NATCA

A History of Air Traffic Control

Founded in 1987, the National Air Traffic Controllers Association (NATCA) represents more than 15,000 aviation safety professionals throughout the United States, Puerto Rico, Guam and other U.S. territories. All share a common goal: protecting the safety of the flying public.

These individuals are air traffic controllers, engineers, architects, nurses, health care professionals and financial and accounting professionals.

In 1981, air traffic controllers lost their collective voice after the Professional Air Traffic Controllers Organization (PATCO) was decertified. The decertification followed a strike that led to the firing of 11,345 controllers. Over the next several years, the Federal Aviaton Administration (FAA) hired large numbers of controllers, but never returned to pre-1981 levels. Meanwhile, the number of daily flights grew – along with safety concerns. The controllers needed representation to address their concerns and ensure that passengers remained safe in air travel. NATCA was formed to fill that role.

NATCA serves as the exclusive bargaining representative for FAA air traffic controllers, engineers, architects and many other aviation safety professionals – representing the concerns of all in the field, not just their members. Although membership is voluntary, NATCA has the highest percentage representation of any federal employee union.

NATCA also works to further the general public's interest in safe and efficient air travel. To do that, NATCA seeks to influence aviation policies through efforts related to political and legislative affairs, communications and technology advancement.

Since its founding, NATCA has carved out an influential role in the aviation industry, fighting on behalf of all its members and the flying public to achieve the safest and most efficient air travel system in the world. NATCA continues to serve as the voice of aviation safety professionals throughout the country and works tirelessly with the FAA, government officials, airlines and other aviation officials to keep the skies safe for all travelers.

1903 — 1925

THE DAWN OF AVIATION

In the decade following the Wright Brothers' first powered flight on Dec. 17, 1903, aviation captured the public imagination, but practical applications lagged.

Thomas Benoist started the first scheduled air service – an 18-mile seaplane route over Tampa Bay in Florida – in 1914. But his business died with the end of the tourist season and railroads provided stiff competition for the emerging new technology.

World War I accelerated development of aviation technology, aircraft manufacturing and pilot training. People were beginning to realize that unless the means were developed to control and direct airplanes, they would crash into each other just as the first automobiles had.

Transcontinental airmail service was established in 1920. But because airplanes could fly could fly only during daylight, they needed to hand off their cargo to trains at the end of the day.

On Feb. 22, 1921, the U.S. Postal Service conducted a daring night-flying experiment, lighting the transcontinental route with a series of bonfires. Two planes each left New York and San Francisco with loads of mail for the cross-country run. One of the eastbound planes crashed after takeoff in Elko, Nev., killing the pilot. Both westbound planes got stuck in Chicago by a snowstorm. The pilot of the remaining eastbound plane, Jack Knight, survived the trip, but only through extraordinary heroics.

Also, in 1921, rotating beacons on towers replaced the bonfires on a segment of the cross-country route through Ohio. By 1923, the Postal Service had installed similar beacons between Chicago and Cheyenne, Wyoming. This enabled all-night flights across the continent and cut mail delivery time to 29 hours – two to three days less than it took by train.

By the mid-1920s, the Post Office fleet flew 2.5 million miles a year. Having proven the feasibility of airmail and set facilities in place, the government moved to transfer airmail service to private business. Congress passed the Contract Air Mail Act of 1925, spurring the growth of a private U.S. airline industry.

From Washington D.C.'s Polo Field, located between the Tidal Basin and Potomac River, a Curtis "Jenny" airmail plane is being positioned for takeoff for the first regularly scheduled airmail service.

A DH4, more commonly called "The Flying Coffin," was the workhorse of the fledgling U.S. Airmail fleet.

1926 — 1935

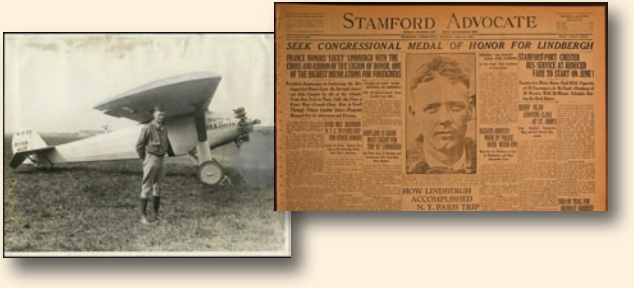
LUCKY LINDY AND ARCHIE LEAGUE

As increases in aircraft speed, traffic and capacity led to safety concerns and delays, the leaders of the new industry concluded that federal action was needed to set and maintain safety standards.

With the Air Commerce Act of 1926, Congress charged the Secretary of Commerce with setting air traffic rules, certifying pilots and aircraft, establishing airways and operating aids to navigation.

In 1927, Ford Motor Company produced the first plane for carrying passengers commercially. The Ford Trimotor seated only 12, but the sturdy appearance of the "Tin Goose" increased public confidence in air transport.

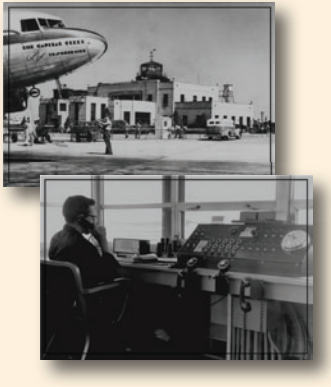
1927 became better known, of course, as the year of Charles Lindbergh's solo flight across the Atlantic. The feat riveted public attention on aviation and attracted much-needed investment.



At Lindbergh's home airfield in St. Louis, air traffic was roaring like the Twenties. In 1929, the city hired the first U.S. air traffic controller – Archie W. League, a pilot and mechanic who had barnstormed around the area with his "flying circus."

League's "control tower" was a wheelbarrow. In it, he carried a chair, an umbrella for shade, his lunch, water, notepad and a pair of signal flags he used to direct aircraft to "GO" or to "HOLD."

League went on to earn a degree in aeronautical engineering and, during a 36-year career, helped develop the federal air traffic control system. Within a few years, League's signal flags were replaced by "light guns," which focused their beams on single planes and communicated with colors and flashes. However, it was the emerging technology of radio that allowed air traffic control to expand beyond airport boundaries.



Cleveland's airport opened the first radio-equipped control room in 1930. Soon, nearly all airlines were equipping aircraft for radio navigation. By 1932, the Commerce Department had installed 83 radio beacons across the country. These transmitted directional beams that pilots could follow to their destinations.

Within a few years, radio marker beacons were helping pilots navigate through poor visibility, and two-way radio technology allowed ground-to-air communications as radio-equipped air traffic control towers sprouted around the country.

1936 — 1957

FROM SHRIMP BOATS TO RADAR

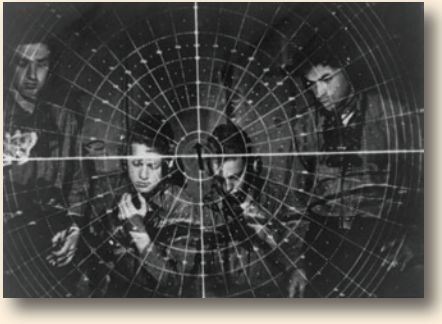
With the expansion of commercial aviation in the Thirties, airlines began to press for coordination and tracking of flights beyond airports – along entire air routes.

The Commerce Department called for three Air Route Traffic Control Centers in Newark, Cleveland and Chicago. By 1936, all three were operating. Although private airlines developed these centers, the federal government took over as planned the next year.

The early route controllers used maps, blackboards and mental calculations to ensure the safe operation of aircraft. To represent planes, they moved boat-shaped weights – called "shrimp boats" – across maps. These controllers had no direct radio links with aircraft. They used telephones and radio to communicate with airline dispatchers, controllers in airport towers and airway radio operators, who relayed instructions and weather information to pilots.

In 1938, Congress established the Civil Aeronautics Authority, consolidating all federal regulation of aviation into one agency. On the eve of World War II, the CAA expanded its authority over the airways to also include takeoffs and landings at airports, uniting airport towers with air route traffic control centers.

World War II brought dramatic changes. Wartime needs for freight and passenger transport brought the airlines more business than they could handle. They pioneered new routes, and new technology allowed aircraft to go faster, higher and farther. The war also pushed growth of the air traffic control system and brought the first female controllers.



The war's largest impact, though, came through the adoption of radar, the acronym for radio detection and ranging. Initially developed for military defense, radar consists of a synchronized transmitter and receiver that emits radio waves and processes their reflections for visual display. It revolutionized air traffic control.

In 1946, the CAA experimented with a radar-equipped tower for civil flights. By 1952, approach and departure control routinely employed radar. But federal budget cuts thwarted installation of systems that extended beyond airports.

Then, on June 30, 1956, two planes collided over the Grand Canyon, killing all 128 aboard. Congress quickly appropriated $250 million for a major upgrade of the nation's airway system, including advancements in radar surveillance.

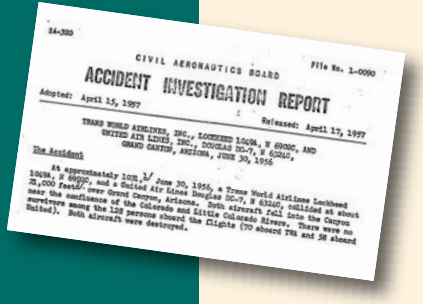
1958 — 1977

THE JET AGE

Although the jet engine inspired excitement immediately with its introduction in World War II, 13 years passed before a military transport was revamped as the first U.S. passenger jet – the Boeing 707.

The new jet flew at speeds up to 550 miles per hour and carried up to 181 passengers. It was 1958. The Jet Age had begun.

That year, for the first time, more people crossed the Atlantic by air than by sea. From 1958 to 1977, passenger travel grew by more than 1,000 percent, an unprecedented increase.



CIVIL AERONAUTICS BOARD File No. 1-0090

ACCIDENT INVESTIGATION REPORT

Adopted: April 15, 1957 Released: April 17, 1957

TRANS WORLD AIRLINES, INC., LOCKHEED 1049A, N 6900C, AND UNITED AIR LINES, INC., DOUGLAS DC-7, N 6324C, GRAND CANYON, ARIZONA, JUNE 30, 1956

The Accident

At approximately 10N 1/ June 30, 1956, a Trans World Airlines Lockheed 1049A, N 6900C, and a United Air Lines Douglas DC-7, N 6324C, collided at about 21,000 feet 2/ over Grand Canyon, Arizona. Both aircraft fell into the Canyon near the confluence of the Colorado and Little Colorado Rivers. There were no survivors among the 128 persons aboard the flights (70 aboard TWA and 58 aboard United). Both aircraft were destroyed.

Meanwhile, in response to the crash over the Grand Canyon two years earlier, Congress passed the Federal Aviation Act of 1958. The law created the Federal Aviation Agency (later the Federal Aviation Administration) and gave it broader authority to combat aviation hazards. It also gave the FAA sole responsibility for a common civil and military system of navigation and air traffic control.

In 1960, the FAA began to require the use of transponders, which send a radar beacon – or "squawk" – identifying the aircraft. With secondary radar, this squawk helped controllers identify each radar blip as an individual flight. The controllers would write this information on plastic "shrimp boats" that they pushed along with sticks on tabletop radar scopes.

Meanwhile, computers were beginning to transform air traffic control and usher in the Age of Automation. Computers were first introduced experimentally in 1956; within a few years, the FAA was developing complex systems.

From 1965 to 1975, the FAA installed a computerized system that for the first time wedded data from the flight plan with readings from the radar and transponder, producing alphanumeric screen readouts of data on the plane's position, speed and altitude. Controllers could at last "see" flights in three dimensions, and do so continually. With the new automation, controllers could also connect transponder signals with flight plans and detect and correct any variations. By 1975, all Air Route Traffic Control Centers (ARTCCs) plus the 61 busiest airports were receiving this real-time, in-flight data on computers. This allowed controllers to place their scopes upright, finally making the shrimp boat markers obsolete.

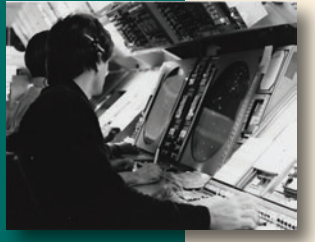
Meanwhile, in 1970, the FAA established a prototype Central Flow Control Facility to prevent clusters of air traffic congestion from disrupting nationwide transportation flow. Today's facility in Herndon, Va., provides a nationwide picture of air traffic flow and allows large-scale adjustments to reduce delays.

1978 — 1993

TURBULENCE IN THE AVIATION SYSTEM

The Airline Deregulation Act of 1978 phased out the economic regulation of the airlines by the Civil Aeronautics Board, which ceased to exist at the end of 1984. As lower fares and greater airline efficiency followed, so did a rapid increase in air traffic.

In 1981, equipment outages and undue stress plagued the system. In the words of presidential candidate Ronald Reagan, "...too few people working unreasonable hours with obsolete equipment has placed the nation's air travelers in unwarranted danger." The frustrations of air traffic controllers boiled over into an illegal strike by their union, the Professional Air Traffic Controllers Organization (PATCO). The strikers' main demands related to shorter hours, updated computer equipment and higher pay.



At the time, U.S. controllers were:

- Suffering from hypertension and other stress-related ailments at extraordinary rates.
- Often forced to work up to 20 hours of overtime a week.
- Nearly 90 percent were leaving before retirement, and about 40 percent of those to collect disability payments.

On the third day of the strike, President Reagan fired the 11,000 strikers. Three years later, PATCO was decertified. To keep the airlines aloft after the strike, the Federal Aviation Administration limited the number of flights and staffed the control towers of America with controllers who hadn't been fired, new hires, military controllers and controllers transferred from smaller facilities, which the government had closed.

Hope for desperately needed new equipment rose in 1985 when the FAA awarded a contract for the Advanced Automation System (AAS) to replace computer systems in use since the late 1960s at the Air Route Traffic Control Centers. But the program fell short of expectations and was canceled in 1993. Meanwhile, Transportation Secretary Federico Peña made headlines by demonstrating how – well into the computer age – many controllers were still saddled with antiquated vacuum tubes for the display of vital information.

1994 — 2001

TECHNOLOGY ADVANCES, CHALLENGES REMAIN

Aging technology remained an issue in the mid-1990s. Problems plagued centers and towers across the country when power outages, computer failures and other equipment problems caused air traffic disruptions and compromised passenger safety.

In the mid-1990s, the Air Transport Association estimated such delays cost $3.5 billion in wasted fuel, passenger time and under-used aircraft.

In response, Congress passed major FAA reform legislation, which went into effect in 1996. It allowed the agency, through long-term budgeting, to make multi-year acquisitions funded by trust fund revenues. The legislation also required the FAA to develop a new personnel system that allowed it to determine pay based on the specific demands of the unique technical professions rather than being tied to government-wide pay scales. It also provided a streamlined path for new technology, leading to the deployment of more new air traffic control technology in the following five years than the previous few decades.

But even with new technology off the ground, airport congestion remained a problem. More runways were needed to accommodate the country's increasing air travel. In 1995, Denver International Airport opened, the first new major airport in 30 years. During its first 11 months of operation, delays were five times less than those at the old Denver Stapleton Airport. Other modern airports, such as Detroit, Atlanta and Dallas-Fort Worth, became models, maximizing the use of parallel runways, which allow air traffic to operate more smoothly.


The New York Times

U.S. ATTACKED

HIJACKED JETS DESTROY TWIN TOWERS AND HIT PENTAGON IN DAY OF TERROR

President Vows to Exact Punishment for 'Evil'

Tragedy struck the United States on Sept. 11, 2001. Controllers train for engine failures, fires, bomb threats, medical emergencies and even hijackings. But bring down every plane in the air?

At 8:24 a.m., air traffic controllers at the Boston Center knew something was wrong when crackling over the radio in the dimly lit control room came the first chilling words "we have some planes just stay quiet and you will be okay we are returning to the airport." For each hijacked aircraft, controllers were in the unenviable position of being the first witnesses as tragedy struck our nation, but there was no time for shock as the safety of nearly 5,000 airborne aircraft was their primary duty.

After halting all takeoffs, controllers began clearing the skies over America – for the first time ever. Under unprecedented conditions, controllers successfully:

- Guided 4,500 planes carrying 350,000 passengers in U.S.-controlled airspace to safe landings.
- Brought in roughly 75 percent of those planes within an hour of the order.
- Rerouted more than 1,100 of the 4,500 flights within the first 15 minutes of the landing order, about one every second.
- Dealt with a limited workforce by improvising. Many controllers in the West were not yet on duty.
- Cleared the skies over America within 2.5 hours, accomplishing this mission without any loss of separation between aircraft.
- Landed all planes at the rate of 30 a minute over that 2 1/2 hour period.

2002 — Today

A HIGHLY DEDICATED AND SKILLED WORKFORCE

The U.S. air traffic controller workforce today consists of more than 15,000 well-trained and dedicated men and women. They apply their skills and judgment to ensure that more than 700 million passengers aboard 60 million aircraft a year travel safely to their destinations.

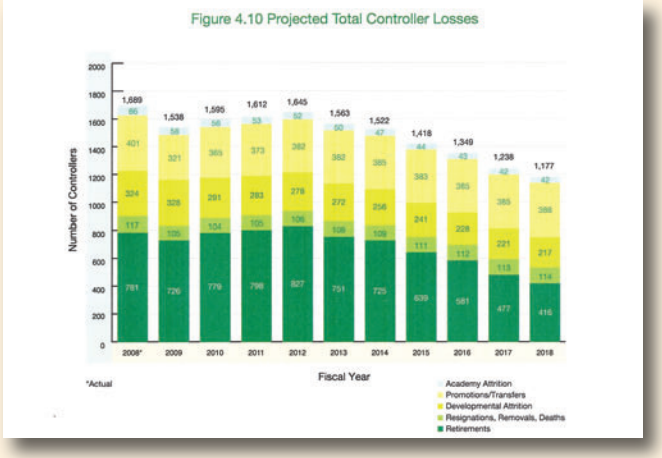
Controllers are on duty 24 hours a day, every day, at more than 350 locations around the country. These are stressful, high-energy environments where controllers are responsible for the lives of thousands of people. The margin of error is zero. The physical and mental demands are such that new controllers can't be older than 31 and must retire by 56.

Once hired by the FAA, candidates move on to the FAA's Academy in Oklahoma City. Upon successful completion, each goes to an actual control facility to continue training, which includes classroom studies, simulation training and intensive on-the-job instruction, where a qualified trainer retains responsibility for safe operation and must take over from the trainee at a moment's notice if necessary.

In addition to basic separation rules and techniques, training emphasizes learning of weather phenomena, a specific geographic area, communication, procedures, equipment capabilities and teamwork – as well as the various techniques of getting the job done safely and efficiently. Training takes one to three years at a tower and three to five years at an ARTCC.

Before the FAA imposed work rules on the controller workforce in 2006, the Agency told Congress that there would not be a mass exodus of air traffic controllers. Unfortunately, the FAA was wrong.

The FAA predicted 950 controllers would leave the workforce in FY2007, the actual attrition number was 1,622 – 70 percent higher than the Agency's prediction. FY2008 saw the loss of an additional 1689 controllers and trainees with losses expected to continue through 2018.



The future will bring many changes, from new technology on the ground to sophisticated avionics in the air. Controllers will continue working to implement these changes and ensure that our system remains a model for the world.

What will remain unchanged, however, is the dedication and commitment air traffic controllers have shown ever since Archie League took up his signal flags in 1929.

U.S. Air Traffic Control: A Typical Flight

The job of the air traffic controller is to provide for the "safe, orderly and expeditious flow of aircraft" through our country's national airspace system.

Similar to the handing of a baton in a relay race, one air traffic controller after another takes responsibility for a specific leg of the trip ensuring that the aircraft is safely separated from other air traffic and vehicles.

As a first step, a pilot files a flight plan with the flight service station, or an airline files the plan automatically with the FAA. This plan outlines the route the aircraft will take and alternative plans in the event of an emergency or weather-related problem. Once the flight plan is approved, the pilot is ready to contact the ground controller for taxi instructions.

Take Off and Departure

The ground controller notifies the pilot when it is safe to push the aircraft out of the gate or enter the controlled movement area at the airport, issues instructions to a runway and places the aircraft in a departure sequence with other aircraft taxiing about the airport.

The local controller in the tower assumes control of the aircraft and integrates its movement into the flow of traffic arriving and departing the runway. The local controller issues a departure clearance and grants permission to enter the runway and depart. After takeoff, the local controller will assign the aircraft a frequency change to the departure controller, stationed in a radar room which may be at the airport or several miles away. The departure controller assumes responsibility for the plane through its ascent while safely avoiding other arrival, departure and transition aircraft.

En Route

Once the flight departs the airport, controllers in one or more of 21 regional Air Route Traffic Control Centers, also called en route centers, take over in sequence. Each center controls all aircraft, military and civilian, in its defined portion of airspace – called a sector. The en route controllers direct and separate planes flying within their sector. They coordinate with pilots on weather conditions and issue instructions on speed, route and altitude to ensure positive separation from other aircraft operating under Instrument Flight Rules. When the aircraft moves into a new sector, the next controller takes over.

Approach and Landing

As the aircraft approaches its destination, the en route center organizes the traffic into several streams and flows the traffic towards the airport. The center will "hand off" responsibility for the aircraft to the approach controller located in the same room as the departure controllers and will adjust the aircraft's speed, altitude and flight path by issuing instructions to the pilot. Once an aircraft has been cleared for the approach, responsibility for the aircraft is transferred to the local controller. The local controller ensures that there is enough spacing between departures and arrivals, both in the air and on the runways, and gives the pilot clearance to land. After landing, the local controller gives responsibility for the flight to the ground controller who ensures safe passage from the runway to the gate.

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