FBO Management

Operating, Marketing, and Managing as a Fixed-Base Operator

C. Daniel Prather, PhD, DBA, AAE, CAM

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AVIATION SUPPLIES & ACADEMICS, INC.
NEWCASTLE, WASHINGTON

FBO Management: Operating, Marketing, and Managing as a Fixed-Base Operator
by C. Daniel Prather

Aviation Supplies & Academics, Inc.
7005 132nd Place SE
Newcastle, Washington 98059
asa@asa2fly.com | 425-235-1500 | asa2fly.com

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ASA-FBO-MGT
ISBN 978-1-64425-229-1

Additional formats available:
eBook EPUB ISBN 978-1-64425-231-4
eBook PDF ISBN 978-1-64425-232-1
eBundle ISBN 978-1-64425-230-7 (print + eBook PDF download code)

Printed in Malaysia
2027 2026 2025 2024 2023 9 8 7 6 5 4 3 2 1

Cover photos: Courtesy of Narrows Aviation, Tacoma Narrows Airport (KTIW).

Chapter start photos: Page 1—Bill Larkins, flickr.com/photos/34076827@N00/5202931667/, CC BY-SA 2.0, creativecommons.org/licenses/by-sa/2.0/. Page 35—Harbucks/Shutterstock.com. Page 59—BoJack/Shutterstock.com. Page 79—Svitlana Hulko/Shutterstock.com. Page 107—Hurst Photo/Shutterstock.com. Page 125—monkeybusiness/Envato. Page 141—narokzaad/stock.adobe.com. Page 161—svitlanah/Envato. Page 181—DC_Studio/Envato. Page 193—Photo by Chris Leipelt on Unsplash. Page 217—Gino Santa Maria/Shutterstock.com. Page 251—monkeybusiness/Envato. Page 271—iStock.com/Ziviani. Page 285—voronaman111/Envato. Page 311—iStock.com/SDI Productions. Page 323—Scharfsinn/Shutterstock.com.

Library of Congress Cataloging-in-Publication Data

Names: Prather, C. Daniel, 1971- author.
Title: FBO management : operating, marketing, and managing as a fixed-base operator / C. Daniel Prather.
Other titles: Fixed-base operator management : operating, marketing, and managing as a fixed-base operator
Description: Newcastle, Washington : Aviation Supplies & Academics, Inc. | "ASA-FBO-MGT"—Title page verso. | Includes bibliographical references and index.
Identifiers: LCCN 2022051581 (print) | LCCN 2022051582 (ebook) | ISBN 9781644252291 (hardback) | ISBN 9781644252314 (epub) | ISBN 9781644252321 (pdf) | ISBN 9781644252307 (eBundle)
Subjects: LCSH: Fixed base operators industry—Management—Textbooks. | Airplanes—Marketing—Textbooks. | Aircraft industry—Management—Textbooks. | Aviation ground crews—Management—Textbooks. | LCGFT: Textbooks.
Classification: LCC HD9711.A2 P74 2022 (print) | LCC HD9711.A2 (ebook) | DDC 338.4/762913334—dc23/eng/20230417
LC record available at https://lccn.loc.gov/2022051581
LC ebook record available at https://lccn.loc.gov/2022051582

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Foreword

It was August 5, 2000, at approximately 3:00 pm, and I was at 1,500 feet in a Cessna 172 on a beautiful sunny day over Long Beach Harbor off the coast of Southern California. We were flying from Catalina Island back to our home airport, Fullerton Municipal, my fellow CFI was flying, and I was watching a sailboat unfurl its sails when everything went black. The next thing I remember, someone was removing my headset as I was laid on a stretcher and put into an ambulance.

I had experienced a seizure and blacked out for about 20 minutes. It was my first seizure, and as of this writing in the year 2023, it has been the only seizure I have ever had. But the seizure was God's way of changing my career trajectory from being a commercial pilot to a business aviation executive.

My father and grandfather were both commercial pilots with American Airlines, and yet shockingly I had never thought about being a pilot. However, upon graduation from Biola University with a business degree in 1998, I was less than excited about my job prospects in the business world, so I took a job working as a customer service representative at an FBO at Orange County's John Wayne Airport (KSNA) in the mornings and worked on my private pilot training in the afternoons. Flying grabbed me, and I loved seeing the Earth from the air. By August 2000, I had earned my CFI, CFII, and MEI and was two months into my first CFI job.

But that Saturday afternoon flight changed my life in a way that I could have never imagined, and for which I am forever grateful, because it launched my career in business aviation, a segment of the global aviation industry that I wasn't aware of prior to my first job at the FBO. After my seizure, I circulated my resume around the FBO and was quickly hired as an aircraft dispatcher by an aircraft management and charter company with five small jets. That job grew to selling private jet charter, eventually managing a charter team and marketing activities, and then on to managing operational, maintenance, and financial aspects for an expanding aircraft management, charter, and maintenance organization. Over the next 14 years, my responsibilities grew with the company, increasing my exposure to many different facets of business aviation, with the company eventually coming to manage 65 jets across cities in the United States and Asia.

In 2013, I joined Clay Lacy Aviation as their vice president of marketing. In 2021, Clay Lacy Aviation was awarded a 35-year lease to build and operate a full-service FBO at John Wayne Airport. For the past few years, I have had the privilege of leading our SNA FBO team in establishing an FBO operation in a temporary facility as we move toward groundbreaking on our new FBO facility later this year. Now, in addition to leading Clay Lacy's marketing activities, I lead our new location development team, sustainability program, and student scholarship initiatives.

You may be asking why I am sharing my story, and how does this relate to a book about FBO management? Well, it's quite simple. Business, as well as life, is about people and relationships. Over the last 23 years in business aviation, I have worked alongside and gotten to know so many wonderful and genuine professionals in business aviation, each with their own story of how they got to where they are in their careers. This is how I came to meet Dr. Prather and learn about the aviation program at California Baptist University, and I have gone on to hire several of his graduates from

that fine program who I work alongside today. No two stories are the same, but one thing about these professionals is constant: they love working in business aviation and jump at the opportunity to share their passion with the next generation. My hope is that one day I get to meet you and hear your story. Perhaps this book will spark your interest in joining this awesome industry.

In the following text, Dr. Prather simply and eloquently lays out the foundational principles of FBO management as well as a brief but very well written history of aviation and overview of general aviation. You may be reading this forward-thinking, I am going to be a pilot or technician, or perhaps a flight attendant or airport manager, so what does FBO management have to do with those careers? The information covered in this book, while focused on FBO management, also provides great insight into many careers and functions of businesses around an airport, and the principles and topics covered herein are widely applicable and would be valuable for any aviation professional to be proficient with.

The COVID pandemic reinforced the value and importance of the business aviation industry. Business aviation could not function without FBOs, which serve as the gateway between airside and landside for general aviation aircraft at most airports around the world. Business aviation and its reliance on professional, efficient, and well-run FBOs serve as economic engines for local economies, contribute to enhanced productivity, provide humanitarian support, are a lifeline for communities not served by the airlines, and provide millions of high-paying careers.

Studies published by No Plane No Gain, a joint undertaking of the National Business Aviation Association and General Aviation Manufacturers Association, outline the benefits business aviation plays in our economy and in the quality of life of individuals—benefits which would not be possible without well-run FBOs. Here are just a few highlights.

98% of Fortune magazine's Top 50 "World's Most Admired Companies" use business aviation.

S&P 500 companies using business aviation outperform those that don't by 70%.

95% of Fortune magazine's "Change the World Top 20" companies use business aviation.

Whether you have your sights set on a career in airport management or as a commercial pilot, or perhaps I have opened your mind to a future in business aviation, this book will provide a solid foundation from which to build your career, no matter the twists and turns it may take. See you around the airport one day.

Scott Cutshall
Senior Vice President, Business Development & Sustainability
Clay Lacy Aviation
Connect with me on LinkedIn and share your story: linkedin.com/in/cutsh

Acknowledgments

An author learns quickly during the writing and publication process that bringing an idea to a published book takes time and energy for sure, but it also requires a team of professionals.

This *FBO Management* text would not have been possible were it not for Mr. Alexander Wells' trust in me more than 15 years ago to revise his *General Aviation Marketing and Management* text for the third edition. That book is no longer in print, but it served as a foundation for this much-improved FBO-focused text.

Ms. Jackie Spanitz, general manager of ASA, is a true supporter of me and my efforts. She continues to lead ASA with determination to bring the best aviation products to market, and I thank her for choosing me to participate in that powerful endeavor.

Ms. Laura Fisher, editor at ASA, is a true gem in this industry. Her constructive feedback and ideas for improvement made this text what it is today.

I certainly would not be as knowledgeable of the FBO business if the Hillsborough County Aviation Authority and the City of Riverside (CA) had not believed in me enough to provide me the opportunity to serve as an airport professional for their respective organizations. Thank you Jim Johnson, Ed Cooley, Robert Burr, Grant Young, and all my former colleagues at Tampa International Airport. Thank you Mike Futrell, Edward Enriquez, Kris Martinez, Rafael Guzman, Carl Carey, Shari Call, and my amazing team at Riverside Municipal Airport—Cris Avila, Mike Dean, Eric Jorgensen, Rodger Kane, Benny Lange, and Maria Russey.

My beautiful wife and two children have always supported me and believed in me. Their ability to carry on, even when I am preoccupied with the laptop at times, has been the wind that keeps me moving forward. I love you guys!

My mom has always been my most vocal cheerleader. Her ever-present camera documented much of my life long before smartphones, and even though I was embarrassed at the time, thanks for doing that, Mom.

My dad showed me the value of hard work by his example. He succeeded at everything he set his mind to, and I can mostly say the same thing. Thanks, Dad.

My brother and sister, although both older than me, have always believed in me and supported my efforts. Thank you.

My Nanny was always so impressed with my talents, and even though she went to be with the Lord on August 1, 2021, her spirit is with me and I continue to make her proud, I'm sure.

Most importantly, I am who I am today because of my Lord and Savior Jesus Christ. He provides me wisdom, strength, and energy on a daily basis to glorify Him in all that I do. "Every good and perfect gift is from above, coming down from the Father of the heavenly lights, who does not change like shifting shadows" (James 1:17).

May God bless you, reader. Thank you for choosing this text to learn more about the FBO business.

About the Author

(City of Riverside)

Dr. C. Daniel Prather, PhD, DBA, AAE, CAM, currently serves as airport manager of Riverside Municipal Airport. This general aviation reliever airport, located in Southern California, has more than 200 based aircraft, with 116,000 annual operations as of 2022. Dr. Prather served as assistant director of operations at Tampa International Airport (TPA) from 1998 to 2006, and associate professor of aerospace at Middle Tennessee State University (MTSU) from 2006 to 2012. Dr. Prather was Founding Chair of Aviation Science at California Baptist University (CBU), where he established a new collegiate aviation program in 2012. In this role, he was responsible for developing curriculum and recruiting students and faculty to the nation's newest collegiate aviation program. He continues to serve as professor of aviation science at CBU.

As a former president of the University Aviation Association (UAA), Dr. Prather is active in the American Association of Airport Executives (AAAE), Helicopter Association International (HAI), and the National Business Aviation Association (NBAA). Dr. Prather is an Accredited Airport Executive through AAAE, a Certified Aviation Manager through the NBAA, and an instrument-rated private pilot. He is also an active aviation industry consultant, often busy on projects with the Airport Cooperative Research Program (ACRP) of the Transportation Research Board (TRB), having authored 12 ACRP Synthesis projects since 2009. He holds a doctor of philosophy degree from the University of Nebraska at Lincoln, a doctor of business administration degree from California Southern University, a master of public administration degree from Southern Illinois University at Carbondale, a master of business administration degree from the University of North Alabama, and a bachelor of commercial aviation degree from Delta State University.

In addition to this textbook, Dr. Prather is author of *Airport Management,* which is designed to be a practical guidebook to all aspects of managing today's complex commercial-service airport.

Not counting his one year as a flight coordinator intern at FedEx Express while in college, or flight training he undertook while in high school, Dr. Prather entered the aviation industry in 1996 and has never looked back. Visit Dr. Prather at dprather.com or pdpcredit.com

General Aviation: A Historical Perspective

In Chapter 1

Objectives

At the end of this chapter, you should be able to:

1. Discuss some of the major developments in aviation that took place up to the outbreak of World War I.
2. Describe the role of the barnstormers in the development of general aviation.
3. Explain how Wichita became the home for many general aviation (GA) aircraft manufacturers.
4. Describe how Beech, Cessna, Mooney, and Piper got started in GA aircraft manufacturing.
5. Explain aviation highlights of the 1940s.
6. Explain aviation highlights of the 1950s.
7. Explain aviation highlights of the 1960s.
8. Explain aviation highlights of the 1970s.
9. Explain aviation highlights of the 1980s.
10. Explain aviation highlights of the 1990s.
11. Explain aviation highlights of the 2000–2010 time period.
12. Explain aviation highlights of the 2011–2020 time period.
13. Explain the effects of COVID on the GA industry.

The Early Days of General Aviation

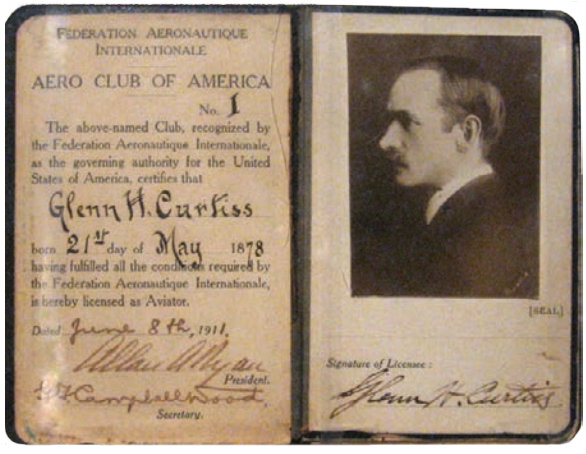
It can be said that general aviation (GA) was born on December 17, 1903, when Orville Wright completed the first sustained powered flight in a heavier-than-air aircraft (Figure 1-1). However, it was not until 1908 that the U.S. Army purchased its first Wright Flyer and not until 1911 that it received five more. Consequently, most of the early Wright models were used to instruct new pilots and for pleasure flying. Others became attractions for special events such as fairs, and some were used to take paying passengers into the air for the first time.

Figure 1-1. *Wright Flyer* first flight. *(John T. Daniels, public domain)*

As early as 1909, the **Wright brothers** encountered their first competition from the Curtiss Aeroplane and Motor Corporation as well as from several foreign models shipped to the United States to take part in flying contests and exhibitions. On June 26, 1909, the first commercial sale of an airplane took place. An improved version of the 1908 Curtiss *June Bug* was sold to the Aeronautic Society of New York for $7,500.

Figure 1-2. Glenn Curtiss winning the Scientific American trophy on July 4, 1908. *(Library of Congress, LCCN 2001705775, public domain)*

Like the Wright brothers, **Glenn Curtiss** was a bicycle maker. By 1902 he had graduated to motorcycles, both building and racing them, and by 1908 his company had grown to more than 100 employees working around the clock to meet demand. Part of the demand came from budding aviators who were charged a premium for Curtiss's coveted air-cooled engines. In 1905, the famed Alexander Graham Bell, inventor of the telephone, hired Curtiss to head up a group of aviation experimenters known as the Aerial Experiment Association. On July 4, 1908, Curtiss's *June Bug* won the Scientific American prize of a silver trophy for the first officially observed flight in the United States exceeding one kilometer (Figure 1-2).


FEDERATION AERONAUTIQUE INTERNATIONALE

AERO CLUB OF AMERICA

No. 1

The above-named Club, recognized by the Federation Aeronautique Internationale, as the governing authority for the United States of America, certifies that

Glenn H. Curtiss

born 21st day of May 1878 having fulfilled all the conditions required by the Federation Aeronautique Internationale, is hereby licensed as Aviator.

Dated June 8th, 1911.

President.

Secretary.

[SEAL]

Signature of Licensee: Glenn H. Curtiss

Figure 1-3. First pilot license issued by the Aero Club of America. *(National Air and Space Museum, public domain)*

In August 1909, Curtiss traveled to Reims, France, to enter the first Gordon Bennett Aviation Trophy race. He won the $10,000 prize money with an average speed of 47.4 miles per hour, which captured the public's imagination on both sides of the Atlantic. Aviation activity experienced a sharp increase between 1909 and 1911 partly as a result of fierce competition among newspapers for aviation news. Another reason was the public's sudden interest in flying. In October 1910, the first international air meet was held in the United States at Belmont Park, New York. Britisher Claude Grahame-White won the second Gordon Bennett Speed Trophy with a speed of 60 miles per hour.

More and more people were entering the general aviation picture, and by 1911 several manufacturers were building airplanes as "professional" devices. Many amateur airplane builders were also involved with aviation projects; some were killed or injured trying to fly their home-built machines. At the close of 1911, there were 82 pilots in the United States licensed to fly in air meets and exhibitions. In addition to the licensed pilots, approximately 50 more individuals had flown solo. The licensing authority at that time was the **Aero Club of America**.

When war broke out in Europe in 1914, the United States had as many as 12 aircraft manufacturers, including some companies that were producing only three or four airplanes per year. Fewer than 200 flying machines had been commercially produced since 1903, and about one-half had gone to the U.S. Army and Navy. The Curtiss Aeroplane and Motor Company, successor to the Aerial Experiment Association, was the largest company in America producing airplanes.

During **World War I**, Curtiss produced about 6,000 JN-4 Jenny trainers for the army (along with the navy version of the Jenny, the N-9). The Jenny was first built in 1914 to meet U.S. Army requirements for a training aircraft. Over 95 percent of the 10,000 American pilots trained during the war years flew this aircraft. Thousands of Curtiss OX-5, water-cooled, 90-horsepower V-8 engines were built. So durable were Jennys that they stayed around for many years after the war, becoming the standard barnstorming plane during the 1920s and continuing in use by the Air Corps until 1927. These aircraft—which had cost the government about $17,000 new depending upon how they were equipped—became surplus after the war and were sold for as high as $750 new and as low as $50 used.

THE BARNSTORMERS

Many of the early **barnstormers** were ex-World War I pilots who could not get aviation out of their systems. Flying war surplus aircraft such as the Curtiss Jenny, they toured the country, putting on aerial shows and giving rides to curious townspeople. Teams of pilots working together as a "flying circus" put on thrilling exhibitions, including wing walking and plane changes, in which a stunt man would transfer between planes in the air.

The largest and best known of the circuses was developed by an ex-automobile racer and salesman, Ivan R. Gates. The **Gates Flying Circus** attracted some of the best stunters and wing-walkers ever to thrill a crowd. Pilots like Clyde Pangborn and Ormer Locklear would fly inverted over a field and perform loops to an astonished audience. These two individuals were as popular as movie stars of the day. The barnstormers kept aviation alive during the early 1920s when most people looked upon the airplane as good for only two things: war and exhibitions.

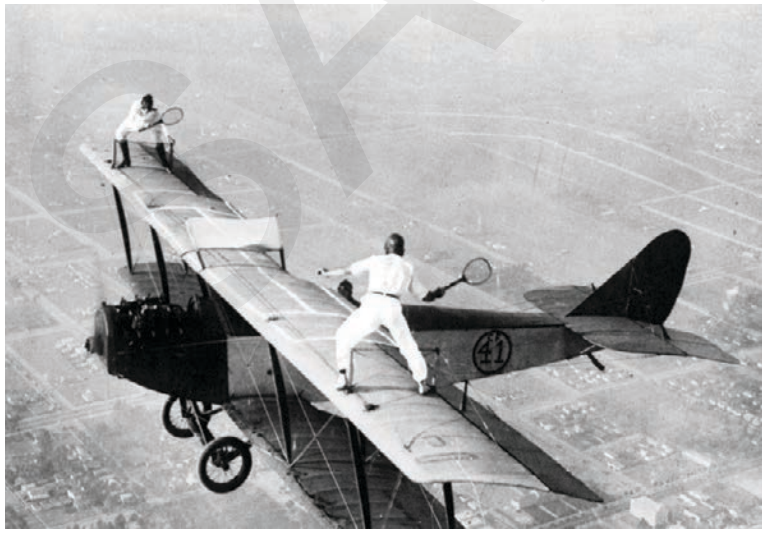


Figure 1-4. Tennis match, barnstormer style. *(INTERFOTO/Alamy)*

Figure 1-5. Gates Flying Circus flyer. *(Florida Memory, State Library and Archives of Florida, CC PDM 1.0)*

Figure 1-6. Early airmail. *(Bill Whittaker, commons.wikimedia.org/wiki/File:Airmail_1930s_Detroit_Smykowski.jpg, CC BY-SA 3.0, creativecommons.org/licenses/by-sa/3.0/)*

By 1925, crashes and neglect had diminished the surplus warplanes and the barnstormers needed new and better-performing airplanes. Federal legislation also had its effect in shaping the industry. The **Air Mail Act of 1925**, also known as the Kelly Act for Congressman Clyde Kelly who championed the legislation, turned the transport of mail over to private carriers. The newly formed airlines and airmail service lured the barnstormers into more settled work. The **Air Commerce Act of 1926** created the first Aeronautics Branch in the U.S. Department of Commerce and provided the establishment of airports, airways, and NAVAIDs, as well as the first licensing of planes and pilots. It also made stunting difficult, if not illegal in many instances.

The gypsy pilots, as they were called, became more of an oddity, and the flying circuses came to be viewed as bad for aviation. More and more bad days curtailed their barnstorming seasons. In December 1928, the Gates Flying Circus broke up. In its career, it had appeared in 2,500 towns and cities and carried more than 1.5 million passengers.

Commercial and general aviation truly began to go their separate ways around this time. The government asked the budding manufacturers to build aircraft for airmail service, and companies like Boeing, Ryan, Douglas, and Lockheed chose to develop mail and passenger planes. Others, including Wright, Laird, Bellanca, and Aeronca concentrated on smaller planes for racing and sport flying.

Another significant civil market, the corporate user, was also developing. In 1927, 34 non-aviation companies were operating business aircraft; by 1930 that number had grown to 300, and manufacturers such as Stinson, Travel Air, Waco, and Fokker were actively cultivating the market. Even private flying, largely the province of the wealthy, was being eyed as a possible market.

WICHITA: HOME OF GENERAL AVIATION

Jake Moellendick was a wealthy oilman who resided in **Wichita, Kansas**. He was also a gambler. The gamble of aviation appealed to him, and in 1919 he agreed to put up $15,000 to back several barnstormers who needed three new planes to replace their worn-out Curtiss Jennys. Billy Burke was sent to the 1919 Chicago Air Show to find the new aircraft. He approached an aircraft builder by the name of Matty Laird who had recently formed the **E. M. Laird Company** and was developing plans for a new, three-place biplane. Burke realized that Laird's aircraft could easily become the country's first successful commercially sold private plane. Burke wired Jake about the new plane and suggested that, instead of forming the flying circus, they get into the airplane building business. The idea appealed to Jake with the one stipulation that the company be moved from Chicago to Wichita.

The Burke-Moellendick-Laird partnership began work, and in April 1920, the first Laird Swallow rolled out of the hangar. It was everything Billy Burke had hoped for in a barnstorming aircraft: a sturdy, well-built and easy-to-fly craft that set the standard for all subsequent private biplanes of the 1920s. Production went from two planes a month to four, and Jake Moellendick went on a hiring spree to keep the plant meeting its orders. He assembled a group of unknowns, mostly ex-barnstormers like Buck Weaver, who later organized the **Weaver Aircraft Company** (subsequently shortened to WACO). Others included Lloyd Stearman and his brother, Waverly, and Walter Beech. The company should have prospered, but Jake was impossible to work for, and one by one his fine team quit. After 43 Laird Swallows had been sold, Matty Laird went back to his own company in Chicago, which built high-quality private aircraft until World War II. Jake renamed his plant the **Swallow Airplane Manufacturing Company**, but the next year, 1924, the Stearman brothers and

The number of active aircraft and hours flown per aircraft type are shown in Table 2-2.

Table 2-2. Active Aircraft and Hours Flown per Aircraft Type

Aircraft type	Number of active aircraft	% of total aircraft	Hours flown	% of hours flown
Fixed-wing piston	141,396	67%	14,431,000	56.4%
Fixed-wing turboprop	10,242	4.9%	2,619,000	10.2%
Fixed-wing turbojet	14,888	7.0%	3,926,000	15.3%
Rotorcraft	10,199	4.8%	2,997,000	11.7%
Gliders	1,517	0.7%	71,000	0.3%
Lighter-than-air	2,617	1.2%	64,000	0.2%
Experimental	27,449	13.0%	1,269,000	4.9%
Light Sport	2,675	1.2%	189,000	0.7%
TOTAL	**210,983**		**25,566,000**	

Source: FAA 2019.

There were 210,981 active GA aircraft in 2019 that flew more than 25 million hours. Fixed-wing, piston-engine aircraft dominated the fleet, accounting for 67 percent of the total active fleet and 56.4 percent of total hours flown. Fixed-wing turboprops accounted for 4.9 percent of the fleet and 10.2 percent of total hours flown. Fixed-wing turbojets accounted for 7 percent of the fleet and 15.3 percent of total hours flown. Rotorcraft accounted for 4.8 percent of the fleet and 11.7 percent of the hours flown. From this data, it is apparent that utilization is greater for turboprops, turbojets, and rotorcraft than it is for piston-engine aircraft. Indeed, although piston-engine aircraft are more plentiful, it appears the turboprops, turbojets, and rotorcraft are the workhorses of the GA fleet.

PERSONAL

Figure 2-1. Personal flying. *(Harbucks/Shutterstock.com)*

Personal flying includes any use of an aircraft for personal purposes not associated with a business or profession, and not for hire. A personal aircraft 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. It does not change its appearance. There is no way for anyone to tell whether a car or an aircraft is being used for business or pleasure just by looking at it. A high-net-worth individual may own a large aircraft for private transportation, with no business use. However, since 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.

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

These aircraft are also flown by doctors, lawyers, accountants, engineers, farmers, and small business owners in the course of conducting 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 aircraft they fly are

Figure 2-5. Aerial observation. *(EB Adventure Photography/ Shutterstock.com)*

Geophysical survey pilots search for new sources of energy using general aviation aircraft. With sophisticated instruments in the aircraft, a general aviation aircraft can locate and identify oil and gas deposits, coal, diamonds, and even water below the earth's surface.

Commercial fishing fleets on both coasts have found that their operations are more productive and profitable when they can be directed to concentrations of fish schooling far from the shore. Hence, light aircraft for that purpose have evolved into making a major contribution to the industry.

The **U.S. 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. Ranchers also use general aviation aircraft to inspect fences, round up strays, and check cattle for possible injuries. Because of the versatility of these aircraft, they can land and make necessary repairs or take care of cattle that may need treatment.

Major metropolitan police departments have found that road patrols by aircraft are highly effective for keeping watch over the flow of traffic during morning and evening rush hours and as an aid in apprehension of 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 check for transformer failures, broken insulators, short circuits, or line breaks. Inspection by air is frequently the only economical means of performing such service.

It should be noted that **uncrewed aircraft systems (UAS)**, or drones, are now providing the same level of observation at much lower cost. UAS have been adapted to many operations once performed by manned aircraft. In fact, experience has shown UAS to be extremely useful in dull, dirty, and dangerous operations. Although UAS have become more popular and have been adapted to a number of missions, including aerial observation, these platforms are generally supplementing manned operations, rather than completely replacing them.

AERIAL APPLICATION (OTHER)

Other aerial services include the use of aircraft for weather modification, firefighting, and insect control. Weather modification includes efforts by ski resorts to create snow and by governmental authorities in arid regions to create rain. Additionally, air-dropping chemicals and fire retardant by aircraft is a major weapon in the control of forest and brush fires. Very large aircraft, such as the McDonnell Douglas DC-10 and Boeing 727, have been retrofitted into tankers for this purpose.

Figure 2-6. Aerial firefighting. *(ShutterLibrary/Shutterstock.com)*

Resort operators have found that spraying 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 the elimination of a nuisance, aerial application of pesticides has been highly effective in controlling and, in many cases, eliminating diseases transmitted by insects, such as malaria.

Cherry orchard farmers in California, Oregon, and Washington state have employed helicopters not so much to apply a chemical but to fly low and slow over the tops of cherry trees, using the helicopter's rotor downwash to blow moisture from the cherries to enable them to dry quickly—cherry drying. Otherwise, rainwater settles near the cherry stems, which can cause expansion and splitting of the fruit as well as mold and mildew. This is of greatest concern in the 3–4 weeks before harvest. This is quite an innovative use of helicopters, but it is heavily relied upon by these cherry farmers.

EXTERNAL LOAD

External load flying includes aircraft operating under 14 CFR 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. These heavy-lift helicopters can also transport heavy, expensive drilling equipment, transport wind turbine blades, and lift commercial air-conditioning units on top of high-rise buildings. There are times when external load operations are the only way to complete a task.

Figure 2-7. Helicopter external load. *(Stephen Duncombe/Shutterstock.com)*

OTHER WORK

The "other work" category includes research and development, testing, air shows, air racing, parachuting, towing gliders, and aerial advertising. For example, aerial advertising is a highly specialized—but very lucrative—part of GA. 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 less 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 eyes than a similar message carried for the same price in any other communications medium. A message sky-written over Manhattan on a clear day can be seen by 10 million people at one time.

Figure 2-8. Helicopter sightseeing. *(ladyphoto89/Shutterstock.com)*

SIGHTSEEING

Sightseeing flying includes commercial sightseeing conducted under 14 CFR Part 91, whereas air tours are conducted under 14 CFR Part 135. More than one-half of the sightseeing flights are made in lighter-than-air aircraft (i.e., balloons). The majority of air tours are conducted in rotorcraft; for example, helicopter tours of the Grand Canyon, Hawaii, or Alaska glaciers.

AIR MEDICAL

The **air medical** category is dominated by helicopters, which transport ill patients for medical attention or donor organs for transplant. There are times when the American Red Cross needs to transport emergency supplies to disaster victims or transport 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 has been greatly enhanced when people can be transported quickly to nearby hospitals.

TAIL NUMBERS

Figure 4-5. Tail number. *(C. Daniel Prather)*

Every aircraft is registered in its country of ownership by the country's equivalent to the Federal Aviation Administration (FAA). As part of this registration, each aircraft has a given **tail number**, referred to as such because it is typically painted on the tail of the aircraft, either on the vertical stabilizer or the engine nacelle (Figure 4-5). As expected, whether it includes numbers or letters, the tail number is referred to using aviation-speak (phonetic alphabet and numerals). Although tail numbers in the United States are referred to as N-numbers, this is not true for any other country. Table 4-3 presents the registration prefixes from other countries. For instance, Canada, rather than having N-numbers, has "CF-numbers."

AIRCRAFT COMPONENTS

It is also important for line service specialists to fully understand the typical components of an aircraft. Although almost anyone interested in aviation has a basic understanding of these components, they are presented here for clarification purposes (Figures 4-6 and 4-7).

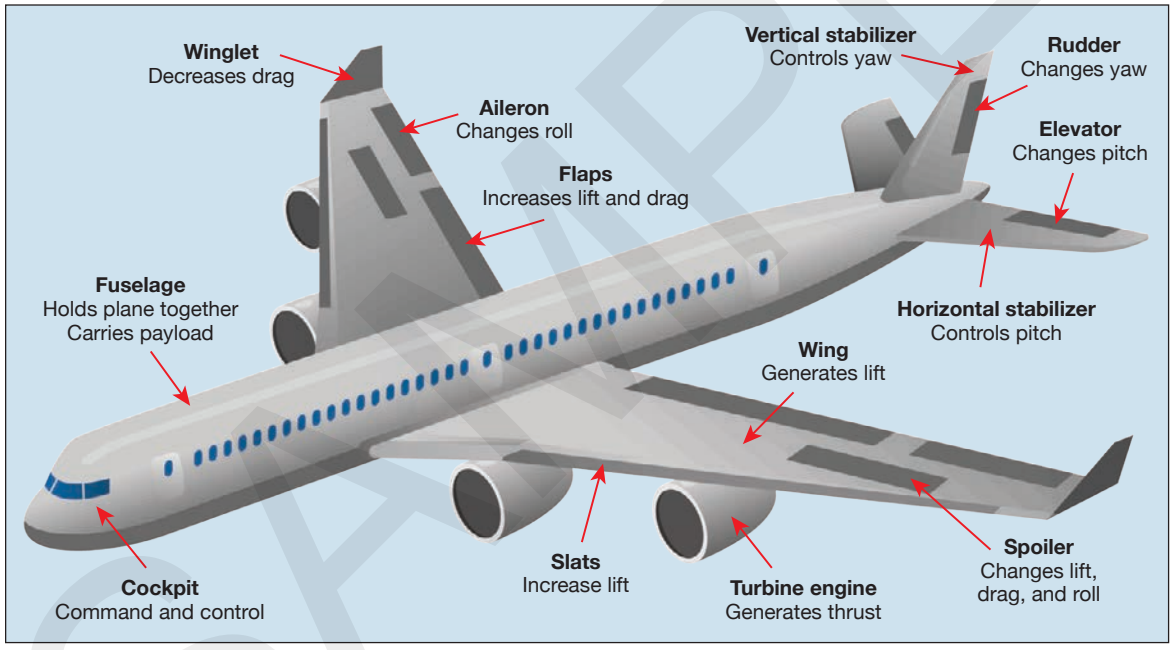


Figure 4-6. Parts of a large aircraft.

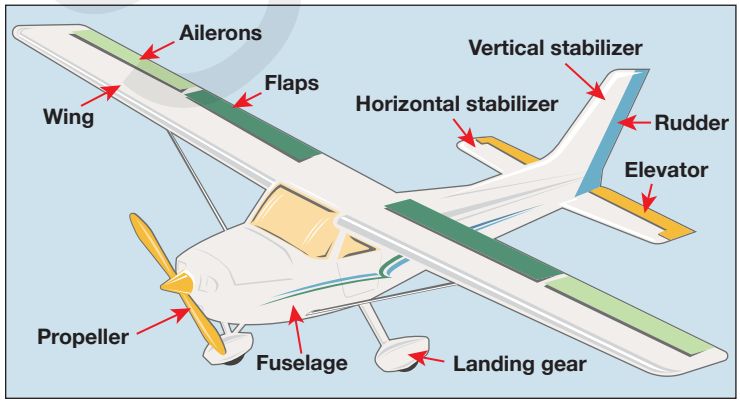


Figure 4-7. Parts of a small aircraft.

Introduction

As noted in chapter 4, the principal business of fixed-base operators is line service, which includes the retail sales of fuel and oil, minor repairs, emergency service, and other minor services for general aviation aircraft, including lavatory service, cleaning, etc. In addition to line service, FBOs may also maintain storage facilities for private aircraft, provide major maintenance and overhaul services, and offer flight instruction and charter services. Some of the larger FBOs are also active in selling new and used aircraft. A few of the larger operators offer aircraft management services, which allow high-net-worth individuals and corporations the ability to own an aircraft, with all maintenance, fueling, and even crewing taken care of by the FBO.

Maintenance

OVERVIEW

The proper maintenance of aircraft is necessary so that aircraft can be maintained in an airworthy condition, as required by the **Federal Aviation Regulations (FARs)**. The aircraft owner/operator is responsible for ensuring that maintenance personnel, upon completion of necessary maintenance, make appropriate entries in the aircraft maintenance records indicating the aircraft has been approved for return to service. It is the responsibility of the owner and operator to have maintenance performed that may be required between scheduled inspections.

Inspection of airframes, powerplants, propellers, and appliances is the single most effective way to identify potential problems with aircraft and ensure safe operations. The FAA requires aircraft and their associated components to be inspected at regular intervals. The frequency of these inspections varies depending on the type of aircraft, primary use, and components installed. As a result, inspections, maintenance, and repairs can be a primary business function of an FBO.

Although corporate-owned aircraft may be maintained by an in-house maintenance department, there are many aircraft owners that utilize FBOs for aircraft maintenance. FBOs that present a complete offering of services will include maintenance in those services. At a minimum, these maintenance services will cover piston-engine aircraft. Larger FBOs with the proper equipment and personnel will also have larger aircraft maintenance departments that are capable of maintaining turboprop and jet aircraft.

Figure 5-1. Aircraft maintenance in progress. *(industryviews/Shutterstock.com)*

Any maintenance performed on an aircraft today must comply with the FARs. When it becomes necessary to implement a new rule or change an existing FAR, the FAA creates a statement of reason and support called a **notice of proposed rulemaking (NPRM)** for publication in the ***Federal Register.*** After a predetermined period for public comments, proposals are adopted in Title 14 of the **Code of Federal Regulations (CFR)**, thus becoming a federal statute.

The FARs are organized into separate sections or parts. For example, Title 14 CFR Part 65 describes the requirements, privileges, and limitations for certification of airmen other that flight crewmembers, which includes aviation maintenance technicians and repairmen.

control centers and towers that can pinpoint an aircraft's location. ELTs are automatically activated when the aircraft impacts the ground or water above a certain G-force or can be manually activated by the pilot. Section 91.207 requires that all U.S. aircraft be equipped with an ELT. These devices must be inspected every 12 calendar months for proper operation of the crash sensor, battery condition, and radio strength.

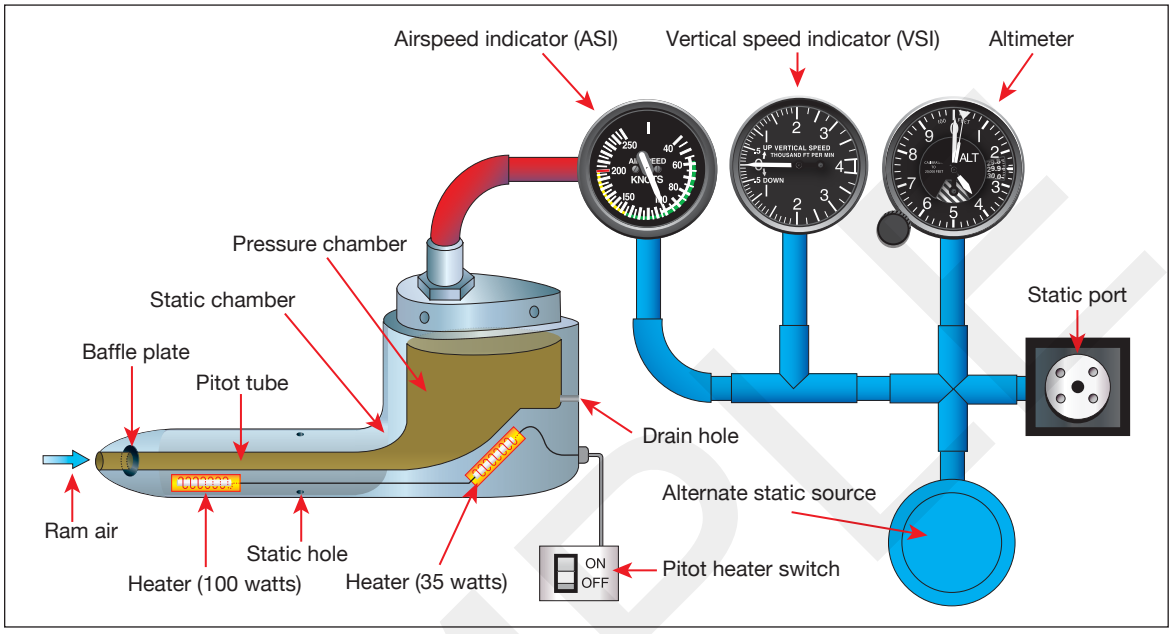


Figure 5-3. Pitot-static system and instruments. *(FAA Pilot's Handbook of Aeronautical Knowledge)*

14 CFR PART 145

FBOs located at major airports are often affiliated with aircraft manufacturers to provide aircraft maintenance and other services such as painting, interior improvements, or engine and component overhauls. In addition to providing flight training, fuel, and crew rest facilities, many FBOs also hold a **repair station certificate** issued by the FAA under 14 CFR Part 145. These certificates are the FBO's version of a "license to do business as a repair station." Authorized repair stations perform maintenance and alterations on civil aircraft, which includes engine overhauls, propellers, and the component parts installed on these products. These repair stations can also perform maintenance for airlines and air taxi or charter operators.

Today, many low-cost air carriers do not perform their own heavy maintenance on their respective aircraft fleets. As a result, several large repair stations have emerged, or existing repair stations have expanded, to accommodate the increased work from these air carriers. In an effort to reduce workforce numbers and expenses related to heavy maintenance work, there has been a trend for established air carriers to contract out heavy maintenance work to overseas repair stations that can perform the necessary procedures at substantially reduced costs.

To operate in the civil aviation maintenance industry, certificated repair stations must demonstrate to the FAA that they possess the facilities, equipment, personnel, technical data, and quality control systems necessary to perform maintenance in an airworthy and safe manner. A repair station is rated to perform certain types of maintenance on specific aircraft, engines or propeller types, and components such as generators or governors. Not all repair stations are alike, and their capabilities can vary significantly. Some repair stations provide line maintenance, or routine work necessary to keep an aircraft operating safely. Some perform substantial maintenance, which includes more comprehensive or progressive inspections and repairs on airframes and overhauls of aircraft engines. Some repair stations offer specialized services such as fuel cells, landing gear overhauls, or aircraft paint.

Figure 16-7. Fueler price sign. *(C. Daniel Prather)*

The margins FBOs experience between their fuel price and net profit per gallon are relatively thin. For example, if avgas costs the FBO $3.00 per gallon, and truck cost, insurance, fuel flowage fee, maintenance, and rent amount to $0.92 per gallon, a retail price of $4.63 per gallon equals a net profit of $0.71 per gallon. Thus, as wholesale fuel prices increase, FBOs generally have no option but to increase their retail fuel prices. The key is to be aware of what the competition is charging per gallon and focus on cost control to the extent that fuel prices can remain competitive. An FBO manager may create elaborate spreadsheets showing the FBO's cost for fuel, indirect costs associated with fueling, retail price, and net per gallon on a daily, monthly, and yearly basis.

Just as fuel costs are one of the two largest costs for an airline (the other being labor), fuel is one of the largest sources of revenue for an FBO. Thus, a wise FBO manager will continually analyze fuel costs, prices, and net profit on a regular basis. As with most goods, the supply and demand equation holds true at FBOs. With fuel prices lower than the competition, demand will increase, possibly disproportionately. With disproportionate demand, an FBO may actually increase revenues by lowering fuel prices. For example, it is better to sell 10,000 gallons at $3.00 per gallon ($30,000 gross), than 7,500 gallons at $3.50 per gallon ($26,250). The key for the FBO manager is to find the balance where revenues will increase with lower fuel prices; otherwise, revenues will decrease.

Figure 16-8. Sustainable aviation fuel. *(Scharfsinn/Shutterstock.com)*

SUSTAINABILITY

As the aviation industry continues to minimize its impact on the environment, operators of aircraft and ground support equipment have explored **sustainability** as a standard of operation. For example, the use of **sustainable aviation fuel (SAF)** has received significant support from organizations such as the National Business Aviation Association (NBAA). As a drop-in fuel, biomass SAF can be safely used in any turbine-powered aircraft. The suppliers of fuel—and dispensers of fuel, such as FBOs—are playing a major role in SAF. For example, in April 2021, Signature Flight Support announced that 1 million gallons of SAF (30/70 blend of renewable feedstock and conventional Jet A) had been supplied through its Signature Renew Program at San Francisco International Airport. This milestone marked the first time in history that a single FBO location had delivered such a substantial and consistent supply of SAF to business aircraft. Operators of aircraft fueled with SAF have experienced a 25 percent reduction in direct carbon output compared to aircraft fueled with traditional jet fuel.

The FAA, Environmental Protection Agency (EPA), and industry partners are committed to developing a replacement for leaded avgas used in piston-powered aircraft. According to the FAA:

FBO Management

Operating, Marketing, and Managing as a Fixed-Base Operator

C. Daniel Prather, PhD, DBA, AAE, CAM

This industry-leading textbook covers all aspects relating to the operation, marketing, and management of fixed-base operators (FBOs). Author Dr. C. Daniel Prather, an experienced aviation industry professional educator, presents key considerations for FBO managers and prepares university-level students for this competitive business field. This text begins by covering the history of general aviation and the scope of the current industry and then examines all elements of FBO operations, including line service, aircraft maintenance, flight operations, aircraft sales, aircraft charter, customer service, and more. A focus on marketing an FBO explores the role of marketing, sales and promotion, marketing research, and transportation needs assessment. As a management resource, this book examines methods of acquiring a business aircraft, management functions and organization, risk management, financial planning, and human resources as well as presents current and future challenges confronting FBOs.

Each chapter contains resources to aid readers' learning, including definitions of key terms, review questions, and real-world scenarios to help students apply their learning to challenges encountered by FBOs. Entrepreneurs establishing an FBO will find practical discussions of FBO services to consider, safe line service practices, proper legal structures, marketing plans, risk management, and more.

C. Daniel Prather currently serves as airport manager of Riverside Municipal Airport, professor of aviation science at California Baptist University, and president of DPrather Aviation Solutions and PDPCredit.com. He is an active educator, researcher, trainer, and industry consultant with expertise in airport management and collegiate aviation. Prather is an Accredited Airport Executive, Certified Aviation Manager, instrument-rated private pilot, and remote pilot with sUAS rating.

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