



## Historic Aerospace Site Nomination Form

1. Name of Site:  Delaware Valley (Greater Philadelphia, PA)	2. Site Address: American Helicopter Museum & Education Center 1220 American Blvd. West Chester, PA 19380
3. Site Point of Contact	
Name: Sean Saunders (Executive Director)	
Address: same as above	
Phone: (610) 436-9600	Fax: (610) 436-8642
Email: director@helicoptermuseum.org	

4. Short Paragraph of Site’s Significance:

The Philadelphia and Delaware Valley has been recognized as the “Birthplace of Rotary-Wing Flight in the United States.” Harold Pitcairn brought the first rotary-wing aircraft from Spain, a Cierva C.8W autogiro, and flew it in 1928 in Willow Grove, PA. In February 1929, Pitcairn purchased the U.S. rights to Cierva’s invention and the autogiro patents then existing and established the Pitcairn-Cierva Autogiro Company for licensing its manufacture in the U.S. The Kellett Autogiro Company located in Philadelphia also manufactured autogiros in response to a growing market for the aircraft. The autogiro industry grew substantially until the arrival of helicopters. The Philadelphia Section of IAS hosted the first International Rotating Wing Conference in 1938 at the Franklin Institute; this was attended by Igor Sikorsky, Frank Piasecki, Arthur Young and many other industry pioneers. Subsequent conferences were held here in 1939 and 1941 and led to the creation of the American Helicopter Society. Frank Piasecki was the second American to build a successful helicopter, with the PV-2 in 1943 in Philadelphia. Arthur Young pioneered the critical technologies in Paoli, PA that created Bell Helicopter. E. Burke Wilford, Wynn Laurence LePage, Drago Jovanovich, Gerard Herrick – all Delaware Valley residents – experimented with new rotary-wing configurations. The Piasecki tandem rotor PV-3 convinced the USN of its ability to transport squads of troops. This was the basis of all Piasecki/Boeing tandem helicopters, including the H-46 and H-47 series that are still in service today. The American Helicopter Museum & Education Center was chartered to preserve and protect the history of rotary-wing aviation; if awarded, recognition of the area as an AIAA Historic Aerospace Site would provide further acknowledgement of the role the Greater Philadelphia area has played in the development of rotary-wing aircraft in the US.

5. Proposed Plaque Wording (aim for 60-80 words; can be fewer):

In the surrounding areas, rotary wing aircraft became a reality in America through the combination of inventors’ imagination, technical discourse and operational experience that resulted in the achievement of the vertical flight ability sought after for many centuries. Here many people communicated ideas, successes and failures that enabled the creation of innovative approaches to create a new mode of transportation. The realm of flight was enhanced for the betterment of society. The American Helicopter Museum & Education Center exists to ensure the retention and public access to the history of rotary-wing development.

Send this completed form along with relevant attachments to:  
 Historic Aerospace Sites Program, American Institute of Aeronautics and Astronautics  
 1801 Alexander Bell Drive, Suite 500, Reston, VA 20191-4344 or email to emilys@aiaa.org  
 For additional information: contact Emily Springer at emilys@aiaa.org or call 703/264-7533

6. Other Recognition Site Has Received: (e.g. National Register, Other Societies)

Harold F. Pitcairn: April 19, 1972, Historical Marker, Buck and Paper Mill Rds., Bryn Athyn, PA. The noted aeronautical pioneer established his first flying field on this site in 1924. The 1930 Collier Trophy, an award for accomplishments in aviation, was presented to Pitcairn and his associates for developing the American autogiro, first introduced here. A historic marker dedication is planned on April 17, 2010 and is scheduled to take place at the location of Frank N. Piasecki's first business site established in 1940; 1937 Callowhill Street in Philadelphia. It was the place where his early helicopter development started and became a passion for the rest of his life.

7. Ownership of Property:

Private  Federal  State  Local  Other

Owner:

8. Has the site been contacted as to acceptance of designation if selected? YES  NO

9. Qualifying Criteria:

A. Event  B. Significant Persons  C. Design/Construction  D. Information Potential

10. Is this site accessible to the general public? YES  NO

Supporting Material, Attach Supporting Items, such as:

- 11. Detailed Summary of Site Significance - see below.
- 12. Maps of Site - See below.
- 13. Drawings of Site - N/A
- 14. Photos of Significance - See below.
- 15. Articles Concerning Site - N/A.

16. References Used In Preparation of Nomination Form:

- Douglas, Lee L.; *Memoirs of a Helicopter Pioneer*
- Brooks, Peter W.; Cierva Autogiros, *The Development of Rotary-Wing Flight*
- Smith, Frank Kingston; Legacy of Flight, *The Harold F. Pitcairn Story*
- Smith, Frank Kingston & Harrington, James P.; *Aviation & Pennsylvania*
- Spenser, Jay P.; *Whirlybirds, A History of the U.S. Helicopter Pioneers*
- Townson, George; *Autogiro, The Story of "the Windmill Plane"*

17. Nominator Information:

Name: Michael J. Hirschberg	Member #: 069142
Address: CENTRA Technology, Inc., 4121 Wilson Blvd #800, Arlington, VA 22203	
Phone: 571-218-4417	Fax: 703-741-7807
Email: michael.hirschberg.ctr@darpa.mil	

The Delaware Valley as a whole has more early aviation and rotary wing heritage than perhaps any other area in the world. In addition, it continues to lead in rotorcraft development and production in the United States today. No other region can match its helicopter industry presence. The American Helicopter Museum & Education Museum (<http://www.helicoptermuseum.org>) – although about 20 miles outside of Philadelphia County – was selected as the appropriate site for recognition, since that museum was specifically created to recognize and preserve the “Birthplace of Rotary-Wing Flight in the United States.”

Harold F. Pitcairn procured and made the first flight of a Cierva C.8W Autogiro in the United States on December 18, 1928 at Pitcairn Field #1 in Bryn Athyn, PA and in 1929 the Pitcairn-Cierva Autogiro Company of America was formed. In October 1929 autogiro manufacturing and operations were conducted from a larger Pitcairn Field #2 in Willow Grove, PA. [See [http://www.airfields-freeman.com/PA/Airfields\\_PA\\_Philly\\_NW.htm](http://www.airfields-freeman.com/PA/Airfields_PA_Philly_NW.htm)]



Cierva C-8W over Bryn Athyn, PA

In 1931 the Autogiro Company of America was formed to hold the U.S. licensing rights of Cierva-Pitcairn. Sub-license rights were given to the Pitcairn Autogiro Co. and the Kellett Autogiro Company, both of whom developed and manufactured a number of autogiros during the 1930s. Pitcairn Autogiro became Pitcairn-Larsen Autogiro in 1940 and then G&A Aircraft Inc. (bought out by Firestone Aircraft in 1943). In 1942, Pitcairn (reluctantly) sold Field #2 to the U.S. Navy to support the war effort. The Navy extended the field and equipped it with paved runways, taxiways and numerous hangars. In 1943 the field was commissioned the U.S. Naval Air Station Willow Grove. [See Delaware Valley Historical Aircraft Association: <http://www.dvhaa.org>.]

[It should also be noted that Pitcairn Aviation had been started in 1926 and evolved into Eastern Air Lines in 1930. The historically significant Pitcairn Mailwing was created in 1927.]

The Kellett brothers, Wallace and Rod, became interested in autogiros and obtained a license from the Autogiro Company of America for the Kellett Autogiro Company with a plant in Upper Darby, PA. It subsequently moved to the Philadelphia Municipal Airport area. Rather than use the Cierva or Pitcairn designs, they went their own way. After some difficulty during tests in October 1930, they went to the Pitcairn/Cierva style that had been successful. The differences were that the Kellett's had side-by-side seats, a larger rotor blade area and a simpler landing gear. One of the Kellett machines went with the Byrd Antarctic Expedition in 1933-1934. In 1939 the Post Office Department advertised for bids to fly airmail by autogiro from Philadelphia's 30th Street Post Office roof to the Camden, New Jersey Central Airport. The post office roof was ten stories high and about a city block square. Eastern Airlines was the successful bidder and Kellett was selected as the builder of the autogiro. The KD-1B autogiro operated from June 1939 to June 1940 making five trips daily. More than 2300 takeoffs and landings were made and it had completed more than 90% of all scheduled flights.



Kellett KD-1

On Sept. 11, 1943 Kellett received a contract for a two-place helicopter, XR-8, with intermeshing rotors that was similar to the German Flettner FI 265. Its first flight was on Aug. 7, 1944. They also received a contract for a two-engine helicopter, XR-10 with intermeshing rotors that could carry 10 troops. Its first flight was on April 24, 1947. At the time it was the world's largest and most powerful helicopter.

In 1928 E. Burke Wilford of Chester County, PA visited Europe and while there acquired the U.S. patent rights for a rotary wing aircraft conceived by a German named Rieseler. In 1929 Wilford began building his own gyroplanes. The idea was a scheme for feathering the pitch of the blades rotating around the hub instead of the blade flapping system of Cierva. Wind-tunnel tests proved the effectiveness of the idea and the first Wilford gyroplane made successful flights in 1931. Improvements in the rotor enabled the fixed wings of the airplane to be removed. In 1934 Wilford built a gyroplane designated the XOZ-1 from a Fleet N2Y-1 airplane for U.S. Navy and NACA tests. The aircraft was on floats and was operated from the seaplane base in Essington, PA. It proved very successful but did not reach production.



Wilford WRK Gyroplane

In 1932 Gerard P. Herrick became associated with Ralph H. McClarren of the Franklin Institute and constructed an experimental aircraft that would operate as a fixed-wing airplane and an autogiro. The initial model, HV-1, was not successful and crashed. The second, HV-2A, was a biplane with the lower wing fixed and the upper wing capable of being fixed or free to rotate like an autogiro when actuated by the pilot. It made its first flight at the Boulevard Airport in Northeast Philadelphia on July 27, 1937 with public demonstrations on the 30th. By the end of the year, more than 100 flight conversions were made. Further testing was discontinued because of financial difficulties, but these were the world's first convertiplanes.



Herrick HV-1 Vertaplane

In 1937 W. Laurence LePage and Haviland Hull Platt traveled to Germany to view the Focke Fw 61 (arguably, the world's first successful demonstrator helicopter) and to obtain an option to build Focke helicopters in the United States. However, the worsening conditions between the governments prevented a deal from going through. Since they had their own patents and ideas, they formed the Platt-LePage Aircraft Company in Eddystone, PA. A design was started on an experimental helicopter PL-1. At around the same time the Air Corps held a competition for a helicopter and Platt-LePage revised their configuration to meet their needs, changing the configuration to PL-3. In July 1940 the Platt-LePage Aircraft Co. won the competition to build the XR-1 helicopter – the first U.S. Army Air Corps contract for a helicopter. The XR-1 design was similar to the configuration of the German Fw 61. The first flight occurred on May 12, 1941. Some difficulties occurred with the aircraft and a second model, the XR-1A was built and delivered to Wright Field in June 1944. With the Sikorsky XR-4 by then being much more capable, the U.S. Army Air Forces cancelled the contracts with Platt-LePage.



The Platt-LePage XR-1

Late in 1938, the First Annual Rotating-Wing Aircraft Meeting sponsored by the Philadelphia Chapter of the Institute of Aeronautical Sciences, predecessor to the AIAA, was held at the Franklin Institute. The attendees included prominent persons from the U.S. as well as international companies involved with the development of rotary-wing aircraft. A similar meeting to advance the development of the autogiro and helicopter was held in 1939 and a final such meeting was held in New York City in 1941. Since no helicopter industry existed at the time, the autogiro community dominated the proceedings. Laurence LePage showed movies of the German Focke-Achgelis Fw 61 helicopter flights. Igor Sikorsky and Arthur Young provided information on their helicopter activities. These meetings indirectly resulted in the formation of the American Helicopter Society in 1943.

Frank N. Piasecki of the P-V Engineering Forum investigated potential configurations and designed a single main rotor / anti-torque tail rotor helicopter. It was designated the PV-2 and after some ground testing Frank made its first flight on April 11, 1943 at their Roxborough facility becoming the second successful U. S. helicopter. Flights were later made in the Washington D.C. area to demonstrate the helicopters capability.



Piasecki PV-2

Seeking a potential customer, contact was made with the U.S. Navy and it was found that there was a lack of interest in helicopters unless they could carry a payload of at least one ton. Studies by the P-V Engineering Forum indicated that a tandem rotor configuration would be the most promising for higher payload capability. To support a proposed design, model testing was accomplished at the University of Pennsylvania small wind tunnel and revealed that front rotor airflow would not affect the rear rotor as some thought. A formal proposal was submitted to the Navy for a PV-3 tandem rotor helicopter that would be capable of lifting 1800 pounds. On Jan. 1, 1944 a contract for one XHRP-X helicopter was received by the P-V Engineering Forum. The design was completed in three months at the new Sharon Hill facility and the helicopter was rolled out on March 7, 1945. The first flight occurred later in the month. Subsequently, orders for the production of 10 HRP-1 helicopters in each of June 1946 and April 1947 contracts. A new facility in Morton, PA was established for this production.

The HRP-1 (nick-named the “flying banana” because of its shape) was used by the USMC in operational evaluations to determine the capability of the helicopter to replace the landing craft from the ship-to-shore assault role into a vertical envelopment tactic under potential atomic warfare situations. The model evolved into the HRP-2 and then through competitions, Piasecki was selected for the USAF & Army H-21 series helicopters to perform Search & Rescue, troop transport, cargo and sling-load missions including missions for transport operations from the shore to the Texas-Tower radar site in the Atlantic Ocean. Civilian models were also produced for international customers.



Piasecki HRP-1

New version tandem rotor configurations resulted in the development of the Air Force H-16 helicopter that would be the world’s largest at the time. The USN HUP/H-25 Series for plane-guard duty during aircraft carrier flight operations and Army med-evacuation missions. Other new designs resulted in tilt-wing experiments to increase the speed capability of rotary-wing aircraft.

Piasecki Aircraft Corporation (PIAC) was formed in 1955 after Frank Piasecki had a falling out with the board of Piasecki Helicopter (which was renamed Vertol Aircraft Corporation). A facility was established in Essington, PA. In 1957 Piasecki Aircraft was awarded an Army Transportation Research Command contract for development of a flying “Jeep”. It was a VTOL type vehicle that would operate at very low altitudes at speeds up to 110 km/h and designated the VZ-8P. The first free flight was made in October 1958 and renamed “Airgeep.”



Piasecki AirGeep

In the 1960s a compound helicopter research design concept known as the Model 16H-1 Pathfinder was developed as a private venture flew with cruciform fins to support an annulus containing a propeller to perform the functions of anti-torque and directional control. With stub wings added the aircraft was able to fly at speeds up to 273 km/h. Subsequent modifications by installation of a more powerful GE T58-5 turboshaft engine the Pathfinder II achieved speeds of 361 km/h. Compound helicopter research continued and eventually resulted in the Piasecki

Vectored Thrust Ducted Propeller (VTDP) used on the X-49A SpeedHawk, which first flew on June 29, 2007.

In the mid 1970s the Piasecki Heli-Stat project began with a view to combining the lift capability of a lighter-than-air vehicle with the precise maneuverability of the helicopter. With support from the Forestry Service and the U.S. Navy, a prototype Heli-Stat was constructed at Lakehurst, NJ in 1979 using an airship-based envelope with a skeletal structure for four Sikorsky SH-34 helicopters for control using large diameter propellers in place of the tail rotors. During testing an accident occurred resulting in a loss of the vehicle.

Boeing acquired the Ridley Park, PA-based Vertol in March 1960, forming what is now the Boeing Rotorcraft division. In that time period, extensive helicopter development occurred. With the availability of turboshaft engines a company funded program produced a Model 107-II civil helicopter that would be procured by New York Airways, the Canadian Forces, Swedish AF and Navy and others. Evaluation by the U.S. Marines resulted in procurement of the CH-46 series helicopters with operations continuing today. Also, a competition for a 3-ton capable cargo helicopter resulted in selection of Boeing for the CH-47 Chinook series helicopters. Boeing with Bell were selected to build the world's first production tilt rotor aircraft, the V-22 Osprey, for the USN/USMC and USAF. The CH-47 continues in production for the U.S. Army and international customers as well as upgrades of existing aircraft. The aircraft has been in active service for over 50 years.



Boeing CH-47

Arthur Young living in Radnor, PA in 1931 constructed the first of many models and a whirling arm for testing propellers. A boyhood friend Bartram Kelly helped him with these initial model experiments that he believed was the best way to understand the dynamics of rotors. Late in 1938 he attended the first Rotating Wing Aircraft Meeting at the Philadelphia Franklin Institute. He learned from the speakers about investigations and issues to be solved and continued his model testing to further learn about rotor dynamics. During this time, he hit upon the idea of using a stabilizer bar set transversely to the rotor blades. By the time of the second Meeting in November of 1939 he delivered a paper, "A New Parameter of Lifting Rotors." He traced his findings, but stopping short of describing the stabilizer bar. By the time of the January 1941 annual meeting he was able to demonstrate the stability of his models. Through contacts with Larry Bell of Bell Aircraft, he was invited to Buffalo, NY to demonstrate his models on September 3, 1941. Both Arthur Young and Bart Kelly were hired in November 1941. Design of the first Bell helicopter, Model 30, began and the first flight occurred on December 18, 1942. Thus the teetering rotor with a stabilizer bar configuration conceived in the Delaware Valley became a reality. The Model 30 was productionized as the ubiquitous Bell Model 47 – of which 5,600 were produced and made famous in the M\*A\*S\*H TV series.



Arthur Young Bell Model 30

Keystone Helicopter Corporation in Malvern, PA was founded in 1953 by Peter Wright, a pioneer of today's modern helicopter industry. Now a subsidiary of Sikorsky Global Helicopters, Keystone has one of the largest and most complete maintenance and overhaul facilities for helicopters in the U.S. and is a factory-authorized service center for Bell, Eurocopter, MD Helicopter, Rolls Royce, Pratt & Whitney, and Sikorsky products.

It should be noted that as a result of the deep heritage of vertical flight in the Delaware Valley, Sikorsky Global Helicopters in Coatesville was created as a business unit of Sikorsky Aircraft to focus on the construction and marketing of commercial helicopters. The business unit combines

the main civil helicopters that were produced by Sikorsky Aircraft and the helicopter business of Schweizer Aircraft that Sikorsky acquired in 2004. Sikorsky Global Helicopters continues to expand its facilities in the region in response to market growth. In addition, AgustaWestland has recently expanded in the Northeast section of Philadelphia to become AgustaWestland's third main helicopter final assembly location and continues to be the main product support center for customers throughout the Americas. AgustaWestland Philadelphia builds AW119, AW109, and AW139 helicopters and provides associated flight and maintenance training.