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**AVIATION &
AEROSPACE**

LAW

J. Scott Hamilton and Sarah Nilsson
EIGHTH EDITION



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Practical Aviation & Aerospace Law

Eighth Edition

J. Scott Hamilton, Sarah Nilsson

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7005 132nd Place SE

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asa@asa2fly.com | 425-235-1500 | asa2fly.com

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PREFACE

Practical Aviation and Aerospace Law is designed to be used in conjunction with the *Practical Aviation and Aerospace Law Workbook* as a university text for aviation and aerospace law courses and, standing alone, as a reference guide for aviation and aerospace business managers, pilots, mechanics, aircraft owners, and others involved in aviation by vocation or avocation.

Originally titled simply *Practical Aviation Law*, beginning with the first edition in 1991 and continuing through the sixth edition in 2015, the book has continuously grown in response to industry developments and instructor feedback. In much of the world, aviation is generally considered to be included in the term “aerospace industry,” but in the United States, a distinction has persisted, with the term “aviation industry” generally encompassing operations, repair and maintenance, while “aerospace industry” is used to refer to aircraft, spacecraft, and component design and manufacturing, and now also spaceflight, as well as uncrewed aircraft operations.

With the recent expansion of the number of companies engaged in commercial spacecraft design and manufacturing, and most of these companies engaging in or preparing to engage in operation of those spacecraft (beyond the flight test phase) for commercial purposes, it appeared timely to add a new chapter covering the law of commercial spaceflight operations in the sixth edition, and UAS operations in the seventh edition. The addition of “*and Aerospace*” to the title signified the book’s expanded scope for the sixth and subsequent editions. To that end, Dr. Sarah Nilsson, Professor at Embry-Riddle Aeronautical University, became the first contributing author since the book’s inception and provided the new spaceflight law chapter in the sixth edition; an uncrewed aircraft systems law chapter in the seventh; which now in the eighth edition also includes advanced air mobility (AAM) law.

Except for certain treaties having worldwide or at least multinational effect, the scope of previous editions of the book has been limited to the law of the United States and may have had little relevance to the domestic laws of other nations. In keeping with the truly global nature of the aviation and aerospace industries and in recognition of the

worldwide employment opportunities that offers, the new editions began what is likely to be a long-term effort to continually expand the global perspective. The book does not attempt to explore the entire seamless web of the law—only those areas particularly applicable to aviation and aerospace. The authors recommend that students considering a career in aviation and aerospace, whether in operations, maintenance, engineering, manufacturing or business management, also take courses in business law and aviation labor relations. While there is some overlap between the content of those courses and this text, those give much broader and deeper coverage of some of the legal concepts and principles studied here.

As the title suggests, this book takes a practical viewpoint. It aims to provide the reader with basic legal knowledge and perspectives along with an understanding of how the legal system works in relation to aviation and aerospace activities. It aims to provide that in a form that can be applied to help you recognize and avoid common legal pitfalls, and to recognize when the moment has come to stop what you are doing and consult your lawyer. If this book had a subtitle, it would be *How to Avoid Aviation Lawyers and When to Call One*.

No book can hope to advise you what to do in every conceivable situation. In advising our clients, lawyers must take into consideration not only the law but also the facts and circumstances. In over thirty-five years of practicing law—in private practice, as government and later corporate counsel—co-author Hamilton represented clients in well over three thousand aviation matters involving every subject in this book, and never saw two identical cases. While similar facts give rise to similar considerations, slight differences in the facts and circumstances often lead to major differences in the best approach to solving the problem. Examples in this book and its accompanying workbook are drawn largely from cases encountered in both authors' practices.

The law itself is also in a constant state of change. Even as we write, the Congress of the United States, fifty state legislatures, and a vast number of administrative agencies are daily making changes to statutes and regulations, while hundreds of federal and state courts are writing and publishing case decisions on the interpretation, application, and constitutionality of those laws and regulations, along with decisions that modify, clarify, or sometimes confuse the common law. Simultaneously, U.S. diplomats are negotiating with their foreign counterparts new or

amended treaties to be ratified by their governments. Such changes as have occurred since the seventh edition of this book was published are one reason for this expanded and updated eighth edition.

While this process of continual change keeps the lawyer's work from becoming routine to the point of boredom, it also means that what was good advice yesterday (or the day this book went to press) may no longer be good advice today. While the fundamental legal principles discussed in this book are less susceptible to sudden obsolescence than, say, a text on the Internal Revenue Code and IRS Regulations, *you are cautioned not to attempt to solve actual individual legal problems on the basis of information contained in this book.* Finding yourself faced with an actual legal problem, you should recognize that the time has come to consult your lawyer.

ACKNOWLEDGMENTS

FROM J. SCOTT HAMILTON

I would like to thank the following people for their encouragement, advice, and support, without which I would not have undertaken and persevered with the writing of this text, the related workbook and teacher's manual, and subsequent updated editions of each. These acknowledgments should not be construed to imply an endorsement of this teaching system by any of the persons or organizations mentioned.

Dr. Stacy Weislogel, chair, Department of Aviation, The Ohio State University, one of the first to urge me to write this book.

Professor Gary Kiteley of Auburn University, who retired in 2001 as executive director of the University Aviation Association, an organization that consistently provides a wonderful forum and source of information to those of us who teach aviation-related courses in colleges and universities. He was a source of encouragement not only in the drafting of the original manuscript for the first edition, but also in the continuously expanded international law coverage of each subsequent edition.

Dr. Rex A. Hammarback, director, University of North Dakota Aviation Foundation and formerly a professor in UND's renowned aviation program, who after I had explained my concept for the book said simply and directly: "If you write it, I'll use it."

Hon. John E. Faulk, NTSB administrative law judge (retired), a practicing attorney with the Trachtman law firm in Melbourne, Florida, and an adjunct professor in the School of Aeronautics at the Florida Institute of Technology. Many of his recommendations based on his classroom experience using this teaching system have been incorporated as improvements to each successive edition.

Professor Terri Haynes, Chadron State College, Chadron, Nebraska. She deserves particular credit for strongly encouraging me to avoid "legalese" jargon wherever possible in favor of plain English to make

the book as clear and understandable as possible to students and other readers having no previous training in the law.

Jonathan Stern, Esq., partner in the Washington, D.C. office of the world-renowned Schnader, Harrison, Segal & Lewis law firm and editor of the American Bar Association's *Aviation Litigation Quarterly*. Jon has been especially helpful in providing materials, insights, and updates on the continuing evolution of international law governing airline liability.

Bill Behan, CEO, AssuredPartners Aerospace, Golden, Colorado. Bill has been a reliable source of information on developments in the ever changing field of aviation insurance.

John and Kathleen Yodice, a father-and-daughter team in the Yodice & Associates law firm in Bethesda, Maryland, who do yeoman service for general aviation as legal counsel for the Aircraft Owners & Pilots Association and other clients and have proved themselves reliable sources of insights into recent developments in FAA enforcement, aviation medical, and airport and airspace access issues.

Professors Robert Kaps of Southern Illinois University (Carbondale) and Timm Bliss of Oklahoma State University, co-authors with me of the *Labor Relations in Aviation and Aerospace* textbook and study guide with supplemental readings, published by Southern Illinois University Press, and Professor Jack Panosian of Embry-Riddle Aeronautical University's Prescott, Arizona, campus, who strongly encouraged that effort. All of them also use this *Practical Aviation & Aerospace Law* text and motivated me to expand the coverage of Chapter 17 to provide students a broader introduction to that topic.

Dr. Sarah Nilsson, Professor, Embry-Riddle Aeronautical University, friend, admired colleague, practicing attorney, and coauthor of this text.

Dr. Harry W. Lawrence, transportation lawyer, adjunct professor and author of *Aviation & the Role of Government* for engaging in a long-running colloquy that has led to many improvements in this text over the years.

The Lawyer-Pilots Bar Association, Southern Methodist University's *Journal of Air Law and Commerce*; DePaul University College of Law's International Aviation Law Institute (IALI) and its journal, *Issues in Aviation Law and Policy*; and the University of Denver's *Transportation Law Journal*, each of which consistently provides wonderful forums

and opportunities for attorneys and others interested in aviation and aerospace law to share knowledge and ideas in print and face-to-face in an atmosphere of professional collegiality. They continue to contribute greatly to the advancement of the legal profession and the quality of legal service to aviation and aerospace clients.

Colleagues teaching aviation and aerospace law courses at numerous colleges and universities who provide feedback and suggestions that contribute to the continuous improvement of each successive edition of this teaching system.

Our students, past and present, who continue to relentlessly question, challenge, and demand clear explanations and sound reasoning, rightly refusing to settle for less.

Not unlike the airline and aerospace industries, the publishing industry is in dynamic change as publishing companies merge, are acquired, go out of business, or adjust their scope and market focus, particularly in response to technological advancements in alternative means of dissemination of knowledge. Through all this change, successive editors at Iowa State University Press, Blackwell Publishing Professional, and now Aviation Supplies & Academics have recognized the need for this teaching system and its periodic updates, turning my vision into the solid reality you are now holding in your hand or viewing on your electronic device.

My family, who encouraged me in this project and more-or-less cheerfully tolerated the many hours I spent sequestered writing and updating this work (often after a full day of practicing aviation law, running a corporation or teaching), and especially my late wife Charlotte, who did most of the work of preparing the original and several subsequent manuscripts.

The credit is theirs; the errors are mine.

FROM SARAH NILSSON

I would like to thank the following people for their encouragement, advice, and support. First and foremost, Dr. Hamilton for being my long-time mentor and friend, not to mention the reason so many opportunities in my aviation law profession came my way. From the start, he has been my biggest supporter. He had absolute faith in me when he offered me the task of writing the commercial space law chapter of the sixth edition of this text. That task gave me the courage I needed to author my own textbook, *Drones Across America*, with the American Bar Association in 2017; and the eBook *Drones Across the World* (eaglepubs.erau.edu/dronesacrosstheworld), with Embry-Riddle Aeronautical University in 2023.

As an intern in law school, I owe a debt of gratitude to my first aviation attorney boss, Michael Pearson, for giving me a chance to learn from one of Arizona's best.

As a budding aviation attorney in 2015, I would also like to acknowledge John and Kathleen Yodice for their inspiration and training starting with their weekend seminar, *Representing Airmen and Air Agencies in FAA Enforcement Matters*, in Salinas, California, and continuing throughout her last five years in private practice when Kathy was kind enough to continue her mentorship.

My students, past and present, for being the reason I continue to work on improving my teaching and learning. My clients, for never allowing a dull moment and continuing to challenge me to mold my practice to industry demands.

Lastly, to my soulmate, Bill Lange, for his support in all things, as I wrote eighth edition revisions way into the wee hours of the night. From the very first day we met, he has been my staff of strength, source of wit and humor, and cup of abundant love.

Thank you all. I am eternally grateful for your support and I remain your humble advocate for improving what parts of this industry as are within my purview.

NOTES ON THE TEXT

Unless otherwise noted, all opinions expressed herein are entirely our own and do not necessarily reflect the views of our employers, past or present.

All photos and illustrations are by the authors, unless otherwise credited.

The use of proper language and phraseology is of crucial importance in the law. The primary use of *italics* in the text is to alert you to the introduction of a law, legal word or phrase you need to understand to grasp the concepts under discussion, though italics are also occasionally used to give special emphasis to a point. The authors strive to maintain an informal, conversational tone wherever possible. To that end, wherever stories from our personal professional experiences are used to illustrate our points we simply refer to ourselves as Scott or Sarah.

The law is constantly evolving to keep abreast of challenges presented by the evolution of society and technology. The aviation and aerospace industries are among the most dynamic of all enterprises, and thus the locus of some of the most continual legal change. The reader can watch for changes that may occur after this book is in print by consulting the ASA website at asa2fly.com/prlaw.

ABOUT THE AUTHORS

J. SCOTT HAMILTON is an adjunct professor and course developer at Embry-Riddle Aeronautical University, formerly assistant professor and faculty chair. He previously served as general counsel for the Civil Air Patrol, then as the national organization's chief operating officer. Prior to that, he served as senior assistant attorney general for the State of Wyoming. While practicing aviation law in Colorado, he also was a faculty member at the University of Denver College of Law, as well as Metropolitan State College of Denver. He is an experienced pilot and skydiver who served as a HALO instructor in the Green Berets. Hamilton is widely published on aviation law and has received many honors, including induction into the Colorado and Arkansas Aviation Halls of Fame and the International Skydiving Hall of Fame.

SARAH NILSSON is a tenured professor at Embry-Riddle Aeronautical University and a practicing attorney in Arizona, where her practice focuses on aviation/aerospace and business law. Sarah gained extensive aviation operating experience working as a cargo pilot and flight instructor. She maintains her crewed pilot certificates and ratings and still flies her personal aircraft, a Cherokee 235. She has also obtained remote pilot certificates in the US, Canada, and the UK. She volunteers as a safety representative and DronePro on the FAA Safety Team. Her research interests include aviation, space, uncrewed aircraft, and advanced air mobility law.

Her other textbook that remains current, as she updates it regularly, is an eBook, *Drones Across the World*, (eaglepubs.erau.edu/dronesacrosstheworld) published with Embry-Riddle Aeronautical University in 2023.

PART I

ADMINISTRATIVE LAW

1

REGULATORY AGENCIES AND INTERNATIONAL ORGANIZATIONS

If you are involved in aviation, you will deal with administrative agency regulations far more frequently than any other area of the law. Indeed, you will probably be confronted with making decisions based on the Federal Aviation Regulations (FARs) on a daily basis. Those regulations also establish standards of legal behavior by which a judge or jury may later decide whether you and your employer are legally liable for negligence in the event of an aircraft accident. Hardly any aspect of aviation today is unaffected by these regulations. That is why we begin with an examination of administrative law, with particular focus on the role of the Federal Aviation Administration (FAA) in administering the federal program of air safety regulation.

Since the 1920s, Congress has created a plethora of regulatory agencies to administer the many federal programs it has initiated. Indeed, federal agencies continue to grow and multiply, under Democratic and Republican administrations alike. We start here with an overview of the numerous U.S. administrative agencies most directly involved with some aspect of aviation, distinguishing them from each other according to the specific role played by each in regulating aviation. Although this chapter focuses on the U.S. model, virtually all nations have their own counterparts of these agencies, engaged in similar aviation regulatory activities. For example, at least 193 nations have their own domestic counterpart of the FAA, such as the European Union's European Aviation Safety Agency, the Civil Aviation Authority of Singapore, the National Civil

Aviation Agency of Brazil, the United Arab Emirates' General Civil Aviation Authority, and the Civil Aviation Administration of China.

The ease with which civil aircraft cross national borders, air transportation's key role in the global economy, and horrific and effective use of civil airliners as weapons of terror have made the regulation and development of civil aviation a continuing subject of not only national but also international concern.

This chapter also introduces the International Civil Aviation Organization (ICAO) and the International Air Transport Association (IATA), organizations that, although not technically regulatory agencies, play an important role in harmonizing technical standards for civil aviation worldwide.

FEDERAL ADMINISTRATIVE AGENCIES

The terrorist attacks of September 11, 2001, shook the United States to the core. Few industries—indeed, few aspects of American life—were untouched, though some were more deeply affected than others. Civil aviation, having been so infamously and effectively abused in these attacks as a weapon of terror, has borne the brunt of these changes.

One of the results of the attacks was the most sweeping reorganization of the federal government in over a half-century.

Transportation Security Administration (TSA) ([tsa.gov](https://www.tsa.gov))

Barely two months after the attacks and for the express purpose of improving security in all modes of transportation, including civil aviation, Congress enacted the *Aviation and Transportation Security Act of 2001*, creating the Transportation Security Administration (TSA). The TSA was originally established as an operating agency of the Department of Transportation (DOT), but moved into the Department of Homeland Security (DHS) when that agency was created.

Previously, operators of airports served by commercial airlines had been responsible for airport security, relying primarily on contractors, with some FAA oversight. The new law brought the responsibility for day-to-day screening of airline passengers, baggage and cargo into the federal arena, under the TSA, which immediately set about hiring and

training security personnel. Most of the new federal screeners were the same individuals previously employed by those contractors that had been performing the function prior to its federalization. With a change of uniform and some additional training, they returned to the same work. However, in late 2004, the Screening Partnership Program (SPP) enabled airports to obtain TSA approval to replace those federal screeners with qualified, TSA-approved private sector vendors. At this writing, some twenty-two airports have taken advantage of the SPP and now utilize private sector contractors to provide passenger and baggage screening services.

The TSA also took over from the FAA the responsibility for inspecting and testing security measures at airports, with the added responsibility for the same at other transportation facilities, including foreign aircraft repair stations. Congress also empowered the TSA to receive, assess, and distribute intelligence information related to transportation security. The new agency was directed to develop plans, policies, and strategies for dealing with threats to transportation security and to coordinate countermeasures with other federal agencies. Congress also ordered that the Federal Air Marshal program be beefed up and that steps be taken to increase the availability and use of explosive detection systems at air carrier airports.

Under the Secure Flight Program, the TSA is now responsible for maintaining the Terrorist Watchlist and related No Fly and Selectee lists. The “watch list” of known and suspected terrorists is a uniform list used to identify persons who should be prevented from boarding (the No Fly List) or who should undergo additional security scrutiny (the Selectee List). The TSA began taking over the responsibility for the pre-boarding matching of airline passengers’ names against these lists from the airlines in early 2009.

Transportation Security Oversight Board (TSOB)

Congress’ initial investigation into the terrorist attacks of September 11, 2001, revealed that various federal law enforcement agencies had clues that, if assembled together and investigated coherently, might have revealed the plot and enabled prevention, but that these agencies tended to hoard, rather than share, potentially crucial intelligence information.

In an effort to address that shortcoming, the *Aviation and Transportation Security Act* also created the Transportation Security Oversight Board (TSOB), an extremely high-level panel composed of the Secretaries of Homeland Security, Transportation, Defense, and Treasury; the Attorney General, and the Director of National Intelligence (or designees of any of the foregoing), along with a presidential appointee representing the National Security Council (NSC). The TSOB was made responsible for assuring the coordination and sharing of intelligence relating to threats against transportation.

Department of Homeland Security (DHS) (dhs.gov)

Next, Congress and President George W. Bush created the new Department of Homeland Security (DHS), now the largest federal department. Paralleling President Truman's epic 1947 merger of all branches of the U.S. armed forces into a new Department of Defense (DoD) to better coordinate the nation's defense against military threats, 24 federal agencies were brought under the new DHS to protect the nation against further terrorist attacks and respond to natural disasters. Agencies brought into the DHS include the following (*italics* indicate the agency's former home in the federal bureaucracy):

Secret Service

Coast Guard (*Department of Transportation*)

U.S. Customs Service (*Department of the Treasury*)

Immigration and Naturalization Service (INS), since 2002, U.S. Citizenship and Immigration Services (USCIS) (part, from *Department of Justice*)

Transportation Security Administration (TSA) (*Department of Transportation*)

Federal Protective Service (*General Services Administration*)

Federal Law Enforcement Training Center (*Department of the Treasury*)

Animal & Plant Health Inspection Service (part, from *Department of Agriculture*)

Office for Domestic Preparedness (*Department of Justice*)

Federal Emergency Management Agency (*FEMA*)

Strategic National Stockpile & Disaster Medical System
(Department of Health and Human Services)

Nuclear Incident Response Team *(Department of Energy)*

Domestic Emergency Response Teams *(Department of Justice)*

National Domestic Preparedness Office *(FBI)*

CBN Countermeasures Program *(Department of Energy)*

Environmental Measures Laboratory *(Department of Energy)*

National Biological Warfare Defense Analysis Center *(Department of Defense)*

Plum Island Animal Disease Center *(Department of Agriculture)*

Critical Infrastructure Assurance Office *(Department of Commerce)*

Federal Computer Incident Response Center *(General Services Administration)*

National Communications System *(Department of Defense)*

National Infrastructure Protection Center *(FBI)*

Energy Security and Assurance Program *(Department of Energy)*

The *Aviation and Transportation Security Act* originally assigned the attorney general responsibility for screening all aliens applying for training at U.S. flight schools for security risks. Due to comparatively low fuel costs, prevalent VFR weather, and abundant suitable airspace, the United States (and particularly Florida and the desert southwest) was a popular destination for large numbers of foreigners wishing to learn to fly (and land). This new requirement hit U.S. flight schools—many of which were heavily reliant on foreign students—hard and hundreds closed their doors. This screening duty was later transferred to the new DHS and limited to students desiring to learn to fly aircraft with a maximum certificated gross takeoff weight of more than 12,500 pounds. As required by Congress, DHS now gives quick service to these foreign students, acting on them within five days.

Aviation security law is discussed in much greater detail in Chapter 15.

Department of Transportation (DOT) (dot.gov)

The U.S. Department of Transportation houses a variety of federal agencies dealing with policy and regulation of various means of transportation of people and goods. DOT agencies having jurisdiction over various aspects of transportation include the Federal Aviation Administration

(FAA), Federal Highway Administration (FHWA), Federal Motor Carrier Safety Administration (FMCSA), Federal Railroad Administration (FRA), Federal Transit Administration (FTA), Maritime Administration (MARAD), National Highway Traffic Safety Administration (NHTSA), Pipeline and Hazardous Materials Safety Administration (PHMSA), Research and Innovative Technology Administration (RITA), St. Lawrence Seaway Development Corporation (SLSDC), and Surface Transportation Board (STB). The head of the agency is the Secretary of Transportation.

In civil aviation, the DOT amasses and publishes a wealth of detailed operational and financial data and statistics on airlines and airports, available online at bts.gov/topics/airlines-and-airports-0.

The DOT also issues certificates of economic authority to U.S. carriers for interstate or foreign passengers and/or cargo and mail authority, a certificate for interstate or foreign all-cargo authority, or authorization as a commuter air carrier, as well as foreign air carrier permits to foreign airlines designated by their nations to provide service to the United States pursuant to treaty. The DOT consults with the State Department in the foreign air carrier approval process. Permit issuance requires presidential approval. The president may disapprove a specific foreign carrier only for foreign relations or national security reasons. Such permits have occasionally been denied or withdrawn in the application of U.S. foreign policy, as when Aeroflot's permit was suspended following the Soviet Union's invasion of Afghanistan.

The DOT also regulates deceptive and anticompetitive practices by airlines and airports to protect consumers and foster competition in the airline industry.

Federal Aviation Administration (FAA) ([faa.gov](https://www.faa.gov))

In the *Federal Aviation Act of 1958*, Congress made the FAA primarily responsible for the safe and efficient use of the nation's airspace. The agency's influence on the entire aviation industry is pervasive.

The FAA Administrator is the head of the agency, and likely the single most influential person in U.S. civil aviation.

For many years, the FAA (and its predecessor, the Civil Aeronautics Authority, or CAA) enjoyed independent agency status within the

federal bureaucracy, an arrangement that afforded the administrator direct access to the president. But now that the FAA is but one of those many divisions of the DOT, the Secretary of Transportation is the sole voice for all of these subordinate agencies in the president's cabinet. Some aviation interests still feel that the development of sound aviation policy has suffered as a result of this organizational structure. A parade of proposals to liberate the FAA from the DOT has come before Congress, but none has passed and as the years go by, it appears even less likely that one will.

For several decades, the position of FAA Administrator was one of the plums of political patronage. The administrator served at the pleasure of the president, and turnover in the position was frequent, averaging about every two years—hardly sufficient time to accomplish anything in so ponderous a bureaucracy. Now, however, the individual appointed to the position is assured a five-year term in office.

The FAA's activities cover a wide range, and include:

1. Regulation

The FAA regulates aviation safety, airspace use, and, to a certain extent, aircraft noise. The primary laws promulgated and enforced by the FAA are the Federal Aviation Regulations (FARs), found in Title 14 of the Code of Federal Regulations (14 CFR). This pervasive body of regulations addresses every conceivable aspect of aviation safety. Additionally, through those regulations prescribing airworthiness standards for the certification of new aircraft, the FAA has established aircraft noise limits. These regulations, developed in consultation with the Environmental Protection Agency (EPA), deserve credit as the primary incentive for development of the quieter high bypass ratio fanjet engines that came into use on the second generation of airline transport jets—the Boeing 747, Lockheed L-1011, and McDonnell Douglas DC-10. In comparison, the straight turbojet engines used on the first generation of jet transports, such as the Boeing 707, Douglas DC-8, and Convair 880, were positively thunderous. Indeed, as we'll see in Chapter 13, that first generation of airline jets (whose noise was not regulated by the FAA) appears largely responsible for creating the widespread enmity that persists today between airports and their noise-sensitive neighbors. Although these noisy "Stage 1" jets are now banned from flying in the United States

unless retrofitted with quieter new-technology engines or “hush kits,” the legacy of public hostility toward airports engendered decades ago by their noise remains an effective obstacle to the development of new and the expansion of existing airports in this country.

The FAA also recently imposed noise limits on propeller-driven light and commuter aircraft receiving FAA type certification in 2006 and later, based on criteria developed by the International Civil Aviation Organization (ICAO, discussed later in this chapter).

Congress has also given the FAA sole regulatory authority over suborbital spacecraft, in the *Commercial Space Launch Amendments Act of 2004*, intended to encourage private enterprise investment and participation by avoiding overregulation of this developing area of commercial activity, recognizing that spaceflight is inherently more risky than flight in the atmosphere. That authority is now exercised by the FAA’s Office of Commercial Space Transportation, which licenses the launch and re-entry of commercially operated spacecraft. (NASA, however, retains the authority to set safety standards for any spacecraft that carry NASA astronauts or visit NASA destinations, such as the International Space Station.)

In addition to the FARs, the FAA from time to time issues other mandatory orders having the force and effect of law on the subject of aviation safety. The primary examples are Airworthiness Directives (ADs), which are FAA orders requiring some inspection or modification of previously certified aircraft. An AD is usually issued when operating and maintenance experience reveals the need to change some element of the design or fabrication of a particular type of aircraft or component to improve flight safety. The need for such an improvement may be revealed by an accident (or series of accidents), or by reports of difficulties experienced or observed by aircraft operators, inspectors, and mechanics in the field.

In 2022 in its *Advanced Air Mobility and Leadership Act*, Congress gave the FAA another task: to plan for and coordinate efforts to integrate advanced air mobility aircraft into the national airspace system (discussed in greater detail in chapter 19).

2. Certification

It is virtually impossible for a person or business to participate in any aspect of civil aviation in the United States without first obtaining one or more certificates from the FAA. The FAA certifies not only flight crew members—including pilots (student, sport, recreational, private, commercial, and airline transport), flight engineers, flight instructors, flight navigators, and ground instructors—but also airmen other than flight crew members, including air traffic control tower operators, aircraft dispatchers, mechanics, repairmen, parachute riggers and remote pilot certificates for small unmanned aircraft systems. The FAA also issues a great variety of skill-specific ratings to accompany these certificates, as well as aviation medical certificates required of pilots and air traffic controllers (discussed in greater detail in Chapter 3).

The agency also certifies air carriers and commercial operators, including domestic, flag, and supplemental air carriers; foreign air carriers operating in the United States, commuter and on-demand operators, rotorcraft external load operators, agricultural aircraft operators, and airports serving certificated air carriers; pilot schools and aviation training centers, aircraft and component repair stations, and aviation maintenance technician schools. The agency, using safety agreements with other nations, such as Canada, the European community, and Singapore, also enters into partnerships for the conduct of aircraft maintenance and airworthiness approvals.

Additionally, each civil aircraft of U.S. manufacture is the product of three separate FAA inspection and certification processes. An aircraft manufacturer intending to introduce a new aircraft design into the marketplace must first produce prototype aircraft that are subjected to an intense program of both flight and static testing to prove the design's conformity to the certification standards contained in the FARs. Once this test program is completed to the satisfaction of the FAA, an FAA *Type Certificate* is issued, approving the design. Next, the manufacturer's production facilities and quality assurance program are submitted to FAA scrutiny. The agency must be convinced that the manufacturer's production and inspection methods are adequate to ensure that each aircraft produced will precisely replicate the design for which the type certificate was issued. Once this is accomplished, the FAA issues a *Production Type Certificate* and manufacturing can proceed. Next, each



Figure 1-1. If it has an “N-number,” a title search through the FAA Aircraft Registry and the International Registry can reveal who owns it and who has recorded liens against it.

aircraft produced is inspected and tested for conformity with the original design and receives an FAA *Airworthiness Certificate* before being delivered to the customer. Subsequent modifications and improvements to the design require additional FAA certification, through amendments to the Type Certificate, by issuance of a *Supplemental Type Certificate*, or by a one-time field approval for modification of an individual aircraft under an FAA Form 337.

3. Registration

The FAA also operates a single centralized registry for all civil aircraft in the United States and for certain powerful aircraft engines and propellers. The FAA Aircraft Registry in the FAA Aeronautical Center in Oklahoma City maintains files on every aircraft that has ever been issued an “N-number” signifying U.S. registry (*see* Figure 1-1). The files include the entire history of the sequence of owners of the aircraft and other legal interests in the aircraft, such as liens and encumbrances. The utility and importance of this registry is explored in greater detail in Chapter 11, along with its connection to the new International Registry applicable to certain aircraft. The agency also has a separate registry for UAS.

Since December 2015, the FAA has maintained a registry for owners of uncrewed aircraft systems (UAS), both hobbyists and commercial remote pilots. 14 CFR Part 48 allows for online registration as well as paper submissions if your UAS weighs more than 0.55 pounds.

4. Security

The *Aviation and Transportation Security Act* transferred the FAA's former air carrier security function to the TSA, but in that act, Congress ordered the FAA to improve flight deck security by requiring airlines to strengthen flight deck doors and keep them locked except as necessary to permit authorized persons to enter or exit, and to develop guidance for training flight deck and cabin crews to deal with threats. Congress also ordered the FAA to explore the use of video monitors in the cabin, along with methods to prevent disabling of the aircraft's transponder in flight (as the 9/11 hijackers had done, to make tracking the aircraft more difficult) and improved methods for cabin crews to alert the flight deck of security breaches and other emergencies.

5. Cartography

Responsibility for the production of government aeronautical charts, once the domain of the Department of Commerce's National Ocean Service (NOS), has been transferred to the FAA. Along with that transfer of responsibility, over 300 NOS employees were transferred to the FAA's then-new National Aeronautical Charting Office (NACO). (Since then the office was renamed the Aeronautical Products Department ["AeroNav"] and more recently changed again to "Aeronautical Information Services [AIS]").

6. Education

The FAA educates members of the aviation community on new developments and matters pertaining to aviation safety through a system of publications, such as the advisory circulars (AC), and through safety seminars and recertification programs for flight instructors, pilot examiners, mechanics holding inspection authorization, and others through the "FAASTeam." The FAA also trains its own employees at the FAA Academy in the Aeronautical Center in Oklahoma City and numerous programs at its various facilities.

7. Funding

Under the Airport Improvement Program (AIP), the FAA distributes federal matching funds for the construction of new airports, the improvement of existing airports, and related airport planning. These funds are appropriated by Congress from the Aviation Trust Fund comprising the proceeds of aviation fuel taxes paid by general aviation and passenger ticket taxes paid by persons traveling on U.S. commercial airlines. This funding program administers a trust fund currently valued at approximately \$15 billion, generally expended at a rate of over \$3 billion per year, and is discussed in greater detail in Chapter 13.

8. Investigation

The FAA investigates virtually all civil aircraft accidents in the United States, as well as some accidents outside the country involving U.S. built civil aircraft, in connection with the agency's air safety regulation and enforcement function. As more fully discussed in Chapter 10, the FAA also performs the on-site investigation of general aviation aircraft accidents under delegated authority on behalf of the National Transportation Safety Board (NTSB). The NTSB, however, has the exclusive authority to make the federal government's official finding of the "*probable cause*" of all civil aircraft accidents, regardless of whether the factual investigation was conducted by NTSB or FAA personnel.

The FAA also investigates incidents in which aviation safety may have been jeopardized but no accident occurred, such as when two aircraft pass within such proximity as to create a collision hazard. The FAA also investigates all reports of violations of the Federal Aviation Regulations. This process of investigation and enforcement in connection with alleged FAR violations is described in detail in Chapter 2.

9. Operations

The FAA operates a great variety of aviation facilities and equipment, including:

a. The Air Traffic Control (ATC) System

This system includes airport control towers, terminal radar approach control (TRACON or Approach) facilities, en route Air Route Traffic Control Centers (ARTCC or Center), the Air Traffic Control System Command Center (formerly known as Central Flow Control), and

Flight Service Stations (FSS). There are some control towers operated by private enterprise and local governments at airports that do not meet activity-level criteria to qualify for a federal control tower, but most control towers and all TRACONs and Centers are FAA operated (*see* Figure 1-2). At this writing, Leidos Holdings, Inc. is operating the FSS under contract to the FAA.

Since 2016, the FAA's Office of Commercial Space Transportation has been working closely with the Department of Defense to develop options to create a civil space traffic management system. This would be founded on non-security focused paradigms and would promote norms of behavior as well as support national interests in space together with commercial and civil needs.

In the July 2018 FAA roadmap for the integration of civil UAS into the National Airspace System (NAS), the FAA is clear about its work with NASA to create a UAS Traffic Management (UTM) for U.S. airspace. This lines up with the mandate in the *FAA Reauthorization Act of 2018* to the FAA to create regulations for delivery of packages for compensation or hire by UAS (discussed in greater detail in chapter 19).



Figure 1-2. Most ATC facilities, such as this control tower at the Cheyenne Regional Airport in Wyoming, are operated by the FAA, although some towers at airports that are not busy enough to qualify for a federal tower are operated by private corporations under contract to local governments. More privatization of the ATC function is possible, as lawmakers search for ways to reduce federal spending.



Figure 1-3. Ronald Reagan Washington National Airport with national capital building visible in the background to the left of tower. (*Washington Metropolitan Airport Authority photo*)

b. Radio Aids to Navigation

The FAA also operates a vast network of ground-based radio aids to navigation (“NAVAIDs”), including radio beacons guiding aircraft over long distances (such as VORs and VORTACs), non-directional beacons (NDB) for imprecise navigation to some airports, and others that lead aircraft precisely to the runway in all weather, such as instrument landing systems (ILS), microwave landing systems (MLS), and the wide-area augmentation systems (WAAS) to improve the accuracy and reliability of satellite-based global positioning systems (GPS). The Department of Defense operates the constellation of GPS navigation satellites. The Coast Guard operated the Loran C navigation aids until 2010, when it discontinued that service in favor of satellite-based navigation. Local governments also operate some NAVAIDs, particularly NDBs, and private industry also owns and operates some approach aids, with several airlines having proprietary ILS or MLS equipment at remote airports they serve. With the increasing industry reliance on GPS navigation and impending implementation of the next generation air traffic control system (NextGen), it appears likely that a phase-out of many of these ground-based NAVAIDs may begin in this decade. In 2022, the FAA announced its VOR Target Discontinuance List, with some 311 VORs set to be shut down by 2025.

c. National Airports

For many years, the FAA was the operator of two of the major Washington, D.C., air carrier airports designated as the “National Airports” (Reagan—formerly known as Washington National—and Dulles). These airports are now operated by the Washington Metropolitan Airport Authority (Figure 1-3).

d. Aeronautical Center

The FAA’s Mike Monroney Aeronautical Center in Oklahoma City is a major record-keeping and training facility. There, you will find the Aircraft Registry (discussed more fully in Chapter 11), which maintains the records of ownership and other legal interests in every civil aircraft ever registered in the U.S. (*see also* Figure 1-1 and accompanying text); the Airman Records Branch, which keeps a dossier on every person ever issued an FAA certificate; the FAA Academy, which trains air traffic controllers, air safety inspectors, and other FAA personnel; and the

Civil Aviation Medical Institute (CAMI), which reviews and develops medical certification standards along with drug and alcohol testing policy for persons in the aviation industry.

e. Technical Center

The William J. Hughes Technical Center (formerly known as the National Aviation Facility Experimental Center or NAFEC), located near Atlantic City, New Jersey, is the site of the scientific test base for FAA research and development, test and evaluation activities relating to air traffic control, communication, navigation, airports, aviation security, and flight safety. The facility is deeply involved in shaping the NextGen air traffic system. The FAA does no basic research on aircraft and flight system technologies, these being within NASA's area of research responsibility. Where FAA and NASA research and development (R&D) responsibilities abut or overlap, the two agencies work together closely to coordinate their efforts without duplication, conflict, or waste. Throughout the federal government there is increased emphasis on interagency cooperation. Examples in aviation include Safer Skies, an FAA initiative that involved a wide range of government and industry organizations in an effort to improve the safety record of general and commercial aviation. The initiative is developing recommendations for changes in training, technology, and procedures with the goal of reducing general aviation accidents. The Safer Skies initiative also led the FAA, NTSB, NASA, and a variety of industry associations to form the General Aviation Data Improvement Team (GADIT) to gather better data on general aviation accidents, especially those involving human factors. Another example is the Advanced General Aviation Transport Experiments (AGATE), a consortium of industry, higher education, and government entities (organized by NASA and including the FAA) focusing on developing technologies for general aviation. AGATE is intended to help revitalize the general aviation industry by advancing the use of new technologies in aircraft and developing new training methods for pilots. A related NASA program, the Small Aircraft Transportation System (SATS), is discussed later in this chapter in the section describing that agency.



Figure 1-4. Many airliners are sprouting winglets such as these, originally developed by NASA, to improve fuel efficiency.

National Transportation Safety Board (NTSB)

([ntsb.gov](https://www.ntsb.gov))

The National Transportation Safety Board is an independent federal agency whose primary responsibility is to investigate transportation accidents, determine the “probable cause” of each accident, and recommend to the appropriate regulatory agencies (in the case of aviation, the FAA) measures that might prevent similar accidents in the future. Like the Department of Transportation, the NTSB’s duties cover a broad range of civil transportation modes, including aviation, highway, marine, pipeline, and hazardous materials transportation accidents.

The NTSB is one of the smallest federal agencies, having only about 400 employees, only a fraction of whom are trained aircraft accident investigators. Therefore, the board must frequently delegate its on-site aircraft accident investigation duties to the better-staffed FAA. This is done particularly in non-fatal general aviation accidents, to allow the

NTSB field investigators to concentrate on airline and other high-profile civil aviation accidents.

Regardless of which agency's employees conduct the on-site investigation, it is always the NTSB that must analyze the information and make the official finding of the probable cause of the accident. This process is discussed in greater detail in Chapter 10.

The NTSB also has the responsibility for coordinating and integrating the resources of the federal government and other organizations (such as the American Red Cross) to support the efforts of state and local governments and the airline to meet the needs of airline disaster victims and their families.

The NTSB also serves as the first level of appeal in cases where the FAA has taken enforcement action to suspend or revoke a certificate or, under certain circumstances, to impose a fine. This process is discussed in Chapter 2.

National Aeronautics and Space Administration **(NASA)** (nasa.gov)

Although NASA's name most commonly brings to mind the agency's space exploration activities, NASA continues to make important contributions in the areas of aerodynamics and aviation technology. In aerodynamics, NASA research & development led to the supercritical airfoil now in general use on high-performance aircraft (in both wing and propeller cross sections) and the "Whitcomb winglet" (Figure 1-4), both of which increase aircraft efficiency and conserve aviation fuels. Much of the basic research that led to successive generations of increasingly quiet and fuel-efficient high bypass ratio fanjet engines was done at NASA.

The agency is also conducting research into alternative aviation fuels, helicopter blades made of shape-changing materials to reduce noise and smooth out the ride, blended wing/fuselage technology to improve the efficiency and reduce the carbon emissions and noise footprint of subsonic jet transports (*see* Figure 1-5), and the design and propulsion of a second-generation (the British Aerospace Concorde, now retired from service, being the first) supersonic or hypersonic transport. NASA research and development efforts in aviation have also led to advanced flight control and aircraft deicing systems, along with improvements in

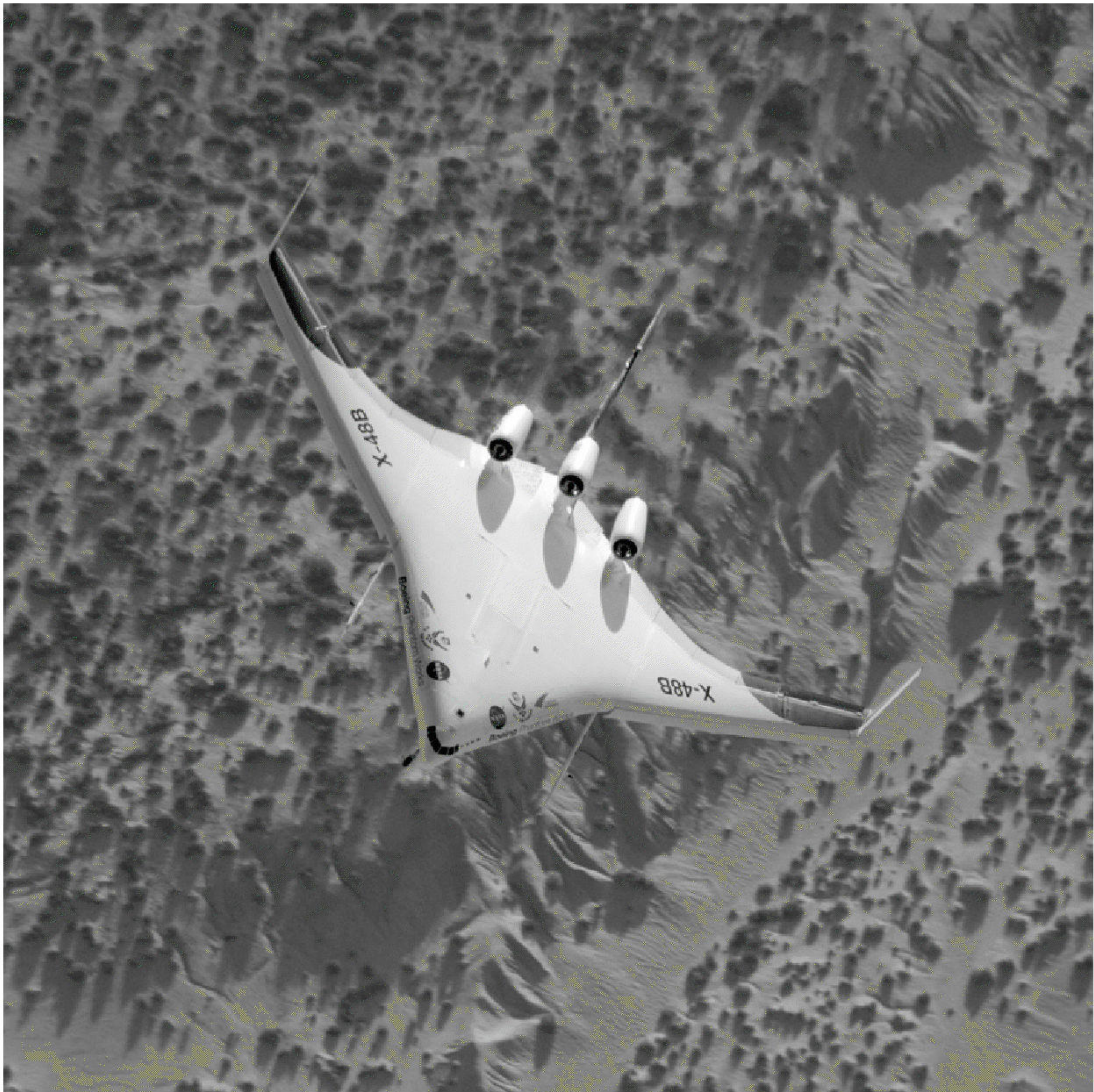


Figure 1-5. NASA is currently researching a blended wing body design for quieter and more efficient transport category jets. Here, a subscale X-48B is seen banking over desert scrub at Edwards Air Force Base. (NASA photo)

civil aircraft airworthiness. NASA is now providing research support in connection with development of the NextGen ATC system.

NASA's general aviation research activities focus on:

- Propulsion, noise and emissions improvements to reduce environmental impacts
- New flight deck displays to improve safety
- Advanced metals and composites for general aviation applications
- Aerodynamic improvements to increase aircraft speed, capacity, and fuel efficiency

Recent interrelated general aviation programs supervised or participated in by NASA include the Highway in the Sky program, intended



Figure 1-6.

The ergonomically designed high-tech “glass cockpit” in this very light jet (VLJ) exemplifies the ease of operation goals of the AGATE and SATS programs. (*Hyku Photo*)

to ease pilot workload and simplify air navigation through more sophisticated electronic displays; the Advanced General Aviation Transport Experiments (AGATE), focused on developing technologies for general aviation; and the Small Aircraft Transportation System (SATS) program, building on the others to demonstrate the viability of using increasingly sophisticated light general aviation aircraft (Figure 1-6), including very light jets (VLJs) (Figure 1-7), to affordably reduce many of the expected problems in the nation’s transportation system, such as increasing congestion on highways and at major airports served by the airlines, by providing point-to-point transportation between the thousands of existing public use airports not served by the airlines.

NASA also administers the confidential Aviation Safety Reporting Program (ASRP), designed to identify problems in the National Air Transportation System, especially those related to air traffic control. This program is described in greater detail in Chapter 2.



Figure 1-7. Very light jets, such as this Eclipse 500, may fulfill the vision of NASA’s SATS program of doubling the number of U.S. communities receiving air transportation. (*Copyright of Eclipse Aerospace, used with permission*)

On the space operations side, NASA and the FAA have distinct but interlocking safety regulation authority. The FAA is responsible for regulation and licensing of commercial space launch and re-entry operations, primarily to assure safety of persons and property on the surface and in the airspace during those operations, but lacks regulatory authority over the airworthiness/spaceworthiness of the spacecraft (at least for now, early in the learning curve of these operations). NASA retains authority to set safety standards (so-called “man-rating”) for any spacecraft that will carry NASA astronauts or visit any NASA destination (such as the International Space Station). The two agencies closely coordinate their activities and share their respective stores of specialized knowledge and experience in this area.

Civil Aeronautics Board (CAB)

Formerly the powerful and pervasive regulator of airline economics, including routes flown and routes served by U.S. airlines and foreign airlines serving the U.S., the CAB was gradually wound down as a result of Congress’ passage of the *Airline Deregulation Act of 1978*. The CAB finally ceased to exist on January 1, 1985.

Before deregulation, the Public Utilities Commissions (PUCs) of most states also exercised tight regulatory control over the economic aspects of intrastate operations of air carriers, duplicating the CAB’s controls over interstate and foreign transport for air carriers operating within the states. For example, in Colorado there is a niche market for air transportation between Denver and the state’s ski resort areas. One airline focusing on serving this market was Rocky Mountain Airways (RMA), which operated only within Colorado. Before adding or deleting service between any two points within Colorado, RMA was required to obtain a certificate of public convenience and necessity from the state’s PUC. Before setting or changing the fare to be charged on any of these routes, RMA was required to obtain PUC approval. This duplicative, expensive, and time- and resource-wasting state regulatory process was specifically preempted by the *Deregulation Act*, which prohibited all states *except* Alaska (which, due to its size, geography, and extremely limited highway system, is uniquely reliant on commercial air transportation) from regulating the economics of federally certificated air carriers (rates charged and routes served, for example).

This federal preemption does not, however, extend into the areas of registration and taxation of aircraft, so that state aircraft registration requirements and state personal property or specific ownership taxes on aircraft are lawful and commonplace. Typical state aircraft registration and taxation programs are discussed in Chapter 11.

Air Transportation Stabilization Board (ATSB)

Only 11 days after the terrorist attacks of September 11, 2001, Congress passed the *Air Transportation Safety and System Stabilization Act* to compensate victims of the attacks for their losses and to aid the recovery of U.S. airlines from the financial consequences of the attacks. Victim compensation provisions of the Act are discussed in detail in Chapters 8 and 9.

The Act created the Air Transportation Stabilization Board, composed of the Secretary of Transportation, Chairman of the Board of Governors of the Federal Reserve System (designated as Chair of the ATSB), Secretary of the Treasury, and Comptroller General of the United States (as a nonvoting member), or their designees.

The ATSB was empowered to issue up to \$10 billion in federal loan guarantees to the airlines and to compensate the airlines up to \$5 billion for direct losses resulting from federal action grounding the airlines in the wake of the attacks.

National Mediation Board (NMB) (nmb.gov)

Unlike most other industries, labor-management relations in the airlines (and railroads) are governed not by the National Labor Relations Board (NLRB) under the *National Labor Relations Act*, but by the National Mediation Board under the *Railway Labor Act of 1926*, made applicable to common carriers by air in 1936. The NMB supervises union efforts to organize workers, elections, and conducts the compulsory mediation procedures the RLA requires as a mandatory step toward resolving major labor-management disputes within the airline industry. These procedures are discussed in detail in Chapter 17.

National Labor Relations Board (NLRB) (nlrb.gov)

The NLRB regulates labor-management relations in all U.S. industries except the airlines and railroads. Thus, the NLRB supervises union organizing efforts and elections, and rules on unfair labor practice claims in the aerospace manufacturing industry and general aviation (except general aviation operators conducting common carrier operations, such as on-demand charters and emergency medical air transportation). The NLRB's regulations and procedures are discussed in some detail in Chapter 16.

Office of Personnel Management (OPM) (opm.gov), **Federal Labor Relations Authority (FLRA)** (flra.gov), and **Merit System Protection Board (MSPB)** (mspb.gov)

These agencies have roles in regulating labor-management relations of federal employees, such as FAA air traffic controllers and air safety inspectors.

The OPM establishes the rules and procedures and practices for federal employment, the FLRA oversees union organizing and collective bargaining by federal employees, and the MSPB hears appeals of federal employee grievances—such as those filed by thousands of former FAA air traffic controllers whose employment was terminated as a result of their participation in an illegal strike by the Professional Air Traffic Controllers Association (PATCO). These agencies are discussed in greater detail in Chapter 16.

Federal Trade Commission (FTC) (ftc.gov) **and Department of Justice (DOJ)** (usdoj.gov)

The Federal Trade Commission and Department of Justice police all industries for anticompetitive practices. In aviation, this mostly involves airline and aerospace manufacturer mergers and acquisitions and collusion among competitors in price-fixing.

The Department of Justice is also responsible for investigation and prosecution of federal crimes relating to aviation, such as aviation security and bogus parts cases. Crimes relating to aviation are discussed in Chapters 2 and 15.

In the *Aviation and Transportation Security Act*, Congress also directed the National Institute of Justice, the research and development branch of the Department of Justice, to assess potential use of nonlethal weapons by flight deck crewmembers to temporarily incapacitate intruders.

Customs and Border Protection (CBP) (cbp.gov)

U.S. Customs and Border Protection (CBP) is the largest federal law enforcement agency and is part of the Department of Homeland Security. CBP is responsible for preventing terrorists and terrorist weapons, unauthorized persons, illegal drugs, and other contraband from entering the United States.

The *Aviation and Transportation Security Act* required all airlines providing international air transportation to the United States to secure their computer reservation systems against unauthorized access and to electronically transmit passenger and crew manifests to U.S. Customs prior to departure. Under the Secure Flight Program, implementation of which began in early 2009, the TSA now screens the names on these lists against its “watch list” of known and suspected terrorists to identify persons who should be prevented from boarding (the No Fly List) or who should undergo additional security scrutiny (the Selectee List).

The CBP’s Office of Air and Marine (OAM), formed in 2005 to consolidate several federal law enforcement aviation programs, is the world’s largest civilian law enforcement air force, with over 700 pilots operating more than 272 aircraft of 22 different types (including uncrewed aircraft systems) (Figure 1-8). The division’s mission is to detect, interdict, and prevent acts of terrorism and the unlawful movement of people, illegal drugs and other contraband toward or across the borders of the United States, and to conduct air operations in support of other federal, state, and local needs, such as disaster relief. CBP’s activities are focused along U.S. borders.

Immigration and Customs Enforcement (ICE) (ice.gov)

Another DHS agency, working in close coordination with CBP and the U.S. Marshals Service, ICE law enforcement activities focus more on identification and apprehension of removable aliens, detention and removal of illegal aliens who are already within the United States. It

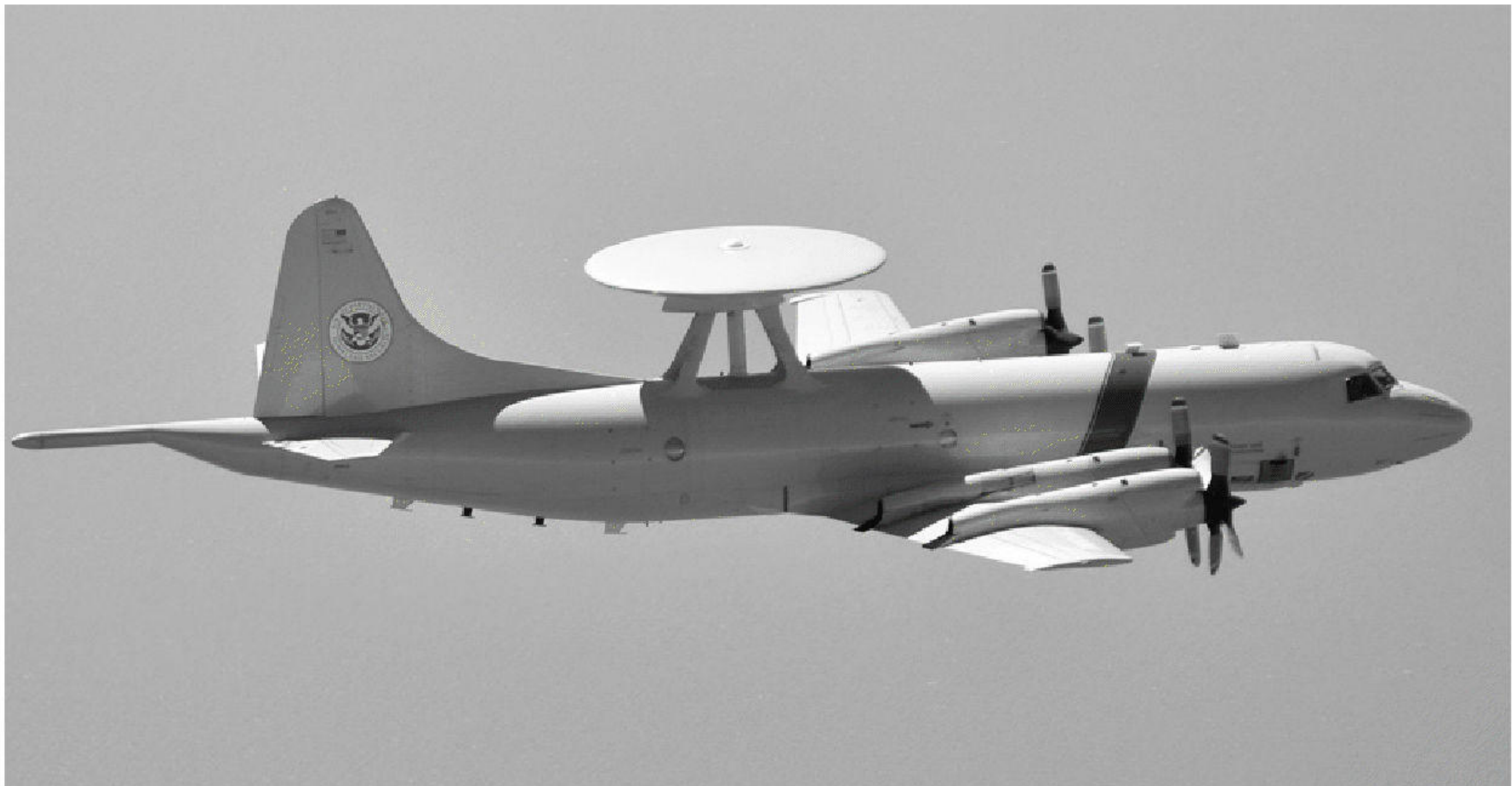


Figure 1-8. U.S. Customs and Border Protection Lockheed P-3 Orion on offshore patrol. (*Customs and Border Protection Photo*)

prioritizes the apprehension, arrest and removal of convicted criminals, those who pose a threat to national security, fugitives, and recent border entrants. It is also the first point of contact for individuals seeking asylum in the United States.

ICE removal (deportation) activities are directed by ICE Air Operations (IAO), which utilizes commercial airlines and air charter services (often referred to as “Ice Air”) to transport such individuals both domestically and for repatriation worldwide.

Occupational Safety and Health Administration (OSHA) (osha.gov)

An office within the Department of Labor (DOL), OSHA regulates safety and health in the American workplace, publishing and enforcing specific health and safety regulations, requiring employers to keep records of all workplace injuries and accidents, and inspecting workplaces to ensure compliance. OSHA is empowered to assess fines for violations and order employers to correct unsafe conditions.

The *Occupational Safety and Health Act*, which created and empowered OSHA, also imposed on employers a general obligation to keep their workplaces free from hazards that could cause serious harm to employees.

In the aviation and aerospace industries, OSHA had generally confined its inspection activities to aerospace manufacturing facilities and airline ground operations, but in 2013 the agency adopted new workplace safety rules for required aircraft cabin (but not flight deck) crewmembers, whether operating under 14 CFR Part 121, 135, or 91 rules. OSHA and the FAA are cooperating in developing minimally intrusive inspection and enforcement protocols for these new in-flight standards.

Overall, OSHA's approach appears effective. In 1900, about 35,000 American workers died at work, but although a century later the workforce had increased by a factor of five, the number of annual workplace deaths had dropped to about 5,500.

National Institute of Industrial Occupational Health & Safety (NIOSH) ([cdc.gov/niosh/](https://www.cdc.gov/niosh/))

Although also involved with the same subject matter, unlike OSHA, NIOSH has no regulatory authority. A part of the Department of Health and Human Services, Centers for Disease Control (CDC), NIOSH can be considered the research arm of the federal government in this area of concern. It works closely with OSHA, the FAA, and others to identify and research on-the-job safety risks, develop training materials, and make recommendations to the relevant rule makers and industries.

NIOSH has an Aviation Safety Program that has researched and provided training materials on such subjects as commuter and air taxi operations in Alaska, pilot fatigue, controlled flight into terrain, mid-air collisions, aircrew health and safety, and wildland firefighting.

The State Department ([state.gov](https://www.state.gov/)) **and the President** ([whitehouse.gov](https://www.whitehouse.gov/))

The State Department negotiates treaties between the United States and other nations. Examples relating to aviation include treaties relating to air piracy and air transport agreements providing for reciprocal international air service. Once the State Department has negotiated a proposed treaty, it must be approved and executed by the president and ratified by the Senate.

Foreign air carriers designated by their country to provide service to the U.S. under an international air service agreement must receive a

foreign air carrier permit before commencing operations to the U.S. The DOT issues these permits, after consultation with the State Department and subject to presidential approval. The president may disapprove a specific foreign carrier only for foreign relations or national security reasons, such as when the carrier's security practices are deemed overly lax.

STATE ADMINISTRATIVE AGENCIES

State governments are also free to regulate commerce, as long as state rules do not conflict with federal law or unduly burden interstate or foreign commerce. (See Chapter 13 for detailed discussion of the application of this concept to the regulation of airport operations and airspace use.)

In one example of permissible state regulation, Florida's Department of Environmental Protection (DEP) initiated enforcement action against Embry-Riddle Aeronautical University (ERAU) for the age-old and then industrywide practice of "sumping and dumping." It is a crucial step in the preflight inspection of any powered aircraft to drain small fuel samples from the aircraft's various fuel sumps to check for water, debris, and other possible contaminants, as well as to verify (by color and odor) that it is the correct type of fuel for that aircraft ("sumping"). For virtually the entire first century of powered flight, it was routine practice throughout at least the general aviation community to then discard each small collected sample by pouring it on the ground ("dumping"). The problem is that fuel is toxic, flammable, and corrosive, which qualifies it as *hazardous waste*. Although most of such a small sample of dumped avgas evaporates, some (including the tetraethyl lead additive) remains to run off into the soil and water, making the practice an unlawful disposal of hazardous waste, punishable by a fine of up to \$50,000 per day under Florida law—enough to motivate anyone to make a focused effort to break an old bad habit. In consideration of ERAU partnering with DEP and the Aircraft Owners and Pilots Association (AOPA) to develop an educational campaign to persuade pilots to break this old bad habit, the state reduced the university's fine for the past illegal practice.

The *Occupational Safety and Health Act* that created OSHA as a federal administrative agency also empowered states to take responsibility for enforcing occupational safety and health standards through OSHA-approved state plans. At this writing, 22 states or territories

have OSHA-approved state plans that cover both private and state and local government workers, and 5 additional states and 1 U.S. territory (Virgin Islands) have OSHA-approved state plans that cover state and local government workers only.

INTERNATIONAL REGULATION

International Civil Aviation Organization (ICAO)

(icao.int)

Although not technically a regulatory agency, the International Civil Aviation Organization, an organ of the United Nations and headquartered in Montreal, has a profound worldwide effect on aviation standards.

ICAO was organized in late 1944 at the Chicago Conference. There (with World War II still raging in Europe and the Pacific), representatives of 52 allied and neutral nations gathered to chart global civil aviation's postwar course.

The two specific goals of the gathering were:

1. *Establishment of international technical standards* for airworthiness certification, flight crew certification, communications, and radio aids to navigation, and
2. *Establishment of principles and procedures for the economic regulation* of international civil aviation's routes, fares, frequency, and capacity.

The delegates' philosophy was clearly expressed in the preamble to the resulting treaty, the *Convention on International Civil Aviation* (also known as the *Chicago Convention*):

WHEREAS the development of international civil aviation can greatly help to create and preserve friendship and understanding among the nations and peoples of the world, yet its abuse can become a threat to the general security; and

WHEREAS it is desirable to avoid friction and to promote that cooperation between nations and peoples upon which the peace of the world depends;

THEREFORE, the undersigned governments having agreed on certain principles and arrangements in order that international

civil aviation may be developed in a safe and orderly manner and that international air transport services may be established on the basis of equal opportunity and operated soundly and economically;

HAVE ACCORDINGLY concluded this Convention to that end.

Today, virtually all nations (at least 193) have signed the *Convention on International Civil Aviation* and become members of ICAO. The organization has succeeded famously in achieving the first goal. ICAO-adopted technical standards, known as international Standards and Recommended Practices (SARPs), are published in a series of documents known as *Annexes* to the treaty. The smooth and efficient functioning of international civil aviation is largely attributable to ICAO's work. Wherever you fly on earth, you have ICAO to thank for communication and navigation systems that are compatible with the equipment in your aircraft and for the ability to communicate with air traffic controllers in the English language (an area ICAO has targeted for further improvement, because ATC English capabilities still vary widely across the globe). ICAO has also developed internationally accepted standards for the transport of hazardous materials by air and is actively pursuing agreement to achieve international harmonization of aircraft certification and operating rules as a goal to help reduce airlines' operating costs.

ICAO's Technical Cooperation Programme provides technical expertise, consultation, training, and airport and airway equipment to developing countries.

Concerns over global environmental deterioration brought ICAO to the forefront of organizations and businesses collaborating to minimize aviation's impact on the problem (quantified as about 2 percent of the greenhouse gas emissions contributing to global warming, but probably disproportionately effective in exacerbating the problem, since much of these emissions occur at the upper levels of the atmosphere). Frustrated by a lack of progress in efforts to achieve a global solution to greenhouse gas emissions, the European Union (EU) adopted the market-based cap-and-trade Emissions Trading Scheme (ETS), with civil aircraft to be included in 2012. The EU ETS—which would apply to the entire length of any flight into, out of, or through EU airspace—provoked a firestorm of adverse response that brought the world to the brink of a global trade war over the issue. Russia denied overflight rights to

EU-based Finnair, China refused to pay for and accept delivery of 30 completed jetliners from EU-based Airbus, the U.S. Congress passed legislation prohibiting U.S. airlines from participating in the EU scheme, and India and other nations voiced objections to the EU and considered retaliatory options. ICAO had long sought a global solution for civil aviation emissions, but was making no progress toward achieving consensus. When this unilateral action by the EU raised such ire, the organization rapidly ramped up its effort and the EU postponed the effective date for application of its ETS to civil aircraft until after the ICAO governing body's next meeting, the ICAO Assembly in the fall of 2016, to give the organization a chance to resolve the issue. In December 2022, a political agreement between the European Parliament and the Council was reached to help make the aviation sector "Fit for 55," which sets in law its contribution to the target of reducing net greenhouse gas emissions by at least 55 percent by 2030.

Accomplishments in the area of the Chicago conferees' second goal were less sweeping, but significant. At that 1944 conference, the United States sought basically a free global market for the airlines, proposing that the nations of the world agree to recognize the Five Freedoms of the Air (*see* Figure 1-9).

Although much of the world might jump at such a generous offer today, to gain greater access to comparatively lucrative U.S. markets, in late 1944 the U.S. was poised to dominate the international airline industry at war's end. At the beginning of World War II, there were only 365 transport aircraft in the U.S., but by war's end the U.S. had produced over 300,000 aircraft, of which over 11,000 were transports such as the C-47 (DC-3) and C-54 (DC-4), most of which would be taken out of service and disposed of as surplus shortly after the war's end. In the same time period, the U.S. had trained hundreds of thousands of aircrew members, including pilots, navigators, and loadmasters, along with mechanics, weather forecasters, dispatchers, and other essential support personnel. Many of these had operating experience on international routes and at foreign bases, and most would be mustered out of the armed forces and on the civilian job market shortly after the end of the war.

It would have required little more than a change of aircraft paint and crew uniforms to transform that military airlift fleet into civil airlines

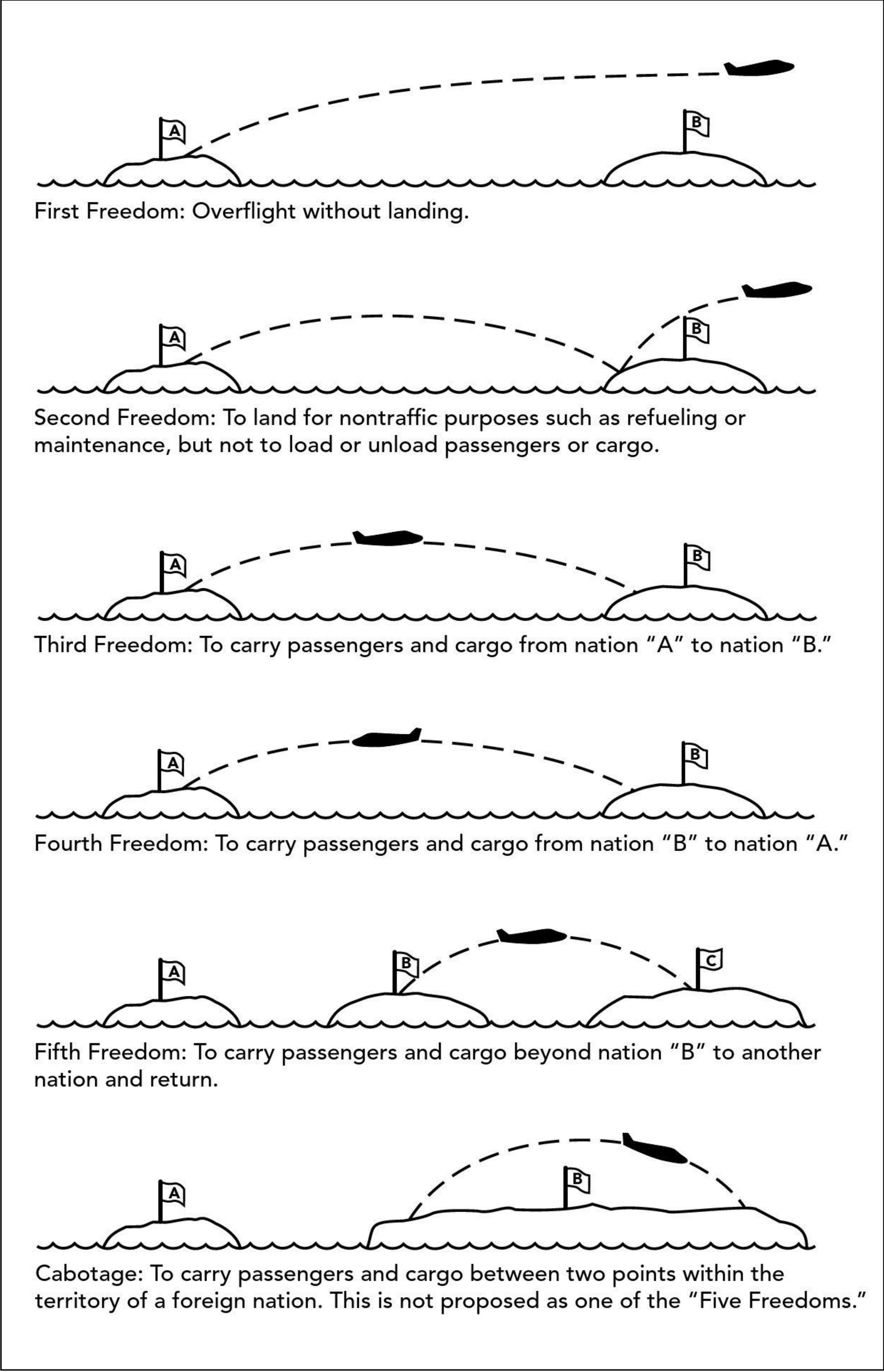


Figure 1-9. The Five Freedoms of the Air, illustrated for an airline of nation A.

having a greater capacity than all of the other nations could hope to muster for many years. And unlike the other major powers on both sides of the war, America's aircraft manufacturing industry emerged intact, with plants undamaged, new designs in progress, and (with the abrupt cancellation of military orders) excess capacity to produce those new transports.

Thus it is not surprising that national protectionism prevailed over free market competition. The conferees agreed only on the principle of international sovereignty in airspace, providing that no scheduled international air service may be operated over or into a nation or its airspace without its permission.

A separate agreement known as the *Transit Agreement* was also signed at that time in Chicago by fewer than all of the conferees, agreeing to the first two Freedoms (overflights and nontraffic stops). Foremost among the nonsigners were the security-obsessed nations of the communist bloc (also understandable, considering the devastation they had received and were still receiving from Axis air power). The other Freedoms were left to be negotiated between individual nations, although as part of the Chicago Conference, ICAO did develop a standard form of bilateral (between two nations) agreement for exchange of air routes. The form has been widely used since and is generally recognized as a significant contribution to the high degree of consistency in commercial international air service agreements for well over a half-century. According to ICAO, over 3,500 bilateral air service agreements are in effect today.

Additional Freedoms discussed since the Chicago conference and included in some bilateral and multilateral (between more than two nations) air service agreements are:

- **Sixth Freedom:** The right to carry traffic from one nation through the homeland and on to a third nation.
- **Seventh Freedom:** The right to carry traffic between two foreign nations without going through the home country.
- **Eighth Freedom:** (Also called *cabotage*.) The right to carry traffic between two points in a foreign country, such as if a European airline were permitted to operate commercial flights between New York and Los Angeles. If the origin and destination are located in geographically separated parts of that