Experimental airplane!

Electric propulsion Sceptor set to fly in 2 years

By Jay Levine
X-Press editor

NASA is researching ideas that could lead to developing an electric propulsion-powered aircraft that would be quieter, more efficient and environmentally friendly than today’s commuter aircraft.

The proposed piloted experimental airplane is called Sceptor, short for the Scalable Convergent Electric Propulsion Technology and Operations Research. The concept involves removing the wing from an Italian-built Tecnam P2006T aircraft and replacing it with an experimental wing integrated with electric motors.

An advantage of modifying an existing aircraft is engineers will be able to compare the performance of the proposed experimental airplane with the original configuration, said Sean Clarke, Sceptor co-principal investigator at NASA Armstrong. The Tecnam, currently under construction, is expected to be at the center in about a year for integration of the wing with the fuselage. Armstrong flew a different Tecnam P2006T in September to gather performance data on the original configuration.

NASA researchers ultimately envision a nine-passenger aircraft with a 500-kilowatt power system in 2019. To put that in perspective, 500 kilowatts (nearly 700 horsepower) is about five times as powerful as an average modern passenger car engine.

However, to reach that goal NASA researchers intend to fly the Aeronautics Research Mission

Major aeronautics initiative proposed

By Jay Levine
X-Press editor

NASA aeronautics could see its biggest boost in more than a decade if a $3.7 billion plan is approved that would bring agency-matured technology to flight during the next 10 years.

The New Aviation Horizons initiative would include, if approved by both houses of Congress, demonstration and validation of new technologies to dramatically reduce fuel consumption, emissions and noise and open new markets for industry. The initiative would include $150 million in the proposed fiscal year 2017 budget for the Aeronautics Research Mission Directorate.

The aeronautics budget would then increase every year to a total of nearly $1.3 billion in 2021. The initiative aims to develop aeronautics research for transformative capabilities to enable the U.S. aviation industry to maintain and advance its global leadership and continue the nation’s economic growth and job creation through aviation. Included in the plan are ultra-efficient aircraft such as a hybrid wing body aircraft and a low-boom flight demonstrator. Multiple human-piloted demonstrators are planned in each of the categories.

“All the credit goes to Jaiwon By Jay Levine

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Flick awarded presidential award
By Jay Levine  

Bradley C. Flick, NASA Armstrong’s director for Research and Engineering, has been recognized as a recipient of the 2015 Merit Presidential Executive Presidential Rank Award.

The Presidential Rank Awards were established in 1978 to recognize a select group of career members of the Senior Executive Service (SES) for sustained exceptional performance. No more than five percent of career SES or senior career government employees can receive the award.

As director for Research and Engineering, Flick is responsible for the technical and administrative management of the directorate’s engineering workforce. Flick began his 29-year career at the Dryden Flight Research Center (now Armstrong) in 1976 as a flight test engineer on the F-18 High Alpha Research Vehicle (HARV) project.

He transferred to the Operations Engineering Branch in 1988, where he continued work on the HARV project with a lead role in the development of several experimental systems, including the thrust vectoring control system, emergency electrical and hydraulic systems, the spin recovery parachute system and an actuated nose actuator system. He served as mission controller for approximately 100 HARV research flights.

Flick’s management career started when he served as Flight Systems Branch chief from 1998-2001. From 2001 to 2005 he served in an acting capacity as associate director for Flight Operations, deputy director for Research Engineering and director of Engineering.

Prior to his current position, Flick served as the center’s chief engineer, where he was responsible for providing independent technical guidance and oversight to flight projects to ensure conformance with Center and Agency standards, policies and processes. As the chair of the Airworthiness and Flight Safety Review Board, he was responsible for developing and providing the appropriate level of independent technical review for each project prior to flight. Flick served as acting chief engineer from October 2005 until his permanent appointment to the post in January 2008.

Some of the accomplishments of the Research Engineering directorate under Flick’s tenure include the maturation of Stratospheric Observatory for Infrared Astronomy through the flight envelope expansion and mission system development to full operational capability and system integration, instrumentation and successful test of the Orion Pad Abort-1 flight test. He also led the organization during the development of the Live Virtual, Augmented and Constructed Environment and integrated flight tests in support of the Uninhabited Air Systems integration in the National Airspace System Project.

In addition, Flick led the organization through numerous Aeronautics Research Mission Area contracts, including the Advanced Compliant Trailing Edge on the G-II subsonic testbed, integrated ground and air collaboration tools and the provision of flexible structures research on the X-56 Multi-Utility Technology Testbed aircraft. Flick is also credited with management support and encouragement that has led to significant expansion of technology, such as Fiber Optic Strain Sensing, and initiation of readiness in emerging areas such as vehicle/ system autonomy and electric/hybrid propulsion.

Flick reorganized the directorate to better align skills and increase overall engineering effectiveness. Flick created a stand-alone organization for project chief engineers to provide more consistency in project technical leadership and emphasized the development of systems engineering skills to improve overall technical leadership performance.

Flick chaired the mishap investigation board in 2012 for the Taurus X/LG following the second consecutive failure of the launch system. For that work, he received a NASA Exceptional Achievement Medal.

During his career, he also received the NASA Exceptional Service Medal in 2004 for his contributions to aeronautical research programs. Flick received a bachelor’s degree in electrical and computer engineering from Clarkson University, Potsdam, New York, in 1986 and a master’s degree in engineering management from Rochester Institute of Technology, Rochester, New York, in 1997.

Scholarship deadline near

The Armstrong Employee Exchange is accepting applications for the 2016 Thomas W. Finch Memorial Scholarship until May 31. Finch was a research scientist at the NASA High-Speed Flight Station (now NASA Armstrong). He authored and co-authored technical reports on handling qualities and stability and control of the Bell X-5 and North American X-15 research aircraft during the 1950s. High school seniors graduating between January and June 2016 and enrolling at a four-year college or university, or a two-year community college are eligible.

Women@NASA recognizes Bixby, McMurtry, in feature

Cynthia (C.J.) Bixby and Kate McMurtry, two NASA Armstrong managers, are featured in the agency’s Women@NASA Website.

Bixby is the chief of the Systems Engineering and Integration branch at Armstrong. Bixby supervises and advises both project chief and system engineers working with other branch chiefs around Armstrong to ensure a healthy pipeline of engineering management candidates. Women@NASA recognizes Bixby for determining and articulating the mission of the branch to provide sound engineering guidance to ensure airworthiness throughout planning, integration and testing of unique systems and flight vehicles.

McMurtry is the chief of Operations Engineering at Armstrong. McMurtry is responsible for planning, directing and coordinating the technical and administrative functions for the branch. The mission of the branch is to provide sound engineering guidance to ensure airworthiness throughout planning, integration and testing of unique systems and flight vehicles.

Flick, who received a bachelor’s degree in engineering management from Clarkson University, Potsdam, New York, in 1986 and a master’s degree in engineering management from Rochester Institute of Technology, Rochester, New York, in 1997, is responsible for the technical and administrative management of the directorate’s engineering workforce. Flick began his 29-year career at the Dryden Flight Research Center (now Armstrong) in 1976 as a flight test engineer on the F-18 High Alpha Research Vehicle (HARV) project.

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Cynthia Bixby

Kate McMurtry

Candidate of the Armstrong Employee Exchange, Cynthia C.J. Bixby, is a Senior Manager, Systems Engineering Branch, at Armstrong. Bixby is responsible for planning, directing and coordinating the technical and administrative functions for the branch. The mission of the branch is to provide sound engineering guidance to ensure airworthiness throughout planning, integration and testing of unique systems and flight vehicles.

Candidate of the Armstrong Employee Exchange, Kate McMurtry, is a Senior Manager, Systems Engineering Branch, at Armstrong. McMurtry’s branch is responsible for planning, directing and coordinating the technical and administrative functions for the branch. The mission of the branch is to provide sound engineering guidance to ensure airworthiness throughout planning, integration and testing of unique systems and flight vehicles.
Hypersonic research pioneer passes

By Jay Levine

NASA Armstrong employees, retirees and family gathered Feb. 9 to honor the life and career of Kenneth W. Iliff, a driving force of modern methods of parameter identification and estimation and a pioneer in hypersonic research. Iliff died Jan. 4. He was 75.

Mary Shafer Iliff, a former Armstrong aerospace research engineer and a senior flying qualities engineer on the SR-71 research project, was married to Iliff. Prior to Iliff’s passing, the couple had celebrated their 45th anniversary.

“He loved Dryden, he loved Armstrong and he loved the people here,” Shafer said. “He thought this was the greatest place in the world because of the people. I am going to really miss him, but we had a lot of fun.”

Many employees and retirees said Iliff was one-of-a-kind.

“Dr. Ken Iliff, was amazing, insightful and brilliant,” said Al Bowers, NASA Armstrong chief scientist. “He was my friend. Ken was a key player in the X-15 and the lifting body flight research, and he had a deep love of hypersonic flight. Ken’s greatest work was his parameter identification techniques, which are still used today and formally coded by his two most brilliant engineering protégés Rich Maine and Jim Murray. His sense of humor and mischievous smile will be sorely missed.”

Iliff was key in formulating, perfecting and advancing the science and technology of aircraft parameter estimation – how to formulate questions about aircraft performance once the answers are known, or how to determine “why” when the “what happens” is known.

His methodology on parameter estimation is one of the most significant analytical advances in flight research and testing, and his codes are used by virtually all flight test organizations. The codes are also used for identification of other dynamic systems, including submarines, economic models and biomedical models. He is also renowned for his contributions to model structure determination for high angles of attack flight.

“Parameter Estimation technology was a breakthrough in digitally analyzing the motions of an aircraft and the control surface inputs and extracting the characteristics of the vehicle in flight,” said former center director Ken Szalai. “His work directly contributed to safer and more efficient flight test, flight control design and simulation development.”

Iliff’s contributions didn’t end with technical brilliance.

“Ken constantly encouraged people to innovate, create and ask why something is happening,” Szalai said. “He promoted the idea that every flight is an opportunity to do scientific research to increase the understanding of flight in the real environment. He challenged people at every level to remember that the mission of NASA and the center was exploration and discovery and to act boldly. He also reminded managers that people were the most valuable asset of NASA and to treat them accordingly.”

His peers recognized his many skills.

“Ken had a thorough understanding of flight research, and I respected his ability to work with diverse groups to get results to NASA’s goals,” said Patrick Stolker, NASA Armstrong’s deputy director. “He was a consummate professional.”

Iliff joined the Flight Research Center (now Armstrong) in 1962, when flight data were recorded on film and measurements were made with a slide ruler. He began his career studying the handling qualities of the X-15 and a heating study and analysis of proposed modifications. Iliff spent his career at Armstrong and became the center’s chief scientist in 1994, a position he held until his retirement in 2002.

He accelerated work on the M2-F1’s controls and demonstrated the advantages and pitfalls of different configurations. He worked on the M2-F2 heavyweight lifting body aircraft, transferred to the XB-70 program and provided support on the HL-10 lifting body aircraft.

Iliff also worked on the X-24A, M2-F3 and X-24B lifting body aircraft and early studies of the space shuttle, including computer simulations of the re-entry and landing of various shuttle designs.

Iliff, page 12

Directorate-funded Sceptor in about two years. Progress in three areas is happening now to enable that timeline, Clarke said.

“Those areas include testing of an experimental wing on a truck, developing and using a new simulator to look at controls and handling characteristics of an electric airplane and verifying tools that will enable NASA’s aeronautical innovators to design and build Sceptor. Sceptor also is part of NASA’s efforts to help pioneer low-carbon propulsion and transition it to industry.”

The first area is the Hybrid Electric Integrated Systems Testbed, or HEIST, an experimental wing initially mounted on a specially modified truck. It is used for a series of research projects intended to integrate complex electric propulsion systems. The testbed functions like a wind tunnel on the ground, accelerating to as fast as 73 mph to gather data, Clarke explained. Researchers have used the testbed to measure lift, drag, pitching moment and rolling moment that can validate research tools.

“By evaluating what we measured, versus what the computational fluid dynamics, or CFD, predicted, we will know if the predictions make sense,” he added. “Since Sceptor is a new design, we need to validate we have good answers for the Sceptor experimental wing.”

“HEIST’s first experiment was called the Leading Edge Asynchronous Propeller Technology Ground Test team includes from left Brian Sukup, Sean Clarke, Douglas Hulse, Deni Grunau, Kurt Papathakis, Jason Derman, Vincent Bayard and Freddie Graham. Clarke explained. Sceptor could be a solution to aeronautical propulsion and transition it to industry.”

Team members of the Leading Edge Asynchronous Propeller Technology Ground Test team include from left Brian Sukup, Sean Clarke, Douglas Hulse, Deni Grunau, Kurt Papathakis, Jason Derman, Vincent Bayard and Freddie Graham. Clarke explained. Sceptor could be a solution to aeronautical propulsion and transition it to industry. Clarke explained. Sceptor could be a solution to aeronautical propulsion and transition it to industry. Clarke explained. Sceptor could be a solution to aeronautical propulsion and transition it to industry. Clarke explained. Sceptor could be a solution to aeronautical propulsion and transition it to industry.
NASA and university scientists studied the wet winter weather near Seattle as part of the Olympic
Mountain Experiment, or Olympex, NASA-led field campaign. The campaign began Nov. 10, 2015, and ended in mid-January. In addition to the aircraft, the science team used weather radars, weather balloons, and specialized ground instruments to verify rain and snowfall observations made by the Global Precipitation Measurement (GPM) satellite mission.

By Jay Levine

The DC-8 begins one of its missions for the Olympex campaign. Above, Chris Jensen, left, and Matt Berry work aboard the DC-8.

Above, ER-2 pilot Donald “Sea” Bruce captured the DC-8 flying a mission during the Olympex campaign. At right, NASA’s weather radar on the Quinault Indian Reservation in Taholah, Washington, is one of two fully transportable research-grade S-band radars in the world.

Olympex

NASA-led field campaign verifies rain and snowfall observations, studies precipitation.
Aircraft, weather radars, weather balloons and specialized ground instruments were used to verify rain and snowfall observations made by the Global Precipitation Measurement satellite, which is illustrated above.

Snowfall observations made by the Global Precipitation Measurement satellite, which is illustrated above.

At right, Tacoma, with the ER-2 as confers with a DC-8 crew member about the flight.

Above

Olympex
... from page 7

NASA Armstrong, NASA's Goddard Space Flight Center in Greenbelt, Maryland, NASA's Wallops Flight Facility in Virginia, NASA's Jet Propulsion Laboratory in Pasadena and a partnership with the University of Washington. The 62nd Airlift Wing and base public affairs office at Joint Base Lewis-McChord, Washington, Olympic National Park Service and Quinault Indian Nation also supported the effort.

The campaign was part of NASA work to study precipitation and the water cycle. The GPM is the first coordinated international satellite network that will provide near real-time estimates of rain and snow every three hours, at any location.

On a media day and NASA Social held Nov. 11-12, people were invited to tour the DC-8 and visit ground sites located in the Olympic National Park. The public affairs team also supported media flights on the DC-8 during the early part of the campaign, which included The Weather Channel and USA Today online. The campaign attracted a number of news and social media representatives that resulted in a number of news and social media stories estimated audience of more than 100 million viewers and readers.

At top right, a scientist confers with a DC-8 crew member about the flight.

At right, NASA Armstrong pilot Steve Broce arrives at McChord Field in Washington, south of Tacoma, with the ER-2 as onlookers greet him.

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Hubert Drake, engineering pioneer, dies at 94

Hubert Drake, a member of the original NASA contingent that came to the Mojave Desert for X-1 flight tests, died Jan. 13. He was 94.

The stability and controls engineer came to the NASA Muroc Test Unit (now Armstrong) in 1947 from the NACA Langley Aeronautical Laboratory in Virginia. He spent about two decades working on a diverse range of experimental aircraft beginning with the X-1, D-588-I, D-588-II, X-2, X-5, X-15, the lifting body aircraft and was a driving force in the NASA selection and research of the Lunar Landing Research Vehicle. He also served on NASA advisory committees.

Drake is credited with originating the idea of researching the LLRV, while Donald Bellman and Gene Mattinga were senior engineers on the project. The research was part of a NASA-wide effort to develop the experience and techniques necessary for a successful moon landing.

In 1958, when the NASA became NASA, Hubert was selected as advanced planner. He then spent a month in a NASA headquarters study group to select the right approach to a moon landing. The LLRV flight testing was at the NASA Flight Research Center (now Armstrong) and the LLRV was evolved into the Lunar Landing Training Vehicle used by the astronauts to train for lunar landings.

In 1965 Drake became chief of advanced aeronautical studies at NASA's Ames Research Center in Moffett Field, California. In 1970 he was chief of the Aeronautics Division at Ames, a position he held until his retirement in Jan 1975.
Global Hawk flew El Niño missions

By Jay Levine

February 2016

X-Press

Extreme weather predictions on the West Coast could become more accurate with help from NASA’s remotely piloted Global Hawk. Flights observed El Niño Pacific storms as they developed.

The mission demonstrated how a Global Hawk could augment satellites and routinely fly vast areas of the ocean, said Robbie Hood, director of the National Oceanic and Atmospheric Administration (NOAA) Unmanned Aircraft Systems program. “How do you use Global Hawks and actually chase storms?” Hood asked. “That’s what we are looking at with these mission.”

NOAA, NASA and the National Weather Service are partnering on an El Niño field research campaign “to get data in the hands of forecasters and for our weather models,” said Robert Webb, Physical Science Division director of the Office of Oceanic and Atmospheric Research for NOAA.

Webb and a panel of experts from NASA, NOAA and the National Weather Service detailed elements of the campaign at NASA Armstrong Feb. 5. The observation flights are part of an ongoing NOAA mission called Sensing Hazards with Operational Unmanned Technology, or SHOUT. The multi-year mission plans to show how the use of autonomous vehicles can fill gaps in weather modeling and as a potential backup in case a satellite is unable to capture data.

This SHOUT mission is being conducted in collaboration with NOAA’s larger El Niño Rapid Response Field Campaign. In addition to the Global Hawk, NOAA also used a Gulfstream IV research plane and the NOAA ship Ronald H. Brown. El Niño is a recurring climate phenomenon characterized by unusually warm ocean temperatures in the equatorial Pacific, which increases the odds for warm and dry winters across the Northern United States and cold, wet winters across the South.

Based at NASA Armstrong, the Global Hawk flew four to six, 24-hour flights in February at 60,000 feet altitude. The aircraft provided detailed meteorological measurements from a region in the Pacific that is known to be the origin point of El Niño storms and particularly critical for interactions linked to West Coast storms and rainfall.

The Global Hawk can help fill a void over the Pacific Ocean that other assets, like satellites, cannot easily study, especially in the upper atmosphere where clouds can obscure observations, Webb said. “It gives us a chance to really get ahead of the storm,” he added.

Some of that data is collected through the use of tools resembling paper towel tubes called drooping devices. These devices are dropped from the Global Hawk into the weather to gather temperature, moisture and wind speed and direction, Webb said.

Also onboard the Global Hawk is the High Altitude Imaging Wind and Rain Airborne Profiler (HIRAP) instrument, operated and managed by NASA’s Goddard Space Flight Center and the High Altitude Microwave Radiometer (HAMSAR) instrument, managed by NASA’s Jet Propulsion Laboratory. The instruments collected remote observations of the area, producing data similar to satellite observations.

The final instrument, NOAA-O3, measured ozone at the altitude the aircraft is flying. Doppler radar was also used to track wind speed and direction.

“Every place the Global Hawk flies is like a layer cake and we see how it stacks up,” Hood said. “The data can be cross referenced and more data in and around the storm, and we can watch how it develops. We are interested in understanding the data that can improve our ability to predict extreme weather.”

Gary Wick, lead NOAA scientist for the SHOUT mission, said the long-endurance flights provide information over a large area of the ocean like satellites do, but with greater resolution because the instruments are closer to the weather.

“The SHOUT campaign provided unprecedented information that will improve hurricane predictions and add to weather models in areas of prediction that the models just don’t get right,” said Jason Stipler, a National Weather Service scientist. Frank Cutler, Armstrong’s Global Hawk project manager, talks to media about the Global Hawk and its current mission.

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The SHOUT campaign provided unprecedented information that will improve hurricane predictions and add to weather models in areas of prediction that the models just don’t get right,” said Jason Stipler, a National Weather Service scientist. Frank Cutler, Armstrong’s Global Hawk project manager, said the aircraft’s role extends beyond providing the aircraft. Staff members are responsible for integrating the instruments into the aircraft, planning the missions as directed by the science team and then flying those missions.

In addition, the proposal increases investments in Uninhabited Aircraft Systems integration, such as small UAS operations at low altitude, enabling U.S. leadership in safe, scalable applications.

Another element of NOAA’s work is improving innovative university research and increasing student involvement in implementing the NASA Aeronautics vision and strategy.

NASA Armstrong’s proposed budget is $273 million, which does not include funds from the aeronautics initiative until roles and responsibilities of the centers are detailed, McBride said. It does include $84 million for aeronautics, which includes contributions to aviation safety, advanced air vehicle research and aeronautics test capabilities related to flight operations and test architecture. Also included is $66 million for Earth science, airborne research and full funding for the Stratospheric Observatory for Infrared Astronomy Space Technology accounts for $17 million in the budget, which includes Armstrong’s management of Space Technology’s Flight Opportunities Program. That program facilitates access to flight testbeds for researchers using commercial reusable suborbital providers.

In addition, Armstrong manages Small Business Innovative Research and Small Business Technology Transfer program awards aligned with the center’s technical expertise. Armstrong will continue to develop center-based capabilities through the Center Innovation Initiative and support the Office of the Chief Technology’s technology transfer and strategic integration activities at the center level.

Exploration has $25 million for testing of the Orion Crew Vehicle. The funding also covers advanced exploration systems like Armstrong’s launch support and pilot, photo and video support of the Orion parachute landing system to be used for the vehicle’s return from space.

Education is proposed at $1 million for NASA’s education efforts. In addition, $62 million is proposed for safety, security and mission services that ensure the facilities, tools and services needed for conducting NASA’s missions are available and $18 million for construction and environmental compliance restoration.

The NASA budget supports developing the technologies that will make future space missions more capable and affordable, partnering with the private sector to transport crew and cargo to the International Space Station, continuing the development of the Orion crew vehicle, Space Launch System and Exploration Ground Systems that will one day send astronauts beyond Earth orbit. The budget also keeps the Webb Telescope on track for 2018 and builds on scientific discoveries and achievements in space.

In addition, the budget supports the Administration’s commitment to serve as a catalyst for the growth of a vibrant American commercial space industry. The $19 billion 2017 NASA budget includes $5.6 billion for Science, $8.4 billion for Human Exploration Operations, $827 million for Space Technology, $790 million for Aeronautics research, $100 million for Education and about $3.3 billion for NASA infrastructure called the safety, security and mission services and construction and environmental compliance and restoration budget category.
Missions... from page 10

Although the aircraft is autonomous, the Global Hawk can be sent instructions in flight to alter course to better observe items of interest based on changing conditions and "complete the mission with a perfect landing every time," Cutler explained.

As the current El Nino situation evolved, the Global Hawk helped determine what the storms looked like and provided information for models to help better predict how the big storms develop.

Keith Rossman dies at 56

Keith Rossman, a NASA Armstrong quality assurance inspector, died Jan. 26. He was 56.

Rossman began working at Armstrong in 2007. He was hired as a quality assurance contractor for the Computer Science Corporation and supported the Pad Abort 1 buildup and launch of the escape system for Orion.

Following that effort, Rossman supported the ER-2 high altitude aircraft, F-15s and the Stratospheric Observatory for Infrared Astronomy as a quality assurance and operations inspector.

Here today, gone tomorrow

NASA Armstrong’s campaign to demolish older facilities included T-42 near the Armstrong Gift Shop. That building at one time was home to the public affairs team, as was Building 4839, which also was recently leveled. Building 4839 was located near the entrance to the center where the historic aircraft are displayed. Facilities that once housed the space shuttle program offices also were demolished.

Iliff... from page 4

He was instrumental in assembling the shuttle’s Aerodynamic Data Book, a collection of aerodynamic data from wind tunnels and flight tests used in predicting the shuttle’s flight characteristics. Once the shuttle was making orbital flights, Iliff analyzed the re-entry data. He also worked on the X-29 forward swept wing, the F-18 High Angle of Attack Research Vehicle program and the F-15 Spin Research Vehicle.

He received a number of honors and recognitions during his career, including NASA’s highest scientific honor, the Exceptional Scientific Achievement Award in 1976. He also was a recipient of the Society of Flight Test Engineers Kelly Johnson Award in 1989 for his significant contributions to the fields of flight testing and flight research. He was inducted into the National Hall of Fame for Persons with Disabilities in 1987. Iliff authored more than 100 technical papers.

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