CLEVELAND
THE AIR LABORATORY OF THE WORLD

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Cleveland’s “Flats” along the Cuyahoga River in the early 20th century.
Cleveland, a center of American industry beginning in the early 20th century, helped give birth to both the automotive and aviation industries.

This story of the journey from “horseless carriages” to passenger planes and spacecraft that took astronauts to the moon is presented by Parker Hannifin Corporation, the Western Reserve Historical Society and the Cleveland Hopkins International Airport.
leveland, at the turn of the 20th century, was blessed with the advantages of geography, financial capital, and human resources. The city sat at the base of the westernmost escarpment of the Appalachian Mountains, marking the beginning of the Great Plains, which extend from Cleveland all the way to Denver, and the foothills of the Rocky Mountains. Half of the American population and more than half of the country’s manufacturing plants were located within 500 miles of the city.

The city’s business owners were sitting at the center of a transportation network that allowed them to send their products to all points of the compass — by water throughout the Great Lakes; to New York City, via Lake Erie, the Erie Canal, and the Hudson River; and to New Orleans, through the Ohio Canal, the Ohio River and the Mississippi. Cleveland was the terminus of parallel rail lines from the south, east and west, making it a center for the transportation of people and goods. The city had one of the highest per capita incomes of any municipality in the country. Hundreds of wealthy Clevelanders were investing in start-ups, and the city was home to a talented group of immigrant craftsmen, eager to work in Cleveland’s new factories.
Cleveland became the early 20th century version of Silicon Valley, generating the innovations that would allow “Second Industrial Revolution” industries to drive the American economy for most of the century. The breakthrough that made the revolution possible was a new way of thinking about business problems. Called “scientific management,” this new discipline applied rigorous analysis to manufacturing, and it facilitated new methods of mass production.

Along the banks of the Cuyahoga River, extending for two miles upstream of Lake Erie, lay the “Flats,” which contained the mills and factories making iron and steel, paints, chemicals, electrical apparatus, machine tools, and John D. Rockefeller’s “Standard Oil.” The Parker Appliance Company (the predecessor to Parker Hannifin Corporation) was making pneumatic brakes for trucks and buses in the Flats. Cleveland manufacturers such as Parker, Sherwin Williams, Standard Oil, Goodyear, Winton, White Motor, Cleveland Pneumatic, and Thompson Products (the predecessor to TRW) would produce the innovative products that would make the city a center of the emerging automobile and aviation industries.
The “Cleveland” was a 5-passenger touring car made by the Chandler Motor Car Company.
THE CLEVELAND AUTOMOBILE INDUSTRY GIVES BIRTH TO THE AVIATION INDUSTRY

The automobile industry began one morning in 1898, when a Pennsylvania man came to Cleveland and paid Alexander Winton $1,000 for a “horseless carriage.” By the first decade of the 20th century, Cleveland had become the number one maker of automobiles, ahead of the up and coming city of Detroit. After World War I, Cleveland area makers of automobile components began turning out precision metal parts that were just as suitable for planes as for automobiles. As a result, aircraft builders, inventors, engineers, entrepreneurs and just plain adventurers that were jump-starting the aviation industry began flocking to the Cleveland area.

Glenn L. Martin moved his aircraft manufacturing company to Cleveland from Los Angeles in 1917. He built the first American designed bombers, the MB-1 and MB-2, in Cleveland. Thompson Products supplied Glenn Martin with valves for the bombers’ engines, and the Parker Appliance Company supplied Martin with leak proof fittings for the fuel systems of those bombers.

In Cleveland, Martin hired an extraordinary group of men who would go on to found their own aircraft companies, including Bell Aircraft, which would build helicopters and the first supersonic plane; North American Aviation, which would build the Apollo command modules that took astronauts to the moon; McDonnell Aircraft, which would become one of America’s leading defense contractors; and Douglas Aircraft, which for decades would be the preeminent maker of commercial aircraft in the world.
Ticket office of Aeromarine Airways, 1922.
CLEVELAND’S ROLE IN EARLY PASSENGER AVIATION

One of the first passenger airlines in America flew from Cleveland to Detroit, beginning in 1922. Aeromarine Airways operated a ticket office in a downtown Cleveland hotel. Seaplanes took off from a dock in Lake Erie and landed on Lake St. Clair in Detroit 90 minutes later. A one-way ticket cost $25, a considerable sum in 1922. An airline brochure assured passengers of the safety and comfort of the flight, saying “You are always in sight of land as you soar over our beautiful lake islands and watch lake steamers crawling beneath you.”

In the late 1920s, Ford Tri-Motors flew the route to Detroit, in only 55 minutes, with fuel system components provided by the Parker Appliance Company. Tri-Motors carried a pilot, co-pilot, and nine passengers, seated in wicker chairs, outfitted with blue seat cushions and set in a single row. Every Tri-Motor was equipped with a bathroom, which one passenger called “a much underrated milestone.”
Early Boeing passenger planes at the Cleveland Airport.
Cleveland Municipal Airport: An Innovator in Passenger Air Travel

The Cleveland Airport, which opened in July, 1925, was the first in America to install landing lights and a radio-equipped traffic tower. The airport became the busiest in the country, with 4000 air mail flights taking off and landing in its first year of operation. Passengers boarded planes after passing through gates in a metal fence surrounding the tarmac. The “gates” on today’s airport concourses owe their name to the gates in real fences, like those at the Cleveland Airport in the 1920s.

The Cleveland Airport became a favorite stop for pilots and aircraft executives eager to consult with Cleveland area manufacturers on the latest innovations in aircraft design. Late one evening in the fall of 1926, a young airmail pilot flew into Cleveland to meet with Cleveland companies that were making parts for a new airplane he was designing. He was unable to locate the beacon at the airport, and was about to run out of fuel. Flying over a farmer’s field near the village of Medina, he donned his parachute and prepared to step out on the wing and jump far enough away from the plane to avoid being torn to pieces by his propeller. Suddenly the young man spied the beacon and was able to land at the airport just minutes before he exhausted his remaining fuel. The young man’s name was Charles Lindbergh. A year later, as he completed the first New York-to-Paris flight, he had to circle the Paris airport repeatedly before he could find its lights, and he remembered that night in Cleveland when he nearly ran out of fuel.
CLEVELAND CONNECTIONS TO CHARLES LINDBERGH & THE SPIRIT OF ST. LOUIS

Five Cleveland companies made important parts of the Spirit of St. Louis. Thompson Products supplied sodium-cooled cylinders for the plane’s engine, Park Drop Forge provided the engine mounts, the Aluminum Company of America made a new aluminum alloy for the plane’s propeller, Sherwin Williams supplied the silver paint for the fuselage, and the Parker Appliance Company provided fittings and valves for the fuel system in the plane.

The Parker fuel system was located directly in front of Lindbergh’s wicker seat in the cramped cockpit of his plane. He fought off a constant tendency to drift off to sleep during his 36-hour flight from New York to Paris by constantly leaning forward from his seat and adjusting the Parker valves to re-balance the fuel in the five tanks in the Spirit of St. Louis.

The publicity from Lindbergh’s flight helped jump-start passenger air travel in America. The Parker Appliance Company, which had become known as the company that supplied Lindbergh’s fuel system, was able to convince Boeing, Douglas, Lockheed, Curtiss Wright, and the other American makers of aircraft to install Parker fuel system components on the planes that were taking more and more Americans to their destinations by air.
THE CLEVELAND AIR RACES:
PUSHING THE BOUNDARIES OF INNOVATION

Starting in 1929, the National Air Races were held at the Cleveland airport. The races remained in Cleveland for nearly every year until 1949, with a hiatus during World War II. The races were sponsored by Cleveland area aviation companies such as Thompson Products, Eaton, Cleveland Pneumatic Tool, Standard Oil of Ohio, American Wire and Steel, the Austin Company, Sherwin Williams, General Tire and Rubber, Firestone, and B.F. Goodrich.

The races led to improvements in the design of fuselages, cockpit ventilation, retractable landing gear, engine cooling devices, and a lighter metal covering for aircraft. Those innovations allowed planes to fly faster, higher and with greater reliability, leading the press to call Cleveland the “Air Laboratory of the World.”

At the first race in 1929, Emilia Earhart competed in the “Women’s Air Derby,” a cross-country race from Santa Monica, California to Cleveland. The men’s cross country race, called the “Bendix Trophy race, began in Burbank, California, and ended in Cleveland. The “Thompson Trophy Race” took place on an oval course, marked by large red pylons. Like the Indianapolis 500, the Thompson Trophy Race attracted 100,000 spectators, drawn by the chance to watch men risk their lives at speeds never before achieved on an oval racecourse. The winner’s name was telegraphed instantly around the world, and his trophy was considered just as prestigious as the “Green Jacket” at the Masters’ Golf Tournament.
Parker’s men and women arriving for the “night shift” in 1944.
CLEVELAND HELPS THE ALLIES ACHIEVE AIR SUPREMACY IN WORLD WAR II

In 1940, Cleveland boasted 90 companies making parts for the aircraft industry. They turned out 25% of all the parts made for America’s military aircraft during World War II. One worker at a Cleveland defense plant said, “If Hitler had looked down at the flats from a bridge over the Cuyahoga River, he never would have started World War II.”

The Parker Appliance Company made 500 million valves and fittings that flew on every one of the 300,000 planes made in America. The company grew from 500 to 5000 employees, half of them women, who proved, as they kept their plant running for 24 hours a day, 7 days a week, that they could turn out products just as efficiently as men.

Parts for Boeing’s B-29 were made at the 2.2 million square foot GM Fisher Body plant at the Cleveland airport. The government chose Cleveland over possible locations on the East and West Coasts, because of the city’s Midwest location, far from possible German attacks from the East or Japanese attacks from the West.

The federal government’s Aircraft Engine Research Laboratory began its work in Cleveland in 1941. The laboratory was built on the parcel of the land that had been used for spectator seating for the National Air Races. The scientists at the laboratory were able to correct a lethal defect in the engines of Boeing’s B-29. After the war, the laboratory aided in the development of jet engines for military and commercial aircraft.
CLEVELAND’S CONTRIBUTIONS TO THE SPACE PROGRAM

Scientists at Cleveland Aircraft Engine Research Laboratory (renamed the NASA Glenn Research Center) helped develop the propulsion system for the upper stage of the moon rocket. The Center is currently researching the design of propulsion systems for trips to Mars and the outer limits of the solar system.

Two of the Cleveland companies that brought Lindbergh safely across the Atlantic went on to carry the Apollo astronauts to the moon. TRW (the successor to Thompson products) made the descent engine for the lunar module, which was pressurized by a group of Parker valves. When the Apollo 13 service module suffered an explosion on the way to the moon, the astronauts used the lunar module as a “lifeboat” for their return to earth. They made repeated firings of the descent engine on the lunar module to alter their trajectory to speed them on a faster return home.

After the explosion that crippled the Apollo 13 command module, Mission Control feared the astronauts would not have enough oxygen to last for their return to earth. Parker engineers were able to devise a way to move oxygen from high pressure storage tanks in the lunar module to the lower pressure environment of the command module, giving the astronauts a sufficient oxygen supply to return safely home.
CLEVELAND’S TECHNOLOGY HERITAGE

From Winton’s “horseless carriage” to the Spirit of St. Louis, the aircraft that won World War II, the moon rockets and beyond.
Presented by Parker Hannifin Corporation, the Western Reserve Historical Society and Cleveland Hopkins International Airport.