrus delivered 95 new four-seat SR 20 models. Cessna piston deliveries increased to 912 units.

However, clouds were on the horizon, and by 2001 the economy slipped into a recession. While sales reached another high, largely the result of strong turboprop and jet sales, the total number of shipments fell for the first time in six years. Unexpected events, such as the tragedy on September 11, 2001, the economic slowdown during the first three years of the new millennium, and the increase in costs related to fuel and liability, vividly demonstrate that the future, as in the past, will bring new challenges to the general aviation industry.

Uses of Aircraft

The size and diversity of general aviation makes it difficult to categorize for statistical purposes. Aircraft flown for business during the week may be used for personal transportation on weekends, the same way a family car is used. Instructional aircraft may be used for charter (air taxi) service or rented to customers for business or personal use. An air taxi airplane may be used for advanced flight instruction or for rental to business- or personal-use customers, and so on. Nevertheless, the FAA has broken down the numbers of general aviation aircraft by type and primary use, from which a further analysis can be made on the basis of solicited reports from the users (see Table 4-3).

Business Aviation. The National Business Aircraft Association (NBAA) defines business aviation as falling into two categories: **business aircraft use** and **corporate aircraft use.**

1. *Business aircraft use*. Any use of an aircraft not for compensation or hire by an individual for the purpose of transportation required by a business in which he or she is engaged (in other words, personally flown)

2. *Corporate aircraft use*. Any use of an aircraft by a corporation, a company, or another organization for the purpose of transporting its employees and/or property not for compensation or hire and employing professional pilots for the operation of their aircraft

Business aircraft complement airline services in satisfying the nation's business transportation requirements. Although airlines offer transportation to the largest cities and business centers, business aviation specializes in many areas where major airlines cannot satisfy demand. More than 36,000 general aviation aircraft are flown, primarily for business purposes, providing quick, safe, and reliable transportation whenever and wherever business needs require them.

Business aviation operators use all types of aircraft, from single- and twin-engine piston-powered airplanes, helicopters, and turboprops to the fastest jets, to ensure maximum business effectiveness. Over two-thirds of the Fortune 500 companies operate business aircraft, and virtually all of these aircraft operators are members of the **National Business Aircraft Association (NBAA).** The NBAA is the principal representative of business aviation before Congress and the regulatory agencies, such as the FAA. It represents over 7,000 companies, which operate over 9,000 aircraft. NBAA member companies earn annual revenues amounting to approximately $5 trillion. Turbojets are the most widely used type of aircraft. Over one-half of NBAA members have turbojets, approximately 20 percent have turboprops, and about 10 percent use multi-engine piston-powered aircraft. Although most of these aircraft are operated domestically, an increasing number are utilized to expand markets overseas.

Numerous examples of typical traveling schedules purport to demonstrate the advantages of business aircraft over the commercial airlines. Because of the proliferation of airline hub-and-spoke systems since deregulation, flying business aircraft directly between airports has become a big advantage. The monetary-equivalent savings in terms of executives' time that would otherwise be spent in traveling to and from air carrier airports and in waiting for scheduled air carrier flights, plus hotel expenses, meals, and rental car expenses, loom large on the benefit side of such calculations. Normally unquantified are

TABLE 4-3 Number of Active General Aviation Aircraft by Type and Primary Use, 2002 (excluding commuters)

Aircraft Type	Active General Aviation Aircraft	Corporate	Business	Personal	Instructional	Aerial Application	Aerial Observation	Aerial Other	Sight-Seeing[a]	External Load	Air Tours[b]	Air Taxi	Medical	Other
All aircraft total	211,244	10,810	24,153	145,996	13,203	3,971	4,535	899	641	151	259	3,898	996	1,733
Piston	161,087	1,947	20,619	117,365	11,775	2,759	2,632	431	130	0	110	2,212	190	918
Turboprop	6,841	2,417	1,386	1,086	42	510	113	174	0	0	0	779	224	118
Turbojet	8,355	5,691	1,119	618	95	5	0	0	0	0	0	685	26	117
Rotorcraft	6,648	551	463	1,373	536	581	1,748	260	65	145	99	216	532	67
Gliders	1,951	0	5	1,704	201	0	0	0	34	0	0	0	0	7
Lighter-than-air	4,426	5	21	3,679	45	0	0	5	407	0	50	0	0	214
Experimental	21,936	198	540	20,172	509	116	43	30	5	7	0	6	23	287

Source: Federal Aviation Administration, *FAA Statistical Handbook of Aviation, 2003*.
Notes: Row and column summation may differ from printed totals because of estimation procedures or because some active aircraft did not report use.
[a] Includes sight-seeing performed under FAR 14CFR91: General Operating and Flight Rules.
[b] Includes air tours performed under FAR 14CFR135: Air Taxi Operators and Commercial Operators.

the advantages of flexibility and prestige (which may or may not bring about pecuniary benefits) and the fact that private meetings can be held in privately owned aircraft.

The same is also generally true of smaller businesses, which have discovered the benefits of maintaining their own aircraft. It is not unusual for general aviation aircraft operators to hold business meetings in several cities hundreds of miles apart—on the same day.

Fractional ownership has also become an important option today. Companies or individuals own a fraction of an aircraft and receive management and pilot services associated with the aircraft's operation. Fractional ownership allows companies that have never before used business aircraft to experience many of the advantages of business aviation quickly and without typical start-up considerations associated with traditional flight departments. It also allows existing flight departments to supplement their current aircraft when needed.

Today's business aircraft are quieter, more efficient, and safer than ever before. Much like computers, business aircraft are powerful business tools that can make a company more profitable by enabling it to make better use of its most valuable assets—time and personnel.

Personal Flying. All flying that is not common carrier for hire, business flying, or commercial flying, as defined to this point, is **personal flying.** Personal transportation by air is not economically regulated; a personal plane is like a personal car. When the owner (or renter) uses a car or plane for a business trip, it becomes a business automobile or a business aircraft. But there is no way to tell whether a car or an airplane is being used for business or for pleasure simply by looking at it. A multimillionaire may own a large airplane as a purely private conveyance, with no business use. However, because the majority of privately owned (as distinguished from company-owned or corporate-owned) aircraft are of the light single- or light twin-engine variety, it is appropriate to discuss this important segment of the general aviation industry at this time.

Although the range and endurance of light airplanes is well documented (for example, with Lindbergh's *Spirit of St. Louis*, a high-wing monoplane similar in size to a Cessna 180, and his Lockheed Sirius, in which he flew over the North Pole to the Orient; and with Wiley Post's Lockheed Vega), the public impression is that the planes are good only for short hops in a limited area. In the early 1950s, Bill Odom flew a single-engine Bonanza from Hawaii to Seattle nonstop, then went back to the Islands and flew the same airplane nonstop to Teterboro, New Jersey. Max Conrad flew a 125-hp Piper Pacer across the North Atlantic and back to visit his family in Europe. He also flew a Piper Comanche from Casablanca to Los Angeles nonstop. In 1959, a Cessna 172 was flown for 65 days without landing, which is equivalent to circling the world six times nonstop.

Just as automobiles and boats are used for personal transportation and recreation, personal flying is a legitimate use of the sky. An aircraft is an efficient and effective business tool, but it is also a pleasant recreational vehicle. Thousands of private pilots use their aircraft to visit friends and relatives, attend special events, and reach remote vacation spots.

These aircraft are also flown by doctors, lawyers, accountants, engineers, farmers, and small-business owners in the course of their business. Typically, such persons use their aircraft partly for business and partly for pleasure. They differ primarily from the purely business flier with respect to the type of aircraft flown. A much higher proportion of the 100,000 aircraft they fly are single-engine piston aircraft.

A number of organizations represent the interests of the business and pleasure flier; by far the most important is the **Aircraft Owners and Pilots Association (AOPA).** This organization, headquartered in the Washington, D.C., area, includes over 385,000 members, who own about 70 percent of the active general aviation aircraft in the United States. In addition to its function as congressional liaison, the AOPA provides a variety of services for its members, many of which are designed to enhance air safety.

Instructional Flying. Instructional flying accounted for roughly 15,000 aircraft, or 7 percent of the total, in 2005. This category includes any use of an aircraft for purposes of formal instruction, either with the instructor aboard or when the student is flying solo but is carrying out maneuvers according to the instructor's specifications. Close to 90 percent of the aircraft used for instruction are of the single-engine type.

Obtaining a private pilot's license for business or personal reasons is the primary goal for many students. Others use it as a stepping stone to an airline or military aviation career. Most people learn to fly through a local **fixed-base operator (FBO).** FBOs provide fuel and service, and they also rent and sell airplanes. They usually have a professional flight instructor on staff who provides ground and flight instruction. Many individuals also learn to fly through a local flying club that offers flight training. Such clubs are made up of groups of individuals who own aircraft and rent them to members. They usually offer flight instruction and other flying-related activities to their members. In addition, many vocational and technical schools, colleges, and universities offer aviation programs that include flight training.

Commercial and Industrial Aviation. The remaining aircraft use categories are broken down as follows:

1. *Aerial application.* Any use of an aircraft for work purposes related to the production of foods and fibers or to health control measures, in which the aircraft is replacing farm implements or ground vehicles for the particular task accomplished. This includes fire-fighting operations and the distribution of chemicals or seeds in agriculture, reforestation, and insect control. Approximately 4,000 aircraft are used for **aerial application.** The majority are single-engine piston aircraft.

   The use of aircraft in agriculture is a major factor in the production of food and fiber all over the world. The Japanese, Russians, and Chinese are spending huge amounts of money to apply fertilizers, to spread seeds in inaccessible locations, to control pests, and to harvest crops using aircraft. Although the public image of crop dusters is that they are flying daredevils who operate flimsy crates and pollute the environment, the fact is that aviation is a major factor in the production of cotton, vegetables, and beef (by seeding and fertilizing grazing lands) and in the eradication of pests, such as the fire ant, the screw worm, and the gypsy moth. But it is also an expensive business. These specially designed aircraft, such as the Cessna Ag Truck and Ag Husky, cost in excess of $150,000 each. Needless to say, the operators, many of whom have fleets of as many as 50 aircraft, are involved in big business, requiring bank loans for equipment renewal, which, in turn, requires insurance coverage. But if the business was as hazardous as many think it is, no banker or insurance company would deal with it.

   The air-dropping of chemicals and fire-retardant slurry by aircraft is a major weapon in the control of forest and brush fires from the pine woods of New Jersey to the Florida Everglades, and from the forests of the Big Sky country to the hills of

southern California. This aviation specialty is seldom seen by most members of the public.

Resort operators have found that the spraying of light oils and suspensions by aircraft (as distinguished from agricultural use of similar aircraft) has enhanced their business by eliminating the irritations of small flying insects. In addition to eliminating a nuisance, aerial application of pesticides has been highly effective in controlling, and in many cases eliminating, diseases transmitted by insects, such as malaria.

2. *Aerial observation*. Any use of an aircraft for aerial mapping or photography, survey, patrol, fish spotting, search and rescue, hunting, or highway traffic advisory not included under FAR Part 135. Over 4,500 aircraft are included under this category.

   Land use planners, real estate developers, beach erosion engineers, businesspeople seeking new industrial sites, and public officials and highway designers all use photographs taken from aircraft in their deliberations.

   Commercial fishing fleets have found that their operations are more productive and profitable when they can be directed to concentrations of fish schooling far from the shore. Therefore, the use of light aircraft for that purpose has evolved to become an integral part of the fishing industry.

   Major metropolitan police departments have found that road patrols by aircraft are a highly effective means of monitoring the flow of traffic during morning and evening rush hours and apprehending lawbreakers. Most police air patrols are performed in aircraft leased from general aviation operators.

   Another specialized service usually performed on a contract basis is flying at very low levels along public utility rights of way to inspect the integrity of energy lines and to check for transformer failures, broken insulators, short circuits, or line breaks. Inspection by air is frequently the only economical means of performing such service.

3. *Aerial other.* Approximately 900 aircraft fall into other aerial pursuits such as aerial advertising, weather modification, and wildlife conservation.

   On the basis of "cost per thousand," key words in the advertising business, a towed banner or a message written in smoke over a city will draw a larger audience for the cost than any other form of advertising. A banner towed over a sports stadium or along a hundred miles of crowded beach is seen by more people than a similar message carried for the same price in any other communication medium. A sky message written over Manhattan on a clear day can be seen by 10 million people at one time. Aerial advertising is a highly specialized—but very lucrative—part of commercial aviation.

   Weather modification and wildlife conservation functions of commercial aviation are usually performed on a contract basis and require special expertise. The creation of both rainfall in arid regions and snow in ski resort areas has been accomplished recently. The Fish and Wildlife Service retains commercial operators to survey herd and flock movements and to count the size of herds, as well as to air-drop food when natural forage is unavailable.

It is impossible to assign a specific value to these commercial aviation operations. However, without them, we would pay far more for clothing, fibers, and food products. Similarly, the protection of natural resources, land planning, and disease and pest control are important, but their value is difficult to compute in dollars.

Sight-seeing, Air Tours, and Air Taxi. Aircraft flown for the purpose of *sight-seeing and air tours* totaled over 900 in 2002, or less than 1 percent of the active fleet. Sight-seeing includes flying conducted under FAR Part 91, whereas air tours are conducted under FAR Part 135 (see Table 4-3). More than one-half of the sight-seeing flights are made in lighter-than-air aircraft. The majority of air tours are conducted in rotorcraft and lighter-than-air aircraft. *Air tours* flown over widely diverse areas such as the Florida Keys or the Grand Canyon have become very popular with tourists.

Air taxi or charter firms serve as on-demand passenger and all-cargo operators. This category covers all types of aircraft, including single- and multi-engine piston and turbine aircraft and rotorcraft operating under FAR Part 135. The great advantage of the on-call air taxi or charter operator is its flexibility.

Chartering an airplane is similar to hiring a taxi for a single trip. The charterer or air taxi operator provides the aircraft, flight crew, fuel, and all other services for each trip. The charteree pays a fee, usually based on mileage or time, plus extras such as waiting time and crew expenses. Using an air taxi is particularly attractive for a firm that requires an airplane only infrequently or seldom needs a supplement to its own aircraft. Firms will also charter when they need a special-purpose aircraft, such as a helicopter.

As commercial operators, air taxi firms must conform to more stringent operating and maintenance requirements. In addition, each air taxi or charter operator, regardless of the type of airplanes used, must have an air taxi certificate on file with the FAA. This certificate is issued by the FAA after proper application procedures have been followed, the plane has been inspected, and certain minimum insurance coverages and limits have been obtained. In 2002 the FAA listed approximately 3,900 air taxi aircraft, which represented about 2 percent of the general aviation fleet (see Table 4-3).

External Load and Medical. *External load* includes aircraft under FAR Part 133. The majority of aircraft under this category are rotorcraft used for external load operations, such as hoisting heavy loads and hauling logs from remote locations. If it were not for general aviation aircraft, primary helicopters that transport heavy, expensive drilling equipment, as well as people, day and night, good weather and bad, America's dependence on foreign oil would be far greater and would surely impact negatively on the American consumer.

The *medical* category is also dominated by helicopters, which represent more than 50 percent of the aircraft flown to carry people or donor organs for transplant. There are times when the American Red Cross needs to transport emergency supplies to disaster victims or blood of rare types or in large quantities. The entire medical emergency evacuation process was changed when state and local governments began establishing "MEDEVAC" units to respond to critically injured persons such as those involved in auto accidents. The survival rate in life-threatening injuries is greatly enhanced when a person can be transported quickly to nearby hospitals. There are over 1,100 aircraft used in the external load and medical categories.

Other Flying. The final category of general aviation craft includes a wide variety of over 1,700 single-engine and multi-engine aircraft used for purposes not included under the other categories. Examples include aircraft used for research and development, testing, demonstration, and government purposes.

Close to one-third of the aircraft in this category are government aircraft. These aircraft, most of which were designed for civilian use, log millions of hours a year on government business. Agencies and departments such as Agriculture, Commerce, Energy, the EPA,

Health and Human Services, Interior, Justice, State, Transportation, Treasury, NASA, and TVA use aircraft to perform a wide variety of tasks, including:

- Fire fighting
- Law enforcement
- Scientific research and development
- Flight inspection
- Surveying
- Powerline and pipeline patrol
- Aerial photography
- Pollution control
- Search and rescue
- Drug interdiction
- Agricultural application
- Transportation of government personnel

Airports

Actually, the term *general aviation airport* is a common misnomer. All airports are general aviation airports, including those used by the certificated air carriers, which are sometimes referred to as "air carrier airports." In addition, many airports that are not certificated for air carrier service may be used by air carrier charter flights if the facilities are adequate. Or, to put it another way, air carriers may use so-called general aviation airports as well.

The FAA issues an annual report on landing facilities in the United States and its possessions. At the beginning of 2001, the gross number of aircraft landing facilities was given as 19,245 (see Table 4-4). However, this figure is not restricted to airports but includes other forms of landing facilities not used by conventional aircraft, such as heliports, stolports (short-takeoff-and-landing airports), and seaplane bases. It also includes airports located on American Samoa, Guam, and U.S. Trust Territories.

Private-Use Airports. **Private-use airports** are those that are not open to the general public but are restricted to use by their owners and the invited guests of the owners on an exclusive-use basis. Such airports are comparable to private roads or driveways.

Public-Use Publicly Owned Airports. There are 5,133 **publicly owned airports** in the United States, ranging in size from the enormous Dallas–Fort Worth and JFK layouts to the small grass fields owned by local communities. All of these airports may be used by light general aviation aircraft. Fliers intending to use any airport can consult government or industry publications to ascertain its capacity and equipment.

An airport owned by a government body can usually be regarded as permanent and stable, particularly if federal funding has been obtained for improving the facilities.

Public-Use Privately Owned Airports. It is estimated that close to 40 percent of the **public-use privately owned airports** in the United States are not permanent; they disappear from the roster of available landing places because of economic, political, or personal reasons. The disappearance of public-use privately owned airports is a matter of deep concern to the entire general aviation industry, because once an airport is lost, it can never be replaced. Without ready access by air to a community, the transportation utility of aircraft is seriously eroded.

TABLE 4-4 U.S. Civil and Joint-Use Airports, Heliports, Stolports, and Seaplane Bases on Record by Type of Ownership, 2004

FAA Region	Total Facilities	Total Facilities, by Ownership		Public-Use Paved Airports[a]		Public-Use Unpaved Airports[a]		Total Airports
		Public	*Private*	*Lighted*	*Unlighted*	*Lighted*	*Unlighted*	
Grand total[b]	19,816	5,148	14,664	3,645	295	393	857	5,190
U.S. total[c]	19,749	5,118	14,627	3,628	292	393	856	5,169
Alaskan	675	384	287	52	6	110	144	312
Central	1,576	498	1,078	383	12	38	54	487
Eastern	2,631	375	2,156	337	33	48	91	509
Great Lakes	4,307	908	3,399	752	31	127	182	1,092
New England	775	143	632	114	18	5	49	186
Northwest Mountain	2,054	687	1,467	418	45	18	163	644
Southern	2,943	839	2,104	641	39	27	51	758
Southwest	3,310	815	2,495	631	55	16	79	781
Western	1,426	489	937	310	54	4	43	411
South Pacific[d]	19	10	9	7	2	0	1	10

Source: Federal Aviation Administration, *FAA Statistical Handbook of Aviation, 2005*.
[a] Among all airports open to the public, either privately or publicly owned.
[b] Excludes Puerto Rico, Virgin Islands, Northern Mariana Islands, and South Pacific.
[c] U.S. total excludes Puerto Rico, Virgin Islands, Northern Mariana Islands, and South Pacific.
[d] Includes American Samoa, Guam, and U.S. Trust Territories.

FAA Services

The most widely used service provided by the FAA to general aviation pilots is the **flight service station (FSS)** network of 75 facilities for collecting and disseminating weather information, filing flight plans, and providing in-flight assistance and aviation advisory services. This figure includes automated flight service stations. Air carriers have their own meteorological service, and their instrument flight plans are prefiled by computer. (These are called "canned" flight plans.) General aviation flight plans are filed individually via FSS facilities.

Flight service stations are the sole means of general aviation's filing flight plans, which are required under actual instrument conditions but are optional in good weather. They are the sole source from which to obtain legal weather information, either in person (face-to-face briefings) or by telephone or, when airborne, by air/ground radio communications.

The FSS system is vital to general aviation operations, and it is used by pilots at every level, from student pilots to air transport-rated pilots of large business jets. Flight service stations are indispensable to all general aviation flight operations.

Whenever there is an active control tower in an airport, all traffic is required to comply with its direction of aircraft in flight and on the ground. However, not all airports (to be accurate, not all air carrier-served airports) have control towers. There are 680 airports in the United States with traffic control towers. With the exception of the major hubs that serve large metropolitan areas, general aviation is the primary user of the tower-controlled airports.

The busier tower-controlled airports have an additional facility to ensure the safe and expeditious movement of air traffic: radar. Many civil airports have terminal radar approach control (TRACON), and military airport radar facilities are also available to general aviation pilots who operate in the areas of their coverage. When using airports with such equipment, the majority of general aviation pilots use radar assistance because it is available and in some cases required.

Another service available to all fliers is the en route air traffic control complex, which consists of 24 air route traffic control centers (ARTCCs). These centers provide radar air traffic separation service to aircraft operating on instrument flight plans within controlled airspace. No aircraft may operate when the visibility or ceiling falls below prescribed limits unless an instrument flight plan has been filed under instrument flight rules (IFR). Air carrier aircraft, particularly those operated by certificated air carriers, operate under instrument flight rules all the time, no matter how good the actual weather may be, as a matter of course. General aviation pilots who are instrument qualified, or instrument "rated," tend to file instrument flight plans only when they must fly in adverse weather.

THE GENERAL AVIATION SUPPORT INDUSTRY

The economies of all businesses require interrelated and carefully balanced relationships among three players: the manufacturers, the service industry, and the users. The small size of general aviation makes this "triangle" exceptionally vulnerable because, in comparison with, say, the automobile industry, the market is so limited in terms of the number of units. Only a relatively small reduction in the flow of goods and money can wreak havoc throughout the industry.

The Manufacturers

Approximately 15 U.S. airframe manufacturers are involved in designing and constructing light (or small) and large aircraft for the various segments of general aviation. The number of aircraft these manufacturers produce varies greatly, from as many as 17,811 units in 1978 to as few as 1,132 in 1994 (see Table 4-2). The export market also experienced a long recessionary period. Exports typically represent about one-third of total aircraft shipments.

For 16 years, beginning in 1979, general aviation aircraft shipments steadily declined. The decline in aircraft sales has been accompanied by a decrease in the number of student and private pilots. Between 1979 and 2005, the number of individuals holding a student pilot certificate declined from 210,180 to 87,213 and the number of private pilots declined from 343,276 to 228,619.

The failure of the industry to respond to the economic recovery of the mid-1980s, which was one of the most robust in the past 50 years, was puzzling. Historically, the economic cycle of the general aviation industry has clearly paralleled that of the national economy. Possible reasons for the industry's slump were discussed in the section "Factors Affecting General Aviation," earlier in this chapter.

In any case, a number of steps were taken to reverse the downward trend in sales. One of the most significant was the passage of the General Aviation Revitalization Act, which will curtail product liability suits. Also, there has been an industrywide effort to promote the use of general aviation aircraft for business purposes and to increase the number of

student starts. "No Plane, No Gain" is a joint NBAA/GAMA advocacy program to actively promote business aviation. This innovative program taps all segments of the media to identify, document, and disseminate the benefits of business aviation. In 1996, AOPA and GAMA invited all general aviation businesses, associations, and organizations to join in a new industry alliance to attract new pilots, called "GA Team 2000." Unlike previous efforts, this program targeted new pilots based on research completed by GAMA's Piston-Engine Aircraft Revitalization Committee (PEARC) in 1995 and strategic planning by AOPA earlier that same year. Renewing the pipeline of new pilots is the keystone on which all other industry revitalization needs will build. Many analysts believe that increasing the industry's current number of student starts from about 50,000 a year in the late 1990s to at least 100,000 is needed to re-establish a healthy pilot base and, at the same time, to create demand for a new fleet of piston-powered airplanes.

Following passage of the General Aviation Revitalization Act of 1994, manufacturers resumed production of existing popular designs, incorporating upgraded airframe, engine, and avionics technology. The result is overall improvement of the perceived value of new aircraft, offsetting higher purchase prices in the eyes of prospective buyers. Today's piston-engine aircraft fleet has an average airframe age of 28 years, and one-fourth of the fleet is over 35 years old.

Renewed research and development and improved certification regulations aimed at replacing this outdated technology base has already brought advanced systems like electronic ignitions to market. Also, the NASA-sponsored Advanced General Aviation Transportation Experiment (AGATE) is well under way. The wide-ranging AGATE program involves a joint research consortium with broad manufacturer participation and cost sharing. Its primary goals are to improve small piston-engine aircraft cockpit displays and integration, icing prevention and avoidance systems, engine controls, manufacturing methods, and pilot training methods.

Although there is some diversification in the industry (such as military contracts and military/industrial subcontracts with major military/air carrier manufacturers), the financial health of the manufacturers requires a sales volume equal to the manufacturing volume over the long run, or else surplus inventories build up and production must be curtailed in accordance with good business practice. Of course, there are other segments of the general aviation industry besides the airframe manufacturers, such as manufacturers of engines, avionics (aviation communications and navigation radio equipment), flight instruments, and autopilots, all of which are used only in aviation and are directly affected by any diminution in the sales rate of aircraft. However, this subject is not within the scope of this book.

Between 1995 and 2005, general aviation shipments almost tripled (see Table 4-2). GAMA estimated that more than 25,000 manufacturing jobs were created during that time period. GAMA also reported increases in general aviation exports and new products as a result of the increases in research and development.

Tables 4-5 and 4-6 show the general aviation aircraft in production and usually available in the United States. The economy slowed by the end of 2000 and went into a recession in 2001. Shipments declined in 2001 as a result of the recessionary economy and the tragic events surrounding September 11, 2001. As of 2006, aircraft orders picked up over 2001 with many industry experts claiming the industry is getting "back on track".

Significance of Pilots to Aircraft Manufacturing

The significance of pilots to the growth in airframe manufacturing cannot be overstated. Traditionally, the industry has looked at pilots in two ways. First of all, as people who would learn to fly and, in some form or fashion, then buy an airplane, pilots might buy a new or used aircraft or join a flying club or rent from an FBO. In essence, however, they were purchasing the aircraft, either in total or by the hour. The manufacturers also looked at pilots as those who would fly their products for a living with the air carriers or with military, corporate, utility, agricultural, air ambulance, state, local, or federal government, or other operations.

The overwhelming majority of business aircraft sales are by companies that already own and operate an aircraft and are acquiring more capable, new equipment. The awareness of aviation—the influences that go into creating the potential for a company to use aircraft as a business tool—comes significantly from pilots. Over the years, manufacturers have recognized that one of the key indicators of aircraft usage or acquisition by a company is the presence of a pilot, even a noncurrent pilot, in the senior management ranks of a company. These advocates inside the company are often much more influential in the sales process than the manufacturers' sales and marketing staffs.

The Aviation Service Industry

All civil aircraft are directly affected by the safety regulations of the FAA, which require that repairs, maintenance, and installation of parts be done by FAA-licensed personnel. In addition, all aircraft must go through a cyclical reinspection on at least an annual basis, a function that can be carried out only by FAA-licensed mechanics and must be approved by authorized inspectors designated by the FAA.

Major air carriers have their own maintenance facilities for periodic and progressive maintenance of airframes, engines, and avionics equipment, but many local-service carriers, most commuter airlines, and all but a few major general aviation business aircraft operators rely on the services of specialized support business operations.

The Functions of FBOs. General aviation sales, service, and support operations are carried out by free-enterprise businesses that are known in the industry as fixed-base operators, or FBOs. By the very nature of the aviation business, any of these operations must be concentrated at or close to an airport, usually at one or two spots at an airport, and often while sharing the airport with air carrier and military operations. The FBOs provide the ground services and support required by general aviation and, at some locations, the major airlines and military units. They are comparable to the collocation of all automobile support services (gas station, garage, body shop, parts, sales, driver training, and so on) at one site. The following outline summarizes the operations of a typical general aviation FBO:

1. Administration of the business

2. Line services
   a. Fueling
   b. Sale of lubricants

TABLE 4-5 Piston Airplane Shipments by Manufacturer, 1995–2005

(number of units)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Adam Aircraft	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
A500	-	-	-	-	-	-	-	-	-	-	2
American Champion	**46**	**53**	**46**	**74**	**91**	**96**	**56**	**53**	**63**	**94**	**89**
7ECA Aurora	4	2	6	6	9	3	2	3	2	2	3
7GCAA Adventurer	-	1	2	11	19	23	8	12	9	12	12
7GCBC Citabria Explorer	11	17	11	18	31	22	21	13	12	24	26
8GCBC Scout	6	7	7	14	5	23	6	11	8	18	9
8KCAB Super Decathlon	25	26	20	25	27	25	19	14	32	38	39
Aviat Aircraft	**42**	**56**	**61**	**85**	**83**	**91**	**57**	**38**	**47**	**42**	**47**
A-1 Huskey	26	46	-	-	-	-	-	-	-	-	-
A-1A Huskey	-	-	54	58	23	4	-	-	-	-	-
A-1B Huskey	-	-	-	6	44	76	50	34	37	30	41
Huskey Pup	-	-	-	-	-	-	-	-	3	3	1
S-1 11B Pitts	-	-	1	1	-	-	-	-	-	-	-
S-1T Pitts	1	-	-	-	-	-	-	-	-	-	-
S-2B Pitts	15	10	6	3	-	-	-	-	-	-	-
S-2C Pitts	-	-	-	17	16	11	7	4	7	9	5
Bellanca	**1**	**2**	**2**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**0**
Super Viking 17-30A	1	2	2	1	1	1	1	-	-	-	-
Britten-Norman	**9**	**5**	**0**	**1**	**1**	**2**	**0**	**0**	**0**	**0**	**0**
BN-2B Islander	9	5	0	1	1	2	-	-	-	-	-
Cessna Aircraft	**0**	**0**	**360**	**775**	**899**	**912**	**821**	**559**	**588**	**654**	**822**
Cessna 172 Skyhawk	-	-	287	358	180	150	107	57	58	32	37
Cessna 172S Skyhawk	-	-	-	64	272	340	341	258	291	204	314
Cessna 182 Skylane	-	-	73	338	248	267	142	109	118	196	241
Cessna 182T Turbo Skylane	-	-	-	-	-	-	96	79	47	133	118
Cessna 206 Stationair	-	-	-	12	79	53	41	18	16	22	29
Cessna 206T Turbo Stationair	-	-	-	3	120	102	94	38	58	67	83
Columbia Aircraft (form. Lancair)	**0**	**0**	**0**	**0**	**0**	**5**	**27**	**24**	**51**	**78**	**114**
Columbia 300	-	-	-	-	-	5	27	24	19	-	-
Columbia 350	-	-	-	-	-	-	-	-	32	28	25
Columbia 400	-	-	-	-	-	-	-	-	-	50	89
Cirrus Design	**0**	**0**	**0**	**0**	**9**	**95**	**183**	**397**	**469**	**553**	**600**
Cirrus SR-20	-	-	-	-	9	95	59	105	112	91	116
Cirrus SR-22	-	-	-	-	-	-	124	292	355	459	475
Cirrus SR-V	-	-	-	-	-	-	-	-	2	3	9
Commander Aircraft	**25**	**15**	**14**	**13**	**13**	**20**	**11**	**7**	**0**	**0**	**0**
Commander 114AT	4	3	-	-	-	-	-	-	-	-	-
Commander 114B	14	7	10	8	8	-	-	-	-	-	-
Commander 114TC	7	5	4	5	5	1	-	-	-	-	-
Commander 115	-	-	-	-	-	11	5	1	-	-	-
Commander 115TC	-	-	-	-	-	8	6	6	-	-	-
Diamond Aircraft	**0**	**142**	**88**	**0**	**0**	**0**	**0**	**155**	**228**	**261**	**329**
DA-20	-	142	88	n/a	n/a	n/a	n/a	70	75	58	54
DA-40	-	-	-	-	-	-	n/a	85	153	203	207
DA-42	-	-	-	-	-	-	-	-	-	-	68
Embraer	**35**	**23**	**24**	**30**	**17**	**17**	**1**	**0**	**0**	**0**	**0**
EMB-201A Ipanema	17	12	16	22	-	-	-	-	-	-	-
EMB-202 Ipanema	-	-	-	-	12	15	1	-	-	-	-
EMB-720 Minuano	1	2	1	1	2	-	-	-	-	-	-
EMB-810 Seneca II	17	9	7	7	3	2	-	-	-	-	-
Gippsland Aeronautics	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**19**	**20**	**22**
GA-8 Airvan	-	-	-	-	-	-	-	-	19	20	22
Liberty Aerospace	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
XL2	-	-	-	-	-	-	-	-	-	-	2
Maule Air Incorporated	**68**	**63**	**54**	**63**	**68**	**57**	**54**	**46**	**31**	**25**	**27**
M-4-180A	-	-	-	-	-	-	-	-	-	-	1
M-6-235	1	-	-	-	-	1	-	-	-	-	-

TABLE 4-5 *Continued*

(number of units)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Maule Air Incorporated (ctd)	-	-	-	-	-	-	-	-	-	-	-
M-7-235, A, B, C	17	18	18	11	24	24	19	21	12	8	11
M-7-260, C	-	-	-	2	16	10	11	3	4	3	4
MT-7-235	6	4	2	6	4	5	16	12	7	1	2
MT-7-260	-	-	-	-	2	1	4	1	-	-	2
MX-7-160, C	9	3	-	-	1	-	-	-	-	-	-
MX-7-180, A, B, C, AC	26	14	9	11	3	3	1	4	6	5	3
MX-7-235	1	-	-	-	-	-	-	-	-	-	-
MXT-7-160	1	-	-	5	-	-	-	-	-	-	-
MXT-7-180, A, AC	7	24	25	28	18	13	3	5	2	8	4
Micco	**0**	**0**	**0**	**0**	**0**	**6**	**10**	**0**	**0**	**0**	**0**
SP-20	-	-	-	-	-	5	-	-	-	-	-
SP-26	-	-	-	-	-	1	10	-	-	-	-
Mooney	**84**	**73**	**86**	**93**	**97**	**100**	**29**	**10**	**36**	**37**	**85**
M20J Allegro	20	25	19	17	-	-	-	-	-	-	-
M20K Encore	-	-	15	18	-	-	-	-	-	-	-
M20M Bravo	18	15	18	17	25	26	8	-	5	9	20
M20R Ovation	46	33	34	41	24	-	-	-	-	-	-
M20R Ovation 2	-	-	-	-	10	55	16	8	30	28	65
M20S Eagle	-	-	-	-	38	-	-	-	-	-	-
M20S Eagle 2	-	-	-	-	-	19	5	2	1	-	-
New Piper Aircraft (Piper Aircraft)	**165**	**183**	**222**	**295**	**341**	**377**	**343**	**265**	**205**	**163**	**193**
PA-28-161 Warrior III	18	5	10	20	20	43	32	29	31	18	37
PA-28-181 Archer III	37	45	47	90	107	102	88	38	49	19	16
PA-28-236 Dakota	4	-	-	-	-	-	-	-	-	-	-
PA-28R-201 Arrow IV	4	7	3	2	6	18	23	26	16	12	9
PA-32-301FT Piper 6X	-	-	-	-	-	-	-	-	10	24	18
PA-32-301XTC Piper 6XT	-	-	-	-	-	-	-	-	11	14	16
PA-32R-301 Saratoga II HP	30	43	38	27	28	28	22	5	9	9	8
PA-32-301T Saratoga II TC	-	-	26	45	52	70	68	45	28	31	37
PA-34-220T Seneca IV	28	18	-	-	-	-	-	-	-	-	-
PA-34-220T Seneca V	-	-	38	54	57	42	38	43	28	10	12
PA-44-180 Seminole	4	8	7	2	8	11	62	60	16	11	29
PA-46-350P Malibu Mirage	40	57	53	55	63	63	10	19	7	15	11
Symphony Aircraft (prev. OMF)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**19**	**1**	**10**
Symphony 160	-	-	-	-	-	-	-	-	19	1	10
Pacific Aerospace Corporation	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**0**
CT/4E Airtrainer	-	-	-	-	-	-	-	-	-	6	-
Raytheon Aircraft Company	**138**	**149**	**134**	**137**	**144**	**153**	**136**	**83**	**82**	**93**	**99**
Beech-33 Bonanza F33 A/C	6	8	-	-	-	-	-	-	-	-	-
Beech-36 Bonanza A36	89	83	85	73	77	85	63	51	55	62	71
Beech-36TC Bonanza B36TC	14	14	14	22	20	18	26	5	-	-	-
Beech-58 Baron 58	29	44	35	42	47	50	47	27	27	31	28
Socata EADS	**53**	**37**	**32**	**39**	**37**	**48**	**63**	**70**	**40**	**5**	**9**
TB-9 Tampico	2	1	14	14	0	2	2	3	2	0	1
TB-10	7	18	4	0	2	5	8	7	7	3	4
TB-20	31	13	11	20	31	26	33	44	19	0	1
TB-21	5	2	1	2	4	8	12	14	9	2	3
TB-200	8	3	2	3	0	7	8	2	3	0	0
Tiger Aircraft	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**14**	**18**	**19**	**15**
AG-5B Tiger	-	-	-	-	-	-	-	14	18	19	15
Total Number of Airplanes	**666**	**801**	**1,123**	**1,606**	**1,801**	**1,980**	**1,792**	**1,721**	**1,896**	**2,051**	**2,465**
% Change	**8%**	**20%**	**40%**	**43%**	**12%**	**10%**	**-9%**	**-4%**	**10%**	**8%**	**20%**
Total Billings for Airplanes ($M)	**169**	**191**	**238**	**377**	**440**	**512**	**541**	**483**	**545**	**692**	**805**
% Change	**58%**	**13%**	**25%**	**58%**	**17%**	**16%**	**6%**	**-11%**	**13%**	**27%**	**16%**

Source: GAMA, *General Aviation Statistical Databook, 2005.* Available at: http://www.gama.aero/dloads/2005GAMAStatisticalDatabook.pdf.

TABLE 4-6 Business Jet Shipments by Manufacturer (1995–2005)

(number of units)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Airbus	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**2**	**0**	**0**	**9**
Airbus Corporate Jet	-	-	-	-	-	-	5	2	0	0	9
Avcraft (form. Fairchild)	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**4**	**9**	**9**	**1**
Envoy 3	-	-	-	-	-	-	4	4	9	9	1
Boeing Busines Jet	**0**	**0**	**0**	**7**	**29**	**14**	**16**	**11**	**7**	**3**	**4**
Boeing Business Jet	-	-	-	7	29	14	11	9	4	2	3
Boeing Business Jet 2	-	-	-	-	-	-	5	2	3	1	1
Bombardier Business Aircraft	**64**	**67**	**78**	**100**	**173**	**207**	**179**	**101**	**70**	**129**	**188**
Learjet 31A	19	12	21	22	24	27	17	9	2	-	-
Learjet 40	-	-	-	-	-	-	-	-	-	17	21
Learjet 45	-	-	-	7	43	71	63	27	17	22	28
Learjet 60	24	22	24	32	32	35	29	17	12	9	18
Challenger 300	-	-	-	-	-	-	-	-	1	28	50
Challenger 601	21	6	-	-	-	-	-	-	-	-	-
Challenger 604	-	27	33	36	42	39	41	31	24	29	36
Global 5000	-	-	-	-	-	-	-	-	-	4	17
Global Express	-	-	-	3	32	35	29	17	14	20	13
CL 850/870/890	-	-	-	-	-	-	-	-	-	-	5
Cessna Aircraft	**113**	**122**	**174**	**195**	**216**	**252**	**306**	**305**	**196**	**181**	**247**
C525 CJ1	42	44	63	64	59	56	61	30	22	20	14
C525 CJ1+	-	-	-	-	-	-	-	-	-	-	4
C525A CJ2	-	-	-	-	-	8	41	86	56	27	23
C525B CJ3	-	-	-	-	-	-	-	-	-	6	48
C550 Citation Bravo	-	-	28	34	36	54	48	41	31	25	21
C560 Citation V	56	-	-	-	-	-	-	-	-	-	-
C560 Cxitation Ultra	-	52	47	41	32	-	-	-	-	-	-
C560 Citation Encore	-	-	-	-	-	6	37	36	21	24	13
C560XL Citation Excel	-	-	-	15	39	79	85	81	48	23	-
C560XLS Citation XLS	-	-	-	-	-	-	-	-	-	32	64
C650 Citation VI	1	-	-	-	-	-	-	-	-	-	-
C650 Citation VII	14	19	8	11	14	12	-	-	-	-	-
C680 Citation Sovereign	-	-	-	-	-	-	-	-	-	9	46
C750 Citation X	-	7	28	30	36	37	34	31	18	15	14
Dassault Falcon Jet	**28**	**33**	**51**	**47**	**69**	**73**	**75**	**66**	**49**	**63**	**51**
Falcon 50	8	1	-	-	-	-	-	-	-	-	-
Falcon 50EX	-	-	10	13	11	18	13	10	8	5	5
Falcon 900B	10	8	7	5	8	-	-	-	-	-	-
Falcon 900C	-	-	-	-	-	6	6	4	3	3	1
Falcon 900EX	-	3	16	15	16	23	21	17	6	1	-
Falcon 900DX	-	-	-	-	-	-	-	-	-	-	2
Falcon 900EX EASy	-	-	-	-	-	-	-	-	4	14	16
Falcon 2000	10	21	18	14	34	26	35	35	12	11	6
Falcon 2000EX	-	-	-	-	-	-	-	-	16	10	-
Falcon 2000EX EASy	-	-	-	-	-	-	-	-	-	19	21
Embraer	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**13**	**13**	**20**
Legacy Executive	-	-	-	-	-	-	-	8	13	13	20
Gulfstream Aerospace	**31**	**36**	**57**	**75**	**80**	**88**	**101**	**85**	**74**	**78**	**89**
G100/150 (form. IAI Astra)	5	9	6	14	9	11	5	9	24	22	26
G200 (form. IAI Galaxy)	-	-	-	-	1	6	25	15			
G300/350/400/450 (f. GIV/IVSP)	26	24	22	32	39	37	36	29	50	56	63
G500/G550 (f. GV / VSP)	-	3	29	29	31	34	35	32			
Raytheon Aircraft	**64**	**58**	**78**	**91**	**100**	**118**	**98**	**94**	**100**	**115**	**141**
Premier I	-	-	-	-	-	-	18	29	29	37	30
Hawker 400XP	30	29	43	43	45	51	25	19	24	28	53
Hawker 800	26	-	-	-	-	-	-	-	-	-	-
Hawker 800XP	-	26	33	48	55	67	55	46	47	50	58
Hawker 1000	8	3	2	-	-	-	-	-	-	-	-
Total Number of Airplanes	**300**	**316**	**438**	**515**	**667**	**752**	**784**	**676**	**518**	**591**	**750**
% Change	8%	5%	39%	18%	30%	13%	4%	-14%	-23%	14%	27%
Total Billings for Airplanes ($M)	**3,351**	**3,881**	**6,019**	**7,216**	**10,190**	**11,661**	**12,117**	**10,427**	**8,616**	**10,229**	**13,161**
% Change	15%	16%	55%	20%	41%	14%	4%	-14%	-17%	19%	29%

Source: GAMA, *General Aviation Statistical Databook, 2005*. Available at: http://www.gama.aero/dloads/2005GAMAStatisticalDatabook.pdf.

3. Aircraft storage
   a. Bulk hangarage
   b. T-hangarage
   c. Outdoor tiedowns

4. Aircraft maintenance
   a. Major repairs and reconstruction
   b. Minor repairs
   c. Annual inspections and relicensing

5. Engine maintenance
   a. Minor
   b. Major
   c. Remanufacture

6. Avionics
   a. Sales
   b. Service
      1. Maintenance
      2. Recertification

7. Aircraft sales and rentals
   a. New aircraft
   b. Used aircraft

8. Flight instruction
   a. Primary
   b. Advanced
      1. Instrument
      2. Multi-engine
   c. Recurrent

9. Parts sales and service
   a. Tires, brakes, and bearings
   b. Batteries

10. Specialized commercial functions
    a. Aerial application
       1. Aerial advertising
       2. Utility-line surveillance
       3. Pest control

Not all FBOs perform all of these functions; indeed, some may specialize in only one or two categories. However, an FBO normally performs at least six of the functions listed, either as part of the business or by leasing space out to specialists who perform the functions on the owned (or leased) premises. An FBO, then, is like a shopping mall manager who is charged with making a profit on each of the many, widely diverse individual business operations within the orbit of the overall operation.

The Size and Scope of FBOs. As previously mentioned, over 5,000 airports are open to public use in the United States, of which approximately 800 are served by air carriers and by general aviation. Of the 4,200 airports that might be called purely general aviation airports, not all are attended (which entails at least a fueling function), and not all of those that are attended have service all the time; many are seasonally attended (summer resorts, for example), and many are attended only during daylight hours. At the same time, many of these airports offer service 24 hours a day, and many large airports have several FBOs competing for aviation business.

The best guess is that there are about 3,500 FBOs of different sizes at public-use airports in the United States. They fall into four categories.

1. Major FBOs. These FBOs are located at major airports and are fully equipped to handle the servicing and maintenance of all types of aircraft, from the large air carriers used by major service carriers and business corporations to single-engine aircraft. Many of the major FBOs have multi-plex operations, as do some of the medium-size FBOs, but most major FBOs have a single operations base. Some FBOs are affiliated with a franchise and operate nationally and internationally, whereas others are independently owned and operated but have a network affiliation with other independents. Some of the largest FBOs are part of a larger corporation whose interests extend beyond the FBO industry. Gross revenue exceeds $50 million, and investments in FBOs run into the hundreds of millions of dollars, including leaseholds and equipment.

2. *Medium-size FBOs*. The difference between the major and the medium-size FBOs is chiefly the size of the investment, for most medium-size operators are also located at air carrier-served airports. They must be able (by contract with the lessor) to remove and repair any aircraft that might use their facility in the event that such aircraft become disabled on the ramps or runways. The investment in a medium-size FBO may run as high as $50 million, and sales volumes are generally in the range of $5 million to $25 million.

3. *Small FBOs.* Of the 3,500 FBOs, approximately 2,000 fall into this category. Many of them are known in the business world as "mom-and-pop shops," doing business on a shoestring using the cash drawer system: at the beginning of the year, there is so much money in the till; during the year, some goes out and some comes in; and at the end of the year, whatever is left is profit. The vulnerability of such operations in the modern business environment should be evident.

   The vast majority of the small operators have no business training. Small FBOs are started by someone who loves aviation: an aeronautical specialist, a pilot, a mechanic, or a technician, such as an engine rebuilder or a radio expert or a sheet metal fabricator. Then the business grows to meet the increasing demands of the aviation public.

   Beginning as a flight instruction or repair facility, the small FBO develops a clientele, and as the flying public learns of the operation, functions are added: fueling, hangarage, tiedowns. In a short time, the specialist becomes a generalist and blossoms out into a classic multiservice FBO, with numerous employees and increasing investments—an aviation shopping mall that the operator may not be educationally equipped to operate in a businesslike way. Because FBOs in general are the major contact between the manufacturers and the general public for the sale of new aircraft and for flight

instruction, the small FBOs reflect a fragility in the industry that must be corrected if general aviation is to be of value to the nation.

4. *Special FBOs.* Some extremely specialized aviation operations found at public airports do not qualify as true FBOs but are nevertheless necessary to aviation. These include engine manufacturers and remanufacturers, avionics and propeller specialists, and certain flight training specialists who do nothing but recurrent flight training for professional or semiprofessional pilots of high-performance aircraft. These operations are separate from and do not compete with the true FBOs, but they fall within the category simply because they are located at the same airport.

FBOs and the Bottom Line—Profitability. As noted previously, fixed-base operators vary widely in size, scope of services offered, type of facility, size of investment, and management expertise. They may range from the small grass-field mom-and-pop shops that offer minimum services to huge complexes that service the large general aviation business jets and are located at hub airports. No matter how large or how small, they share a challenge: they must operate at a profit in a narrowly defined business, or they will go belly-up.

There can be no general aviation air transportation without a nationwide system of FBOs to support it. Not only are FBOs the interface between the manufacturers and the public, and thus the principal outlet for aircraft sales, but they also provide fueling, routine (and major) maintenance, inspection and relicensing facilities, storage, and general aviation terminal buildings. No one can plan a trip by general aviation aircraft unless such support facilities are available at both ends of the trip (at least fueling capability). FBOs are the backbone of general aviation transportation. However, many are running so close to the line of unprofitability that any reduction of their business, especially in the realm of new- and used-aircraft sales and fuel sales (the two staple sources of income for FBOs), will put them in a loss position. The same possibility exists for the large multiplex operations, despite their huge size. The problems are the same; only the numbers are larger. The advantage that the large operators have over the small ones is that they practice modern business techniques and can absorb some losses over a period of time by maintaining cash reserves, which the small operators frequently do not have.

An aspect of economic vulnerability that is seldom recognized is that of financing. Except for the very smallest FBOs, the operation of the business depends on credit and loan arrangements from commercial banks. Aircraft floor plans, equipment loans, mortgages, and construction loans run into substantial figures and substantial overhead payments. If for any reason an operator is unable to repay loans or to keep current in the obligations to the trade, to fueling suppliers, and to others, so that loans are called or turned over to creditors, the operation can disappear overnight.

There is a serious corollary to this: once a bank has been exposed to such a loss, it is justifiably leery of making subsequent loans to successor operators. A general aviation business failure affects the entire industry far more than a comparable failure of a small business in other industries, which usually are more widely distributed and require far less financing in their normal operations. Because the FBO is the economic gateway for general aviation to thousands of communities and the sole threshold for general aviation transportation, the economic impact can be enormous in the event of its business failure.

In the post-World War II era and continuing through the 1950s, 1960s, and 1970s, the number of FBOs accelerated dramatically. Much of the expansion of the industry after

World War II can be directly related to the G.I. Bill, which provided funding for the majority of flight training that occurred throughout this period. Flight training was clearly a catalyst for growth in the industry, as newly licensed pilots created additional demand for aircraft, which increased manufacturing- and sales-related activities and, ultimately, increased demand for aircraft fueling, maintenance, and other services.

In the late 1970s and early 1980s, many nonaviation investors were overwhelmed by the attractiveness of the FBO industry. Many of these individuals lacked the operational and managerial expertise, which is typically acquired only after years of actual hands-on operating experience, required to properly meet the needs of aviation consumers. By 1980, it was estimated that more than 10,000 FBOs were operating throughout the United States. At the same time, the economy was plagued by an undesirable combination of double-digit inflation and interest rates. Additionally, during this period, the funds required to acquire and/or develop FBOs were readily available from a multitude of sources, including savings and loans, commercial banks, finance companies, and private investors. Combine this with the decline in aircraft sales beginning in 1979, and the result was a situation in which the number of FBOs far exceeded the demand. The dramatic consolidation, which occurred throughout the 1980s, was the result of a market desperately trying to reach a rational balance between the number of FBOs (supply) and the services and needs (demand) of aviation consumers.

With approximately 3,500 FBOs in business by 2006, the supply is approaching equilibrium with the level of demand that now exists for FBO products and services. As a result, the industry apparently is now in a position to develop and sustain rational growth and profitability.

THE AVAILABLE MARKET—THE USERS

The critical issue of aircraft and equipment sales on a constant-flow and increasing-flow basis through the dealer-distributor network eventually depends on the absorption of the product by the end users, the people who spend money to purchase such equipment. In the highly competitive new- and used-aircraft sales market (and used aircraft are relicensed annually and upgraded by equipment replacement), the fortunes of the manufacturers are largely dependent on the quality of service provided by their dealers and distributors and on the general state of the national economy.

There are two classifications of aircraft use: (1) transportation, in which the user travels from one point to another, whether for business or for pleasure, and (2) local flight, mostly for the sheer fun of flying. Flight training and certain special uses discussed earlier in the chapter really do not belong in the transportation category, nor does local flying, although the aircraft involved obviously have a transportation capability. The transportation market is our point of focus.

The Business Market

The general aviation manufacturers made the business judgment in the early 1950s to concentrate on the business market, where there is a continuing and growing need for swift, reliable transportation. Business aviation, one of the most important segments of general aviation, is made up of companies and individuals who use aircraft as tools in the conduct of their business.

Business aircraft are utilized by all types of people and companies, from individuals who often fly rented single-engine piston-powered airplanes, to sales or management teams from multinational corporations, many of which own fleets of multi-engine turbine-powered aircraft and employ their own flight crews, maintenance technicians, and other aviation support personnel.

Many large companies use business aircraft to transport priority personnel and cargo to a variety of far-flung company or customer locations, including sites overseas. Often, business aircraft are used to bring customers to company facilities for factory tours and product demonstrations. Companies and individuals, such as salespeople and doctors, use business aircraft to cover regional territories within several hundred miles of their home bases. Although the overwhelming majority of business aircraft missions are conducted on demand, some companies maintain scheduled operations, known as corporate shuttles, which are essentially in-house airlines.

Most corporations that operate business aircraft use modern multi-engine turbine-powered jets, turboprops, or turbine helicopters that are certified to the highest applicable transport category standards. Aircraft built specifically for business use vary from four-seat short-range piston-powered airplanes to two- or three-engine corporate jets that can carry up to 20 passengers nearly 7,000 miles nonstop. Some companies even use airline-type jets, such as 737s and 757s, and helicopters for business transportation.

Business aircraft operated by larger companies usually are flown by two-person professionally trained crews whose primary, if not exclusive, responsibility is to fly company aircraft. Some smaller operators of business aircraft, especially businesspeople who pilot their own aircraft, typically use one pilot to fly piston-powered machines.

Although the majority of business aircraft are owned by individuals or companies, businesses also utilize business aviation through arrangements such as chartering, leasing, fractional ownership, time-sharing, interchange agreements, partnerships, and aircraft management contracts.

Business aircraft generally are not flown for hire. Thus, the majority of U.S.-registered business aircraft are governed by Part 91 of the Federal Aviation Regulations (FARs). U.S.-registered business aircraft that can be flown for compensation are regulated by FAR Part 135, which covers on-demand commercial operations. Regardless of how business aircraft are utilized, they are chosen because they provide safe, efficient, flexible, and reliable transportation.

Of all the benefits of business aircraft, flexibility is probably the most important. Companies that fly general aviation aircraft for business purposes can control virtually all aspects of their travel plans. Itineraries can be changed instantly, and business aircraft can be flown to thousands more destinations than are served by the airlines.

Business aircraft are productivity multipliers that allow passengers to conduct business en route in complete privacy while reducing the stresses associated with traveling on commercial carriers. Passengers who fly by business aircraft never have to worry about missed connections, lost baggage, overbooking, air carrier maintenance standards, or airline security. And in recent years, business aircraft have compiled a safety record that is comparable, and sometimes superior, to that of the airlines. As the preceding discussion suggests, businesses increasingly are seeking their own transportation for a variety of reasons.

Concentration of Air Carrier Service. The United States has the finest scheduled air transportation in the world. The service points, equipment, personnel, and schedules

are as excellent and as much in the public interest as it is humanly, mechanically, and economically possible to make them. But this does not alter the fact that there still exist vast voids in airline service, infrequent schedules in the majority of places served, and the necessity of using roundabout routes, with time-consuming layovers and frequent changes, unless one is traveling between the major metropolitan areas.

Increased concentration of certificated air carrier service gave rise to the commuter carriers in the early 1970s. It is simply not economically viable to service many hundreds of smaller communities with large jet equipment. In 2005, scheduled air service was provided to approximately 680 airports, with approximately 71 percent of these communities depending exclusively on regional service.

In addition, the scheduled service provided to many of the 680-odd airports is sparse and generally offered only at the most popular times of day. With a shift toward long-haul flights between primary hubs, many medium-size cities are experiencing a decrease in frequency of flights and a curtailment of nonstop service between middle hubs and major hubs. These conditions are frequently the basis for the purchase, charter, or lease of a business aircraft.

Decentralization of the Industry. The demographics of our nation are changing. Firms are decentralizing by moving or establishing facilities in parts of the country far removed from the central headquarters in order to follow the shifting sources of labor resulting from the mobility of the labor force. We are experiencing a large-scale migration of people of all ages to the Sunbelt states. The population of some metropolitan areas in southwestern states grew more than 190 percent between the last two census counts. Cities ranked in the top 20 based on population saw a radical rearrangement of rank during the 10-year period, with cities in the Sunbelt moving up on the list. This shift in population has created a need to shift marketing emphasis. All this again adds up to a need for more business travel and better communications.

Flexibility. Flexibility is the key word in business aircraft: flexibility to go when and where necessary. The key to flexibility is airport facilities. The shorter the time spent between the office and the aircraft, the greater the benefits of the business airplane. This flexibility of destinations not only serves in direct point-to-point travel but also is one factor that is making business aviation one of the biggest feeders of passengers to the airlines. More and more airline passengers are going all the way—making the whole trip—by air. Business and private airplanes feed passengers into major terminals; charter and air taxi services let long-distance jetliner passengers swiftly complete their journeys to cities hundreds of miles distant from airline stops.

Shortage of Management Personnel. The most valuable asset a company has is its human resources. In basic terms, a business's success is based on the degree to which it applies this asset to its problems and opportunities.

In a working year, each executive has only about 2,000 hours of regular working time in which to be in the right places at the right times with the right decisions. A 40-year career thus offers only 80,000 working hours. For both company benefit and personal advancement, each hour takes on precious significance.

This need to make productive use of time is a concern of all executives—seeing that they themselves, and all employees in their areas of responsibility, use their time most efficiently. Investments are made in time and motion studies to produce operating practices

that achieve the most results in the least time. New equipment is obtained either to reduce the number of hours required for a certain operation or to achieve greater production in the same number of hours. Telephones and faxes are used instead of messengers and mail; calculators and computers are acquired. The business aircraft is a time machine that compresses distances into minutes and hours. It does for travel what computers, telephones, and programmed milling machines do for other areas of a company's operations.

Reliability and Capability of Today's Business Aircraft. The wide variety of business aircraft available, from single-engine piston aircraft to corporate jet, can meet almost any need a business might have: a single-engine Cessna 172 for a sales representative covering a tristate area, a light twin for a regional manufacturer, and a Learjet for a national firm with widespread operations.

Federally regulated specifications control design engineering, method of manufacture, mechanical functions, flight operating limits, airworthiness, and maintenance standards. All systems and accessories are subject to regulation, and minimum safety standards are set for structural strength and stress. One single-engine aircraft can require over 15,000 individual inspections during manufacture. The industry's concern with building safe aircraft can best be seen in the fact that virtually all models are structurally stronger than the FAA requires. In fact, each company exceeds the FAA minimums in almost all respects. The industry has both a moral obligation and an economic self-interest in building safe aircraft—a manufacturer with a poor safety record cannot continue to exist.

The general aviation accident rates over the past 10 years attest to the reliability and capability of today's business aircraft. The accident rate per 100,000 aircraft hours flown has steadily decreased since 1972.

In short, business aviation will continue to grow because companies recognize the benefits of speed, economy, and convenience. Specific benefits of using business aircraft can be summarized as follows:

1. *Time savings.* Business aircraft not only reduce flight time by providing point-to-point service but also decrease total travel time by utilizing smaller airports closer to final destinations. Also, the office environment of a business aircraft allows travel time to become productive time.

2. *Flexibility*. People who travel by business aircraft do not have to alter their schedules to conform to those of commercial carriers. Consequently, they have the freedom to change course en route and to leave and arrive according to their own schedules.

3. *Reliability*. Business aircraft are engineered and built to the highest standards, and companies that maintain their own aircraft have complete control over the readiness of their fleets.

4. *Safety*. In recent years, business aircraft have compiled an outstanding safety record that is comparable to or better than that of the airlines.

5. *Improved marketing efficiency*. Business aircraft not only extend the reach of a sales force but also quickly and easily bring customers to the point of sale.

6. *Facilities control*. Business aircraft help management extend its control by facilitating personal visits to remote company sites.

7. *Personnel and industrial development.* The mobility that business aircraft provide company employees can accelerate training, orientation, and teamwork.

8. *Privacy and comfort*. Conversations on business aircraft are confidential, and cabins can be configured to accommodate virtually any special needs of passengers.

9. *Efficiency*. Business aviation enables a company to maximize its two most important assets: people and time.

10. *Security*. A company that uses business aviation controls all aspects of its air travel, including the visibility of its employees on sensitive missions.

Some of the intangible benefits of business aviation—enhanced management productivity and better customer relations—may be difficult to quantify, but they are no less important to a company than direct financial returns on investments.

A community with no aviation gateway for economic development is obviously at a competitive disadvantage compared to one that has one. Many studies on the economic impact of general aviation airports on communities conclude that a small town without an airport is in the same position as a community that was bypassed by a canal or railroad 100 years ago. Close proximity to an airport is always near the top of the list of prime factors a business considers when planning a major move to a particular area.

The Personal Market

As of 2005, the FAA reported 618,633 active pilots in the United States, including 235,994 private pilots, many of whom own, rent, borrow, and lease small aircraft for business and pleasure purposes (see Table 4-7).

It is easy to become caught up in the business and economic aspects of general aviation and the contribution it makes to a locality's economy and to overlook another important part of general aviation's contribution—personal flying. There is a widely held attitude that commercial airlines are a business and so are important but that personal flying is simply a frivolity. However, one must keep in mind that the certificated airlines carry almost as many people for personal and recreational reasons as they do for business purposes. On special charters, virtually all the passengers are on pleasure trips on every flight.

The flexibility of transportation offered by general aviation is not restricted to business use. By light plane it is possible for a citizen of the mid-Atlantic states or the midwest to visit the warm climate of Florida for the weekend or to fly from Montgomery, Alabama, to the Canadian lakes in a few hours.

Air transportation for vacationing is unabashedly advertised by the air carriers. It should not be overlooked as an important aspect of general aviation.

Thousands of single-engine aircraft are flown within 100 miles of home on nice days—comparable to jaunts in small sailboats or on a pair of skis. They are flown for the sheer fun of flying, not for transportation. Many pilots who start off as weekend pilots tend to upgrade into high-performance equipment, to obtain higher ratings and pilot privileges, and eventually to become business as well as pleasure air travelers in light aircraft.

TABLE 4-7 Active U.S. Pilot Certificates Held, 1984–2005

Category	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995 [8]
Pilot--Total	**609,737**	**618,633**	**625,011**	**631,762**	**612,274**	**625,581**	**635,472**	**618,298**	**616,342**	**622,261**	**639,184**
Student	87,213	87,910	87,296	85,991	86,731	93,064	97,359	97,736	96,101	94,947	101,279
Recreational Airplane (only)	276	291	310	317	316	340	343	305	284	265	232
Sport (only)	134	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Airplane [1]											
Private	228,619	235,994	241,045	245,230	243,823	251,561	258,749	247,226	247,604	254,002	261,399
Commercial	120,614	122,592	123,990	125,920	120,502	121,858	124,261	122,053	125,300	129,187	133,980
Airline Transport	141,992	142,160	143,504	144,708	144,702	141,596	137,642	134,612	130,858	127,486	123,877
Rotorcraft (only) [2]	9,518	8,586	7,916	7,770	7,727	7,775	7,728	6,964	6,801	6,961	7,183
Glider (only) [2]	21,369	21,100	20,950	21,826	8,473	9,387	9,390	9,402	9,394	9,413	11,234
Flight Instructor Certificates [4]	**90,555**	**89,596**	**87,816**	**86,089**	**82,875**	**80,931**	**79,694**	**79,171**	**78,102**	**78,551**	**77,613**
Instrument Ratings [4, 5]	**311,828**	**313,545**	**315,413**	**317,389**	**315,276**	**311,944**	**308,951**	**300,183**	**297,409**	**297,895**	**298,798**
Nonpilot--Total [7]	**644,016**	**515,293**	**509,835**	**515,570**	**513,100**	**547,453**	**538,264**	**549,588**	**540,892**	**534,427**	**651,341**
Mechanic [7]	320,293	317,111	313,032	315,928	310,850	344,434	340,402	336,670	332,254	329,239	405,294
Repairmen [7]	40,030	39,231	37,248	37,114	40,085	38,208	35,989	52,909	51,643	50,768	61,233
Parachute Rigger [7]	8,150	8,011	7,883	8,063	7,927	10,477	10,447	10,459	10,336	10,269	11,824
Ground Instructor [7]	74,378	73,735	72,692	73,658	72,261	72,326	71,238	70,334	69,366	68,573	96,165
Dispatcher [7]	18,079	17,493	16,955	16,695	16,070	16,340	15,655	14,804	13,967	13,272	15,642
Flight Navigator	298	336	382	431	509	570	642	712	782	847	916
Flight Engineer	57,756	59,376	61,643	63,681	65,398	65,098	63,891	63,700	62,544	61,459	60,267

Category	1994 [9]	1993	1992	1991	1990	1989	1988	1987	1986	1985	1984
Pilot--Total	**654,088**	**665,069**	**682,959**	**692,095**	**702,659**	**700,010**	**694,016**	**699,653**	**709,118**	**709,540**	**722,376**
Student	96,254	103,583	114,597	120,203	128,663	142,544	136,913	146,016	150,273	146,652	150,081
Recreational	241	206	187	161	87	*	*	*	*	*	*
Airplane [1]											
Private	284,236	283,700	288,078	293,306	299,111	293,179	299,786	300,949	305,736	311,086	320,086
Commercial	138,728	143,014	146,385	148,385	149,666	144,540	143,030	143,645	147,798	151,632	155,929
Airline Transport	117,434	117,070	115,855	112,167	107,732	102,087	96,968	91,287	87,186	82,740	79,192
Rotorcraft (only) [2]	8,719	9,168	9,652	9,860	9,567	8,863	8,608	8,702	8,122	8,123	7,532
Glider (only) [2]	8,476	8,328	8,205	8,033	7,833	7,708	7,600	7,901	8,411	8,168	8,390
Lighter-than-air [2, 3]	N/A[3]	N/A[3]	N/A[3]	N/A[3]	N/A[3]	1,089	1,111	1,153	1,133	1,139	1,166
Flight Instructor Certificates [4]	**76,171**	**75,021**	**72,148**	**69,209**	**63,775**	**61,472**	**61,798**	**60,316**	**57,355**	**58,940**	**61,173**
Instrument Ratings [4, 5]	**302,300**	**305,517**	**306,169**	**303,193**	**297,073**	**282,804**	**273,804**	**266,122**	**262,388**	**258,559**	**256,584**
Nonpilot--Total [7]	**571,358**	**559,726**	**540,548**	**517,462**	**492,237**	**468,405**	**448,710**	**427,962**	**410,079**	**395,139**	**426,802**
Mechanic [7]	411,071	401,060	384,669	366,392	344,282	326,243	312,419	297,178	284,241	274,100	298,028
Repairmen [7]	N/A	N/A	N/A								
Parachute Rigger [7]	8,631	8,417	8,163	7,616	10,094	9,879	9,770	9,659	9,535	9,395	10,194
Ground Instructor [7]	77,789	76,050	73,276	70,086	66,882	64,503	62,582	60,861	59,443	58,214	67,463
Dispatcher [7]	13,410	12,883	12,264	11,607	11,002	10,455	10,020	9,491	9,025	8,511	8,980
Flight Navigator	990	1,039	1,154	1,225	1,290	1,357	1,400	1,445	1,512	1,542	1,603
Flight Engineer	59,467	60,277	61,022	60,236	58,687	55,968	52,519	49,328	46,323	43,377	40,534

Note: The term airmen includes men and women certified as pilots, mechanics or other aviation technicians. Source: FAA

1. Includes pilots with an airplane only certificate. Also includes those with an airplane and a helicopter and/or glider certificate. Prior to 1995, these pilots were categorized as private, commercial, or airline transport, based on their airplane certificate. In 1995 and after, they are categorized based on their highest certificate. For example, if a pilots holds a private airplane certificate and a commercial helicopter certificate, prior to 1995, the pilot would be categorized as private; 1995 and after as commercial.
2. Glider and lighter-than-air pilots are not required to have a medical examination; however, the totals above represent pilots who received a medical examination within the last 25 months.
3. Lighter-than-air type ratings are no longer being issued.
4. Not included in total.
5. Special ratings shown on pilot certificates, do not indicate additional certificates
6. Data for 1996 and 1997 are not comparable to earlier years
7. Numbers represent all certificates on record. No medical examination required. Data for 1996 and 1997 are limited to certificates held by those under 70 years of age
8. Beginning in 1995, includes non-pilots who were excluded in prior years because of incomplete addresses and/or a reques to be excluded from any mailing list.
9. 1994 counts based on medical certificates issued 27 or less months ago. All other years based on medical certificates issued 25 or less months ago.

N/A Not available. Prior to 1995 repairmen were included in the mechanic category. Recreational certificate first issued in 1990

Source: GAMA, *General Aviation Statistical Databook, 2005*. Available at: http://www.gama.aero/dloads/2005GAMAStatisticalDatabook.pdf.

KEY TERMS

Utility Airplane Council
primary-use categories
business aircraft use
corporate aircraft use
National Business Aircraft Association (NBAA)
personal flying
Aircraft Owners and Pilots Association (AOPA)
fixed-base operator (FBO)
aerial application
private-use airport
publicly owned airport
public-use privately owned airport
flight service station (FSS)

REVIEW QUESTIONS

1. Why do the airlines seem to receive all of the attention when general aviation is actually the largest segment of aviation? Why do you think the general aviation aircraft manufacturers broke away from the AIA to form GAMA?

2. List the primary-use categories. Distinguish between business and corporate use. What is the primary role of NBAA? AOPA? Define aerial application, aerial observation, and aerial other. What is the significance of these segments of aviation to our economy? Give some examples. What type of aircraft use falls into the "other flying" category?

3. Discuss some of the factors that led to the decline in general aviation aircraft sales in the postderegulation period. What was the primary reason for the light-aircraft manufacturers discontinuing the production of single-engine piston aircraft?

4. Discuss the significance of the General Aviation Revitalization Act. How have the manufacturers responded in recent years?

5. Approximately how many airports were there in the United States at the end of 2005? How many public-use airports? Approximately how many airports in the United States are served by the certificated and noncertificated carriers?

6. What are the primary services provided by the FAA to general aviation pilots?

7. Describe some of the steps that have been taken by the general aviation community to reverse the downward trend in aircraft sales.

8. Why is the general aviation support industry like a three-legged milk stool? Discuss the important interrelationship among manufacturers, the service industry, and users. Name six general aviation aircraft manufacturers. Why are the FBOs considered the backbone of general aviation? Describe six or seven services provided by a typical medium-size FBO. Distinguish between a large or medium-size FBO and a small mom-and-pop operator. What are some of the special FBOs at a typical public-use airport? What is the primary reason for the tremendous decline in the number of FBOs during the 1980s and early 1990s? What is happening with FBO growth in the early 2000s?

9. Why did the general aviation aircraft manufacturers concentrate on developing aircraft to meet the needs of the business market as early as the 1950s? What are some of the factors that have caused businesses to seek the benefits of their own transportation? List the benefits of using business aircraft.

10. How many active private pilots were there in the United States at the end of 2005? It's been said that "personal flying is just a rich man's sport." Do you agree? Disagree? Why?

WEB SITES

http://www.eaa.org
http://www.landings.com
http://www.aopa.org
http://www.avweb.com
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PART TWO

Structure and Economics of the Airlines