

Frank Piasecki flying the PV-2, which he designed while a student at the University of Pennsylvania in Philadelphia.

# THE PHILADELPHIA REGION:

## The Cradle of Rotary-Wing Aviation in the US

By Robert Beggs

The City of Philadelphia, located in the beautiful Delaware Valley of Pennsylvania, is most notable for its rich history, its lawyers, its cheesesteaks and more recently its Super Bowl-winning professional football team. In 2019, Philadelphia will again be center stage as it hosts the Vertical Flight Society's Forum 75! Celebrating the Society's Diamond Anniversary in Philadelphia is quite fitting and a homecoming of sorts for our Society. Philadelphia is undeniably the cradle of rotary-wing aviation development in the US and was the location of the inaugural meeting of rotary-wing aviation pioneers on April 3, 1945, at the Engineers Club of Philadelphia on Spruce Street, just a few blocks from where Forum 75 will be held.

The aviation history of Philadelphia could fill volumes, but this summary will help you to appreciate how it all began and why we still say there are more "rotorheads" in Philadelphia than anywhere else in the world.

Let's take a trip back to the 1920s, to a small town just north of Philadelphia named Bryn Athyn. The town was home to the wealthy and influential Pitcairn family. **Harold Pitcairn** was an adventurous and entrepreneurial young man with a dream of using airplanes for a revenue-generating air-mail delivery service. He founded Pitcairn Aviation in 1925; however, airplanes were a relatively new invention at the time and airports were few and far between. Troubled by the safety record of biplanes of that era, he constructed a safer mail plane utilizing stronger, square tubing and investigated a new form of flying machine being developed by Juan de la Cierva in Spain called the Autogiro (other companies used the generic term, "autogyro").

In 1928, Pitcairn imported a Cierva C.8W Autogiro, which made the first rotary-wing flight in America on Dec. 18 from a field



Harold Pitcairn's Cierva C.8W Autogiro made the first rotary-wing flight in America at Bryn Athyn in 1928.

on the Pitcairn property. The next year, Pitcairn acquired rights to Cierva's patents and formed the Pitcairn-Cierva Autogiro Company of America. The company began manufacturing and operating Autogiros from Pitcairn Field in Willow Grove, Pennsylvania. In 1931, the Pitcairn PCA-2 became the first certified Autogiro in America. Pitcairn and his associates received the 1930 Robert J. Collier Trophy from President Herbert Hoover in April 1931 — pilot James G. "Jim" Ray landed a PCA-2 on the South Lawn of the White House for the ceremony. Between 1930 and 1940, Pitcairn Aviation was issued 270 US patents, while its engineers began to spin off to form their own companies and new rotary-wing aircraft designs.

Also in 1928, **Edward Burke Wilford** of Chester County, Pennsylvania, acquired US patent rights for a rotary-wing

aircraft conceived by the German aircraft designers Walter Rieseler and Walter Kreiser. One year later, Wilford purchased the Devaney farm near Paoli, Pennsylvania, for the purpose of designing and flight-testing gyroplanes. The field became the Main Line Airport, which would have a rich aviation history over the next few decades (see Vertiflite, Jan/Feb 2018). Wilford was a talented businessman and inventor who developed a gyroplane — designated “Configuration No. 1” — featuring rotor blades that feathered their pitch when rotating around the hub, rather than the blade flapping system employed by Cierva. His second aircraft, designated the “WRK,” was the world’s first gyroplane to successfully fly with a rigid rotor and no secondary fixed wing. In 1932, Wilford relocated his operation to Essington, Pennsylvania, adjacent to the Delaware River. His XOZ-1 aircraft successfully operated on floats from the seaplane base at Essington, but it never went into production. Wilford’s significant contributions as an advocate for national aeronautics during the formative years of the industry, however, cannot be overstated.



E. Burke Wilford in the pilot’s seat of the WRK Gyroplane in Paoli. It was the world’s first gyroplane to successfully fly with a rigid rotor and no secondary fixed wing.

In 1929, the brothers W. Wallace Kellett and Rod Kellett formed the Kellett Autogiro Corporation and began manufacturing Autogiros, under license from Pitcairn-Cierva Autogiro Company (and to its successor organization, the Autogiro Company of America) in Upper Darby, Pennsylvania, and later near the Philadelphia Municipal Airport. In 1934, the Kellett KD-1 achieved first flight and was sold to the US Army Air Forces over the next seven years as the first US military rotorcraft to enter into service. A Kellett K-3 Autogiro accompanied Rear Admiral Richard E. Byrd’s his



In 1939, Eastern Airlines flew the KD-1 Autogiro to deliver mail five times daily from Philadelphia’s 30th Street Post Office to the Camden, New Jersey, Central Airport.

second Antarctic Expedition. In 1939, Eastern Airlines flew the KD-1 Autogiro to deliver mail five times daily from Philadelphia’s 30th Street Post Office to the Camden, NJ, Central Airport. In later years, the Kellett brothers went on to develop new rotary-wing designs, including an innovative tip-jet helicopter called the XR-17, which they sold to Hughes Aircraft in Culver City, California, in 1948.

Between 1928 and 1931, inventors **Gerard Herrick and Ralph McClarren** of the Franklin Institute in Philadelphia developed the world’s first convertiplane that flew both as a fixed-wing aircraft and an autogyro. The unique craft was a technical marvel for its time, being able to convert in flight. Unfortunately, the first aircraft crashed during flight testing. But Herrick’s second model, the HV-2A Vertaplane, made its maiden flight in 1937 at Boulevard Airport in northeast Philadelphia; it soon demonstrated the world’s first of more than 100 conversions from fixed-wing to rotary-wing flight. Further development was discontinued because of a lack of finances, but the craft would spark the imagination of pioneers who would go on to experiment with tilting-wing and tilting-rotor designs.



Gerald Herrick with the HV-2 Vertaplane at Boulevard Airport in northeast Philadelphia. It demonstrated more than 100 conversions from fixed-wing to rotary-wing flight.

The year 1938 was an inflection point in the history of rotary-wing development. In a district where Harold Pitcairn’s Autogiro business created scarce jobs, **US Representative Frank J. Dorsey** from Philadelphia proposed \$2M for the War Department to purchase Autogiros for test and research. However, the Navy was not interested because of the craft’s limited speed and endurance, and the Army was disappointed with the Kellett Autogiros they operated. **Dr. Alexander Klemm**, Dean of New York University’s Guggenheim School of Aeronautics, was an influencer advocating funding for “any aircraft with a rotating wing.” He had been impressed by the public demonstrations of the Focke-Wulf Fw 61 helicopter in Germany. When the Dorsey-Logan Bill became law in June 1938, it was designated for research, development, purchase and testing of “rotary-wing and other aircraft.”

The Franklin Institute of Philadelphia hosted the “First Annual Rotating Wing Aircraft Meeting” in October 1938, sponsored by the Philadelphia Chapter of the Institute of Aeronautical Sciences (the forerunner of today’s American Institute of

Aeronautics & Astronautics, AIAA). It was described as “the first free discussion in this field of science open to all engineers in the aircraft industry.” The event was attended by many of the aforementioned pioneer inventors and engineers of the fledgling vertical lift industry, including Dr. Klemin. Flight magazine that year noted that the Rotating Wing Aircraft Meeting was held in Philadelphia because, “this is the town in which practically all the rotary-wing activity in the United States takes place.” (The Franklin Institute was recognized as the first AHS Vertical Flight Heritage Site in 2013.) Subsequent meetings at the Institute, New York and Connecticut focused on advancing the development of autogyros and a new machine with the engine powering the rotor that was being called the “helicopter.”

**Igor Sikorsky**, who was by that time a well-known flying boat developer, attended several of these meetings. He was influenced by the advanced design of the Autogyros, which by the late 1930s had become sophisticated aircraft with the capability to take off vertically and land on a spot. The one thing they could not do was hover, but Sikorsky had a plan for that. An accomplished aeronautical engineer, he had long been intrigued by the idea of a true helicopter; Sikorsky had built two unsuccessful coaxial helicopters as a teen and submitted a patent application in 1931 for a (novel for the time) single main rotor helicopter. In 1940, he successfully flew the world’s first practical helicopter of what we now call a conventional configuration — designed with a single main rotor and tail rotor. Sikorsky’s VS-300 quickly evolved into the R-4 and went into production shortly thereafter. This was a not a Philadelphia milestone per se, but one that was influenced by the work of the rotary-wing pioneers from the Delaware Valley during the previous decade, as Sikorsky licensed many of the Pitcairn patents and incorporated them into his first helicopters.



The Platt-LePage XR-1A helicopter, inspired by the Fw 61, was developed in Eddystone, Pennsylvania.

**W. Laurence LePage** traveled to Germany to inspect the Fw 61 helicopter, but couldn’t enter into a licensing deal because of the Nazi regime. LePage teamed up with fellow autogyro engineer **Havilland Platt** to form the Platt-LePage Aircraft Company in Eddystone, Pennsylvania, and the team began designing an experimental helicopter, the PL-1. The Platt-LePage Aircraft Company won an Army Air Corps competition to build the XR-1 helicopter using funds provided by the Dorsey-Logan Bill. After many developmental issues, however, the program was cancelled in April 1945, by which time the Army had already been using the much more capable Sikorsky R-4 for more than a year.

McDonnell Aircraft Company invested in Platt-LePage Aircraft in exchange for having McDonnell personnel learn helicopter design. They bought the rights to the PL-9 twin-engine twin-

rotor design that became the McDonnell XHJD-1 Whirlaway, the first twin-engine helicopter to fly in the US. In 1945, Platt and LePage proposed and patented the first tiltrotor aircraft designed in the US, but it was never built. McDonnell Aircraft acquired all Platt-LePage assets and patents in 1946. However, ex-Platt-LePage engineer **Robert Lichten** went to Bell Aircraft (as it was then known) and developed the tiltrotor idea into the Bell XV-3. (Lichten would later go on to lead engineering at Bell Helicopter and become the Society’s 22nd president and then Chair of the Board in 1966-67. The Society named its technical presentation award for him in 1976.)

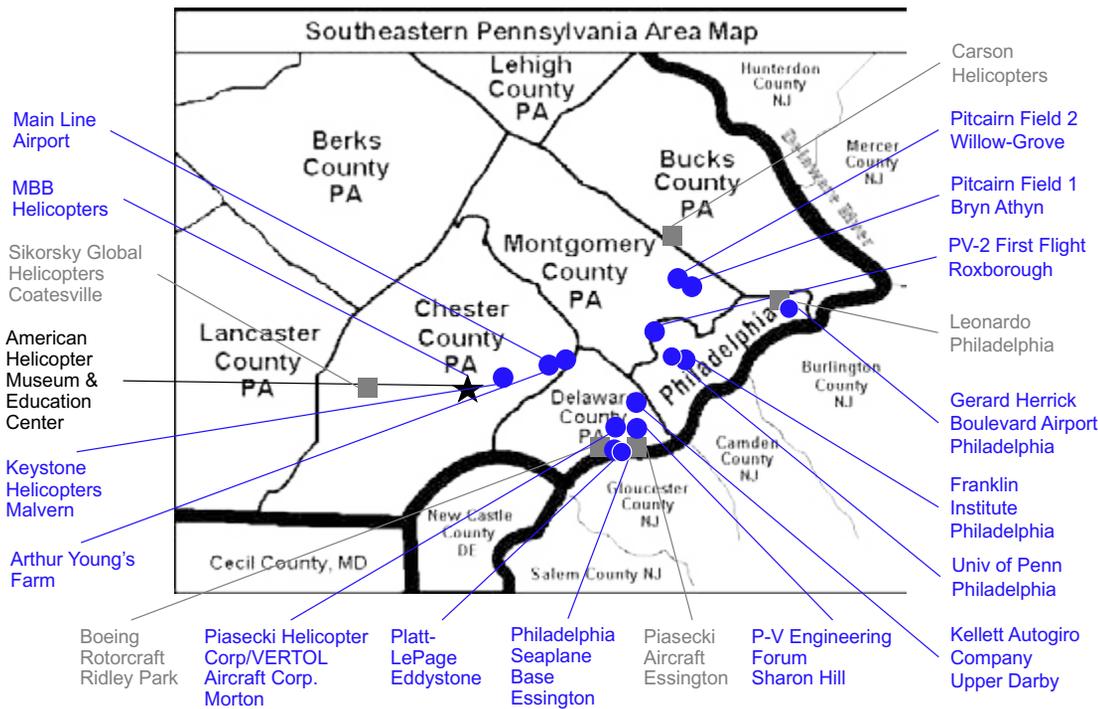
**Frank Piasecki** began his career as a young engineer at Kellett and Platt-LePage while he attended school at the University of Pennsylvania in Philadelphia. Like a number of his contemporaries, Piasecki was a renaissance man with engineering, business and entrepreneurial skills. While still in college, he founded the P-V Engineering Forum with a classmate, Harold Venzie. In 1943, Piasecki’s group designed the PV-2, a single-seat, single rotor helicopter. Piasecki became the second person to design a successful helicopter in the US, and the first person to be issued a federal helicopter-specific license.

In 1945, the P-V Engineering Forum determined that a tandem rotor configuration would best meet the US Navy requirement for a helicopter that carried at least a one-ton payload. The XHRP-1 design was completed in three months in Sharon Hill, Pennsylvania. The Navy ordered 10 HRP-1 helicopters in 1946, and another 10 in 1947. Production was established at a new facility in Morton, Pennsylvania, and P-V Engineering Forum became the Piasecki Helicopter Corporation. (The site of the Morton plant was recognized as an AHS Vertical Flight Heritage Site in 2017.) The successful tandem rotor designs would form the basis of what is now Boeing Vertical Lift in Ridley Park, Pennsylvania.

In 1931, **Arthur Young** began experimenting with rotary-wing models at his home in Radnor, Pennsylvania. Later, he bought a farm near Paoli to work on larger models. Skeptical of rotor theories espoused at the 1938 Rotating Wing Aircraft Meeting at the Franklin Institute, Young presented a paper entitled “A New Parameter of Lifting Rotors” at the second meeting, held at the Institute in 1939.



Arthur Young began experimenting with rotary-wing models at his home in Radnor, Pennsylvania, in 1931.



A map of the Delaware Valley shows the “cradle of rotary-wing aviation” in the US — where history is still being made today. Historic sites (established before 1960) are shown in blue, with present-day locations shown in gray.



Haig-K flew its HK-1 at the old Main Line Airport in Paoli, Pennsylvania. The company later operated as a successful Bell Helicopter repair station for many years.

In 1947, after working at Kellett and Piasecki, **Haig Kurkjian** began teaching at the Quaker City School of Aeronautics in Philadelphia, where he developed plans for a small personal helicopter. Three years later, he flew his HK-1, the world’s first helicopter to utilize multi-vee belt drives for the main and tail rotors. This led to his establishing the Haig-K Aircraft Corporation. Haig-K leased the old Main Line Airport in Paoli to continue development of “a ship marketed in a Cadillac price range to enable commuting that is faster and safer than automobiles.” However, lacking sufficient financing for US Federal Aviation Administration (FAA) certification of the HK-1, Kurkjian transitioned the company into a successful Bell Helicopter repair station.

In 1941, Young and his friend Bartram Kelley flew their model helicopter in and out of their Paoli barn by tethered remote control. Later that year, they demonstrated the stability of the model with a teetering rotor and “stabilizer bar” to Bell Aircraft in Buffalo, New York, leading to the creation of the Bell Model 30. The design became the signature rotor system for Bell helicopters — beginning with the Bell Model 47 that was later immortalized in the “M\*A\*S\*H” movie and TV series — and continuing into the 1980s.

These are but a few of the many talented engineers, craftsmen and pilots who shaped the early days of rotary-wing aviation in the Delaware Valley. Their accomplishments went on to influence an entire industry, and that legacy continues to this day. The Delaware Valley remains home to four major design and manufacturing centers including: Boeing Vertical Lift, Leonardo’s AgustaWestland Philadelphia Company, Piasecki Aircraft Corporation and Lockheed Martin/Sikorsky’s Coatesville plant.

In 1946, **Drago K. Jovanovich** and **Frank Kozloski** founded the Helicopter Engineering Research Corporation in Philadelphia. Their first helicopter, the HERC JOV-3, was flown from the Boulevard Airport (formerly William Penn Airport) near Somerton, Pennsylvania, in 1948. Following acquisition in 1953 by the McCulloch Aircraft Corporation, Jovanovich certified the first commercial tandem rotor helicopter, the MC-4C, for civilian use. In 1955, he designed a rotor for the Hughes 269, followed by the 1958 Del Mar DH-1 Whirlymite series, and the hub for the Hughes 500, as well as the McCulloch J-2 gyroplane. Jovanovich later went on to establish the Jovair Corporation to continue development of a small four-seat private helicopter based on the MC-4.

This is the history that is preserved and celebrated every day at the American Helicopter Museum & Education Center in West Chester, Pennsylvania. It is only fitting then that the Vertical Flight Society’s 75th Annual Forum & Technology Display is located on the hallowed ground that gave birth to America’s rotary-wing aviation industry.

We look forward to seeing you in Philadelphia!



**About the Author**  
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 • [www.americanhelicopter.museum](http://www.americanhelicopter.museum)