# 2

# Historical Perspective



**Chapter Checklist • You Should Be Able To:**

- Discuss some of the early attempts to provide air mail service in the United States
- Explain the significance of the Kelly Act and the Air Commerce Act of 1926
- Identify some of the breakthroughs in commercial aircraft development from 1918 to 1958
- Describe the events that led to the development of commercial jet air transportation
- Summarize the major economic developments in air transportation during the four decades from 1938 to 1978
- Discuss the reasons the federal government got into the business of regulating the air carriers
- Understand the significance of the federal legislation leading up to deregulation in the 1970s
- Give a brief summary of the deregulation movement before the Airline Deregulation Act of 1978
- Describe the major provisions of the Deregulation Act of 1978

- Identify some of the changes that took place in the airline industry during the two decades following deregulation
- Discuss early general aviation and how Beech, Cessna, and Piper began
- Explain the reasons for the decline in general aviation aircraft sales starting in the late 1970s
- Understand the impact of the events of September 11, 2001, on the aviation industry
- Introduce the concept of new aircraft technology for the 21st century

## INTRODUCTION

In 1914, most of the world was too preoccupied with World War I to notice that for a fare of $5 (more if the passenger weighed over 200 pounds), a person could buy a ticket for a one-way trip in an open-cockpit Benoist flying boat that flew across Tampa Bay, connecting Tampa and St. Petersburg. The land journey took an entire day; the flight took about 20 minutes. On January 1, 1914, the mayor of St. Petersburg became the first passenger on a regularly scheduled airline using heavier-than-air aircraft in the United States. Financed by P. E. Fansler and flown by Tony Janus, this primitive operation folded after four months when it ran into financial trouble. A humble beginning for the now-giant industry.

Between 1912 and 1916, the Post Office Department made several attempts to obtain federal appropriations for the transportation of mail by air, but no appropriations were granted until 1916. In that year, Congress made funds available for the establishment of proposed air mail routes, several in Alaska and one between New Bedford, Massachusetts, and Pawtucket, Rhode Island. The Post Office Department issued ads inviting bids on the routes, but no bids were forthcoming because of the lack of planes suitable for the services.

The development of large bombing planes during World War I demonstrated that the airplane could be used for fast commercial and mail transportation. In 1918, Congress appropriated $100,000 to the Post Office Department for the development of an experimental air mail service and for the purchase, operation, and maintenance by the Post Office Department of what were referred to as "aeroplanes." Thus was born the air transportation industry.

## THE FORMATIVE PERIOD: 1918–1938

After preliminary studies, the first regular air mail route in the United States, 218 miles in length, was established on May-15, 1918, between New York City and Washington, D.C. One round trip was made every day except Sunday, and an intermediate stop in Philadelphia enabled the receipt and discharge of mail and the servicing of the planes. The service was conducted jointly by the United States War Department and the Post Office Department. The War Department furnished the planes and pilots and performed the operation and maintenance, and the Post Office Department attended to the sorting of the mail, its transport to and from the airport, and the loading and discharge of the planes. This joint arrangement continued until August 12, 1918, when the Post Office Department assumed exclusive responsibility for the development of a larger-scale mail service.

The New York–Washington air mail route was discontinued on May 31, 1921, because of the need for economy and the failure of Congress to specifically authorize the route.

### *The Post Office Department Service*

When the Post Office Department took over the entire air mail service in 1918, including personnel and equipment and the complete operation and maintenance of the domestic air mail service, it shouldered a formidable task. This period in the history of the air mail service represented a trial stage during which the Post Office Department experimented with airplane equipment, weather service, night flying, flying and ground service arrangements, routes, postage rates, and other areas in which additional data were

required before the service could be placed on a sound basis and operated nationwide over regular routes. Initially, the Post Office Department acquired a number of airplanes from the War and Navy Departments, rebuilding or remodeling the planes to transport mail. Safety and carrying capacity were the principal qualities sought when selecting or remodeling the planes. Later, the Post Office Department acquired planes especially designed for carrying mail. The success of the first experimental route led to the extension of the service through the establishment of a transcontinental route between New York City and San Francisco.

Weather conditions were one of the most serious difficulties faced in establishing the air mail service. The Weather Bureau of the Department of Agriculture was enlisted to provide the pilots with adequate weather information. Improvements were made in the design of planes, in airplane motors, and in airway marking and communication facilities, which made it possible to operate the air mail service in weather that would have prevented flying in the early years of the service.

One of the many contributions of the Post Office Department to the development of aviation during this period of experimentation and development was the demonstration of the practicability of regular night flying over regular routes on fixed schedules. In 1923, using data compiled by the War Department, the Post Office Department studied the feasibility of regular night flying. Army planes had done a considerable amount of night flying during the war. In addition, airplanes had been flown at night occasionally before these experiments, but regularly scheduled route flying had not been attempted.

A lighted airway was established between Cheyenne, Wyoming, and Chicago, and emergency landing fields were located along the airway and equipped with lights. Pilots made experimental night flights over the routes. In August 1923, a regular schedule of night flying was established between Chicago and Cheyenne, and in July 1924, regular night service was established on the transcontinental route.

Other Post Office Department air mail routes were added or discontinued as need for the routes was demonstrated or the lack of need became apparent. One of the most important routes, the overnight service between New York and Chicago, was established on a regular schedule of five nights a week in 1925 and on a nightly basis in 1926.

The Post Office Department experimented with various types of airplanes in actual flight conditions during this period. At first, planes that could be acquired by the government at nominal prices were used in air mail service. Later, the steady increase in volume of mail traffic necessitated the development of a type of plane capable of carrying more than 500 pounds. The government accepted competitive bids, and the Post Office Department began purchasing mail planes that were faster and that had twice the mail-carrying capacity of the earlier types.

By 1925, domestic air mail service in the United States had progressed to the point that the feasibility of regular service had been adequately demonstrated. Facilities for air transportation had been established, and the desirability of continued direct government operation or private operation under contract with the government was widely discussed. The U.S. government traditionally had arranged with railroads, steamship lines, and other carriers for the long-distance transportation of mail, with the Post Office Department providing the services incident to the collection, sorting, local transportation, and delivery of the mail.

## *Contract Mail Service*

The third stage in the development of air mail service was ushered in by the Contract Air Mail Act of 1925, the so-called Kelly Act, named after its sponsor, Clyde Kelly (see the section "Federal Legislation and the Airlines"). The Kelly Act authorized the postmaster general to enter into contracts with private citizens or companies for the transportation of mail by air.

Shortly thereafter, the joint congressional committee on civil aviation, which had been established at the request of the Department of Commerce, decried in its report how much the United States lagged behind Europe in aviation. In response to these findings, President Calvin Coolidge appointed a select board of prominent business leaders, headed by Dwight Morrow, to make recommendations regarding the development of aviation in the United States. The Morrow board essentially confirmed the findings of the joint committee and recommended the separation of civil and military aviation, with the former under the auspices of the Commerce Department. This pleased the secretary of commerce, Herbert Hoover, who was a strong proponent of aviation. Out of all this came the Air Commerce Act of 1926, which, in effect, got the federal government back into the aviation business, this time as a regulator of those budding carriers created by the Kelly Act (see the section on "Federal Legislation and the Airlines").

The Post Office Department first set up short **feeder routes** (designed to feed traffic into the main-line trunk route) between various cities and scheduled the start of a transcontinental **Columbia route** once the short lines were working satisfactorily. Businessmen, lured by the Kelly Act's allowance of 80 percent of the air mail revenue to the contractor who carried it, flooded the Post Office Department with more than 5,000 bids. From these, the department chose the operators of 12 feeder, or **CAM (contract air mail), routes** linking cities throughout the nation (see Figure 2-1).

On November 15, 1926, the Post Office Department advertised for bids on proposals for service on two sections of the transcontinental air mail route—the New York–Chicago and the Chicago–San Francisco sections. An acceptable proposal at a satisfactory rate of compensation for the Chicago–San Francisco section was submitted by the Boeing Airplane Company and Edward Hubbard. This service was later incorporated as the Boeing Air Transport Company. At first, no satisfactory bid was received for the New York–Chicago section, but on March 8, National Air Transport's bid was accepted.

Service on the Chicago–San Francisco route was relinquished to Boeing by the Post Office Department on June 30, 1927. Boeing's entry into commercial aviation had far-reaching effects. To clear the Rocky Mountains, Boeing produced a new airplane, the B-40, powered by the new air-cooled Pratt & Whitney 400-horsepower (hp) Wasp radial engine and equipped to carry two passengers in addition to its mail cargo. Subsequently, Boeing and Pratt & Whitney joined forces to become United Aircraft and Transport Company.

Service on the New York–Chicago route began on September 1, thus placing the air mail service in the same relationship with the Post Office Department as the mail service provided by the railroads, steamship lines, and other mail contractors.

The air mail contracts provided the genesis for several of today's airlines. Colonial Airlines, which won CAM route 1 between New York and Boston, was the predecessor of American Airlines. Western Air Express, operator of CAM 4 from Los Angeles to Salt Lake City, eventually became part of TWA. Northwest Airlines picked up CAM 9 from Chicago to Minneapolis after the original contractor gave it up. United absorbed the operators of


Columbia Routes:

Western Express Route – Boeing Air Transport – July 1, 1927

Eastern Express Route – National Air Transport – September 1, 1927

Feeder Routes:

| Route No. | Company | Route | Began Operating |
|---|---|---|---|
| CAM 1 | Colonial Airlines | New York – Boston | June 18, 1926 |
| CAM 2 | Robertson Aircraft Corp. | Chicago – St. Louis | April 15, 1926 |
| CAM 3 | National Air Transport | Chicago – Dallas | May 12, 1926 |
| CAM 4 | Western Air Express | Los Angeles – Salt Lake City | April 17, 1926 |
| CAM 5 | Varney Speed Lines | Elko, Nev. – Pasco, Wash. | April 6, 1926 |
| CAM 6 | Ford Air Transport | Detroit – Cleveland | February 16, 1926 |
| CAM 7 | Ford Air Transport | Detroit – Chicago | February 15, 1926 |
| CAM 8 | Pacific Air Transport | Los Angeles – Seattle | September 15, 1926 |
| CAM 9 | Charles Dickenson | Chicago – Minneapolis | June 7, 1926 |
| CAM 10 | Florida Airways Corp. | Atlanta – Jacksonville | September 14, 1926 |
| CAM 11 | Clifford Ball | Cleveland – Pittsburgh | April 21, 1927 |
| CAM 12 | Western Air Express | Pueblo, Colo. – Cheyenne, Wyo. | December 15, 1926 |

**FIGURE 2-1 The first contract air mail routes. Airline feeder routes were contracted to private operators in 1926. The transcontinental express sections were set up in 1927, and commercial air travel across the United States became a reality.**

two western carriers, Varney Speed Lines, operator of CAM 5, and Pacific Air Transport, operator of CAM 8. After a struggle to gain majority stock interest, United also gained control of the carrier along the eastern segment of the transcontinental route, National Air Transport, which had flown specially designed planes on CAM. In the midwest, the biggest name in automobiles, Henry Ford, emerged as a major force on the aviation scene by winning the contracts for CAM 6 and CAM 7 between Detroit, Chicago, and Cleveland. Ford's venture into aviation gave a skeptical public new confidence in air transport—if the astute auto manufacturer was willing to get into the business, there must be something to it.

Ford branched out in 1926 by acquiring the Stout Metal Aircraft Company in Stout City, Michigan, and began construction of the famous "Tin Goose". The Ford Trimotor, as it was officially designated, had three-engine reliability, as well as greater altitude capability

and a larger payload capacity than any of its predecessors. From the time of its first flight in 1926 to its retirement from TWA in 1934, the Tin Goose was reliable, relatively slow at 85 knots, very strong, and rather uncomfortable.

In the meantime passenger service could only improve. In 1927, an airplane called the Lockheed Vega made its first flight, heralding the age of fast, comfortable travel for more than a mail sack and pilot.

In 1928, weather information was transmitted by teletype, and in the decade that followed, that network expanded rapidly to bring pilots the kind of information that was essential to safe, reliable service. By 1929, the Graf Zeppelin had flown around the world, and James H. Doolittle had made the first successful instrument landing. In that same era, Hamilton Standard produced the first hydraulic variable-pitch propeller. The technology was advancing, but would any company running an airline be profitable enough to buy it?

## *Postmaster General Brown and the Airlines*

Walter Folger Brown was postmaster general under President Herbert Hoover in the late 1920s. An attorney from Ohio, Brown combined astute vision with a ruthless will to ensure the success of the Post Office's mission to develop commercial aviation. Both Hoover and Brown disliked reckless competition as much as they did monopolies, and they both sought industry stability, efficiency, and growth—specifically, strong companies with regulated competition. Consequently, Brown spurred the adoption of another amendment to the Kelly Act, the McNary–Watres bill. Known as the Air Mail Act of 1930, it empowered the postmaster general to consolidate air mail routes if he thought that would serve the public interest.

Brown redrew the air map of the United States, forcing small operators out of business and awarding the bulk of the air mail business to a handful of airlines he considered to be well run, financially stable, and efficient. In May-1930, he invited the heads of the larger airlines to Washington for a series of meetings that came to be called the **Spoils Conference.** It was an apt name, for the spoils literally went to those participants who supported Brown's plan to establish three main mail routes—central, northern, and southern—out of the original CAM routes. United (a fusion of mostly west coast CAM companies) would get the northern route; Avco (the Aviation Corporation, a holding company that later became American Airlines) would get the southern route. The central route would go to a merger of Western Air Express and Transcontinental Air Transport (TAT), which had hired Charles Lindbergh to survey routes for a passenger service based on alternating rail and Ford Trimotor flights that would allow for coast-to-coast travel in the unheard-of time of 48 hours. Western had also shown considerable interest in passenger travel, although its route was for only the most rugged of individuals. Western's Harris "Pop" Hanshue was not the type to be forced into anything, and he fought Brown all the way, eventually compromising by accepting stock and a position in the new company. Hanshue agreed to the establishment of a new airline named Transcontinental and Western Air Express, in which TAT and Western held the majority of stock. Brown's plan seemed to succeed until 1934, when a scandal erupted in Washington. Although Brown had been quite candid about the fact that he wanted the air mail business awarded according to proven performance and financial solidity, newspaper reporter Fulton Lewis, Jr., discovered the result of Brown's philosophy. Ludington Airlines, flying the triangular Washington–Philadelphia–New York route, had bid 25 cents a mile on the mail contract

between these cities but had lost out to Eastern Air Transport, a much bigger line that had bid 89 cents a mile. When his newspaper would not publish the story, Lewis approached Senator Hugo Black of Alabama, who was chairing a Senate committee investigating maritime mail contracts. When Black heard the story, he quickly added air mail contracts to his investigation.

After some lengthy hearings in which a number of supposed scandals were uncovered, Black had aroused the public and President Franklin D. Roosevelt to a point that all prior contracts were immediately canceled. Roosevelt ordered the Army to begin flying the mail, a decision that had tragic consequences. Even though Postmaster General James Farley had argued against the cancellation, the public's wrath fell on him more than on the president when one Army plane after another crashed in poor weather that the pilots were completely unequipped to handle.

Although Black's hearings ultimately revealed no illegalities in Brown's arrangements—even the supposed bidding scandal was explained to everyone's satisfaction as a more complex arrangement than it first appeared—Black still came out the winner. He talked Roosevelt into supporting a bill to separate the airframe companies from the airlines, to reopen competitive bidding, and to bar all the attendees of the Spoils Conference from further participation. It was pure punitive politics, but at least the Army was out of the mail business. Not only had a number of pilots lost their lives, but it had cost the Army $2.21 a mile to fly 16,000 miles of routes, compared to 54 cents a mile to cover 27,000 miles for the airlines.

The Air Mail Act of 1934 was signed into law by President Roosevelt after Senator Pat McCarran's effort to legislate an independent regulatory body was defeated. The act authorized new one-year contracts that were subject to review before renewal. The Interstate Commerce Commission was involved as a regulator of rates, and the secretary of commerce was empowered to specify what equipment was suitable for each route. To placate smaller airlines anxious to acquire portions of the big routes, Postmaster General Farley added a provision that barred all prior contract holders from bidding anew. Obviously, this meant the end of the airlines as an industry. The government that had created them under Brown was now preparing to destroy them under Farley. Farley privately advised all the airlines to reorganize, which is how American Airlines, Eastern Airlines, and United Airlines all came to be.

Of greatest consequence was the provision that severed aircraft manufacturers from the airlines themselves. Boeing had to pull out of United; Avco gave up American; North American sold its TWA holdings; and General Motors surrendered its stock in both Eastern and Western. A new era had dawned, one in which the airlines would guide their own destinies.

## *The Turning Point for the Airlines*

Certain aspects of the industry were looking up. Both the Boeing 247 and the DC-1 had made their first flights during 1933, rendering immediately obsolete such antiquated fixtures as the Trimotor and the Curtiss Condor, the last of the biplane transports.

Boeing's all-metal, low-wing, twin-engine monoplane was the first modern airliner. Nevertheless, the 247 was not a success, serving as an illuminating example that in the airliner market, the design that is first to the finish line does not necessarily win the race. The 247 was spectacular: faster than most fighter planes and able to carry 10 passengers in unaccustomed luxury. It won the Collier Trophy for speed and endurance in 1933, as

well as the favor of William A. Patterson, who became president of United Airlines after the previous president resigned during the Brown scandal.

Patterson bought 60 of the Boeings for $4 million, at the time the largest single purchase of airplanes in history—and a bigger order than Boeing could really handle. The order tied up the company's assembly lines for a year, forcing TWA and American to look elsewhere for planes. Unfortunately for Boeing, their search took them to a small manufacturer headed up by Donald Douglas.

The 247 originally was to have been built with the new Pratt & Whitney air-cooled Hornet engines, but United's pilots vetoed those engines; they trusted only the reliable Pratt & Whitney Wasp engine. The 247 would have carried 14 passengers with Hornets, but the United version could carry only 10 with the smaller Wasps, and thereby Boeing won the battle but lost the war.

In 1932, Jack Frye, president of TWA, had gone to Douglas with a proposal for a trimotor airliner. Douglas knew that the Wright Cyclone would eliminate the need for the third engine, offering seats for 14 in a twin-engine airplane. Thus, when Boeing slammed the door on TWA and American, Douglas was able to show them something better—four more passengers than the 247 could carry for the same operating cost. The resulting DC-1, which quickly stretched to the DC-2, was a colossal gamble for Donald Douglas, and the debt he incurred developing it was not paid off even by TWA's eventual order for 25 planes. Boeing sold 75 of the 247s—but that was all. Lufthansa bought two that served as models for some of Germany's World War II bombers, so advanced was the 247's design and performance. United soon switched to the Douglas airplanes as well, in order to remain competitive with American and TWA. But if the 247 had been built with the proper engine, there might never have been a Douglas airplane to consider.

The 247 caused a setback for Boeing, but it did serve as the stimulus for the DC family, a line of airplanes that are generally credited with moving the airlines from their pre-1933 red-ink days to times of solid profit. The DC-3, which was introduced as the Sleeper Transport (the DST) in response to a specification written by American Airlines' C. R. Smith, not only increased the speed and comfort of travel, thereby winning passengers who had not been willing to brave an airliner before, but also operated reliably and profitably. The plane was incredibly strong, an attribute that is largely credited to an engineer named Jack Northrop. Its development also introduced the importance of operating costs to airline managers, who were mostly new to the business and therefore willing to try new ideas. The DC-3 was the first airplane to instill a feeling of confidence in air travel, as measured by the fact that its safety record encouraged the introduction of the first air travel insurance in 1937.

## *The Arrival of the Professional Airline Manager*

Once the 1934 Air Mail Act had become law, a new group of managers emerged who would prove to be the most dominant personalities thus far in the short history of air travel. The pioneers had been long on courage, but they came up short when it came to business acumen. Curiously, few of the leaders we now associate with their respective companies actually founded their airlines. The major exception is Juan Trippe, the former Navy pilot who launched Pan American World Airways in 1927 with a rented seaplane because the Fokker he ordered didn't show up on time. Another exception was Tom Braniff, whose brother Paul was one of his first pilots. A third founder, though he came along later, was the colorful Bob Peach of Mohawk Airlines (now part of US Airways).

For the most part, however, the men who became the giants of the industry worked their way up from less exalted positions. For example, William A. Patterson, who boldly signed for $4 million worth of Boeings, was only a vice-president at United when the massacre of 1934 moved him up. As late as 1934, after the Air Mail Act had gone into effect, C. E. Woolman was only general manager of Delta, but he would lead the company's development as its president in the decades to follow. The president of Eastern was Ernest P. Breech; Eddie Rickenbacker didn't join until the following year, as general manager. And TWA was about to elect Jack Frye as president, but he was only a vice-president for the 10-month period preceding his election.

The industry needed strong leadership at this point in its development, and these individuals would enjoy some of the longest and most successful tenures in U.S. business history. This group of dynamic individuals seemed to share one outstanding trait—the ability to take risks against great odds and keep going in the face of adversity. And between 1929 and 1933, the adversity was great indeed. The airlines had a fatality rate 1,500 times that of the railroads and 900 times that of buses; in 1932, the carriers had 108 accidents, 16 of them fatal. And not until the 1940s did passenger revenues exceed the income from mail payments. If that wasn't bad enough, the industry learned early on that the years when its fleet needed modernization and expansion usually preceded times of economic stagnation, recession, tight money, and slack air travel.

Just before World War II, some events took place that influenced the future of the airlines and redirected the way they conducted their operations. Considering their awful safety record at the time, it is hard to fault the decisions that led to the changes, but few would ever have guessed at the eventual outcome.

On December 1, 1935, the first airway traffic control center was formed in Newark, New Jersey, to inform by radio all pilots in the vicinity as to the whereabouts of other air traffic during instrument conditions. Significantly, it was the airlines themselves that first staffed the facility. They had seen the need for such a practice and had hastened to take action. In less than a year, the Bureau of Air Commerce was arranging to take over air traffic control, a landmark event that seemed less significant at the time than it does in retrospect. The government was now irretrievably involved in the direct operation of the airlines.

That same year, Senator Bronson Cutting was killed when his Transcontinental and Western flight crashed in Missouri. An immediate investigation was launched into the safety function of the Bureau of Air Commerce. Also in 1935, the British installed a top-secret network of radar transceivers along their coast and equipped their military aircraft with an early transponder known as IFF (for "identification, friend or foe").

By 1936, Socony-Vacuum Oil Company was producing 100-octane aviation gasoline by a method known as catalytic cracking, which efficiently derived large quantities of high-quality fuel from petroleum stock. Shortly thereafter, Captain Carl J. Crane invented a system for totally automatic landings and successfully tested the devices at Wright Field in Ohio. It seems surprising now to realize that so many major technological advances were available so early. That they arrived when they did may well have had a decisive effect on how the government dealt with what it saw as its obligation to ensure the safety of passengers, for this was a time of fierce debate that would culminate in a significant piece of legislation.

## THE GROWTH YEARS: 1938–1958

### *1938–1945*

The laws relating to air commerce were a hopeless mess. Three agencies held power in various intertwined areas: the Post Office Department, the Commerce Department, and the Interstate Commerce Commission. In an effort to clean legislative house, President Franklin D. Roosevelt solicited and received recommendations for a new, inclusive body of regulations. The result was the Civil Aeronautics Act of 1938, which established the Civil Aeronautics Authority (see the section "Federal Legislation and the Airlines").

When World War II broke out, Roosevelt made arrangements to nationalize the airlines, and had it not been for the strong opposition of the Air Transport Association (ATA), this arrangement might well have become permanent. Just a few days after the Japanese attack on Pearl Harbor, Roosevelt had signed an executive order that would have allowed him to seize the airlines, but the president of the Air Transport Association talked him out of it, pleading that the carriers could do a better job if they were left to run a global wartime transportation system themselves. The order was rescinded.

Still, aviation in all its forms contributed to the war effort. Everything that flew became at least quasi-military: the Civil Air Patrol went out on coastal patrols, and the airlines contracted the bulk of their fleets to the Army. The military also enlisted most of the pilots who had staffed the airlines, and routes were revised drastically to allocate the remaining resources to the war effort rather than the needs of the traveling public.

Production was converted overnight: the DC-3 became the C-47 and was even more legendary in its accomplishments as a military airplane than in its civilian counterpart. At the beginning of the war, U.S. transports were the most highly evolved aircraft the military had, and certainly the most tried and tested. The war shrank the airlines themselves to insignificance, but the industry had never been more than the sum of the skill and equipment that turned it into an efficient military force as easily as they had made it a profitable business.

### *The Postwar Years*

Out of World War II came the DC-4 and the Constellation, two high-performance, long-range airplanes that later prepared the industry for the jet era. The C-54 (the military designation for the DC-4) had its beginnings back in 1936 as the DC-4E, an abortive design that combined the forward end of a DC-3 with four engines and a triple tail. Meanwhile, George Mead of Pratt & Whitney had undertaken the task of getting that company back into the transport business; its military success had been phenomenal, but Wright Aeronautical had dominated the commercial market with the DC-3. The new Pratt & Whitney R-2000 engine met the specifications for the final version of the DC-4, an entirely new Douglas design that first flew in 1942, just in time to become the Army's C-54 Skymaster.

Simultaneously, Lockheed was building the Constellation, which had Wright engines, a pressurized airframe, and the triple tails that Douglas abandoned; it first flew in 1943. It is significant that air cargo became a worthwhile notion during the war. Freight was first carried in the C-47, the C-54, and the Constellation—the old passenger carriers—and later in airplanes such as the C-82s, which were designed specifically to move freight. Although the airlines could not benefit financially from these new

airplanes until after the war, it mattered little. The aircraft existed, and the fact that the military produced them in large numbers simply made them available cheaply as postwar surplus.

The complex operations of war also hastened the improvement of communications techniques, and radar became a high-priority project that would lay the foundation for modern air traffic control. Military air traffic operations in high-density environments became a valid model to be further improved upon and modified to fit the needs of the airlines.

The immediate postwar era was a stagnant time for the airlines. President Harry S. Truman's administration was plagued by heated rivalries and political infighting over routes and revenues. With thousands of aviators available after the war, a large number of airlines sprang up. Trunk routes were already taken by the prewar companies, but many feeder routes were up for grabs. The established carriers viewed with horror the thought of government subsidies for new feeder lines, arguing that they should provide the feeder service. The Civil Aeronautics Board assured the larger carriers that the newly established feeders would be carefully monitored and not allowed to compete with airlines flying the trunk lines. Some of the first feeders established were Allegheny, Mohawk, Piedmont, North Central, Frontier, Bonanza, Ozark, and Pacific.

Overexpansion furnished enough trouble for the airlines, but the nonscheduled airlines that sprang up all over the nation provided more. These airlines, naturally, made runs between major population centers, which cut into the trunk lines' traffic.

The Berlin airlift in 1948–49 represented an unequaled opportunity to develop experience in high-volume air freight and contributed to the sense of optimism about air freight as a viable business. Independent lines specializing in carrying only freight were formed, and the first experiments in using helicopters to carry the mail to inner-city heliports were conducted. In 1947, Los Angeles Airways succeeded in gaining approval for the first scheduled helicopter service.

Boeing tried to bounce back with its 377 Stratocruiser, modeled after the military B-29 Superfortress. Its success was limited, however, and Boeing turned its attention to military jet aircraft. Meanwhile, Convair and Martin twin-engine planes with pressurized cabins flew short-haul routes to feed the ever-growing giant airlines that crossed the entire country in nonstop leaps. Aviation records fell as new and improved models of Constellations, DC-6s, and DC-7s with reciprocating power plants appeared. The United States had emerged in the postwar years as the aircraft manufacturing leader.

The British aircraft manufacturing industry met with government officials after the war to decide whether to try to challenge the lead of the United States with conventional transports or to take another approach. They decided to leapfrog—to gamble on producing the first jet airliner. The result was the deHavilland Comet jetliner. It made its first flight in July 1949, and it entered service with BOAC in May 1952. In January 1954, a Comet plummeted into the Mediterranean, killing all 35 passengers and crew members; in April 1954, a second Comet ripped apart and plunged into the sea after takeoff from Rome. All Comets were grounded while officials conducted a thorough investigation to ascertain the cause of the crashes. In February 1955, the investigators determined that metal fatigue in the hull had led to explosive decompression.

Technological advances were coming so fast that the old pioneers of the airlines were soon left behind. Airplanes quickly became machines of awesome complexity, requiring systems no one person could ever entirely understand. Increasingly, it was the government that recognized this, and beginning in 1947, the Civil Aeronautics Authority

(CAA) began certifying three new classes of flight personnel: flight radio operators, navigators, and engineers, a symbol of the era of the technocrat. Landings became routine at 42 terminal airports used by 12 of the airlines. In 1948, three engineers at the Bell Telephone Laboratories invented the transistor, while distance-measuring equipment (DME) and very high frequency (VHF) omnirange loomed as the answer to a need for improved air navigation aids. By 1951, Pratt & Whitney was testing its 10,000-pound-thrust J57, which would make the development of the Boeing 707 possible.

Very quietly, in 1953, a study was completed showing for the first time that the airplane had become the prime mover of travelers on trips of more than 200 miles. This only confirmed what the young executives in the airline marketing departments already knew. The way to win the public was to sell not "transportation," but "travel," and that took new and ingenious methods.

If U.S. engineers weren't willing to experiment with turbojets, they could at least go halfway with turboprops, and Capital Airlines tried the British-built Vickers Viscount amid press parties that featured demonstrations of how one could balance a quarter on the edge on one's meal tray, so smooth were the new turbine engines. But when Lockheed tried the same approach with its Electra turboprop, the result was one of the most expensive recall campaigns ever. Although the airplane eventually proved to be one of the most efficient ever built, its image suffered when critics questioned its structural integrity. Lockheed eventually redesigned the wings and engine nacelles on 165 of the airplanes.

Boeing had never really prospered in the commercial business since the DCs had stolen the thunder from its 247. The 307 and 377, though praiseworthy for their implementation of revolutionary features, had not really been successful. Fortunately, Boeing had been blessed with an endless succession of contracts for heavy military equipment that kept it afloat.

At great financial risk, Boeing built a jet tanker, the military KC-135, whose purpose was to fuel the Boeing-built B-47 jet bomber. The air force tested the plane and bought it. Boeing then approached the airlines, proposing a jet airliner based on the Boeing jet tanker. The airlines were lukewarm to the proposal and declined to invest any money in research. Once more, Boeing risked its own funds, this time to develop the Boeing 707.

When, in 1955, Pan Am announced its order not only for the 707 but also for the Douglas DC-8, Boeing had spent $185 million on jet transport development. It marked the end of one era, and the beginning of another.

## MATURITY—JETS ARRIVE: 1958–1978

The jets were coming, and by 1956 the CAA recognized the inevitable and held a conference to plan for the jet age. The challenges were enormous, not only for the airlines, for whom 30 years of parts and maintenance experience became obsolete overnight, but also for the government, because safe operations were their responsibility. Then, in 1956, an event occurred that defied all the odds: a TWA Super Constellation and a United DC-7 collided over the Grand Canyon, killing 128 people. Suddenly, it was a crowded sky, and the outcry for reform was loud and clear. The answers, of course, were sought in technology.

If a pair of conceptually obsolete piston airliners could have a midair collision, what would happen with jets, which went 50 percent faster? The seemingly impossible collision between two airplanes in what had once seemed a boundless sky was a pivotal event in

the history of airline travel, for it brought the issue of the control of each flight by some central authority to the fore, made air traffic control mandatory, and increased demands for precision. It also paved the way for the next major piece of legislation.

The Grand Canyon midair collision was followed by two more bad accidents, and in 1958, there was a virtual stampede to push through Congress a law creating a new Federal Aviation Agency (FAA), an independent and comprehensive government agency to control all aviation matters, both civil and military. Centralized air traffic control began less than a month after the bills were introduced. President Dwight D. Eisenhower pressed for passage, and the FAA was born.

Just as the turboprops entered service in 1958, the 707 began flying overseas routes. The turboprop aircraft had a relatively short life with the major carriers. It was American Airlines that began 707 service between the coasts a year later. With the advent of the 727, one of the most efficient transport airplanes ever built and one that became as widely flown as the DC-3, and the DC-9, the airlines soon disposed of all their reciprocating propeller equipment. For a while, Eastern used some older airplanes on its shuttle flights between the northeast corridor cities of Boston, New York, and Washington, but they were soon replaced.

On December 30, 1969, Boeing achieved certification of an airplane that revolutionized airline travel forever. Just as the original B-707 brought vibration-free, over-weather, jet-engine flying to passengers, the giant 747 was to bring low-cost travel to the masses. Once again, Pan Am led the way by introducing jumbo-jet service across the Atlantic in January 1970. An economic downturn dried up orders for the plane between 1969 and 1972, but after that initial setback, orders began to flow in a steady stream.

The Boeing 747 was unmatched. It was able to carry about 380 passengers in an 8- or even 10-abreast, twin-aisle, mixed-class layout and brought a new term to commercial aviation: "wide-body." The humpback profile of the airplane resulted from an early decision to maximize freight-carrying capability; the tilt-up nose on the 747F (freighter) and 747C (convertible) versions allowed direct insertion of cargo containers. Doing so required a cockpit that was removed from the main deck and a generous afterbody for streamlining, and, at Juan Trippe's insistence, an upper-deck, first-class lounge was added in the area behind the cockpit.

The Boeing 747 has reigned supreme over the world's air routes for more than a quarter of a century. More than a thousand 747s have already been built, and production continues. Wisely, other manufacturers did not try to challenge Boeing head-on. The tri-jet Douglas DC-10 and the Lockheed L-1011, under development at the same time as the 747, were only about three-quarters of its size. Containing about 270 seats, the planes were intended to satisfy the requirements of air routes that did not generate sufficient traffic to justify the deployment of the giant Boeings. The DC-10 entered service on August 5, 1971, and the TriStar on April 26, 1972. Both suffered severe setbacks. A DC-10 suffered a spectacular crash at the world's busiest airport, Chicago's O'Hare, on May 25, 1979. Production of the TriStar was disrupted by the bankruptcy of its engine manufacturer, Rolls-Royce.

A latecomer to the wide-bodied airliner field was the Airbus. It was first conceived simultaneously by Hawker-Siddeley, which had taken over deHavilland, in Great Britain and by Brequet-Sud in France. The basic design of this twin-engined variant on the wide-bodied principle took shape in the late 1960s. The wings for what became the A300 series were built by a European consortium of airframe manufacturers. Air France put the first version of the Airbus, as it quickly became known, into service in May 1974.

Boeing had not been neglecting other projects during the years of the 747 program. The three-engine 727 short-haul airliner began as a 100-seat regional carrier, eventually stretching into lengthened versions that matched the 707's length. Both the 727 and the 737 used the fuselage cross section of the 707 series, giving short-range customers amenities similar to those found on the longer trips. The twin-engine 737, certificated in July 1967, was designed to compete with Douglas's DC-9.

Since the jets took over, the airline industry has introduced one technological advancement after another: flight recorders, weather radar, terrain-avoidance systems, and so on. During this era, the airlines passed from a period of high risk to a period of virtually no risk at all. With the passage of the Airline Deregulation Act of 1978 (see the section "Federal Legislation and the Airlines"), the airline industry moved into an era of new challenges.

## ECONOMIC DEVELOPMENTS PRIOR TO DEREGULATION

The period from 1938 to 1978 witnessed truly phenomenal growth in both domestic and international air transportation. Over the years, U.S. airlines received many new route authorizations, domestic and international. Table 2-1 shows the growth in the number of certificated domestic route miles of the leading carriers during 40 years of regulation. The number of U.S. city pairs connected by scheduled airline service grew in step with expanded route miles. Internationally, limited service was provided in 1938 by a handful of scheduled U.S. airlines (principally Pan American Airways and its related companies) and a half dozen or so significant foreign airlines. By 1978, these numbers had increased to 21 U.S. and 73 foreign airlines.

Air passenger traffic also grew at an astonishing rate. The number of passengers (domestic and international) carried by U.S. airlines increased from a little over 1 million in 1938 to almost 267 million in 1978. In addition, in 1978, foreign airlines carried some 16 million passengers to or from the United States. With increases in average length of journey, there was an even greater growth in U.S. airline passenger miles, from 533 million in 1938 to 219 billion in 1978. The air transport industry thus emerged as one of the nation's major industries. Over the four-decade period, revenues increased from $58 million to $22.8 billion, and total airline assets increased from under $100 million to over $17 billion.

The air transport industry also became a major employer. Total direct airline employment increased from about 13,000 to well over 300,000. In addition, hundreds of thousands of people were employed in the manufacture of civil transport aircraft, engines, and accessories; at airports; in travel agencies; and in the vast range of other related service, supply, and support activities.

Technological development was spectacular, not just in aircraft but in the air transport system infrastructure as well. In terms of aircraft, this 40-year period witnessed the evolution from the propeller-driven, 21-passenger DC-3 to the 400-seat, wide-body Boeing 747 jet that, in addition to a full passenger load, has cargo capacity equal to the load-carrying capability of five DC-3s. Aircraft nonstop range, with full payload, grew to over 6,000 miles.

Accompanying these developments were quantum improvements in safety, speed, comfort, and overall convenience for the users of air service. A truly integrated air

**TABLE 2-1 Growth of Certificated Domestic Routes (miles)**

| Airline | 1938 | 1978 |
|---|---|---|
| American | 6,826 | 43,755 |
| Delta | 1,091 | 50,380 |
| Eastern | 5,276 | 43,576 |
| Northwest | 2,507 | 30,927 |
| TWA | 5,749 | 29,127 |
| United | 5,321 | 48,709 |

Source: CAB Statistical Reports.

transport system was developed that enabled the public to buy tickets from virtually any airline (and from many thousands of travel agents) for travel on multiple airlines and to check baggage at the point of origin for delivery at the destination regardless of how many airplane or airline changes were made en route.

At the same time, technological advances combined with economies of scale to produce lower unit costs, helping make it possible to hold the line on prices over this 40-year period. Despite a consumer price inflation rate of almost 400 percent from 1938 to 1978, average fares per passenger mile remained remarkably stable (see Table 2-2). The increase from 1968 to 1978 reflected not only acute inflation but also the sharp fuel cost increases following the 1973 oil embargo.

The air transport industry also met the congressional objective of assisting the national defense. As reported by the CAB in its 1942 Annual Report to Congress: "Pearl Harbor brought real meaning and new force to the national defense standard so wisely written into the Civil Aeronautics Act during peacetime." The airlines, domestic and international, went on wartime footing and contributed significantly to the war effort. Subsequently, they helped break the Berlin blockade, provided important contributions in the Korean and Vietnam wars, and furnished emergency and evacuation assistance in dozens of other critical situations around the globe. And by 1978, the formal Civil Reserve Air Fleet, available with crews for military call-up at defined stages of national emergency, contained 298 commercial aircraft, of which 216 were large intercontinental units.

The U.S. air transport system, by far the largest in the world, was also the best in just about every respect. And this contributed, in no small measure, to the worldwide supremacy of the U.S. aerospace industry, exporting as it did many billions of dollars' worth of aircraft, engines, components, and parts.

All of this was accomplished through private enterprise with an early phaseout of government subsidies except for limited types of service in the public interest. Exact early figures do not exist, because the CAB did not identify the "compensatory" element in total mail pay until 1951. For fiscal 1951, slightly over $75 million was paid in subsidies, equal to slightly over 7 percent of total industry revenues. In 1951, subsidy recipients, by category, were:

**TABLE 2-2 Average Yield per Revenue Passenger Mile (cents)**

| | All Route Carriers[a] | Domestic Trunk Lines | International Trunk Operations |
|---|---|---|---|
| 1938 | 5.50¢ | 5.12¢ | 8.34¢ |
| 1948 | 6.30 | 5.73 | 8.01 |
| 1958 | 5.80 | 5.58 | 6.46 |
| 1968 | 5.46 | 5.45 | 4.95 |
| 1978 | 8.35 | 8.14 | 7.50 |

Source: CAB Statistical Reports.
[a]Includes local service carriers, whose yields were higher than those of domestic trunk lines and international trunk operations.

| | |
|---|---|
| Domestic trunks | $18.9 million |
| Local service | $17.1 million |
| International, overseas, and territorial | $39.3 million |
| | $75.3 million |

For calendar year 1977, by coincidence, almost the same levels of subsidies ($76.7 million) were distributed, but none went for domestic trunks or international services, which had long functioned without government financial support. The recipient groups in 1977 were:

| | |
|---|---|
| Local service | $72.2 million |
| Alaskan carriers | $ 4.5 million |
| | $76.7 million |

Subsidies in 1977 represented only 0.3 percent of total industry revenues.

The 40-year period of air transport regulation saw a steady increase in the number of operators on specific domestic routes. In 1978, few markets with significant traffic existed that were served by only one airline. And in international service, there was a steady and substantial increase in the number of operators (U.S. and foreign) over virtually all commercially important routes.

This 40-year period also saw changes in the structure of the U.S. airline industry. A number of the original "grandfather" trunk-line carriers (5 of the original 16) merged with or were acquired by other airlines; there were no bankruptcies among them. During the same period, new categories of carriers, as well as new carriers, were licensed, including 8 local-service and 3 all-cargo companies, and 10 charter airlines. This latter group played a significant role in offering lower-priced transportation and developed a strong presence in certain markets, particularly for transatlantic flights.

Despite problems and inadequacies, few could reasonably deny the brilliant success of the 1938 regulatory scheme. There was a high level of public satisfaction with U.S. airlines. A *U.S. News & World Report* survey revealed that out of 21 defined categories of U.S. industry, the airlines were rated the highest for "giving the customer good value for money."

In only one respect did the airlines perform poorly: compared with other broad industry groups, the airline business was not highly profitable. Coincidentally, 1978, the last year of regulation, was by far the most profitable year over the 40-year period.

Any review of airline profitability must also take into account the extremely cyclical nature of the business. It is highly leveraged, because the marginal cost of additional traffic (and the marginal savings from less traffic) at any given level of capacity is very low. As a result, the swings in profitability from recession to good times and back to recession can be very wide. This is well illustrated by how the 1970–71 and 1974–75 recessions affected airline financial performance (see Table 2-3). It is interesting to note that ATA computations of rate of return on investment showed, for example, positive returns of 1.2 percent in 1970, when the industry reported a net loss of $201 million, and 2.5 percent in 1975, when it reported a net loss of $84 million. Profit margin provides a meaningful financial yardstick. Based on these computations, airline profit margins from 1967 to 1977 averaged only 1.7 percent, versus 4.8 percent for U.S. manufacturing companies.

## FEDERAL LEGISLATION AND THE AIRLINES

The authority of the federal government to regulate interstate and overseas aviation and air transportation derives from the Constitution of the United States, which grants to Congress the right to regulate interstate and foreign commerce, to regulate the postal service, to make treaties with foreign nations, and to provide for the national defense. The rationale for regulation is rooted in the economic and physical characteristics of the air transport industry. The major reasons are listed here:

1. *To stabilize the industry.* The air transportation industry is a public utility that is important to the commercial and social welfare of the nation. The need to stabilize modes of transportation so that they could serve the public at reasonable

**TABLE 2-3 U.S. Schedule Airlines Operating Revenues and Profits, Before and After Interest Expense (millions of dollars)**

| | Operating Revenue | Operating Profit | Interest Expense | Operating Profit (Loss) After Interest Expense |
|---|---|---|---|---|
| 1968 | $ 7,753 | $ 505 | $222 | $ 283 |
| 1969 | 8,791 | 387 | 283 | 104 |
| 1970 | 9,290 | 43 | 318 | (275) |
| 1971 | 10,046 | 328 | 331 | (3) |
| 1972 | 11,163 | 584 | 307 | 277 |
| 1973 | 12,419 | 585 | 368 | 217 |
| 1974 | 14,699 | 726 | 420 | 306 |
| 1975 | 15,356 | 128 | 402 | (274) |
| 1976 | 17,506 | 723 | 372 | 351 |
| 1977 | 19,917 | 908 | 373 | 535 |
| 1978 | 22,884 | 1,365 | 539 | 826 |

Source: Air Transport Association (ATA) Annual Reports.

prices spurred the introduction of economic regulation of water transportation, railroads, and, later, highways. In the case of air transportation, the industry was somewhat unstable in its early years of growth, even though safety regulations and federal subsidies through air mail contracts were in place from the beginning. Industry instability was one of the primary reasons for bringing air transportation under a system of regulation.

Air transportation's early years were characterized by fierce competition among numerous budding carriers, fluctuating prices, unreliable service, and high turnover among carriers. Overcapacity in the industry and the competitive bidding process for air mail contracts were said to have led to absurdly low bids and disastrous price wars. This atmosphere was not conducive to investment by the financial community, and without outside capital funding, the fierce little competitors that made up the industry in its early years could not acquire the equipment they needed. Later, in the early 1930s, the air carriers themselves sought federal regulation, realizing that the history of transportation demonstrated that the absence of such regulation led to evils from which not only the public but also the industry itself would suffer. By 1938, the air transportation industry was experiencing critical financial difficulties: many of the major lines faced the threat of bankruptcy, and much of the original investment in airlines had been dissipated. Financial difficulties were also aggravated by a series of accidents in the winter of 1936–37 that undermined public confidence. The fact that rail and highway transportation was already regulated set a precedent for regulation that encouraged its enactment in air transportation.

2. *To improve air safety.* The industry was, and still is, largely dependent on government aid to maintain the safe flow of traffic. Federal regulation of air transportation safety was in effect from the early years. It was recognized that safety regulation could not reach its maximum effectiveness if the industry was unstable and if the carriers were financially weak and unable to afford the necessary safety precautions and devices. Therefore, economic regulation was intended, in part, to stabilize air transportation so that the carriers would have the financial capacity to pay for whatever was needed to conform with safety regulations pertaining to the design, operation, and maintenance of aircraft.
3. *To reduce cash subsidies.* Another reason, although minor, for regulating air transportation was the fact that air carriers had been subsidized through the air mail program since the mid-1920s. It was believed that the subsidies needed could be reduced by stabilizing the industry through economic regulation. A financially strong and stable airline industry would need smaller subsidies from the federal government.

Other reasons for regulation included the fact that the industry used the airspace over the entire United States, over other nations, and over international waters. Consequently, it naturally fell under federal rather than state jurisdiction. Another reason was the industry's role in the national defense. This was evidenced as early as World War II, when the airlines, flying under contract for the military, provided the backbone of the Air Transport Command. Under contracts with the military for airlift services, the airlines played a significant role during the Korean and the Vietnam wars. In addition, a joint program between the Department of Defense and the

airlines, the Civil Reserve Air Fleet (CRAF), was designed to augment military airlift capability in the event of a national emergency.

## *Early Federal Legislation*

The first steps the federal government took to regulate aviation and air transportation occurred in connection with the development of the air mail service. In May 1918, the air mail service was inaugurated on an experimental basis by the Post Office Department and the Army. In August of the same year, the service was taken over as a Post Office Department operation. On February 2, 1925, Congress enacted the Contract Air Mail Act, usually known as the Kelly Act, and as such gave birth to the airline industry. This law authorized the postmaster general to contract with private individuals or companies engaged in air transportation service for the transportation of air mail. By 1927, all the air mail services of the Post Office Department had been turned over to the air transportation companies, and new routes were established to be operated by air mail contract carriers. The effect on air passenger transportation of the establishment of contractual relationships between the Post Office Department and the air mail carriers can scarcely be overemphasized. The subsidies received by the air mail contractors enabled a number of airlines to establish passenger services. Indeed, it would have been impossible for some companies to exist without the air mail contracts.

The Kelly Act was amended in 1926 to provide higher rates of compensation. Subsequent air mail legislation was important because of the relationship of this type of regulation to the broader legislation dealing with the regulation of air transportation. The pioneer legislation of this type, because it laid the foundation for all future regulation of air transportation, was the Air Commerce Act of 1926, also known as the Bingham–Parker Act.

## *The Air Commerce Act of 1926*

The Air Commerce Act of 1926 imposed on the secretary of commerce and the Department of Commerce the duty of promoting and fostering the development of commercial aviation in the United States. The act authorized the Department of Commerce to encourage and develop facilities necessary for air navigation and to regulate and maintain them.

The act did not initially create a new bureau within the Department of Commerce. Rather, the intention was to distribute the duties imposed by the act among the then-existing agencies of the department.

The objective of the Air Commerce Act was to stabilize civil or commercial aviation in such a way as to attract adequate capital to the fledgling industry and to provide it with the assistance and legal basis necessary for its development. The law emphasized the federal government's role in the development of civil air transportation more than it stressed its responsibility for regulating the business aspects of air transportation. The act was designed to encourage the rapid development of commercial aviation, as indicated by the legislative history of the act.

In introducing the bill that became the Air Commerce Act, the Senate Committee on Interstate Commerce stated that "although Americans built the first airplanes capable of flight, and were the first to learn how to fly heavier-than-air machines, and hold more world records than do the citizens of any other nation, commercial aviation has not advanced as rapidly in the United States as had been hoped and expected." This act defined **air**

**commerce** as transportation, in whole or in part, by aircraft, of persons or property for hire, and the navigation of aircraft in furtherance of or for the conduct of a business. The act made it the duty of the secretary of commerce to encourage air commerce by establishing civil airways and other navigational facilities to aid aerial navigation and air commerce.

The regulation of aviation provided for in the act included the licensing, inspection, and operation of aircraft; the marking of licensed and unlicensed craft; the licensing of pilots and of mechanics engaged in aircraft work; and the regulation of the use of airways. Several different governmental agencies or departments were empowered to perform functions relative to carrying out the provisions of the act:

1. The Department of Commerce was entrusted with the administration and enforcement of major portions of the act. An assistant secretary for aeronautics was appointed in 1927 to administer the duties assigned to the department.
2. The secretary of the treasury was given the duty of providing regulatory rules for entry, clearance, and customs regulations for aircraft engaged in foreign commerce.
3. The secretary of labor was empowered to deal with all immigration problems relative to air transportation.
4. The Weather Bureau of the Department of Agriculture was authorized to supply meteorological information.
5. The secretary of war was authorized to designate military airways.
6. The Bureau of Standards of the Department of Commerce was directed to undertake R & D to improve air navigation facilities.

Through this distribution of functions in connection with aviation and air transportation, Congress sought to utilize as many of the existing governmental agencies as possible, thus avoiding or reducing the need to create additional and duplicating federal agencies especially for air transportation and aviation. Consequently, no separate bureau was initially set up in the Department of Commerce. However, in July 1927, a director of aeronautics was appointed, who, under the general direction of the assistant secretary for aeronautics, was in charge of the work of the Department of Commerce in the administration of the Air Commerce Act.

In November 1929, because of the increasing volume of work incident to the rapid development of aviation, it was necessary to decentralize the organization. Three assistants and the staffs of the divisions under their respective jurisdictions were assigned to the assistant secretary of commerce for aeronautics. These included a director of air regulation, a chief engineer of airways, and a director of aeronautics development to assist in aeronautical regulation and promotion. The organization was known as the Aeronautics Branch of the Department of Commerce.

The work was further reassigned by executive order of the president in 1933, so as to place the promotion and regulation of aeronautics in a separately constituted bureau of the Department of Commerce. An administrative order of the secretary of commerce provided for the establishment of the Bureau of Air Commerce in 1934. The bureau consisted of two divisions, the Division of Air Navigation and the Division of Air Regulation.

A revised plan of organization for the Bureau of Air Commerce, adopted in April 1937, placed all the activities of the bureau under a director, aided by an assistant director, with supervision over seven principal divisions: airway engineering, airway operation, safety

and planning, administration and statistics, certification, inspection, and regulation. A policy board was formed to deal with all matters affecting policy within the bureau, and an advisory board, consisting of civilian and other representatives of all aviation interests, was appointed to advise the bureau.

## *Additional Air Mail Acts*

The Air Mail Act of 1930, known as the McNary–Watres Act, was passed by Congress on April-29, 1930. It provided the postmaster general with unlimited control over the air mail route system. The postmaster general could now extend or consolidate routes if he thought it would serve the public interest. The act also tightened the provisions under which contractors were reimbursed for carrying the mail and provided additional remuneration for contractors flying multi-engine aircraft and using the latest navigational aids.

In February-1934, the postmaster general annulled all domestic air mail contracts, and the transportation of the mail was assigned temporarily to the Air Corps of the U.S. Army. This action was taken because the postmaster general had evidence that there was a conspiracy to defeat competitive bidding.

The arrangement with the Air Corps continued from February 20 to May 16, 1934. Then, after the reorganization of the commercial air transportation companies according to government requirements as a precondition to submitting bids for air mail contracts, the commercial companies submitted bids, and new contracts were awarded.

The Air Mail Act of 1934, passed on June 12 and known as the Black–McKellar Act, provided temporary contracts and gave the Interstate Commerce Commission (ICC) the responsibility of periodically adjusting the rates of compensation to be paid the air transport companies for the carriage of the mail within the limitations imposed by the act. The ICC was required by law to review annually the rates of air mail pay to ensure that no company was earning unreasonable profits. Each air mail contractor was required to submit for examination and audit by the ICC its books, accounts, contracts, and business records and to file semiannual reports of all free transportation provided. The ICC also was authorized to investigate any alleged unfair practices and competitive services of companies transporting air mail that adversely affected the general transport business or earnings on other air mail routes, and to order the practices or competition to be discontinued if unfair conditions were found to exist. The act also provided that after July 1, 1938, the aggregate cost of air mail transportation to the government could not exceed the anticipated revenue from air mail. The ICC organized the Bureau of Air Mail to administer the regulation of air mail compensation under its direction.

In addition, the act separated the manufacturing companies from connections with airlines and forbade interlocking directorates, overlapping interests, and mutual stock holdings. By 1938, two general categories of "air carriers" had developed. The first, economically more significant, group was composed of the air mail contractors that flew over established routes and transported persons, property, and mail. The second group, the so-called fixed-base operators, was composed of persons operating airports, flying schools, crop-dusting services, and so forth, who also carried persons and property on an air taxi basis in small, nontransport-type aircraft.

## *The Civil Aeronautics Act of 1938*

On June-23, 1938, the Civil Aeronautics Act was approved by President Roosevelt. This act substituted a single federal statute for the several general and air mail statutes that up to this time had provided for the regulation of the aviation and air transportation industry. The act placed all the functions of aid to and regulation of aviation and air transportation within one administrative agency consisting of three partly autonomous bodies—a five-member Civil Aeronautics Authority (CAA), a three-member Air Safety Board, and an administrator—and attempted to demarcate executive, legislative, and judicial functions.

Members of this composite agency or administration were appointed by the president with the advice and consent of the Senate. No term was stated for the administrator, but members of the other two agencies were appointed to office for terms of six years. The act required members of the three agencies to devote full time to their duties and forbade them from having any financial interest in any civil aeronautics enterprise.

The five members of the Civil Aeronautics Authority performed quasi-judicial and legislative functions related to economic and safety regulations. The administrator performed purely executive functions related to the development, operation, and administration of air navigation facilities, as well as promotional work in aviation. The Air Safety Board was a quasi-independent body created for the purpose of investigating and analyzing accidents and making recommendations to eliminate the causes of accidents.

The personnel, property, and unexpended balances of appropriations of the Bureau of Air Commerce of the Department of Commerce and of the Bureau of Air Mail of the Interstate Commerce Commission, which had administered air mail payments under the Air Mail Act of 1934, were transferred to the new Civil Aeronautics Authority. The transfer of the responsibilities of the Bureau of Air Commerce to the Civil Aeronautics Authority, effected in August 1938 under provisions of the Civil Aeronautics Act, brought to a close a 12-year period during which the development and regulation of civil aeronautics were under the jurisdiction of the Department of Commerce.

The Civil Aeronautics Authority exercised all quasi-legislative and quasi-judicial powers conferred by the act and all executive powers of appointment with respect to its officers and employees. It took control of the expenditures of the administrator and the Air Safety Board and of all other executive powers of appointment with respect to the exercise of these quasi-legislative and quasi-judicial powers.

The administrator, appointed by the president, exercised executive powers with respect to the development of civil aeronautics and air commerce; the fostering, establishment, and maintenance of air navigation facilities; and the regulation and protection of air traffic.

The Air Safety Board was appointed by the president, by and with the approval of the Senate. It acted independently of the Civil Aeronautics Authority, and in performing its investigations of accidents, it reported on the facts and probable causes and recommended preventive measures to avoid future accidents.

The Civil Aeronautics Authority was directed by Congress, in the declaration of policy of the Civil Aeronautics Act, to regulate air transportation in the public interest by performing six functions:

1. Encouraging and developing an air transportation system adapted to the present and future needs of domestic and foreign commerce, the postal system, and national defense
2. Regulating air transportation so as to preserve its inherent advantages, promoting the highest degree of safety and sound conditions in the industry, improving relations among air transport companies, and coordinating transportation by air carriers
3. Promoting adequate, economical, and efficient transportation service by air carriers at reasonable charges, and prohibiting unjust discrimination, undue preferences or advantages, and unfair or destructive competitive practices
4. Preserving competition in keeping with the sound development of an air transportation system for commerce, the mail service, and national defense
5. Promoting the development of air commerce and safety
6. Encouraging the development of civil aeronautics

The act extended federal regulation to all phases of aeronautics, to all persons engaged in flying, and to all instrumentalities of aviation with the exception of the actual acquisition and operation of airports. This was accomplished by what has been termed a rather unusual use of definitions. *Air commerce* was defined by the act to mean all interstate, overseas, or foreign air commerce, or the transportation of mail by aircraft, or any operation or navigation of aircraft within the limits of any civil airway, or any operation or navigation of aircraft that directly affected or that might endanger safety in interstate, overseas, or foreign air commerce. This last clause provided for a degree of federal control over intrastate aviation, because a private pilot might use an airway in intrastate operation that might endanger the safe conduct of interstate commerce.

Under several reorganization plans in 1940, the Air Safety Board was abolished and its functions transferred to the five-member Civil Aeronautics Authority, which was redesignated the Civil Aeronautics Board (CAB). The administrator of civil aeronautics (whose organization was then known as the Civil Aeronautics Administration, or CAA, and later as the Federal Aviation Agency, or FAA) was placed under the Department of Commerce. The respective duties of the board and the administrator were delineated in broad outline. The CAB, although administered within the Department of Commerce for housekeeping purposes, retained its status as one of the so-called independent regulatory agencies, such as the Interstate Commerce Commission, the Federal Communications Commission, the Federal Power Commission, and the Securities and Exchange Commission.

Under the later 1958 Federal Aviation Act, the board was designated an "independent" agency. The FAA, successor to the CAA, was not assigned to any executive department, but was considered an "executive agency" as opposed to an independent regulatory commission.

## *Economic Functions of the CAB*

The broad language of the Declaration of Policy, with its somewhat conflicting objectives, left the CAB with considerable discretion in its administration of the act. The CAB's decisions were final, subject to court review, but even here the act provided that the "findings of fact by the CAB, if supported by substantial evidence, shall be conclusive." This was a significant obstacle to efforts to overturn CAB decisions, particularly because

the "findings" in most route and rate proceedings (which were at the heart of the regulatory scheme) were predictive or judgmental in character.

Whatever the complexities encountered in practice, the licensing system was simple in concept: no one could engage in the business of public air transportation unless authorized to do so by a "certificate of public convenience and necessity" issued by the CAB. To obtain such certificates, applicants were required to convince the CAB that they were "fit, willing, and able" to perform the proposed transportation "properly" and that "such transportation is required by the public convenience and necessity." This, of course, led right back to the extremely general congressional objectives set forth in the Declaration of Policy.

The CAB also had broad authority to attach to any certificate "such reasonable terms, conditions, and limitations as the public interest may require," and it exercised such authority. Certificates were often very detailed. They specified intermediate and junction points and in some cases required or prohibited stops or through services. Often, the carriage of traffic between certain pairs of cities named in a certificate, or even the carriage of certain categories of traffic, was prohibited. An important aspect of the regulatory system was that airlines could not lawfully suspend or abandon services without CAB approval.

Regulation of international routes differed from that of domestic routes. Most important, CAB decisions with respect to international route applications of both U.S. and foreign airlines were subject to "the approval of the President." The Supreme Court eventually held the president's decision to be unreviewable. Also, foreign air carrier applications were generally based on preexisting intergovernmental air transport agreements that granted route rights to the airline designated by the foreign government. This alone was almost invariably considered sufficient to meet the statutory standard applicable to the grant of foreign airline route applications (that the proposed transportation "will be in the public interest").

Passenger fares and cargo rates were also subject to strict regulation. Carriers were required to file formal tariffs, establishing prices charged and applicable terms and conditions. These tariffs had to be filed in advance and could be "rejected" (for technical reasons) or "suspended" (for perceived substantive problems). Fares and rates were to be "just and reasonable," and discrimination (with its panoply of related legal terms such as "undue or unreasonable preference or advantage," "unjust discrimination," and "undue or unreasonable prejudice or disadvantage") was prohibited. Once a given tariff became effective, it had to be observed; all forms of rebating were prohibited.

Standards for evaluating the reasonableness of fares and rates were as general as those for awarding routes. Thus, among other factors, the CAB was to consider "the need in the public interest of adequate and efficient transportation of persons and property by air carriers at the lowest cost consistent with the furnishing of such service; and the need of each air carrier for revenue sufficient to enable such air carrier, under honest, economical, and efficient management, to provide adequate and efficient air carrier service." In practice, the CAB applied public utility "rate of return on investment" principles in its rate reviews and rate making, and all carriers generally were required to charge like amounts for like services.

As for international routes, the CAB had to share authority over international rates with foreign governments. The obvious complexities were greatly ameliorated, in practice, by broad worldwide acceptance of the International Air Transport Association (IATA) as a

forum for meetings and rate agreements among international airlines, subject to approval by interested governments.

The CAB also established rates to be paid airlines by the Post Office Department for the carriage of U.S. mail, both domestic and international; this was the mechanism for providing the subsidy that all air carriers initially required. Thus, while the mail rates were to be "fair and reasonable," one of the factors to be considered was "the need of each-… carrier for compensation for the transportation of mail sufficient to insure the performance of such service, and, together with all other revenue of the air carrier, to enable such air carrier under honest, economical, and efficient management, to maintain and continue the development of air transportation to the extent and to the character and quality required for the commerce of the United States, the Postal Service, and the national defense." As in its commercial rate making, the CAB based subsidy allowances on "rate of return on investment" analyses.

Although route and rate regulation had the most direct and visible impact on public service, the CAB also exercised a broad range of other economic controls over the air transportation industry. Thus, it could (and did) prescribe in detail the accounts and records to be maintained by air carriers and the reports to be submitted. Agreements between air carriers had to be filed with the CAB, whose approval was required for certain specified interlocking relationships and for air transport-related mergers, consolidations, and acquisitions of control. At the same time, however, CAB approval of such agreements granted immunity from the general antitrust laws. The CAB also was authorized to investigate and terminate "unfair or deceptive practices or unfair methods of competition in air transportation."

One further economic provision of the Civil Aeronautics Act warrants mention in light of deregulation legislation and postderegulation developments. It relates to labor relations between the airlines and their employees. In recognition of the "public interest" characteristics of air transportation, air carriers were required to comply with the provisions of the Railway Labor Act, which prescribed an elaborate system for resolving disputes.

### *The Federal Aviation Act of 1958*

In 1958, President Eisenhower, citing midair collisions of aircraft that had caused a number of fatalities, asked Congress for legislation to establish "a system of air traffic management which will prevent within the limits of human ingenuity, a recurrence of such accidents." Congress responded by enacting the Federal Aviation Act of 1958, which was signed into law on August 23, 1958. The new law created the Federal Aviation Agency (FAA), which was given authority over the nation's airspace. The FAA combined the existing functions of the CAA, the aviation functions of the secretary of commerce, the duties of the Airways Modernization Board, and the safety and regulatory functions of the CAB.

Under the new law, however, the CAB retained its jurisdiction over route allocation, accident investigation, and fare applications. The 1958 act expressly empowered the FAA administrator to regulate the use of the navigable airspace by both civilian and military aircraft, to establish air traffic rules, to conduct necessary research, and to develop air navigation facilities. The act also provided that military aircraft be exempt from air traffic rules in the event of urgent military necessity and provided for restricted airspace zones for security identification of aircraft.

The 1958 act left virtually unchanged the economic regulatory provisions but made several revisions to the safety program. Although the CAB retained its duties in the fields

of air carrier economic regulation and aircraft accident investigation, the board's power to enact safety rules were transferred to the administrator of the FAA, with the result that the latter official promulgated the regulations and standards. The CAB's role in safety rule making was limited to participation as an interested party in FAA proceedings. A second important revision of prior law concerned procedure in cases involving suspension and revocations of safety certificates. Whereas under former law only the CAB could suspend or revoke in the first instance, the new act provided for initial action by the administrator, subject to the certificate holder's privilege of appeal to the board.

Apart from these matters, the FAA administrator wielded essentially all the powers and duties his predecessor had under the 1938 act, plus a clearer authority to allocate the navigable airspace between military and civilian users.

In the spring of 1967, Congress created the Department of Transportation. The FAA as such was in effect abolished, and in its stead was established within the new department a Federal Aviation Administration, headed by an administrator. The FAA's functions were transferred to the Department of Transportation, where, for the most part, they were placed under the Federal Aviation Administration, where they remain today. The Department of Transportation Act also transferred the CAB's accident-investigating and related safety functions to the new department and, in turn, immediately redelegated them to a new independent agency called the National Transportation Safety Board.

## *The Deregulation Movement*

Despite remarkable advances under the regulatory system established in 1938, as well as broad public satisfaction with the airline system, air regulation gradually came under increasing criticism, particularly from academic economists. This criticism gained strong momentum in the mid-1970s, and between 1977 and 1979, a veritable revolution was accomplished in both domestic and international U.S. air transport policy.

The infancy of the air transport industry, and then World War II, produced an initial period free from serious criticism, but the basic economic regulatory policies of the Federal Aviation Act eventually came under attack. The key issue, as might be expected, was the relative desirability of free competition in this industry versus the supposed need for tight government control of entry, exit, pricing, and other issues. As early as 1951, in a study titled *Federal Control of Entry into Air Transportation,* Lucille Keyes questioned both the theoretical and empirical bases for the regulatory system. In 1962, Richard E. Caves, in *Air Transport and Its Regulators,* concluded that "the air transport industry has characteristics of market structure that would bring market performance of reasonable quality without any economic regulation."

Despite increased criticism and occasional congressional studies that led to minor regulatory changes, it was not until 1975 that certain factors began combining for a successful push to **deregulation.** Traditional distrust of government regulation in general became sharply focused on air transportation through a series of economic and regulatory developments. Adversity struck the industry in 1970 when large increases in capacity, resulting from the advent of wide-body jet aircraft, coincided with a serious economic recession. This, in turn, led to widely criticized CAB regulatory policies, including a four-year moratorium on all new-route cases and approval of a series of agreements among airlines to limit capacity over certain major routes. At the same time, CAB pricing policies (which set industrywide standards based on average industry costs) were increasingly viewed as fostering inefficiency, higher costs, and higher prices. Critics pointed to the

experience of several intrastate carriers in California and Texas (not regulated by the CAB) that charged lower per-mile fares for comparable distances than the CAB-regulated airlines and that operated more profitably.

The storm might have passed had it not been for the Arab oil embargo of 1973 and the ensuing massive increase in fuel costs. Airline operating costs soared, while traffic decreased due to the recession. One result was a series of fare increases. However, with cost increases exceeding increases in yields, another period of poor airline earnings followed. This latter factor added to the list of arguments for regulatory reform the contention that the airlines themselves would be better off with some form of deregulation.

It was in this atmosphere that two influential reports were released. One was a special CAB staff study on regulatory reform, dated July 1975. It concluded: "Protective entry control, exit control, and public utility-type price regulation under the Federal Aviation Act are not justified by the underlying cost and demand characteristics of commercial air transportation. The industry is naturally competitive, not monopolistic." The study recommended that protective entry, exit, and public utility–type price controls in domestic air transportation be eliminated within three to five years by statutory amendment.

At about this same time, an influential report was released by the Subcommittee on Administrative Practice and Procedure of the U.S. Senate Judiciary Committee, headed by Senator Edward Kennedy. The report's repeated message was that prices should and would be lower with a more competitive system. The CAB's practices, the subcommittee report concluded, while effective in promoting industry growth, technological improvements, and reasonable industry profits, had not been effective in maintaining low prices. The report further stated that it was economically and technically possible to provide air service at significantly lower prices, bringing air travel within the reach of the average citizen. With the sudden increase in antiregulation sentiment, President Gerald Ford's administration in 1975 sponsored the first deregulation bills. This started the legislative process that culminated in the Airline Deregulation Act of 1978.

Even before the act's passage, however, the CAB had begun its own administrative journey on the road to deregulation. First, Chairman John E. Robson, who took office in 1975, gradually relaxed the moratorium on scheduled service routes of his predecessor. Supplemental (charter) airlines were given greater opportunities through the expansion of the scope of permissible charters. The CAB also permitted greater carrier flexibility to reduce fares. These initial cautious moves gained enormous momentum under Chairman Alfred E. Kahn, appointed by President Jimmy Carter in 1977. Under his vigorous leadership, the CAB soon began processing and approving applications for new operating authority, particularly when the applicants promised lower fares. To enforce compliance with such promises, awards were made for short terms, with renewal dependent on performance. The CAB also was much more receptive to route realignments and elimination of restrictions, as well as to exit from those markets to which entry had been liberalized. During this same period, the Carter administration sought agreements with foreign governments to permit more international competition and was prepared to authorize as much international service by U.S. airlines as foreign governments would accept.

There was also far greater receptivity to fare reductions. Indeed, CAB Chairman Kahn carried it to the point of justifying dismissal of a complaint against illegal rebating by stating: "The law prohibits departure from tariffs, but departures from tariffs are good for competition. Rebating as we see it is a consequence of noncompetitive rate levels, and the best theoretical remedy is to reduce fares."

The Carter administration's support for deregulation was an important factor, but the movement was also aided by improved industry profitability. Some observers attributed the industry's profitability to the CAB's new procompetition policies. Actually, however, from 1976 to 1978, the industry was merely experiencing its traditional cyclical upturn after the sharp downturn in 1975.

There was, of course, substantial opposition to any significant relaxation of regulation from most airlines, from airline labor unions, and from financial institutions with investments in the industry. Their arguments covered a broad range of concerns, including these:

1. Possible worsening of the industry's excellent safety record
2. Probable concentration of service on dense traffic routes, with a consequent deterioration of service on others, especially those serving small communities
3. Impairment of the air transportation "system," with its conveniences of through-baggage handling, interline ticketing, and so on
4. Destructive and predatory price competition, resulting in earnings deterioration and, ultimately, increased industry concentration
5. Reduced ability to re-equip and to finance other available technological advances
6. Adverse impact on airline employees

But these arguments failed to halt the drive for deregulation. Indeed, although what finally emerged as the Airline Deregulation Act of 1978 was working its way through congressional hearings and reports and although the bills themselves were undergoing various revisions, a mini-deregulation bill was passed by Congress with little fanfare or public notice. This was the deregulation of domestic all-cargo service, which became law in November 1977. Actually, it entered the statute books buried in a package of changes attached to a bill dealing with war risk insurance.

The technique for all-cargo deregulation was simple and effective. Any airline that, under the authority of a certificate or exemption, had provided any scheduled domestic all-cargo service during 1977 could, within 45 days after passage of the law, apply for authority for any and all other domestic all-cargo service, and the CAB was directed to grant the application promptly. At any time within one year after passage, anyone could apply for a domestic all-cargo certificate, which was to be granted within 180 days of application, unless the CAB found that the applicant was not "fit, willing and able." In addition, the CAB's authority to regulate domestic cargo rates, whether carried on combination or all-cargo aircraft, was limited to those cases in which the board found, after a hearing, that the rates were discriminatory, preferential, prejudicial, or predatory. The preexisting test of "unjust or unreasonable" was eliminated, and the CAB was specifically precluded from suspending proposed cargo rates pending a hearing.

In March 1978, another deregulation law dealing with cargo was passed. It gave charter airlines the same immediate opportunity to obtain certificates for scheduled all-cargo service that was made available to scheduled carriers by the 1977 law.

## *The Airline Deregulation Act of 1978*

The Airline Deregulation Act of 1978 dealt primarily with domestic air transportation. There was still substantial practical recognition of the fact that no one government could by itself deregulate international service. As a result, Congress established a new Declaration of Policy applicable only to domestic air transportation; the preexisting policy statement continued to apply to international air transportation.

The overriding theme of the act was competition. There was to be maximum reliance on competition to attain the objectives of efficiency, innovation, low prices, and price and service options while still providing the needed air transportation system. "Competitive market forces" and "actual and potential competition" were "to encourage efficient and well-managed" carriers "to earn adequate profits and to attract capital." At the same time, however, Congress was responsive to small-community needs and pressures, and so the act called for "maintenance of a comprehensive and convenient system of continuous scheduled interstate and overseas airline services for small communities and for isolated areas in the United States, with direct federal assistance where appropriate."

Restrictions on entry into domestic service were to be gradually eliminated over the next several years, with complete elimination by the end of 1981 (subject to CAB determination that particular applicants were "fit, willing and able"). The standard for granting route applications was immediately changed from the preexisting requirement, that the proposed transportation "is required by the public convenience and necessity," to a finding that it "is consistent with" the public convenience and necessity. Further, the burden was now on opponents to prove lack of such consistency.

Several special provisions were made for the three-year interim. First, any certificated airline (scheduled or charter) had the right of entry to one new route in each of the three years before complete open entry. Second, subject to certain limitations, carriers could lay claim to unused authority of other carriers. And third, the CAB was authorized to issue experimental certificates for temporary periods.

The new law contained other entry-related provisions that liberalized the preexisting regime, including the following:

1. *Domestic fill-up rights on international flights.* For example, an international carrier flying from Los Angeles to Rome via New York could be given authority, even though not previously possessed, to carry domestic traffic between Los Angeles and New York on at least one round-trip flight a day.
2. *Removal of restrictions.* All "closed-door" restrictions contained in domestic certificates were eliminated. Thus, if an airline was authorized to fly from City A to City B to City C but prohibited from carrying traffic from B to C, that restriction was eliminated. Congress also ordered simplified and expedited procedures for reviewing applications to remove other types of certificate restrictions, domestic or international.
3. *Suspension and reduction of service.* Provisions were adopted that greatly simplified the ability of carriers to reduce or eliminate service.

The CAB was also directed to establish simplified procedures for disposing of certificate applications and requests for amendment or suspension of certificates, and the board was given relatively short deadlines for reaching decisions.

The ultimate liberalization of entry occurred, as scheduled, on December 31, 1981, when the sole barrier to unrestricted domestic entry was the requirement that the applicant be "fit, willing and able"—a finding that had already been made for all existing certificated airlines. For all practical purposes, all airlines (and virtually all would-be airlines) are now free to serve, or to cease serving, any and all domestic routes and cities.

Congress did recognize the need to ensure continued service to communities that might otherwise have been abandoned or provided an unacceptable service level under deregulation. The traditional subsidy program for local-service carriers, which was directed more toward sustaining the carriers than to maintaining specific service to small communities, was to be phased out by the end of 1985, and a new program of subsidies to guarantee essential air transportation to specific communities was established. All cities named in any certificate are automatically eligible, and unless the city is served by at least two airlines, the CAB (or, now, the Department of Transportation, to which this responsibility was transferred) was required to determine what and how much service is "essential." **Essential air service** at any given city is defined as scheduled service, at specific minimum frequency and at fair rates, to one or more other cities with which it has a community of interest. Whenever it is found that a city will not receive essential air transportation without subsidy inducement, applications to perform subsidized service must be sought and an award made at an established rate of compensation. Under the deregulation act, this program was to be continued until 1988; it was subsequently renewed for another 10 years.

The act specified a number of other changes affecting CAB authority over operating rights, including these:

1. *Expanded authority to grant exemptions from economic regulatory provisions.* The standard for granting exemptions was considerably eased, and, for the first time, exemptions could be granted to foreign airlines.
2. *Specific validation for certain liberalized charter rules that were under court challenge.*
3. *Limitation of the president's authority to overrule the CAB in international route cases.* Formerly, there were no statutory standards for presidential review and no deadlines for any action. Now, the president may only disapprove such decisions for foreign policy or national defense reasons.

The act also dealt with domestic fares. Pending almost complete deregulation at the end of 1982, the general criteria for CAB consideration in exercising its rate regulation functions were amended to give more weight to the desirability of low fares and increased pricing and service options. The act also created a zone of reasonableness for domestic passenger fares geared to "standard industry fare levels," which, in turn, were based on July 1, 1977, fares, adjusted periodically for changes in average operating costs. Within this zone, the CAB could not suspend as unreasonable any fare as much as 50 percent lower or 5 percent higher than the "standard" fare.

There were major changes in the antitrust area as well. Certain types of interairline agreements, transactions, and relationships were removed from CAB jurisdiction and thus left subject to federal antitrust laws. For those transactions still requiring CAB approval (such as mergers), the standard for approval more closely conformed to general antitrust principles. In addition, the previous automatic immunity from antitrust laws for any transaction or agreement approved by the CAB was repealed. The CAB was given discretionary power to grant immunity when specifically requested.

Strong labor opposition to the act led to the inclusion of an employee protection program. This program was intended to provide for preferential hiring and financial assistance to eligible airline employees who lost their jobs or suffered pay cuts because of bankruptcy or major downsizing of a carrier due to the change in regulatory structure caused by the act. Although the program was to be administered by the secretary of labor, the CAB was to determine the circumstances under which the protective provisions become operative. (The CAB never did find that any employees were entitled to protection under that statutory test.)

Most dramatic of the deregulation act's provisions was the CAB's demise ("sunset"). On January 1, 1985, the CAB ceased to exist altogether, and its authority over subsidies and foreign air transportation was transferred to the U.S. Department of Transportation (DOT). First, however, late in 1984, Congress made some changes to the 1978 act, primarily to ensure continued consumer protection and to transfer authority over mergers and agreements to the DOT rather than to the Department of Justice.

## POSTDEREGULATION EVOLUTION

With market entry opened up by deregulation, a series of major changes occurred in the industry's structure. Because the routes of greatest traffic volume and financial appeal were those originally within the trunk system, this is naturally where most exploitation of the free-entry opportunity occurred. Trunk carriers themselves moved into one another's territories, entering markets they had previously desired but been unable to obtain. For the trunk carriers as a group, the substantial movement into one another's markets essentially represented a standoff in the sense that, while all of these carriers gained new opportunities, they also lost markets as other carriers moved into their own previous territory.

### *Merger Mania*

In July 1979, Southern Air Lines and North Central Airlines merged to create Republic Airlines. Not content with what was basically still a regional route system, Republic purchased Hughes Airwest in November 1980 and expanded its route system to the west coast. With this merger of three local-service carriers into one major carrier, the industry consolidation phase began.

Pan American merged with National Airlines in 1980, theoretically to obtain a domestic route system. However, the real significance of this merger was not that Pan American eventually won the rights to take over National, but rather that Texas International Airlines lost. With the profits from the sale of its National Airlines stock, Texas International started New York Air in January 1981. In January 1982, the Texas Air Corporation was set up to operate New York Air. In October 1982, the Texas Air Corporation purchased Continental Airlines and combined it with Texas International. Continental continued to operate as a separate entity, but Texas International went out of existence.

On a single day in December 1978, Braniff Airlines, the most aggressive former trunk carrier in picking up dormant route authorities, inaugurated service to 16 new cities and 32 new city-pair markets. Unfortunately, it became the first victim of deregulation, forced to cease operations in May 1982. Many factors contributed to Braniff's demise, including a high debt structure, a recession-weakened demand for transportation, and dramatically

higher fuel prices. Eastern Airlines subsequently acquired Braniff's prized Latin American routes. In 1991, American Airlines would acquire these routes on the demise of Eastern.

Merger activity remained fairly dormant for the next couple of years, reappearing again in March 1985, when Southwest Airlines purchased Muse Air (later to be renamed Trans Star), one of its major competitors in Texas markets. However, merger actions began in earnest again in fiscal 1986.

People Express acquired Frontier Airlines during the fourth quarter of 1985 and continued its acquisitions in 1986 by purchasing Provincetown Boston Airways in January and Britt Airways in February. In September 1986, People Express was acquired by Texas Air Corporation. In April 1986, Texas Air had added Rocky Mountain Airways to its empire, and by September, Eastern Airlines was under its corporate umbrella.

In May 1986, Delta acquired two commuter airlines, Atlantic Southeast and Comair. By the end of the year, Delta completed the purchase of Western Airlines. In September of that same year, Trans World acquired Ozark Air Lines, while Northwest Airlines, which had acquired Mesaba Airlines in 1984, acquired Republic Airlines. Meanwhile, United acquired Pan American's Pacific routes during the year, and American acquired Air California in November 1986.

Allegheny Airlines, a former local-service carrier ambitious to become a major carrier in the deregulated environment, changed its name to USAir in October 1979. By 1985, it had acquired Pennsylvania Airlines, and in April 1986, it added Suburban Airlines, followed by Pacific Southwest Airlines in December of that same year. Then, in December 1986, USAir acquired another former local-service carrier, Piedmont Airlines. Piedmont had acquired Henson Airlines in 1983, followed by Empire Airlines in 1985 and Jetstream International in July 1986.

The consolidation movement that began in 1979 has had a profound impact on the structure of the commercial airlines industry, and its effects are still being felt. Continental Airline Holdings (the former Texas Air), which in the 1980s had been taken into and out of bankruptcy by its former owner, Frank Lorenzo, wound up in bankruptcy once again in 1990, when its overleveraged balance sheet proved too heavy a burden in a time of high fuel costs and a recessionary economy.

Fifty-three years of aviation history came to an end in January 1991 when Eastern Airlines, to the surprise of few in the industry, finally ceased operations after a lengthy struggle for survival. Incorporated in 1938, Eastern was one of the nation's original four trunk airlines. Plagued by labor problems and operating under Chapter 11 bankruptcy since March 1989, Eastern was pushed over the brink by the outbreak of the Persian Gulf War, which resulted in rising fuel costs and decline in travel during the recessionary early 1990s.

In April-1991, American Airlines acquired Eastern's routes to 20 destinations in 15 Central and South American countries, and in December of that year, it struck deals for Continental's Seattle–Tokyo route authority and for TWA's remaining U.S.–London routes. American had already purchased TWA's Chicago–London route in 1989.

By the end of 1991, another aviation pioneer went out of business: Pan American, whose history traced back to 1927, when it began flying the mail between the Florida Keys and Havana. Later, it pioneered transpacific service with its flying boats, and it was the first carrier to fly both the Boeing 707 and 747. Its financial problems began in earnest with the acquisition of National Airlines shortly after deregulation.

In 1991, Delta solidified its position in the ranks of the "big three" carriers by acquiring first the Pan American Shuttle and later the bulk of Pan American's transatlantic and

European systems. The Delta Shuttle began operating between Boston, New York, and Washington, D.C., in September 1991. Competition on the shuttle route stepped up a notch when USAir took over operation of the Trump (formerly Eastern) Shuttle.

Meanwhile, in the early 1990s, United Airlines acquired first Pan American's Latin American routes and then Pan American's London routes. In 1991, United also completed the purchase of its primary United Express partner, Air Wisconsin, rescuing that carrier from potential bankruptcy.

In January 1992, TWA went into Chapter 11 bankruptcy. In its filing, TWA listed assets of $2.7 billion and liabilities of $3.5 billion. Subsequently, it sold its London routes from Philadelphia and Baltimore to USAir. Earlier, it had sold the bulk of its London routes to American. The Persian Gulf War and a recessionary economy contributed to the addition of America West in 1991 to the list of bankrupt U.S. carriers. Another new-entrant carrier since deregulation, America West became a major airline in 1990 after rising from regional to national status. The fifth-largest carrier, Northwest, also was in financial difficulty by early 1992 due to its leveraged buyout in 1989. Northwest's problems affected another new-entrant carrier born in the deregulation era: Midway Airlines. One of the few remaining new entrants during the deregulation era and the purchaser of Air Florida, Midway went out of business in November 1991 when Northwest backed out of an agreement to acquire the carrier. Founded in 1979, Midway grew into a national carrier by 1990. Two true success stories during the deregulation period have been Federal Express and Southwest Airlines. Both carriers were founded in the early 1970s and have been consistently profitable over the years.

In the late 1990s and early 2000s, new types of air carriers emerged as a result of cost-cutting strategies by the major airlines, expansion of niche markets, and competitive forces. Recent trends indicate that four types of air carriers are growing: new-entrant/low-cost, regional/feeder, mega-carrier, and virtual carrier. New-entrant carriers include airlines such as Spirit and JetBlue. Regional/feeder carriers continue to expand as major airlines realize the benefit of feeder traffic to the main hub airports. Mega-carriers are forming as major airlines partner up with other major airlines in order to reduce costs and increase market share. Because of the high costs of launching a new airline, more virtual carriers exist than ever before. Such carriers subcontract most of their services out to other companies, therefore reducing investment risk.

## *Regional/Commuter Airlines*

Spurred by deregulation, many regional/commuter airlines entered the market in the early 1980s. Simultaneously, the major carriers sought to extend their high-density markets by increasingly dominating their hub airports and sloughing off less profitable routes. The hub system, which has proliferated since deregulation, establishes a number of routes connected to a central hub airport where passengers are collected from feeder flights, transferred to other flights on the same line, and are then carried to their ultimate destination. This trend encouraged regional airlines to offer service linking small cities and providing connections to hub airports. Flying primarily turboprop aircraft and requiring less ground-based infrastructure, the regional airlines could operate such routes more profitably than the major carriers and provide a needed service.

In 1985, there was a dramatic growth in the number of code-sharing agreements between regional airlines and the major carriers. These code-sharing agreements varied from partial or outright ownership to pure marketing alliances devoid of any ownership

by the major carriers. A somewhat predictable outgrowth of these agreements has been the identification of commuter partners with the business name of the major airline partner. Just as in the contract experiments with local airlines in the late 1960s, many independent commuter airlines conduct operations under a "service mark" similar to that of their major carrier partners. Thus, commuter airliners bearing such names as Continental Express, United Express, American Eagle, and Northwest Airlink are flying the skies. The evolution of the relationships with the large air carriers has led to further route rationalization policies on the part of the larger partners in the form of transferring an increasing number of short-haul jet routes to their regional partners. The result has been a process of industry consolidation, increasing concentration, integration, and transition to jet equipment.

From a high of 246 carriers in 1981, the number of regional/commuter operators declined to 124 in 1995. As of year-end 2004, there were 74 such operators in business carrying a total of 134.7 million passengers. Although the number of carriers in this market shows a steady decrease, the number of passengers carried shows a steady increase. Interestingly, the number of hours flown on an annual basis is gradually increasing indicating that regional/commuter operators, although decreasing in number, are becoming larger in size resulting in increased market share, longer flights and better utilization of aircraft. Because of the increased integration of operations with the large air carriers (through code-sharing agreements and partial or total acquisition of the regionals) the success of many regional airlines is closely tied to the success of their larger partners.

Although the number of carriers has declined overall, the size of the dominant carriers has risen dramatically. This has resulted in increased industry concentration, with the top 50 carriers accounting for approximately 98 percent of the total passenger enplanements and revenue passenger miles. When we look at the corporate structure, the picture of industry concentration becomes even clearer. In 1995, 36 of the nation's top 50 regional air carriers used the two-letter designation code of a larger carrier to list their flights. In total, there were 46 code-sharing agreements in existence as of June 1996. These relationships varied from outright ownership by the larger carrier (11 airlines), to partial ownership (4 carriers), to pure marketing alliances (31 carriers).

More sophisticated, modern aircraft are added to the regional airline fleet each year. The average trip length for the regional airline passenger has increased, as has the transition from piston to turboprop and jet equipment. As of January 2005, the number of regional air carriers operating at U.S.-airports was extensive. Table 2-4 provides a breakdown of airport use by state including regional and non-regional operations.

### *New-Generation Airliners*

In the early 1980s, after years of flying the once-revolutionary Boeing 727, 737, and 747 and the McDonnell-Douglas DC-8, DC-9, and DC-10, the airlines were ready for newer, more efficient designs, not simply retooled versions of the old ones. If the two dominant U.S. airframe manufacturers would not supply them, foreign sources, notably the Airbus Industrie consortium from Europe, would oblige. After all, the U.S. commuter airliner industry had been dormant during the 1970s, losing market share to firms such as British Aerospace, Embraer of Brazil, Dornier of Germany, and ATR of Italy.

To hold its market share, Boeing introduced two new airliners, the 757 and the 767, certificated in October 1984 after a development process that may have cost as much as $3 billion. Both were giant twin-engine airplanes with underwing powerplants supplied

**TABLE 2-4 Summary of Passenger Service by State, January 2005**

| State | Airports Receiving Scheduled Service by Category of Service | | | | | Total Airports Receiving Scheduled Service |
|---|---|---|---|---|---|---|
| | Airports Exclusively Served by | | | | | |
| | *Regionals* | *Majors* | *Others* | *Without regionals* | *With regionals* | |
| Alabama | 3 | 0 | 0 | 0 | 3 | 6 |
| Arizona | 10 | 0 | 0 | 0 | 2 | 12 |
| Arkansas | 6 | 0 | 0 | 0 | 2 | 8 |
| California | 17 | 0 | 0 | 0 | 12 | 29 |
| Colorado | 7 | 0 | 1 | 0 | 6 | 14 |
| Connecticut | 1 | 0 | 0 | 0 | 1 | 2 |
| District of Columbia | 0 | 0 | 0 | 0 | 2 | 2 |
| Florida | 6 | 0 | 2 | 0 | 13 | 21 |
| Georgia | 7 | 0 | 0 | 0 | 2 | 9 |
| Idaho | 7 | 0 | 0 | 0 | 1 | 8 |
| Illinois | 6 | 0 | 1 | 0 | 5 | 12 |
| Indiana | 3 | 0 | 0 | 0 | 1 | 4 |
| Iowa | 5 | 0 | 0 | 0 | 2 | 7 |
| Kansas | 7 | 0 | 0 | 0 | 1 | 8 |
| Kentucky | 2 | 0 | 0 | 0 | 2 | 4 |
| Louisiana | 5 | 0 | 0 | 0 | 2 | 7 |
| Maine | 5 | 0 | 0 | 0 | 1 | 6 |
| Maryland | 2 | 0 | 0 | 0 | 1 | 3 |
| Massachusetts | 6 | 0 | 0 | 0 | 1 | 7 |
| Michigan | 10 | 0 | 0 | 0 | 7 | 17 |
| Minnesota | 6 | 0 | 0 | 0 | 3 | 9 |
| Mississippi | 5 | 0 | 0 | 0 | 2 | 7 |
| Missouri | 5 | 0 | 0 | 0 | 3 | 8 |
| Montana | 9 | 0 | 0 | 0 | 5 | 14 |
| Nebraska | 8 | 0 | 0 | 0 | 1 | 9 |
| Nevada | 3 | 0 | 0 | 0 | 2 | 5 |
| New Hampshire | 2 | 0 | 0 | 0 | 1 | 3 |
| New Jersey | 1 | 0 | 0 | 0 | 2 | 3 |
| New Mexico | 10 | 0 | 0 | 0 | 1 | 11 |
| New York | 10 | 0 | 0 | 0 | 8 | 18 |
| North Carolina | 5 | 0 | 0 | 0 | 4 | 9 |
| North Dakota | 3 | 1 | 0 | 0 | 3 | 7 |
| Ohio | 1 | 0 | 1 | 0 | 5 | 7 |
| Oklahoma | 3 | 0 | 0 | 0 | 2 | 5 |
| Oregon | 6 | 0 | 0 | 0 | 1 | 7 |
| Pennsylvania | 10 | 0 | 0 | 0 | 4 | 14 |
| Rhode Island | 2 | 0 | 0 | 0 | 1 | 3 |
| South Carolina | 2 | 0 | 0 | 0 | 4 | 6 |
| South Dakota | 5 | 0 | 0 | 0 | 2 | 7 |
| Tennessee | 3 | 0 | 0 | 0 | 3 | 6 |
| Texas | 13 | 0 | 0 | 0 | 13 | 26 |
| Utah | 4 | 0 | 0 | 0 | 1 | 5 |
| Vermont | 1 | 0 | 0 | 0 | 1 | 2 |
| Virgina | 4 | 0 | 0 | 0 | 3 | 7 |
| Washington | 16 | 0 | 0 | 0 | 3 | 19 |
| West Virgina | 8 | 0 | 0 | 0 | 0 | 8 |
| Wisconsin | 6 | 0 | 0 | 0 | 4 | 10 |
| Wyoming | 9 | 0 | 0 | 0 | 1 | 10 |
| TOTAL 48 STATES | 275 | 1 | 5 | 0 | 150 | 431 |
| Alaska | 193 | 3 | 0 | 0 | 14 | 210 |
| Hawaii | 3 | 0 | 0 | 0 | 8 | 11 |
| Puerto Rico | 6 | 0 | 0 | 0 | 2 | 8 |
| Virgin Islands | 2 | 0 | 0 | 0 | 2 | 4 |
| TOTAL U.S. | 479 | 4 | 5 | 0 | 176 | 664 |
| Canada | 12 | 1 | 0 | 0 | 7 | 20 |
| Caribbean | 18 | 5 | 0 | 1 | 15 | 39 |
| Mexico | 18 | 1 | 0 | 2 | 10 | 31 |
| TOTAL NORTH AMERICA | 527 | 11 | 5 | 3 | 208 | 754 |

Source: Regional Airline Association.

by GE/Snecma, Pratt & Whitney, or Rolls-Royce. Flown by two-person crews, they could carry 190 persons in the narrow-body 757 version or 230 in the wide-body 767. The new planes filled the niche between the 115–145-seat 737 and the smallest 420-seat 747. The 757 quickly supplanted the aging 727 with its greater efficiency, and the roomy 767 proved to be economical on the transatlantic routes.

With the increasing reliability of modern jet engines, the FAA had approved extended twin-engine operations (ETOPS) over routes that did not meet the FAR 121.161(a) requirement for continuous availability of a landing site within one hour of single-engine cruising. Historically the province of three-engine DC-10s and L-1011s as well as four-engine Boeing and Douglas airliners, the new 120-minute ETOPS exemption allowed the 767 to fly to Europe without deviating over an uneconomic northern route to stay near land.

First approved in February 1985 for TWA's Boeing 767-200, the basic criteria for ETOPS was a documented in-flight engine shutdown rate of less than 0.05 per 1,000 hours of operation, or less than 1 shutdown per 20,000 hours. Given that mature turbine power plants were experiencing shutdown rates as low as 0.02 per 1,000 hours, the risk assumed by flying over routes that would require two or even three hours of single-engine cruising to reach a diversionary airport was quite small. Within eight years, ETOPS had become so commonplace that 400-seat twin-engine airliners, such as the Airbus A330 and Boeing 777, were being developed for the North Atlantic run.

Meanwhile, the 737 became the most-built jetliner in 1987, surpassing the 727's previous record of 1,832. More than 3,000 of the 737s have been sold to date, and the 300-series, introduced in 1981, began a new cycle for this phenomenally successful aircraft. The 737-300, -400, and -500 are all equipped with new-technology GE/Snecma CFM-56 turbofans and "glass cockpits" with electronic flight instrumentation (EFIS) replacing the old mechanical flight directors and engine gauges. EFIS had been introduced previously on the 757 and 767.

The 747-400 appeared in 1988 with an extended upper deck, bringing the total seating up to 660 in the all-tourist configuration (550 on the main deck and 110 on the upper deck, 65 more than the 200B). Featuring Pratt & Whitney PW 4000, General Electric CF6-80C2, or Rolls-Royce RB 211-524D4D engines, the 747-400 is capable of flying 7,200 miles, 1,000 more than the 747-300.

McDonnell-Douglas was able to remain a presence in the airliner business during the 1980s and 1990s, but with stiff competition from Boeing and Airbus, it saw its market share drop to 10 percent by the mid-1990s. The stretched DC-9-80 became known as the MD-80, subsequently growing into the MD-81, MD-82, MD-83, MD-87, and MD-88, with each model differing chiefly in gross weight and wing size. An MD-90 version with further updating was rolled out in February 1993. Glass cockpits became the norm, along with flight management systems that choreographed flights for maximum efficiency. The last DC-10 came off the production line in 1989, and in January 1990, the MD-11 made its maiden flight. Powered by new engines, the new airliner grosses over 600,000 pounds at takeoff and can carry over 400 passengers. The panel features six 8-inch cathode-ray tube displays, replacing all the mechanical gauges of the DC-10, and with the aid of flight management computers, the plane is simpler to fly, even with two pilots. The MD-11 offers the option of manual cable controls when the autopilot is not engaged, rather than the full fly-by-wire systems popularized by the Airbus A320.

By the early 1990s, more and more airliners were being built in component form, with only the final assembly taking place at the parent company's plant. In the case of the MD-

11, the wings were built in Canada, the winglets were produced by Italy's Aeritalia, the tailcone came from Mitsubishi, and the control surfaces were manufactured by companies such as Embraer and CASA.

Boeing, seeking to close the gap between the 767 and 747, developed the 777, an even larger twin-engine airliner capable of carrying 305–440 passengers. Powered by huge General Electric, Pratt & Whitney, or Rolls-Royce fan-jet engines in the 74,000- to 92,000-pound-thrust class, with fan diameters approaching 10 feet, the 777 offers efficiency, size, and long-range capability. One of the 777's unique options is its folding wing tips, which reduce the 200-foot wingspan to less than 160 feet for simplified docking at crowded gates.

It should be noted that in 1997, Boeing and McDonnell-Douglas merged to become one company, leaving Airbus Industrie as the primary competitor. The merger was a strategic move to expand Boeing's presence in the increasingly competitive aircraft manufacturing market. The merger was anticipated to bring an estimated $48 billion in revenues per year. After the merger, Boeing moved its corporate headquarters from Seattle to Chicago.

In 2006, Boeing and Airbus continue to remain the largest aircraft manufacturers in the world constantly competing to out perform the other in terms of sales. New aircraft technology leads to increased sales and for the first time since 2000, Boeing is once again the number one aircraft manufacturer leaving Airbus in the number two position. Boeing's production of the B787 Dreamliner has captured the industry by storm as airlines strive toward operating fuel efficient twin-engine aircraft on long-haul flights. However, circumstances could change at any time as Airbus markets new aircraft like the Airbus A380, the world's largest commercial aircraft, and the A350 to compete against the Dreamliner.

## *September 11, 2001—A New Era in Aviation*

On September 11, 2001, the world was shocked to hear about the biggest disaster in the history of aviation. Four commercial airline flights were hijacked simultaneously (United Airlines Flight 93, Newark to San Francisco; American Airlines Flight 77, Washington Dulles to Los Angeles; United Airlines Flight 11, Boston to Los Angeles; and American Airlines Flight 175, Boston to Los Angeles). Flight 93 missed its intended target, believed to be the White House, and crashed into a field in Somerset, Pennsylvania, killing all 45 persons on board. Flight 77 was flown directly into the Pentagon, the citadel of world strategic military planning, killing 189 persons. Flight 11 was flown directly into the north tower of the World Trade Center in New York City, killing all 92 persons on board the aircraft. Flight 175 was flown directly into the south tower of the World Trade Center, killing all 65 persons on board. In the end, more than 3,000 people lost their lives on 9/11 as a result of the acts of fanatic terrorists.

Because of the events of 9/11, security at airports, as well as security at high-risk events outside aviation, was stepped up significantly. The global aviation business was hit hard financially and continues to recover. It was estimated in October 2002 that airlines in the United States would lose a total of $8 billion by the end of the fourth quarter for the same year. Some analysts said that these estimated losses were optimistic and that $10 billion would be a more likely figure.

Since the events of 9/11, a number of airlines around the world have declared bankruptcy with some closing their doors forever. In this new era of air transportation, air carriers

have been forced to implement cost-cutting strategies in order to survive. Such strategies are discussed in later chapters.

## GENERAL AVIATION

World War I ended in November 1918, and several thousand Curtis Jennies, which cost the U.S. government close to $17,000 apiece, became surplus and sold for as much as $750 for a new plane with an OX-5 engine and as little as $50 for a used one. Although most World War I pilots returned to other professions, a group of them with flying in their blood became **barnstormers.** Living from hand to mouth and acting as their own mechanics, the members of this happy-go-lucky group put on air shows and took the local townfolk for rides, usually for about five minutes, and charged whatever the traffic would bear.

With the passage of the Air Commerce Act in 1926 and its requirements for the licensing of pilots, maintenance requirements, and other regulations, the barnstormer era came to an end. A number of these colorful individuals settled down and became known as **fixed-base operators,** providing everything from flight instruction, to sale of aircraft and fuel, to maintenance work. General aviation had been born.

### *The Home of General Aviation*

Wichita, Kansas, was a boom town in the 1920s. Since its founding in 1870, the city had ridden the boom-to-bust roller coaster in cattle and oil. Aviation, however, was the boom that would last. Wichita had the right terrain—flat (the city was called the world's largest natural airport). It had the right weather—clear. It also seemed to attract the right people. Matty Laird and Jake Moellendick began work in April 1920 on the first Laird Swallow aircraft. They soon hired three other aviation enthusiasts, who in time developed their own companies: Buck Weaver, who started Weaver Aircraft Company (WACO); Lloyd Stearman; and Walter Beech. The last two, along with another barnstormer by the name of Clyde Cessna, pooled their talents in 1925 to form the Travel Air Manufacturing Company.

The first Travel Air plane, built of welded metal tubing, as opposed to wood framing, won the 1925 Ford Reliability Tour with Walter Beech at the controls. In the 1926 Reliability Tour, Beech flew a Travel Air 4000 monoplane equipped with instruments that permitted blind flying, the first time such a feat had ever been attempted. By 1929, when the company was bought by Curtiss-Wright Corporation, Travel Air was producing 25 percent of all commercial aircraft in the United States. Beech, who worked for Curtiss-Wright until 1932, then embarked on what proved to be his greatest challenge, the start of Beech Aircraft Corporation. He soon announced plans to build a four-place cabin biplane that would fly 200 miles per hour. Impossible—or so the critics thought. Two months after Beech Aircraft introduced its first airplane, the stagger-wing Model 17, the sleek biplane flew off with first place in the prestigious Texaco Trophy Race in Miami. A string of triumphs followed as Beechcrafts won five major races in 1936 alone, including the Denver Mile-High Air Race and the Bendix Transcontinental Speed Dash. Beechcrafts continued to pick up trophies into the next decade. In 1937, the Model 18 Twin Beech was born. Employment peaked during the World War II years, and in 1946, Beech introduced the V-tail Bonanza, which has had the longest production record of any general aviation aircraft.

By 1934, economic conditions had improved sufficiently to allow Clyde Cessna to open his own small factory in Wichita and to install his nephew, Dwane Wallace, a recent aeronautical engineering graduate, as plant manager. Wallace was not paid a salary, but he did have the opportunity to design, build, test, fly, sell, and race the company's products. Wallace set about designing the C-34, a high-wing, four-place cabin monoplane with a 145-hp Warner Super-Scarab engine. After months of anxious flight tests and tedious refinements, the C-34 was entered in the 1935 Detroit News Trophy Race, part of the prestigious National Air Races. The C-34 won the day, and the attendant publicity vastly enhanced Cessna's reputation as a builder of fast, efficient aircraft.

Wallace's next project was a light, inexpensive trainer-utility airplane that was easy to fly and not too sophisticated to build. By 1939, the T-50 was flying, and by 1940, it was in production and ready for buyers. Among the first was the Canadian government, followed by the U.S. Army Air Corps. By 1945, some 5,000 of these trainers had been produced. After the war, Cessna introduced the 120/140 series, which was followed by the 190/195 series. These strong but simple single-engine aircraft helped Cessna survive the postwar shakeout of many small manufacturers of general aviation aircraft and helped propel the company into the 1950s.

Wichita is the home of another man whose name is famous in corporate aviation: William Lear, gambler, inventor, discoverer, promoter, and industrialist, who developed the highly successful corporate Lear jet.

## *Mr. Piper and His Cubs*

At 48 years of age, William T. Piper was a successful Pennsylvania oilman when he invested in the Taylor Aircraft Company in 1931. He was a superb salesman with a clear idea of what would make a light aircraft successful. His formula was simple: build easy-to-fly machines and price them low enough to attract buyers. After an abortive attempt to design a glider, Taylor Aircraft developed the E-2 Cub, an excellent example of Piper's vision of the simple airplane.

The name of the company was changed to Piper Aircraft Corporation in 1936, and the subsequent models were called J-2 and J-3. The PA-11 came next in the Cub line, and then the PA-18 Super Cub, which had essentially the same structural and aerodynamic configuration as the 1932 E-2. To this day, more than one-third of the over 120,000 aircraft produced by Piper since 1937 have been Cubs, and 80 percent of U.S. pilots in World War II received their initial training in that two-place tandem design. Piper Aircraft Corporation boomed and then nearly busted during the difficult days after World War II.

## *The Post-World War II Years*

The Aircraft Owners and Pilots Association (AOPA) had 22,000 members by the mid-1940s (387,000 members as of 2002), and their motivations were the same then as now: to protect private flying from the depredations of the airlines and the assaults of bureaucrats who want to build empires around the commercial airlines and legislate the private flier out of the skies. The AOPA is the largest, most influential aviation association in the world. The term *general aviation* was coined to remove the imagined onus of the term "private flying" from the industry. General aviation denotes aviation used for vital, useful, general purposes, much like those for which the private automobile is used.

The light-aircraft manufacturers, with few exceptions, envisioned their products becoming as popular as the automobile in the years to come. After a banner year in 1946, the manufacturers realized that the general public had perhaps been oversold on light-plane flying and that they could not hope to have a mass-production industry comparable to the auto industry.

In 1947, a year before Cessna introduced its 170, which eventually developed into the 172, the world's most successful light plane, the industry was beginning to flounder.

With manufacturing companies turning belly up all over the place, delivery ramps were clogged with unsold airplanes. At the end of 1947, sales were down 44 percent from 1946, and the downward trend continued well into 1949. But this period also represented a major turning point for the light-aircraft manufacturers, as executives began to look at the future from a different angle. The future lay in developing a fleet of airplanes that would provide solid, comfortable, reliable business transportation—aircraft that could operate in instrument conditions with high enough speed and long enough range. A certain number of training airplanes would have to be built to get new people started flying, but a utility airplane that businesspeople could afford and on which the manufacturer could make a fair profit was the target design for the future.

Production in 1951 was only 2,477 units. General aviation continued to limp along, although the ranks of the manufacturers were decimated. Beech, Bellanca, Cessna, Piper, and Ryan were still trickling airplanes off the production lines, but not all of these companies were sure that they could hang on much longer.

Things were not all bad in the early 1950s: more ground-based navigation stations were built, improved static-free radios were installed, and factory options on more and more airplanes became available. Bill Lear produced the first light-plane three-axis autopilot in 1951 and made cross-country flying easier and more relaxing. Toward the end of the year, about the time that Ryan was dropping the production of the Navion, a new company, Aero Design and Engineering, offered its five-place Aero Commander to the business community; and Mooney unveiled its single-place $1,000 Mooney Mite. That same year, Piper put a nosewheel on its little Pacer and renamed it the Tri-Pacer, which sparked a new surge of interest in light planes for fun as well as for business.

By 1953, things were starting to turn around for the industry. Engineers in Wichita and Lock Haven made careful note of the growing acceptance of light twins for business. Cessna discontinued the 195 model in 1953 and produced the four-place 180, a more powerful successor to the successful 170. Piper stayed with the Tri-Pacer and the Super Cub, and Beech was backlogged with orders for the Bonanza, the Twin-Bonanza, and the Super-18. The National Business Aircraft Association held its first meeting, in St. Louis, which was attended by 9 manufacturers and suppliers along with 50 voting members and 16 associates (the annual NBAA meeting today attracts over 10,000).

In 1954, Cessna and Piper introduced their four-place light twins, the 310 and the Apache, both of which represented the beginning of a long line of descendants. Many companies had entered the avionics business, including ARC, Bendix, Collins, Lear, Mitchell, and Wilcox, to name a few. Month after month, new autopilots were coming out for light planes.

## *The Maturing of General Aviation*

As the 1950s turned into the 1960s, general aviation was developing an unmistakable stability and purpose. Though pleasure flying was far from extinct, the general aviation airplane clearly was developing into a viable means of business transportation. In 10 years, the general aviation fleet had more than doubled to 60,000 aircraft, over half of which were equipped for instrument flying. General aviation had become a major part of the nation's transportation system, with an inventory of light aircraft that were fully capable of flying people in comfort 1,500 miles in one day to thousands of places not served by the commercial air carriers.

Beech brought out the Travel Air, to be followed by the Baron, the Queen Air, and the King Air. Cessna put tricycle landing gear on its 170s and 180s in developing the 172 and 182 series, which became the best-selling airplanes in history. Piper discontinued the Tri-Pacer and entered the Cherokee, Comanche, and Twin Comanche into the market. Many of the old names, such as Bellanca, Mooney, Navion, and North American, would also enjoy a comeback.

By 1965, the general aviation aircraft fleet had grown to 95,000 airplanes, and production that year totaled 11,852 new aircraft. The following year a record 15,768 units were produced. General aviation growth during the late 1960s paralleled growth in the economy and all segments of aviation at that time.

Nothing added more to the growing importance of general aviation than the advent of turbine power. The business jet and turboprop were introduced to corporate users. At first, there were just a few Lockheed JetStars, North American Sabreliners, Beech King Airs, and Grumman Gulfstreams. It wasn't long before Bill Lear arrived in Wichita with the idea of turning a small Swiss fighter aircraft into a business jet. Both the Sabreliner and the JetStar were designed as military utility aircraft. Lear would go on to sell hundreds of Learjets and, like Piper and his Cubs, his name would become synonymous with a certain kind of transportation.

In 1970, the manufacturers of light aircraft established a strong and effective lobbying and public relations organization in Washington, the General Aviation Manufacturers Association (GAMA). The National Business Aircraft Association (NBAA) blossomed into a highly professional Washington-based service organization for business users. The Aircraft Owners and Pilots Association (AOPA) and other special-aircraft-use organizations developed into effective lobbying groups. The Federal Aviation Administration (FAA), under administrator Jack Shaffer, appointed a deputy administrator for general aviation.

Despite an economic recession during the first two years of the 1970s and an oil embargo in 1973, general aviation continued to grow, reaching a high point in 1978, with 17,811 units produced. By the late 1970s, both manufacturers and users began to feel a confidence in general aviation that they had seldom enjoyed before. Perhaps for the first time, the general aviation community perceived that potential problems related to government controls, charges, fees, and taxes, as well as restrictive legislation, were manageable. However, fundamental changes were taking place in the industry. Fuel prices rose dramatically during the 1970s, and manufacturers looked to more fuel-efficient aircraft for the future. Airspace congestion was another problem that the industry had been studying since the mid-1960s. As a result, the Airport and Airways Development Act of 1970 was passed to provide the revenue needed to expand and improve the airport and airway system over a 10-year period. Finally, the industry was faced with ever-increasing federal regulation during the 1970s. Terminal control areas (TCAs) were introduced around the

country's busiest airports, which required two-way communication with air traffic control (ATC), VHF Omnidirectional Range (VOR) navigation capability, and altitude-reporting transponders. Increasing regulations particularly affected the personal-pleasure pilot.

It was also during the 1970s that the attention of the general aviation industry started focusing on product liability. As the number of lawsuits and the size of awards increased, insurance premiums shot up, from $51 per new airplane in 1962 to $2,111 in 1972. This trend was a sign of things to come for aircraft manufacturers and, no doubt, one of the major causes of the precipitous decline in the production of general aviation aircraft during the 1980s.

Unfortunately, the 1980s brought on a new round of challenges for the industry. Soaring interest rates and a depressed economy during the early 1980s had an effect on sales. Aircraft shipments dropped from 11,877 in 1980 to 9,457 in 1981 and to 4,266 in 1982. By 1994, the number had reached a record low of 928 units. Once again, the ranks of the manufacturers were being thinned. Raytheon Company acquired Beech in 1980, and in 1984, Lear-Siegler took over Piper as part of a buyout of Bangor Punta, its former parent. Piper changed ownership several more times before the end of the decade. General Dynamics took over Cessna, the last independent of the "big three" manufacturers of general aviation aircraft. By 1986, Cessna decided to drop its piston-aircraft production.

Low unit sales of general aviation aircraft during the 1980s and early 1990s have been attributed to the ever-increasing cost of new aircraft with relatively few design changes since the 1970s, higher fuel and other operating expenses, including maintenance and hangar charges, and the availability of used aircraft. Other analysts cite product liability costs and changing tastes and preferences among the traditional business and pleasure aircraft users. Interests in sports cars and boats, the operation of which requires less training, seemed to peak during the 1980s. Another financial pressure working against aircraft ownership involved the passage of the Tax Reform Act of 1986, which eliminated the 10 percent investment tax credit (ITC). Finally, foreign aircraft manufacturers entered the traditionally U.S.-dominated market in a much bigger way during the 1980s.

Although the U.S. economy experienced impressive growth and interest rates declined during the latter part of the 1980s, general aviation failed to recover. By 1992, the number of general aviation aircraft manufactured in the United States had dropped below 1,000 for the first time since the end of World War II. Between 1978 and 1994, flying hours declined by about 45 percent, and the active general aviation fleet, after reaching a peak of 220,943 aircraft in 1984, fell to 170,660 by 1994. More importantly for the future growth of the industry, the number of student and private pilot certificates issued dropped by almost 50 percent between 1978 and 1994.

General Dynamics apparently found the field of general aviation to be too far removed from its core military business, which was in decline during the post–Cold War period, so Cessna was sold to Textron in 1992. This caused much speculation in general aviation circles about a return to light-plane production, because Textron also owned the manufacturer of Lycoming engines, which had been used in Cessna's 152, 172, 172 RG, T182, and 182 RG models, and it would be logical to create a market for them. However, Textron also owned Bell Helicopter, and there was about as much chance of Cessna switching over to helicopter production as to start building Lycoming-powered light planes again. Cessna was satisfied building Caravan single-ngine turboprops, operated primarily under contract to Federal Express over small-parcel freight routes. Cessna was also content with its line of six business jets, ranging from the 10,400 pound Citation Jet, powered by FJ44 fan jets from Williams Research, to the speedy, 31,000 pound Citation X with its two huge

Allison GMA 3007C engines. More than 2,000 Citations have been sold since September 1972, when the first one was delivered; plane number 2,000, a Citation VII, was rolled out on March 30, 1993.

Piper limped along through the downturn of the 1980s but still celebrated its fiftieth anniversary in 1987. However, a series of ownership changes had left it ill-equipped to make the tough managerial decisions needed in hard times. In 1970, control passed from the Piper family to Bangor Punta Corporation, itself acquired by Lear-Siegler in 1984. In turn, Lear-Siegler was taken over by investment bankers Forstmann Little in the mid-1980s. Then, with shutdown imminent, private entrepreneur M. Stuart Millar bought Piper in May-1987 with the idea of returning it to owner-management. Piper dropped its product liability insurance in an attempt to discourage lawsuits, prices were cut, and enthusiasm ran high. Unfortunately, the company slipped into Chapter 11 bankruptcy in 1991, unable to build airplanes cheaply enough to fill the large backlog of orders taken at bargain prices. It was purchased in April 1992 by another entrepreneur, A. Stone Douglas. A trickle of airplanes continued to flow from the production lines under the protection of the court. Finally, in July 1995, the New Piper Aircraft Corporation was formed from the assets sale of Piper Aircraft Corporation.

Beech survived by concentrating on its traditional role as a supplier of business airplanes. With over 90 percent of the executive turboprop market firmly in the hands of the various King Airs, ranging from the 7-passenger King Air C-90B to a 10-passenger Super King Air 350, only limited plant space was devoted to piston-aircraft production. However, Beech still offered its four-place Bonanza F-33A, a six-seat Bonanza A-36 or turbo-charged B36TC, and a twin-engine Baron 58. These finely crafted, piston-powered planes served to introduce future King Air buyers to Beech quality.

Beech acquired the rights to Mitsubishi's Diamond business jet in 1986, giving it a fast entry into the business jet field, just above the largest King Air. This was actually Beech's third attempt at jets. The company had entered into marketing agreements for the French-made Moraine-Saulnier MS-760 in 1955 and the British-made Hawker BH-125 in the 1970s, but neither venture had been overly profitable. This time, however, Beech was in a position to take over the production of its jets, which it redesigned and built as the Beech Jet-400A.

The rest of the U.S. general aviation industry held on through the 1990s by staying small, merging, or diversifying. Mooney had been owned by the French firm Euralair since 1984 and was still building single-engine aircraft in the Kerrville, Texas, plant it occupied in 1953. Learjet was sold to the Canadian firm Bombardier, but it remained based in Wichita. The stretched Model 55 grew into the Model 60, certificated in late 1992.

Specialty aircraft builders hung on by exploiting their particular niche, such as manufacturers of fabric-covered tail-wheel airplanes (Husky, Maule, Taylorcraft, American Champion), amphibian flying boats (Lake), custom-made and steel-tube classic aircraft (Bellanca, Waco Classic), and other personal airplanes (Commander's 114 B and the American General Tiger, a rebirth of the Grumman AA-58).

Signs of optimism appeared in 1994 with the passage of the General Aviation Revitalization Act, which limited products liability suits, and with Cessna's announcement that it would resume production of single-engine aircraft in 1996. The New Piper Aircraft Corporation was formed, and in 1995, general aviation aircraft shipments finally increased after an 18-year decline. Unquestionably, the 1990s brought new challenges to the industry. But as the history of general aviation shows, this is hardly a novel situation.

## *Business Aviation*

Although business or corporate flying had its foundations in the 1930s, when petroleum companies, newspaper publishers, and manufacturers owned and operated their own aircraft, it wasn't until the late 1950s that business flying really took off. The turbine engine was one of the major factors.

Ever since the end of World War II, corporate operators had relied heavily on former military aircraft that were converted to civilian use. The Lockheed Lodestar and Ventura were examples. Pacific Airmotive Corporation's Lode-star conversion, the Learstar, was one of the most sought after of its kind. It offered 280-mph speed and 3,800-mile range. The DC-3 and its military version, the C-47, fit well into the corporate fleets. Many corporate flight departments operating today got started with Beech D-18s or E-18s, each powered by 450-hp Pratt & Whitney R985 radial engines.

But the end was signaled for the large radial-engine business aircraft with Grumman Aircraft Corporation's announcement in 1957 that it intended to build the first made-for-business-aviation turbine-powered airplane. It would be called the Gulfstream, and it would cost a half-million dollars.

Lockheed was first on the turbojet scene with its JetStar, but the big winner in the jet competition was North American Aviation's T-39 Sabreliner. The DH-125 twin-jet airplane by deHavilland followed, and a short time later, Dassault of France was ready with its Model-20 Falcon.

By the mid-1960s, turboprops abounded. The Turbo Commander and King Air could be seen on many ramps, and there was talk of the coming of the Mitsubishi MU-2. But perhaps the favored aircraft among Fortune 500 companies was the Beechjet. Business and corporate aviation has been less severely affected than other segments of general aviation, a fact that reflects the reliability and flexibility of today's corporate fleet.

Deregulation has had a twofold effect on general aviation. First, corporations and businesses with widely scattered plants, mines, mills, construction sites, and so on have found it essential to establish flight departments equipped with high-performance aircraft to minimize executive trip time, increase employee productivity, and maintain a high level of cohesion and control of far-flung operations. Second, the proliferation of hub-and-spoke operations for commercial traffic has expanded scheduled regional and commuter airline systems, which feed about 70 percent of their passengers from widely scattered, low-density airports into large, high-density terminals, where they can continue their trips on the major carriers. The regional/commuter airlines serve many communities in the continental United States, providing air links to communities that might otherwise be cut off from fast, efficient air transportation.

However, the proliferation and expansion of the new regional carriers does not mean that all business and corporate requirements for efficient, nonscheduled air transportation have been met. The current hub-and-spoke pattern may be economically more efficient than the elaborate multipoint network it replaced, but some passengers must pay for this in time-consuming layovers and other inconveniences during their trips. For business and executive travelers, time is of great importance—a commodity companies have shown themselves willing to pay for through the purchase of business aircraft.

## *Will New Technology Affect the Future of Corporate Aviation?*

It was not too long ago that the main function of corporate aircraft was to transport executives between destinations regardless of the financial cost factors. Often, the aircraft was not flown enough in a year to make it a viable mode of transport for the organization, because its use was limited to a small number of key people.

Today, organizations must reduce costs wherever possible in order to remain competitive in the global marketplace. For the most part, the days of the "royal barge" have disappeared as corporate aircraft operators have learned about the high costs of operating such aircraft. More and more, corporate aircraft are used not just by key executives but by employees of all levels within an organization. Some organizations continue to underutilize aircraft but there might be advantages to doing this, depending on what kind of business is transacted on board the aircraft or at a destination. Other organizations fully utilize corporate aircraft and use this technology as a shuttle between destinations while maximizing the load factor.

Aircraft technology has "shrunk" the world, and it is becoming more important to be able to visit more destinations within a short period of time. As the need for travel increases, expenses increase. Locations that were previously not accessible by commercial and corporate aircraft need to beaccessed.

New technology is being developed by government, industry, and academic partners for a type of aircraft that can safely and affordably move people and goods among underutilized airports in urban, suburban, and rural locations throughout the United States. This new technology is known as the **Small Aircraft Transportation System (SATS).** The project reached its conclusion with a proof-of-concept demonstration in June 2005 at Danville, VA. Demonstrations are intended to show policymakers and the public that this new technology can work.

Under SATS, each aircraft will hold 4 to 10 people, including the pilot(s). Each aircraft will be outfitted with digital avionics suites with satellite-based navigation systems, on-board computers that permit coordinated control and display of aircraft system operation and status, and synthetic vision that allows operations in low-visibility environments. A computer display will show a three-dimensional view of the flight path, terrain, obstacles, traffic, and weather, with superimposed guides for the pilot to fly any flight plan selected. These aircraft will have simpler controls than any aircraft currently flying, making the aircraft easier to operate. The conventional throttle and mixture controls will be replaced by a single lever power control. The yoke and pedals will be replaced by a simple joystick control.

Because of the simplicity of this technology, the amount of flight training required will be reduced, and techniques used will be simplified. It is expected that a person will receive private pilot certification with instrument rating in an economical and accelerated single course. SATS aircraft will have access to the Internet and the Public Switched Network for airborne communications. Each aircraft will also have access to weather graphics, traffic information, and ground facility information, allowing operators to schedule reservations for meetings, accommodations, car rentals, and restaurants while en route.

SATS aircraft will not be dependent on current air traffic control (ATC) systems because of the use of satellite-based navigation information. Each aircraft will know its exact location from takeoff to landing, reducing the number of delays currently imposed by ATC systems. For corporate operators, this will mean a more efficient environment to conduct business. Each SATS aircraft will "beam" its location and intent to other SATS aircraft in

the vicinity and to local ATC facilities, reducing routing and scheduling constraints. Once SATS matures, it will integrate with the National Airspace System.

It has been determined that approximately 5,000 existing SATS Portal Airports throughout the nation will be utilized. For the most part, these are airports equipped with fixed-base operators (FBOs), offering a comfortable environment with accessible parking and check-in, baggage handling, food service, office support, ground transportation, access to accommodation, and aircraft service and maintenance. Some 10 percent of Florida's airports were used for SATS demonstrations using primarily professional pilots. Avionics will be what is commercially available. SATS will have "multimodal" connectivity, and it is expected that these airports will all remain in operation as SATS airports.

For corporate operators, SATS will reduce travel time and eliminate the need to fly in and out of congested airports. No more airport lines and no more connecting flights! Departures and arrivals will take place within a 30-minute radius of one's home or office, permitting more reasonable travel times and increased travel range.

## KEY TERMS

Airbus
Boeing
feeder route
deregulation
Columbia route
essential air service
CAM (contract air mail) route
barnstormers
fixed-base operator
Spoils Conference
Small Aircraft Transportation System (SATS)
air commerce

## REVIEW QUESTIONS

1. When was the first regular domestic air mail service provided? Who flew the mail in the years before 1925? What was the major significance of the Kelly Act? Of the Air Commerce Act? Who was the successful bidder on the Columbia route? What was the name of the aircraft specifically designed to carry mail on the Columbia route? Who were 6 of the first 12 carriers on the newly established CAM routes?

2. What role did Walter Folger Brown play in developing the early CAM routes? What was the Spoils Conference? Which three carriers picked up the northern, central, and southern cross-country routes? What event prompted Senator Black to investigate air mail bidding practices? What was the significance of the Air Mail Act of 1934?

3. What was the first modern airliner? How did Douglas Aircraft get started? Describe several technical developments that took place in the 1930s. Why did the federal government tighten its grip over the industry toward the later 1930s?

4. Who were the leading commercial aircraft manufacturers in the post-World War II period? What was Boeing doing at the time? What position did the CAB take when the major carriers wanted to establish feeder routes after the war? What major decision did the British make? Why? Briefly describe some of the technical advances that took place in the early 1950s.

5. How did Boeing arrive at the design for the 707? What were some of the events leading up to the establishment of the Federal Aviation Agency? List and briefly explain several major economic developments in air transportation during the four decades from 1938 to 1978.

6. Describe some of the reasons government is rooted in the economic and physical characteristics of the air transport industry. What was the major object of the Air Commerce Act of 1926? How did the act define "air commerce"? Which governmental agencies or departments were empowered to perform functions relative to carrying out the provisions of the act? Why did Congress choose to spread the workload over so many units of government?

7. What was the primary purpose of the Civil Aeronautics Act of 1938? What does the following statement mean: "The five members of the CAA exercised quasi-judicial and quasi-legislative functions"? Describe four of the six functions of the CAA. What was the significance of the reorganization plans of 1940? Briefly describe five economic functions performed by the CAB. Describe some of the features of the Federal Aviation Act of 1958.

8. What were some of the events leading up to the passage of the Airline Deregulation Act of 1978? Describe the position of the CAB regarding deregulation under the chairmanship of Alfred E. Kahn. List some of the arguments against deregulation. What is the overriding theme of the act? What are the major changes under the act?

9. Explain how the certificated airline industry has changed since deregulation in terms of expansion, consolidation, and concentration. Describe the role of commuter/regional carriers and the reasons they have experienced significant growth despite their shrinking numbers during the 1980s. Identify some of the new-generation aircraft that have arrived in the postderegulation period.

10. How was the term fixed-base operator coined? Who were some of the early general aviation aircraft manufacturers? What was the prevailing thinking of the light-aircraft manufacturers after World War II? What did they decide to do that subsequently turned the industry around? When did things start to look up? Describe the growth of general aviation during the 1960s and 1970s. What were some of the causes for the slowdown in unit sales during the 1980s and early 1990s? When did the large corporate aircraft arrive on the scene? What effect has airline deregulation had on general aviation and corporate aviation?

11. How will new technology like SATS impact the future of general aviation? How will this technology impact airline operations?

**WEB SITES**

http://www.aviation-history.com
http://www.thehistorynet.com/AviationHistory
http://www.airpowermuseum.org
http://www.smithsonian.org

http://www.sats.nasa.gov
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