



1957-2005

A tribute to Bohn-Meyer

■ Family, friends and peers celebrate the life of Dryden chief engineer at memorial

By Sarah Merlin
X-Press Assistant Editor

Few tasks in life come harder than memorializing a well-lived life cut tragically short.

There's the terrible abruptness of the news. A sudden, inexplicable end to so much promise, the silencing of a voice filled with great zest for living – words and rituals seem hopelessly insubstantial in the face of such loss.

But on those occasions there is also the chance for a redeeming moment, for an opportunity to make sense of a tragedy if only through the promise it holds for those left behind.

Marta Bohn-Meyer's legacy is surely one of those moments. Despite the almost incomprehensible sadness of her loss, she leaves behind the record of a life spent in relentless pursuit of excellence, passion and service to principles larger than herself. She leaves behind a fearless example for living that makes those who didn't know her wish they had, and one that those who knew her owe it to her memory to sustain.

See Marta, page 4



EC86 33442-2

NASA Photo

Marta Bohn-Meyer prepares for flight in an F-104. Beginning in her teen years, Bohn-Meyer's favorite place was in and around airplanes both at work and while off duty. She was an accomplished private pilot and flight engineer, and was the first female crew member to fly at Mach 3 in the SR-71.

Schneider walks the Walk

By Sarah Merlin
X-Press Assistant Editor

Many know him as "Fast Eddie," the whiz kid NASA test pilot who was the youngest-ever graduate of the U.S. Navy's Test Pilot School.

But it was a lot more than youthful charisma that earned Edward T. Schneider his slot on the City of Lancaster Aerospace Walk of Honor. It was a long list of accomplishments as test pilot, instructor and researcher in a career in which he logged more than 7,800 hours in 87 types of aircraft.

In ceremonies held Sept. 24, Schneider joined Lt. Col. John "Jack" Allavie (USAF-Ret.), Richard G. "Dick" Thomas, Maj. Gen. Wilbert D. "Doug" Pearson (USAF-Ret.) and Wallace A. "Wally" Lien (1915-1994) to make up the 2005 class of inductees. This year marked the city's 16th annual Walk of Honor event.

"It's great to be honored in this manner and to return to a city where my family spent

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EC05 207-4

NASA Photo by Jim Ross

Former Dryden research pilot Ed Schneider signs autographs for young aviation enthusiasts at the City of Lancaster Aerospace Walk of Honor. Schneider was one of five 2005 inductees, who also included former Edwards Air Force Base commander Maj. Gen. Wilbert D. "Doug" Pearson (USAF-Ret.).

Dryden set for CEV role

By Jay Levine
X-Press Editor

As steps are taken during the next two decades to develop a Crew Exploration Vehicle – using the Apollo missions of the past as a blueprint for future missions to the Moon and Mars – Dryden will play important roles in the CEV's development and operations.

In a Sept. 19 overview of the proposed CEV program (referred to as the NASA Exploration Systems Architecture Study), NASA Administrator Michael Griffin indicated that each NASA

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Center Director's column

Dryden will play role in CEV development

The results of NASA's Exploration Systems Architecture Study are now more broadly available and Dryden's role in support of the Crew Exploration Vehicle development is becoming clearer. The Center is slated to perform launch-abort testing, flight-test support and independent analysis. We are tasked with preliminary definition and planning for CEV launch-abort systems tests, drop tests, landing and recovery tests, flight re-entry and landing profiles and range-safety requirements and integration.

Exactly what this will mean in terms of Dryden's level of support remains to be charted and will depend on further definition of CEV development needs. But we will soon be looking for people to lead and implement our CEV efforts.

This development comes at a time when much is changing in NASA and Dryden's aeronautics activities are being redefined. But Administrator Mike Griffin intends to redirect work to NASA centers, like Dryden, that are losing aeronautics project activity. NASA is also moving toward enabling the



Center Director
Kevin L. Petersen

centers to do more Exploration Systems work directly. The workforce outlook at Dryden is much better than six months ago. It now appears that our civil service workforce will stabilize at our present level of roughly 500 people.

The aeronautics mission at NASA is in transition, and it will take two to three months for the new direction to become clear. Meanwhile, we are to continue what we have been doing until the realignment efforts are better defined. Projections are that aeronautics will continue to be a dominant part of our budget in fiscal year 2006. After that (and maybe before then), it should take all the capabilities we can muster to support the CEV. I encourage all of you to be thinking about your role in supporting these new directions.

Dryden set for Open House

By Alan Brown
Dryden News Chief

Dryden will be among exhibitors featured at the 2005 Edwards Air Force Base Open House and Air Show Oct. 22-23, with four NASA research and support aircraft slated to be in the air and several others on static display.

One of NASA's high-flying Lockheed ER-2s and a highly modified McDonnell Douglas F-15B will be airborne during the event, along with two Dryden mission support aircraft – a Beechcraft NT-34C and a McDonnell-Douglas F/A-18. The ER-2 is flown in Earth resources research and satellite sensor validation, while the F-15B, best known for its role in the Advanced Control Technology for Integrated Vehicles project, is currently the testbed for Intelligent Flight Controls Systems research.

Static displays and exhibits featuring several of Dryden's projects and one-of-a-kind research aircraft will be housed in a 300-square-foot section of Edwards' giant Hangar 1600 or along the base flight line. From NASA's Active Aeroelastic Wing F/A-18 and the

venerable NB-52B "mothership" launch aircraft to a full-scale mockup of the X-43A hypersonic research vehicle, the exhibit will highlight the cutting-edge flight research and technology development conducted each year at Dryden. A new display for this year's show will feature replicas of the Mars Rovers from NASA's Jet Propulsion Laboratory.

As NASA's premier center for atmospheric flight research, several exhibits showcasing Dryden's research capabilities and history will be intermingled among the NASA aircraft. Several current and former Dryden research pilots and engineers will be on hand to chat with the public. In addition, local high school robotic and middle school Lego teams supported by Dryden will explain their program and demonstrate robots in action as part of the exhibit. Participating schools include Lancaster, Mojave and Tehachapi high schools along with Cole, Jacobsen and Desert Christian middle schools.

Hours for the event are 7 a.m. to 4:30 p.m. daily, with flying demonstrations

celebrating Edwards' long history of contributions to the U.S. Air Force and the national defense set to begin each day at 10 a.m. Flight highlights will include appearances by the U.S. Army Golden Knights parachute team, the Tora, Tora, Tora re-enactment of the attack on Pearl Harbor, and a precision-formation flight demonstration from the Royal Netherlands Air Force.

Other scheduled highlights include aerospace legend Brig. Gen. Chuck Yeager (USAF-Ret.) flying a World War II-era North American P-51 Mustang and Julie Clark performing an aerobatic routine in a T-34.

The event showcases the aircraft systems and capabilities of the Air Force Flight Test Center, Dryden Flight Research Center, the Air Force Research Laboratory Propulsion Directorate, Marine Aircraft Group 46 and other resident and visiting units. Additional information is available on the Open House and Air Show web site at www.edwards.af.mil/openhouse, or by calling the Edwards public affairs office at (661) 277-NEWS.

Moes completes leadership program

By Chris Williams
Director, Leadership Development Program
NASA Headquarters

Timothy Moes, business development manager in Dryden's Program Planning Office, was one of 31 members of NASA's 2004-2005 Leadership Development Program celebrating completion of the program year with a ceremony at Headquarters on July 11. Program participants, representing nine NASA centers, were the second graduating class of the LDP, which replaced the NASA Professional Development Program in support of the Agency's emphasis on improving leadership skills and the ability of leaders to produce measurable results.

In his address to graduates, Scott Pace, director of the Program Analysis and Evaluation Office at Headquarters, expressed thanks to participants for their contributions made to the Agency as part of their program assignments. He also lauded completion of their class project, "Enabling Effective Collaboration and Competition." This project involved creation of an easy-to-understand business model that details how and where work is being done within programs and projects across the Agency and offers tools to be used in developing a business plan. Class members also conducted a series of surveys and interviews to complete the collaboration study initiated by the 2003-2004 LDP class, and created a NASA Collaboration Handbook.



NASA Photo by Heidi Fancher

Scott Pace, left, NASA associate administrator for program analysis and evaluation, presents Dryden's Timothy Moes with his LDP graduation certificate.

A link to the full report and Collaboration Handbook can be found on the LDP home page at <http://ldp.nasa.gov/>.

Class members Vicki Zanoni, from Stennis Space Center, Miss.; Bill Green, Marshall Space Flight Center, Huntsville, Ala.; and Steve Craft, Langley Research Center,

Hampton, Va., were elected to speak at the graduation to share their reflections of the year and thoughts on leadership. All three spoke of how, through the LDP, they became aware of the way their personal vi-

See Graduation, page 12

News at NASA

Endeavour powered up for first time in two years

Engineers cheered Oct. 6 as electricity coursed through Space Shuttle Endeavour for the first time in two years. The powering of Endeavour signaled the end of the orbiter's major modification period at Kennedy Space Center, Fla.

"Having three operational vehicles in the fleet affords the shuttle program great schedule flexibility, as we move toward flying safely and completing the International Space Station," said Wayne Hale, space shuttle program manager.

Engineers and technicians spent 900,000 hours performing 124 modifications to the vehicle. These included recommended return-to-flight safety modifications, bonding more than 1,000 thermal protection system tiles and inspecting more than 150 miles of wiring.

Two of the more extensive modifications included addition of the multifunctional electronic display system (glass cockpit), and the three-string global positioning system.

The glass cockpit is a new, full-color, flat-panel display system that improves interaction between the crew and orbiter. It provides easy-to-read graphics portraying key flight indicators such as attitude display and Mach speed. Endeavour was the last vehicle in the fleet to receive this system.

Shuttle major modification periods are scheduled at regular intervals to enhance safety and performance, infuse new technology and allow thorough inspections of the airframe and wiring. This was the second modification period performed entirely at Kennedy. Endeavour's previous modification was completed in March 1997.

Endeavour is beginning 10-12 months of launch processing and power-up testing for a future flight, possibly late next year.

For the latest information about NASA's space shuttle program, visit <http://www.nasa.gov/shuttle>.

Contract goes to GASL Inc.

GASL Inc., Ronkonkoma, N.Y., has been selected to receive a follow-on contract for hypersonic propulsion development and testing to support NASA's Hypersonic Air Breathing Propulsion Branch at Langley Research Center, Hampton, Va. The contract has a maximum value of \$15 million.

The contract provides for operation and application of shock-heated and combustion-heated test facilities. It also provides for supporting equipment to conduct test and evaluation of hypersonic aero-propulsion flow path research at conditions that duplicate flight across the atmosphere, from static sea level to near orbital.

The contract also calls for the conduct of hypervelocity aerodynamic and aerothermodynamic research in a shock-heated tunnel at test gas flows up to Mach 20 simulation, and design and manufacture of research test hardware consisting of specialized aero-propulsion test facility components and engine flow-path components. The research will be primarily conducted at GASL facilities in Ronkonkoma.

Annual CFC campaign is under way

The 2005 Combined Federal Campaign fundraising effort is now under way at Dryden.

This year's theme is "Give a Little, Help a Lot - CFC" and the Center campaign coordinator is Dan Morgan.

Through the Nov. 10 closing date, employees may contribute to the program, which is conducted under the auspices of the Greater Los Angeles CFC. Charities funded through the CFC support community support services such as disaster relief, medical research environmental initiatives, educational and medical services and others.

Proceeds from the local drive, which last year totaled over \$3.9 million, benefit communities in Los Angeles and Kern counties. Those interested in making a contribution or desiring further information may contact Morgan at ext. 3976.

The CFC is a program of the federal Office of Personnel Management, the agency that oversees the U.S. government workforce. Through the campaign, employees are given the opportunity to contribute to selected charities through payroll deductions. Among charities that receive proceeds from the CFC drive are the American Red Cross, the United Way and hundreds of smaller health and human welfare agencies around the nation.

The program's roots are decades old, with organized efforts to coordinate federal employee giving dating to the 1940s. President Dwight D. Eisenhower, in 1957, signed one executive order directing the Civil Service Commission to coordinate and administer a thrice-yearly drive and establish rules for the funds' disbursement. Another executive order, signed by President John F. Kennedy in 1961, cemented the program's future by further clarifying the legalities of fundraising in the federal workplace.

Your news

A new X-Press product called Special Delivery will debut Dec. 2. In addition to a hard-copy version to be distributed throughout the Center and to former employees by mail, key stories from each issue will appear on the Dryden Xnet. The publication is a flashback to the X-Press of the 1960s and 1970s that included a more intimate portrait of the Dryden family.

The new edition will feature a timely news story and some new features. Also included will be an Employee Spotlight on one of the dynamic personalities that make Dryden a great place to work, with Spotlight subjects to be nominated by Dryden employees.

Another feature will be Your News, a compilation of birth, wedding and retirement-news announcements submitted by employees to X-Press staff; at least one Dryden employee tie-in will be required in order for these items to be included in the news. An occasional "Where are they now?" feature will profile Dryden retirees. The names for these features also will come from the Dryden family and will be completed in the order they are received.

The regular edition of the X-Press will become quarterly and will feature special editions and non-scheduled issues containing some of the features and products Team Dryden has come to expect from the X-Press. The recently released X-tras and the full-color special editions also are scheduled to continue.

For more information about submitting materials to the X-Press, e-mail or call editor Jay Levine (jay.levine@dfrc.nasa.gov, ext. 3459), or assistant editor Sarah Merlin (sarah.merlin@dfrc.nasa.gov, ext 2128).



EC05 186-24

NASA photo by Tom Tschida

Pathfinder-Plus is removed from a specially built dolly to prepare it for an Aug. 31 flight that validated turbulence models with atmospheric flight data.

Pathfinder-Plus

Solar aircraft completes turbulence research at Dryden

By Alan Brown

Dryden News Chief

A short series of research flights at Dryden with the Pathfinder-Plus solar-electric flying wing was recently completed, marking the end of an era in solar-powered flight research for the 23-year-old craft now due to retire. The purpose of the flight series was to investigate the effects of turbulence on lightweight flexible-wing structures.

Flown by crews from AeroVironment Inc., owner and builder of the unique experimental aircraft, the Pathfinder-Plus made two low-altitude flights over the northern portion of Rogers Dry Lake. The first was a three-hour flight on Aug. 31, followed by a two-hour mission on Sept 14. Both missions were flown on a combination of solar and battery power.

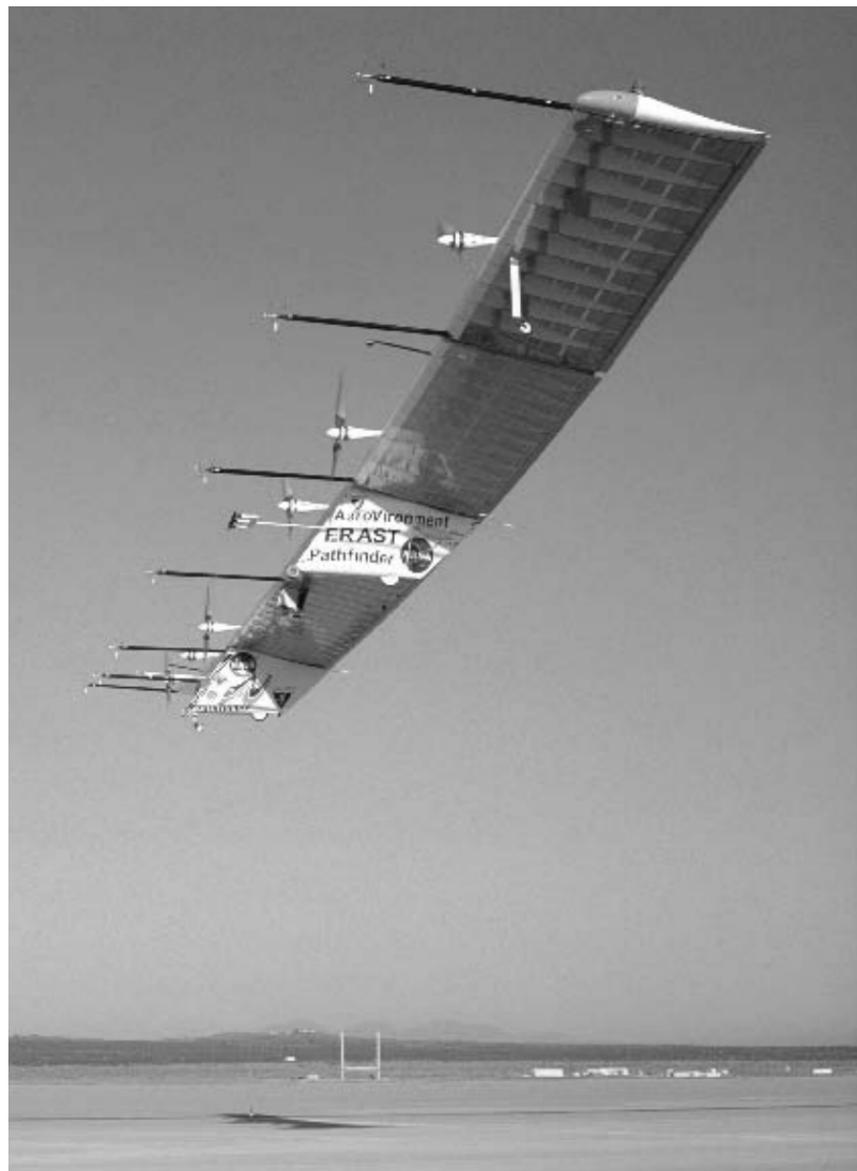
"The primary goal for these flights was to gather aeroelastic data to really begin understanding how these vehicles perform in flight," said Robert Navarro, Dryden's project manager for the test series. "Being so flexible, they constantly change shape and we need to understand how the airplanes behave.

"We gathered some really good data sets on turbulence, and also on aircraft dynamics," Navarro added. "The plan is to use these data sets to correlate some of the models that we're going to be developing for this class of vehicles, and also to validate some of the analytical tools that need to be developed to do the analysis on them. The data would then be available to aircraft developers to reduce design risk for future high-altitude, long-endurance uninhabited aircraft systems."

The lightweight solar craft was instrumented with a sophisticated atmospheric turbulence measurement system on seven long booms mounted across the leading edge of the wing. Data collected by the instrumentation was telemetered to flight controllers in a Dryden ground station several miles away.

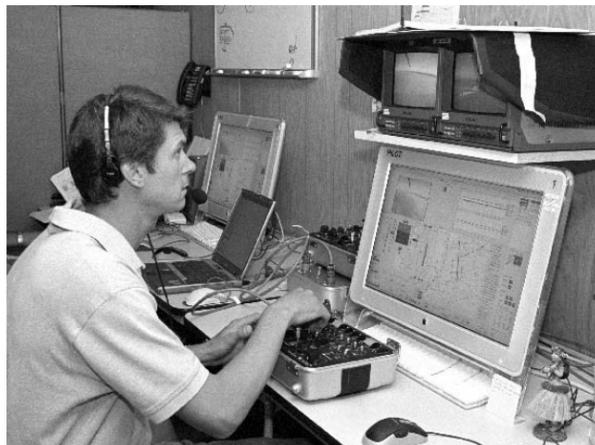
"The idea is that you fly into a gust, and the gust is measured by the booms out in front," said AeroVironment flight director Jim Daley. "Then just fractions of a second later, you fly into that gust with the (leading) edge of the wing, the wing starts to respond, and the instrumentation inside the wing measures what happens when that gust measured out (front) hits the wing."

See Pathfinder-Plus, page 11



EC05 201-8

NASA photo by Tom Tschida



EC05 186-18

NASA photo by Tom Tschida

Above, the Atmospheric Turbulence Measurement System booms extend from the Pathfinder-Plus solar wing as it flies over Rogers Dry Lake. Below, AeroVironment pilot Wyatt Sadler flies the Pathfinder-Plus at a console that includes a video monitor in the ground station during an Aug. 31 flight.

Marta ... from page 1

And those who knew her best would say without irony that she'd expect nothing less of all who would mourn her passing.

Bohn-Meyer, 48, lost her life Sept. 18 near Oklahoma City while practicing for an aerobatic flying competition. In the Giles G300 plane she and husband Bob had designed and had custom-built, she was doing what came as second nature to her: working hard to be the best she could be.

Family, friends and co-workers gathered Sept. 23 in a Dryden hangar – an environment Bohn-Meyer had known well – to pay tribute to the one-of-a-kind woman who, as Center Director Kevin Petersen enumerated, was so many things to so many people.

"We're here to honor Marta," Petersen said in eloquent, heart-felt remarks about the Dryden colleague he'd known for 25 years. "A leader, an engineer, a pilot, a manager, a colleague, mentor, role model, friend, wife and partner, a sister, a daughter and a very special member of the Dryden family. We're here to honor her strength and her commitment to all she pursued.

"We committed lives to this person's judgment every day; she was the last line of defense against complacency. And she never let me – or Dryden – down."

Paying tribute to Bohn-Meyer's achievements was complex. Her personal and professional pursuits cut a wide swath through life. She excelled at baking rum cake as well as aerospace project management, at aerobatic flying and restoring classic cars. She was the first female flight engineer to fly to Mach 3 in an SR-71, a milestone that can never be bested.

And in what she may have considered her most important role, she was a devoted and determined mentor for young girls interested in technical career fields. Bohn-Meyer never tired of making appearances in classrooms or other educational environments in hopes of helping young women realize their dreams in fields traditionally dominated by men.

She was Dryden's Chief Engineer at the time of her death, one of several posts she'd attained since coming to the Center in 1979 after graduation from Rensselaer Polytechnic Institute in Troy, N.Y. The wife of Dryden Associate Director for Programs Bob Meyer, she also served as both deputy director and director of flight operations, as director of safety and mission assurance, deputy director of aerospace projects and project manager for the F-16 XL Supersonic Laminar Flow Control project.

At the memorial, colleagues from all facets of Bohn-Meyer's vibrant life rose to give testimony to her strength of character, personal discipline, her commitment to exacting detail, her well-known tendency to be opinionated, to the irreplaceable role she played in the partnership she had with her husband Bob. First one and then another reminisced about the ways in which Bohn-Meyer had impacted their lives and the lives of everyone at the Center, which played such a big role in her own life and career.

Retired NASA deputy administrator Fred Gregory recalled the long history Bohn-Meyer shared with the Gregory family, from a family ski trip on which, while charged with watching the Gregory children, she hit a tree on a steep run and broke some bones to when, as a young test pilot at Langley Research Center, Gregory was asked to mentor the new engineer when she arrived in about 1976 for her first job with NASA.

"She was smart, detail-oriented, opinionated and professional well beyond her age," Gregory remembered as his first impression.

Gregory gave her her first ride in a helicopter and her first in a high-speed aircraft, a T-38. It was also Gregory who requested that Bohn-Meyer be allowed to transfer to Dryden, because "she'd met a young engineer (Bob Meyer)."



EC91 555-1

NASA Photo by Jim Bean

Marta Bohn-Meyer, Dryden's chief engineer at the time of her recent death, celebrates her successful 1991 first flight at triple supersonic speeds in the SR-71 Blackbird. Bohn-Meyer was one of two women ever to fly in the storied aircraft and the only one to do so as a crew member; a congresswoman took a guest VIP ride in 1985.



EC03 044-11

NASA Photo by Tom Tschida

Above, Marta Bohn-Meyer demonstrates aeronautical principles for students at the 2003 Math and Science Odyssey. Among the many activities to which Bohn-Meyer devoted her time was work in the educational environment with students – particularly young girls – interested in pursuing technical career fields.

Over the years, he said, it became a habit for Bohn-Meyer to phone the Gregory house and leave a message saying simply, "99-100," which meant, "Everything is okay. Called you and missed you – if you get a chance, call back."

Deputy Center Director Steve Schmidt followed Gregory to the dais.

"I will remember her incredible wit, determination, her attitude and her big smile," Schmidt said. "She had a colorful personality, and we had plenty of laughs and heated – but good-natured – arguments. She never had trouble giving me advice."

Schmidt recalled a quote frequently summoned when the topic is strong-willed female aviators, putting Bohn-Meyer squarely in the company of such legendary figures as Florence "Pancho" Barnes and Jackie Cochran.

"They say 'A well-behaved woman rarely makes history,'" Schmidt said with a laugh. "Well, Marta is most definitely a legend."

A steady stream of past and present friends and co-workers continued the tribute, from the Fabrication Branch's Ed Swan remembering her as "a hands-on engineer" to former Dryden research pilot Fitzhugh "Fitz" Fulton recalling how Bohn-Meyer had insisted he check her out in taildragger aircraft.

Several shared light-hearted moments, more than one mentioning Bohn-Meyer's famed – and potent – rum cake. Another recounted an incident in which Bohn-Meyer was able to eyeball a disabled Harley-Davidson motorcycle and spot the cause of an oil leak that had eluded the bike's owner in hours of trouble-shooting. And engineer Brent Cobleigh remembered some self-deprecating hi-jinks by Bohn-

Meyer dressed for Halloween as a witch on a broomstick.

"She was tough and disciplined," Cobleigh said, "but she really knew how to have a good time."

Retiree Lou Steers remembered the glass piggy bank Bohn-Meyer had given Steers' now 26-year-old daughter as a baby gift. Marva Williams, of the Lockheed Federal Credit Union, lauded Bohn-Meyer's ability to breach the "impenetrable glass box that surrounded her" and achieve success in a male-dominated field, calling her a "take-charge woman."

Representatives from Dryden's Office of Academic Investments paid tribute to Bohn-Meyer for her innumerable contributions to NASA's educational outreach.

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Marta ... from page 4

Miriam Rodon-Naveira, Chief Science Advisor/Higher Education Director, read letters of tribute from NASA's Chief Education Officer and from the executive director of the National Science Teachers Association. Pre-College Officer Michelle Davis called Bohn-Meyer "an icon" with the ability to "make real to people their own possibilities."

"She had a gift for sharing that with children," Davis said, enumerating Bohn-Meyer's work with middle school students in classrooms, in online chat rooms, on personal tours of the SR-71 and with teachers in workshops and events like the annual Math and Science Odyssey at Antelope Valley College.

That determination in helping others realize their potential was brought home eloquently by Dryden photographer Jim Ross. Recalling his first attempt to fly in a T-38 and take photos, in October of 1991, Ross related that the experience made him sick and left him certain he'd be unable to take a job as aerial photographer.

But Bohn-Meyer was having none of it. "Marta engineered everything, you know," Ross said. "She told me, 'you've disgraced yourself by walking away from it,'" rationalizing that if he had been ill only four minutes out of an hour, then that left 56 minutes in which he could shoot photos.

"She believed in me when I didn't believe in myself," said Ross, who now has logged over 400 hours of flight time in his career at Dryden.

Another poignant moment came when Betty Jean Williams, a pilot in the Women's Air Force Service Pilots of World War II, read a poem titled "Celestial Flight" that had been written by a WASP member. The poem's words and imagery seemed to speak heart-wrenchingly to the occasion – and of Bohn-Meyer.

Former Dryden Center Director Ken Szalai lauded Bohn-Meyer's performance as a manager, saying she "wasn't weakened by obstacles, but was strengthened."

He heralded her "real-time crisis-management skills" and her willingness "to push the envelope; she was never afraid to question the status quo."

"She made enormous contributions to Dryden," he said, "because of her mastery and her passion. She gave everything she did her all."

Referring to a well-known photo of Bohn-Meyer taken as she emerged from the cockpit after her Mach 3 flight in the SR-71, he called her "a hero and famous role model for thousands of girls."

"At that moment... she broke the glass ceiling for thousands of young women," he said. "She joins an elite group of female aviators."

"I will miss her very deeply, and hold her memory very close."

Fittingly, final words on the program were offered by Petersen and, in an unannounced appearance, by Bob Meyer. Few in Bohn-Meyer's closest circle had known her better than Petersen, and her marriage partnership with Meyer was of the sort aspired to by many.

As they paid tribute to Bohn-Meyer, Petersen and Meyer also illustrated through their words the real depth of the oft-heard phrase "the Dryden family." Hearing them, a listener understood how completely the notion of family permeates the work environment at what is much more than just another government outpost. The day's event was truly that of a family mourning the loss of one of its most significant and accomplished members.

"Marta made an indelible impression on me," Petersen said in emotional comments that reflected the depth of their friendship. "There was nobody else like her. She was an original."

He returned repeatedly to what he termed Bohn-Meyer's "moral courage," calling it



EC87 168-5

NASA Photo

In one of the many partnerships that characterized their marriage, Bob Meyer and Marta Bohn-Meyer test the theory that desert temperatures are hot enough to fry an egg. This "experiment" was staged on the wing of an F-14, but the data they sought was not validated - the egg didn't fully cook.

From the family

I was overwhelmed by the number of people who were able to come and speak to me at Marta's memorial. They almost all had a story to tell about the way that Marta had touched their lives. I mostly listened, and my knee-jerk reaction was to say "thank you." Since then, I've had time to think, and have decided that my response should have been, "You're welcome." Because what all those good people were really saying was, "Thank you for making it possible for us to have Marta." So, now, I'm saying to all of those good people, "You're welcome." I will, however, also say, "Thanks for showing me how much you appreciated my daughter."

-August Bohn

I want to personally thank the Dryden family for Marta's memorial on Sept. 23. That week is one I hope I never have to repeat, but it ended in an afternoon that was uplifting for me and for Marta's family. The effort that went into the memorial and the outpouring of warmth from those in attendance was literally overwhelming. I know that a lot of work and a lot of thought by many people went into the memorial, and it all showed that when the chips are down, Dryden really knows how to come through.

That tribute, and the warmth of the Dryden family, will forever be remembered by me and by Marta's family.

Thank you from the bottom of my heart.

-Bob Meyer

invaluable to her many successes and her approach to life.

"She had both an instinct for caution and a spirit of adventure," he said. "Courage epitomized Marta – it was a unifying force and theme of her life."

That courage infused her career and informed her contributions to the Center, he said. "For Marta, a small technical point differed from a large one only in size, not in importance. She was willing to risk all for the sake of improvement."

Saying he valued Bohn-Meyer's always-unvarnished advice and counsel, he added that "she had little tolerance for ineptness."

Petersen invoked Nobel Peace Prize winner Elie Wiesel in his tribute, saying

that like the humanitarian and Holocaust survivor, Bohn-Meyer aspired to a moral life "through telling truth to power."

"She brandished that moral courage," he said, "against forces of nature as well as in pursuit of excellence in her professional life."

"Her bravery will inspire us always."

The hangar was silent when Meyer rose to speak, those in attendance feeling the weight of his task all too acutely. But he set the tone for his remarks by observing that "Marta was my inspiration. And she would have kicked my butt if I didn't get up here and say something."

Meyer recalled the circumstances of the couple's first meeting at Langley and their

courtship, which revolved around working on his airplane. Love developed, he said, through friendship and "being best buddies." Then as until her death, "we did everything together."

In measured tones, Meyer spoke of his wife's "soft spot for animals and people in need" and of her patriotism and love for the flag. He recalled the "four rights" that were her credo – "the right time, the right place, the right enthusiasm, the right qualifications" – and took pains to credit Bohn-Meyer's family, many of them in attendance, for their impact on her life and her many successes.

But it was for his wife's legacy that Meyer reserved the most impassioned of his comments. Honoring her, he said, meant honoring the ideals she held so fiercely.

"So many people are asking what they can do to help," he said. "So I'll tell you."

"You can help by wearing a flag on your lapel, or by calling a veteran on Veteran's Day – call them or go see them, and say thanks for what they did. You can mentor, if you can – you can encourage youth and support education. Help each other, and do as good a job as you can with everything you do."

"Those are the things that meant the most to Marta and will truly honor her memory. Celebrate Marta's attributes through your own life and actions."

Following Meyer's remarks, a final tribute came when Dryden flight crews gave Bohn-Meyer the traditional send-off of a missing-man formation fly over.

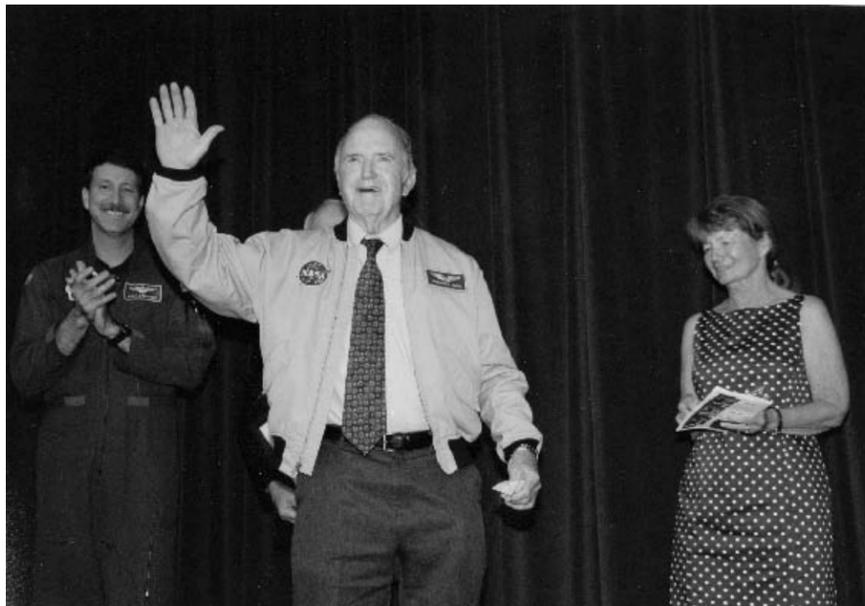
Chief Pilot Gordon Fullerton and Marty Trout manned NASA F-18 No. 846, Craig Bomben and Mike Thomson F-18 No. 852 and Frank Batteas F-18 No. 850. As the formation streaked across the lakebed in a cloudless sky, James Smolka and Stephen Corda made an abrupt climb into the heavens in F-15 No. 836.

It was a hard-won gesture of respect by her peers in the exclusive fraternity to which Bohn-Meyer belonged, a gesture she would surely have treasured.

And the seven men under the canopies were watching themselves carefully; they knew an exacting critic was following their every control input.

A long-over

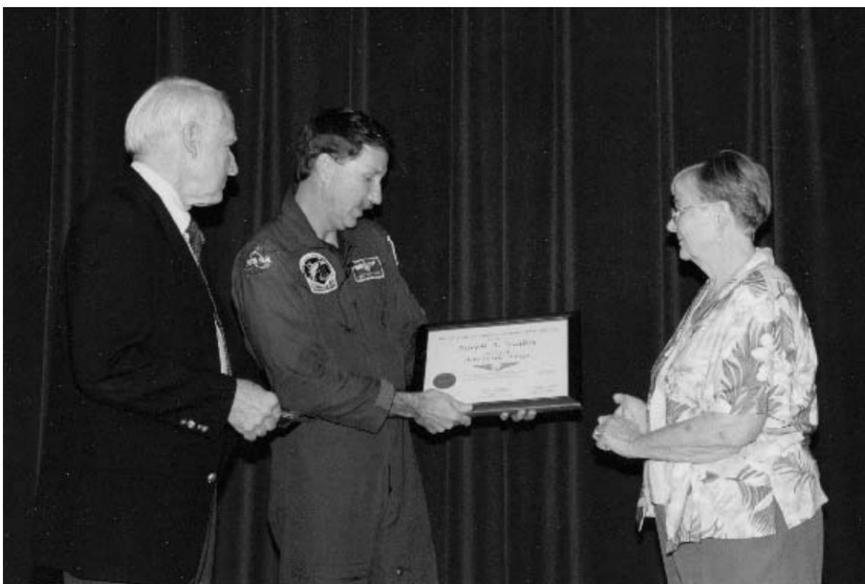
X-15 pilots earn their astronaut



EC05 177-24 NASA Photo by Tony Landis
Former X-15 pilot Bill Dana acknowledges hearty congratulations from Dryden employees and special guests as his wife Judy looks on. Capt. Kent Rominger, left, chief of NASA's Astronaut Office at Johnson Space Center, presented Dana with astronaut wings 40 years after the flights on which he earned them. At far right, Dana is pictured in his flight suit alongside the legendary rocket plane in which he and two other NASA pilots flew to the edge of space.



EC05 177-20 NASA Photo by Tony Landis
Sheri McKay Low, daughter of Jack McKay, accepts his astronaut wings from Rominger and Vance Brand, left, a former astronaut and Dryden's current deputy associate center director for programs. McKay, who died in 1975, is pictured in his flying prime in the second image from the top at far right.



EC05 177-17 NASA Photo by Tony Landis
Joe Walker's wife, Grace Wiesmann, accepts his astronaut wings from Rominger, center, and Brand. Walker was the first person to fly in space twice and he did so within five weeks, flying to 347,800 feet on July 19, 1963, and 354,200 feet on August 22. This marks the fastest turnaround on record of the same pilot flying the same vehicle into space. Walker is pictured in the bottom photo at far right next to the famed rocket plane.

By Jay Levine

X-Press Editor

It's not only angels who must work hard to earn their wings.

An elite group of Dryden research pilots who have met the requirements for receiving astronaut wings has been awarded the honor nearly four decades after they flew the missions that took them above the edge of space.

In an era of Cold War confrontations, the moon race and war in Southeast Asia, these test pilots were among those who flew the three radical X-15 rocket planes for 199 missions between 1959 and 1968. However, until an Aug. 23 ceremony held at Dryden, three of those pioneering test pilots never received official recognition of their membership in the exclusive fraternity of American astronauts.

Fittingly, retired NASA pilot William H. Dana and family members representing deceased pilots John B. McKay and Joseph A. Walker received civilian astronaut wings during the event to acknowledge their flights at Dryden, which was the site of their pioneering achievements.

U.S. Air Force pilots in the X-15 program received their astronaut wings after the qualifying flights were complete. No such honor existed, however, for NASA X-15 pilots and only recently was the decades-old controversy surrounding the definition of the boundary of space – above 50 miles, according to the Air Force – resolved (see sidebar); with that issue settled, efforts finally moved forward to allow the three NASA pilots to get their due for their historic flights.

What they did

Together, the three account for 70 of the 199 flights in the X-15 program. Walker flew the aircraft for more than three years and on his third mission into space claimed the unofficial world altitude record of 354,200 feet, or 67.08 miles, on Aug. 22, 1963. Walker's unofficial record also marked the highest altitude to which the X-15 was ever flown.

Retired Dryden engineer John McTigue, who was an operations engineer on the X-15 program, recalled a laugh at Walker's expense.

"Joe was particular on his instruments placement. I told him we had it ready to go and he should 'come look at the cockpit to see if it's set up the way you want it.' I will never forget the look on face and his shock. We had painted it (the cockpit) pink. He started laughing," McTigue related in remarks at the Aug. 23 event.

Dana's first of two flights into space took him to 306,900 feet, or 58.13 miles above the Mojave Desert on Nov. 1, 1966, on a mission to collect micrometeorite samples while also gathering data about the sky's brightness at that altitude. The second space flight, which marked the last time the X-15 program had a flight over 50 miles, was Aug. 21, 1968, when Dana flew to an altitude of 267,500 feet, or 50.66 miles.

Several speakers recalled Dana's radio conversation following two memorable flights. Radioed with the news that he had hit 280,000 feet, Dana's response was, "How about that?" And upon reaching 310,000 feet on another flight, Dana radioed, "Is Jack McKay sending his congratulations?"

McKay attained 295,600 feet altitude, or 55.98 miles, on Sept. 28, 1965, during a flight carrying several research experiments. He was second in the number of rocket flights he piloted only to A. Scott Crossfield, another of the X-15 pilots.

"McKay was one of the smoothest pilots. I remember a landing that was so smooth that I didn't know when the landing gear hit," McTigue said.

McKay also was responsible for coining a Dryden phrase that he uttered on a day when the weather was not good. His droll assessment, which has lived on in Center lore, was, "Any improvement will be for the better."

Astronaut Neil A. Armstrong, who flew the X-15 before going on to fame as the first man to walk on the moon, spoke eloquently at the ceremony about his former colleagues.

"In much of society, research means to investigate something you do not know or do not understand. But research here in this building at Dryden or at the Air Force Flight Test Center is quite a different thing," Armstrong said. "Research here is exploration and discovery. It's investigating (something that) no one knows or understands. Research here is creating new knowledge. Today we honor three men who did research here.

"They were not involved in such exploits for adventure, or to enjoy the view – although those flights were adventurous and the view was spectacular. They rocketed to these extreme altitudes to conduct research and to learn about and advance the world of flight," he said.

"I cherish my memories of working with each of those three gentlemen and am so pleased to be here for this recognition of their remarkable achievements."

The X-15 program

The North American Aviation (now a division of The Boeing Company) research aircraft was a joint program of the U.S. Air Force, NASA and the U.S. Navy. The nine-year program reaped mountains of information about hypersonic stability and control, flight loads and heating rates.

Three major aerospace concepts were proven in the X-15 program. The first was that a winged vehicle could transition in flight from the 57,000 pounds of thrust provided by the aircraft's XLR99 engines to an unpowered state, in which it became a gliding

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Due tribute

wings four decades after flights

Resume of heroes



NASA Photo



NASA Photo



NASA Photo

Bill Dana, Jack McKay and Joe Walker were honored for their space flights, but each had a storied career. Here is more information about their legacies:

William H. Dana

William H. Dana was chief engineer at Dryden from 1993 until 1998, when he retired after almost 40 years of distinguished service to NASA. Formerly an aerospace research pilot, Dana flew many aircraft including the X-15, a number of lifting body aircraft, the F-100 variable stability research aircraft and the Advanced Fighter Technology Integration/F-16 aircraft.

Before his assignment as chief engineer, he was assistant chief of the Flight Operations Division, a position he assumed after serving since 1986 as chief pilot. He was a project pilot on the F-15 HIDE (Highly Integrated Digital Electronic Control) research program, and a co-project pilot on the F-18 High Angle of Attack research program.

Dana, born in Pasadena, Calif., Nov. 3, 1930, received his Bachelor of Science degree from the U.S. Military Academy at West Point N.Y., in 1952 and served four years as a pilot in the U.S. Air Force. He joined NASA after receiving a Master of Science degree in aeronautical engineering from the University of Southern California in 1958.

As a research pilot, Dana was involved in some of the most significant aeronautical programs carried out at Dryden. For his service as a flight research pilot, he received NASA's Distinguished Service Medal in 1997. In 2000 he was awarded the Dryden Flight Research Center's Milton O. Thompson Lifetime Achievement Award.

He was a project pilot on the hypersonic X-15 research aircraft and flew the rocket-powered vehicle 16 times, reaching a top speed of 3,897 mph and a peak altitude of 307,000 feet (nearly 59 miles). He was the pilot on the final (199th) flight of the 10-year program.

In the late 1960s and the 1970s, Dana was a project pilot on the manned lifting body program, in which several versions of the wingless vehicles were flown and data produced that was used in development of the space shuttles. For his contributions to the lifting body program, Dana received the NASA Exceptional Service Medal. In 1976 he received the Haley Space Flight Award from the American Institute of Aeronautics and Astronautics for his research work on the M2-F3 lifting body control systems.

A member of the Society of Experimental Test Pilots, Dana is the author of several technical papers.

John B. McKay

John B. McKay was one of the first pilots assigned to the X-15 flight research program at Dryden. As a civilian research pilot and aeronautical engineer, he made 30 flights in X-15s from Oct. 28, 1960, until Sept. 8, 1966. His peak altitude was 295,600 feet, and his highest speed was 3,863 mph (Mach 5.64).

McKay was with the NACA and NASA from Feb. 8, 1951, until Oct. 5, 1971, specializing in high-speed flight research programs. He began as an NACA intern, but assumed pilot status on July 11, 1952. In addition to the X-15, he flew such experimental aircraft as the D-558-1, D-558-2, X-1B and the X-1E. He also served as a

A word about the definition of space

By Dennis Jenkins

Special to the X-Press

There has long been controversy in the space-enthusiast community over exactly what constitutes an astronaut. A similar controversy has surrounded the definition of the boundary of space. The latter question, at least, has an answer — two of them, in fact.

Strictly speaking, an atmosphere does not end at any given height, but becomes progressively thinner with altitude. When aeronautics was a young profession, some thought space began at about 15,000 feet, since that's where the partial pressure of oxygen in the atmosphere is too low to permit humans to function for extended periods of time. This definition soon gave way to others that defined the beginning of space as the end of the stratosphere, the thermosphere or the exosphere. None of these definitions was made official by any organization or government, and all soon faded from the lexicon.

During the 1950s, when NASA's predecessor agency, the National Advisory Committee for Aeronautics, and the U.S. military were first thinking about vehicles that would ultimately fly into space, engineers decided to draw an arbitrary line at the altitude where dynamic pressure was less than one pound per square foot, since traditional aerodynamic control surfaces would be rendered largely useless at that point. Although this altitude differs from day to day and area to area due to weather conditions, in general it is at about 50 miles (264,000 feet, or 81 kilometers) and roughly marks the end of the mesosphere. This definition was codified into regulations within the military services that awarded an aeronautical rating of 'astronaut' to military pilots who flew above 50 miles (in the 1950s, extreme altitudes were expressed in miles, not feet).

Somewhat later, aeronautical scientist Theodore von Kármán calculated that above an altitude of approximately 100 kilometers (62 miles, or 328,084 feet), a vehicle would have to fly faster than orbital velocity in order to derive sufficient aerodynamic lift from the atmosphere to stay aloft. Although the precise altitude differed based on several variables, von Kármán proposed that 100 kilometers be designated the boundary of space for purposes of engineering consistency. This 100-kilometer "Kármán Line" was recommended to the Fédération Aéronautique Internationale, the internationally recognized body for recording aeronautic achievements. Upon adoption, it became the internationally accepted boundary to space for the purposes of world records and many treaties.

It is interesting to note that the U.S. government has never officially adopted either of these standards, because doing so would complicate the issue of overflight rights for surveillance aircraft and reconnaissance satellites. (The Department of Defense is the exception, which, for purposes of aeronautical ratings, does subscribe to the FAI definition.)

The question of exactly who is an astronaut is more involved, at least in the U.S. Within NASA, 'astronaut' is a job description for those individuals selected to be members of the Astronaut Corps at the Johnson Space Center in Houston. Once an astronaut candidate completes training, he or she becomes a career astronaut, even before their first space flight. Within the U.S. military, however, the term astronaut is reserved for those individuals that have actually flown above an altitude of 50 miles.

During the course of the X-15 joint program between NASA and the Air Force, eight pilots flew above that altitude, one flying above 62 miles. Of these eight, five were active-duty Air Force pilots who were awarded an aeronautical rating of astronaut. In essence this involved receiving a small sheet of

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re-entry vehicle. Second, program research proved that reaction controls – tiny hydrogen peroxide jet thrusters on the X-15 that controlled pitch, yaw and roll – provided control at the edge of space, where conventional control surfaces were ineffective. Third, the program helped develop energy management techniques that allowed an unpowered spacecraft to make a precision landing on a designated runway following return from space.

In later phases of the program, according to a video presentation compiled by Jim Young, chief historian of the Air Force Flight Test Center at Edwards Air Force Base, the experimental vehicle also was used as a testbed for several additional experiments.

It took tremendous mental and physical strength to fly the approximately 10-minute flights, which slammed X-15 pilots into their seat with an instantaneous 2g acceleration that quickly pushed the ship past Mach 3. The pilot then continued to accelerate to 4g-force conditions until reaching space, where he experienced three minutes of weightless before re-entering Earth's atmosphere at Mach 5. Precise control was critical for reaching 80,000 feet, where the aircraft would level out. It required technique and skill to make a lakebed landing and not fall short or overshoot the base, Young said.

Johnny Armstrong, the Air Force Flight Test Center planner for X-15 flights, explained that most X-15 flights were air-launched at 45,000 feet from the NB-52B at .82 Mach. The first 40 seconds after launch were critical to establishing the aircraft's heading and the engine would fire for a maximum of 85 seconds. One second of burn less would mean the altitude goal would be missed. If the X-15's angle of attack were off by even one degree, it would result in missing the target altitude by 7,500 feet, Armstrong recalled.

Center Director Kevin L. Petersen spoke about what it took to fly the X-15, reading from pilot Milton O. Thompson's 1992 book "At the Edge of Space" about Thompson's first experiences flying the "Black Bull" in October 1963 on the first of 14 missions. Thompson dubbed the X-15 the Black Bull for its power and unpredictability.

"The launch was like being shot downward out of a cannon," Petersen read. "It was a real jolt. No one warned me about the severity of the launch. I guess that the more seasoned pilots had become used to it and began to think of it as routine so they never mentioned it to me..."

The next passage Petersen read focused on the firing of the rocket engine:

"It lit off successfully and then I received my second surprise. The force of the engine forced my body back hard into the seat and headrest and effectively pinned me there for the rest of the powered flight."

Another excerpt from Thompson's book gave details about landing the rocket plane. At 173,000 feet, just 122 seconds after launch, he shut off the X-15's engine and began to glide toward Edwards:

"I had make it to Edwards in reasonably good shape, but now I was going to have to make that honest-to-God deadstick (unpowered) landing. I only had one chance. If I screwed up, I lost the airplane and maybe more. The initial touchdown was very smooth until the nose came down. The nose came down with a vengeance. For a moment I thought the nose gear had failed as the nose slammed down on the runway. I did not realize how close the cockpit was to the ground in the landing attitude. I thought my butt would scrape the lakebed. It was a real jolt. It was about 8 g's in the cockpit."

Of his experiences flying the X-15, Thompson wrote: "The one thing that impressed me on this flight was the amount of physical effort required to fly this airplane. I was really exhausted after the flight. Some of the exhaustion was obviously due to mental stress, but much of it was due to the muscular exertion required to manipulate all the controls and fly the aircraft while fighting the g forces and resistance of the pressure suit...flying the X-15 was definitely not a piece of cake. After that flight I felt like I had put in a 12-hour day digging ditches."

Three piloted hypersonic rocket planes were used in the course of the X-15 program to fly as high as 67 miles and as fast as almost seven times the speed of sound. Volumes of test data gleaned from missions helped shape the successful Mercury, Gemini, Apollo and space shuttle human spaceflight programs. The two surviving X-15s are now on public display, one at the Smithsonian National Air & Space Museum, Washington, D.C., and another at the National Museum of the U.S. Air Force (formerly the U.S. Air Force Museum) at Wright-Patterson Air Force Base, Dayton, Ohio.

The ceremony

Steve Schmidt, Dryden's deputy center director and master of ceremonies for the astronaut wings ceremony, acknowledged aerospace author Dennis R. Jenkins and Dryden photographer Tony Landis for their efforts in making the case for the three X-15 pilots to be recognized (see related story) and making the ceremony a reality. William F. Readdy, former NASA associate administrator in the Space Operations mission directorate, also was instrumental in making the event happen.

Capt. Kent Rominger, chief of NASA's Astronaut Office at Johnson Space Center in Houston and Vance Brand, a former astronaut and Dryden's current deputy associate center director for programs, presented the astronaut wings to Joe Walker's wife, Grace Wiesmann, and son Jim Walker. Rominger said the X-15 pilots had inspired him, and that he had originally wanted to be a pilot rather than an astronaut.

"It truly is an honor as chief of the Astronaut Office to make this presentation," Rominger said in his remarks. "When Dennis Jenkins and Bill Readdy came to me, I jumped at the opportunity to be a part of this."

Brand said he was equally proud to participate in the event.

"I was a beneficiary of the (X-15) program in the 1960s, when we were in awe of the program," said Brand, command module pilot on the 1975 Apollo-Soyuz mission. "We still are today."

Schmidt also called the X-15 pilots his heroes and cited them as a reason he chose the career path he did.

"Growing up, I remember the sounds of sonic booms and windows rattling," Schmidt reflected. "I would lie in the tall, dark grass and look up at the bright blue sky to see the contrails left behind. It left me with dreams of becoming a pilot, a space cowboy and an astronaut. A pivotal point came when I was given a personally signed X-15 model by Maj. Robert A. Rushworth."

Distinguished guests who attended the ceremony included a who's who of historic flight research projects, including X-15 pilots Joe Engle, Robert White and Neil Armstrong. Pilots Stan Butchart, Fitz Fulton and Don Mallick were on hand, as were former Dryden Deputy Director Ted Ayers and former Dryden center directors John Manke and Ken Szalai.

Also at the event were former NASA engineers Gene Matranga, Byron Gibbs and Vince Capasso as well as Andrew Mercy, representing state Sen. George Runner. North American



EC05 177-38

NASA Photo by Tony Landis

Former X-15 pilot Bill Dana greets his son Matt, an F-16 pilot, after the younger Dana arrived at Edwards following a training flight. Matt arrived in time to attend the ceremony in which his dad was awarded astronaut wings for X-15 flights made on the edge of space during the legendary research program of the 1960s. Bill Dana piloted the final flight of the program's 199 missions in 1968.

Aviation was represented by Steve Oswald, Boeing vice president and program director for the space shuttle, an astronaut and former U.S. Navy rear admiral.

Tough times

The most successful flight research program in history did not come without cost.

Pilot Michael Adams perished piloting X-15 No. 3 on Nov. 15, 1967, when it broke apart on reentry. The flight was the 191st of the program and was Adams' first suborbital flight. The accident was the only one involving loss of life in the revolutionary program, but was not the only mishap.

McKay suffered the next-worst accident on Nov. 9, 1962. McKay lost power shortly after launch in X-15 No. 2 and was forced to land on Mud Lake, Nev., at 300 mph. The plane's left skid collapsed on landing and the aircraft tumbled violently with McKay trapped inside.

McKay survived the crash and the aircraft was rebuilt as the X-15 A-2. It was rebuilt with a larger tank, setting the stage for William J. "Pete" Knight to make his Oct. 3, 1967, record speed flight of 6.7 Mach, or 4,521 mph – twice the speed of a 50-caliber bullet. On that flight, aerodynamic heating in the area where a dummy scramjet engine had been attached resulted in damage to the plane's ventral fin due to burn-through of the aircraft's ablative heat-shield coating. It took exceptional piloting skills to bring the charred aircraft back for a landing, and it was never flown again. Knight's speed record stands.

In her remarks about her father, Sheri McKay Lowe marveled that not only did he survive the deadly crash but flew the X-15 22 more times and lived 13 years after the accident.

"He was not the same man (after the accident), but he never complained. 'It's those darn pain pills,' he said once. He has been called a steel-nerved test pilot; he certainly was that," she recalled.

Joe Engle said he admired McKay as he "came back into the program, and healed himself and the program. Doesn't that say enough about the man?"

As for all three of the pilots honored at the ceremony, Engle added, "They are among the very best that operated in this organization."

Families value wings

The recipients and their families said they were honored to be at the ceremony.

"My dad's an astronaut," said Jim Walker. "To our family it means a lot. We are grateful. As my brother mentioned, our father probably would be humble because he knows it was a group effort and it was all the people in the X-15 program and all the people down the line. These are the real heroes."

McKay's son John, a 29-year Dryden employee who retired as a branch chief, said he wanted his father's wings to be dedicated to engineers, mechanics, avionics and instrumentation personnel who worked on the program.

Sheri McKay Low also recalled the story of how her father became interested in aeronautics.

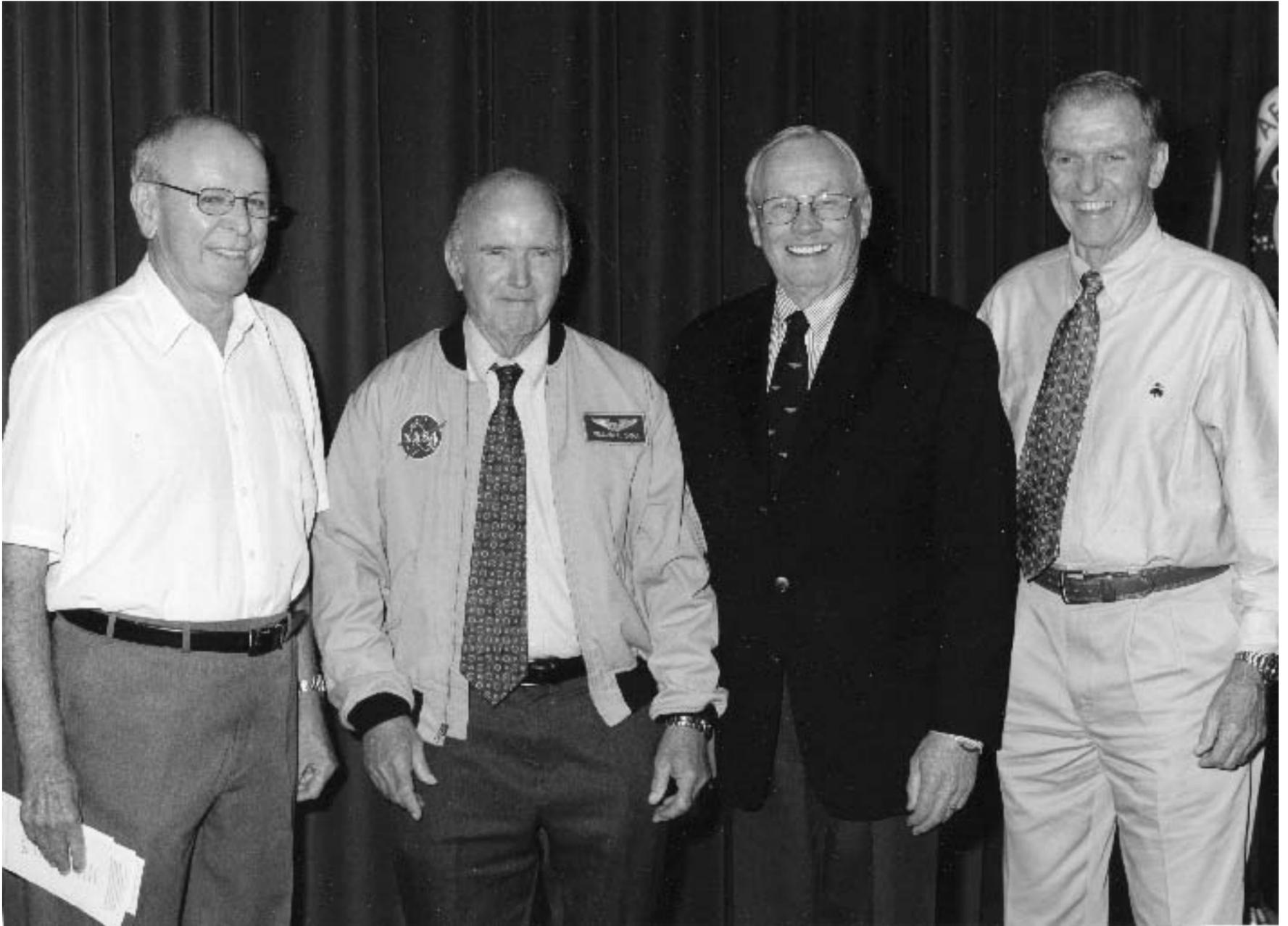
"Charles Lindberg was on a tour, and Jack and Jim (the X-15 pilot and his brother) met him at his seaplane. After they met Lindberg, they started making airplanes out of Popsicle sticks, then balsa wood, and the planes got bigger and bigger. It illustrates how interwoven aviation history is," McKay Lowe said, noting that Lindberg's Spirit of St. Louis and X-15 No. 1 are both prominently displayed in the Smithsonian National Air & Space Museum.

"We honor all NASA employees who keep the dream of space travel alive," McKay Low concluded.

Dana, who is retired from NASA but still works for Analytical Services & Materials Inc. as a contract employee, also said he values his latest honor.

"It is fitting that Judy," he said, referring to his wife, "who didn't get to give me my set of wings out of pilot training – because I didn't even know her then – I think it's fitting for her to place on me these wings that are so very special. I want to thank Capt. Rominger and Vance Brand for their gift to me," Dana said, as his wife removed the nametag on Dana's flight jacket and replaced it with the new one denoting official astronaut status.

It was a well-deserved honor that was a long time coming.



EC05 177-33

NASA Photo by Tony Landis

From left are four of the five surviving X-15 pilots, Robert White, Bill Dana, Neil Armstrong and Joe Engle. They attended the astronaut wings ceremony, where Dana, Joe Walker and

Jack McKay, who flew the X-15 rocket plane into space in the 1960s, received long-overdue recognition for their achievement. Walker and McKay were honored posthumously.

Space ... from page 7

paper (8.5 by 5.5 inches) bearing a rubber-stamped signature of the official issuing it, and the authority for the pilot to wear metal astronaut wings on his uniform. There was no other fanfare, money or fame. These five pilots included Michael J. Adams, Joe H. Engle, William J. "Pete" Knight, Robert A. Rushworth and Robert M. White. It was, however, the existence of these aeronautical orders that allowed Mike Adams' name to be placed on the Astronaut Memorial at the Kennedy Space Center, Fla., over the objections of many.

Unlike the Air Force, NASA had never issued pilots' wings per se, and until the space shuttle program, never issued astronaut wings in any form. Nor did NASA have an official definition of "astronaut" other than as it referred to someone assigned to the Astronaut Corps. As a result, the three NASA X-15 pilots who had flown above 50 miles – William H. Dana, John B. "Jack" McKay and Joseph A. Walker – were never specifically recognized for their achievement. Oddly, many individuals assigned to the Astronaut Corps in Houston were considered astronauts but had never flown in space.

This seeming inconsistency has been discussed for over 40 years, mainly among the space enthusiasts who have little to do but worry about such things. Roger Launius, a former NASA Chief Historian, remembers numerous public inquiries on the subject, with no particular answer other than "astronauts come from Houston." Perhaps ironically, it all seemed to matter much more to the enthusiast community than to the individuals involved, who were more than content to be known simply as test pilots.

Through a conversation with then NASA Administrator Sean O'Keefe and associate administrator of the Space Operations mission directorate, William F. Readdy, I hoped to remedy the situation. This conver-

sation took place in 2004, just weeks after the Federal Aviation Administration had awarded astronaut wings to civilian pilots Brian Binnie and Michael W. Melvill of Scaled Composites Inc. for their flights in SpaceShipOne. Both O'Keefe and Readdy agreed it would be appropriate to recognize the three NASA X-15 pilots for their achievements.

During the conversation, I mentioned the discrepancy between NASA's and the military's definition of "astronaut." The first issue was whether to select 50 or 62 miles as a defining altitude; Readdy selected 50 miles to eliminate any inconsistency between military and civilian pilots flying the same vehicle.

Beyond that, a major stumbling block in recognizing the X-15 pilots as astronauts had been, according to lore, the wishes of

the Astronaut Office at the Johnson Space Center. To determine how the office actually felt about the issue and in an effort to resolve any potential concerns, I turned to Col. Michael J. Bloomfield, the Astronaut Office operations officer. Bloomer, as Mike is known, had flown on three space shuttle flights. Readdy also had flown three times. They seemed appropriate ambassadors. Between the two of them they smoothed the way; the chief of the Astronaut Office, Capt. Kent V. Rominger, subsequently agreed that recognizing the three NASA X-15 pilots would be appropriate and offered his assistance in the matter.

Figuring out exactly how to honor the pilots proved trickier. NASA does not issue metal astronaut wings, and has no official policy on the subject. In the end, it was decided that each pilot – McKay and Walker

posthumously – would receive a set of the cloth-and-leather nametags worn by space shuttle astronauts on their flight suits, along with a certificate signed by Readdy, Rominger and Kevin L. Petersen, director of the Dryden Flight Research Center. Forty years after their groundbreaking achievements in the X-15 rocket plane, the three pilots finally got the recognition they deserved.

Dennis R. Jenkins is a consulting engineer in Florida who works on various aerospace projects, including 20 years on NASA's space shuttle program. He also is the author of "Space Shuttle: The History of the National Space Transportation System: The First 100 Missions," in addition to more than 30 other works on aerospace history, several on the subject of the X-15 program.

Legacies ... from page 7

research pilot on flight programs involving the F-100, F-102, F-104 and the F-107.

Born on Dec. 8, 1922, in Portsmouth, Va., McKay graduated from Virginia Polytechnic Institute, Blacksburg, Va., in 1950 with a Bachelor of Science degree in aeronautical engineering. During World War II he served as a U.S. Navy pilot in the Pacific theater, earning the Air Medal and Two Clusters, and a Presidential Unit Citation.

McKay wrote several technical papers, and was a member of the American Institute of Aeronautics and Astronautics, as well as the Society of Experimental Test Pilots.

He died April 27, 1975.

Joseph A. Walker

Joseph A. Walker was chief research pilot at the Dryden during the mid-1960s. He joined the NACA in March 1945, and

served as project pilot at the Edwards flight research facility on such pioneering research projects as the D-558-1, D-558-2, X-1, X-3, X-4, X-5 and the X-15. He also flew in programs involving the F-100, F-101, F-102, F-104 and the B-47.

Walker made the first NASA X-15 flight on March 25, 1960. He flew the research aircraft 24 times, piloting the rocket plane to its highest altitude. He attained a speed of 4,104 mph (Mach 5.92) during a flight on June 27, 1962, and reached an altitude of 354,300 feet on Aug. 22, 1963, during his last X-15 flight.

He was the first man to pilot the Lunar Landing Research Vehicle used to develop piloting and operational techniques for lunar landings.

Walker was born Feb. 20, 1921, in Washington, Pa. He lived there until graduating from Washington and Jefferson College,

Washington, in 1942, with a Bachelor of Arts degree in physics. During World War II he flew P-38 fighters for the U.S. Air Force, earning the Distinguished Flying Cross and the Air Medal with Seven Oak Clusters.

Walker was the recipient of many awards during his 21 years as a research pilot. These include the 1961 Robert J. Collier Trophy, 1961 Harmon International Trophy for Aviators, the 1961 Kincheloe Award and 1961 Octave Chanute Award. He received an honorary Doctor of Aeronautical Sciences degree from his alma mater in June of 1962. Walker was named Pilot of the Year in 1963 by the National Pilots Association.

He was a charter member of the Society of Experimental Test Pilots, and one of the first to be designated a Fellow. He was fatally injured on June 8, 1966, in a mid-air collision between an F-104 he was piloting and an XB-70.



EC05-0198-08

NASA photo by Carla Thomas

Above, Dryden aerospace engineer Michael Allen hand-launches a model motorized sailplane during a study validating the use of heat thermals to extend flight time. Below, Dryden aerospace technician Tony Frackowiak prepares the Autonomous Soaring Project sailplane for use in studying heat thermals to extend endurance. At bottom, the aircraft comes in for a lakebed landing, concluding the research flight.

Looking for a few good thermals

Researchers use lightweight, motorized sailplane to validate concept

By Beth Hagenauer
Dryden Public Affairs

With the graceful flight of hawks and eagles in mind, NASA aerospace engineer Michael Allen hand-launched a lightweight, motorized model sailplane over the Southern California desert recently, hoping it would catch plumes of rising air called thermals.

It did just that, not once but numerous times – without human intervention – during a series of research flights at Dryden, validating his premise that using thermal lift could significantly extend the range and endurance of small unmanned air vehicles without a corresponding increase in fuel consumption.

Just as sailplanes use thermal lift and updrafts to soar for extended periods, the 15-pound motor-glider was flown in the Autonomous Soaring Project to demonstrate that the same concept could be applied to small, powered UAVs to both increase endurance and save fuel. Small UAVs have many potential applications that are unrealized due to limited fuel capacity and resulting short flight duration.

Allen and his small team of engineers and technicians flew the remote-controlled RnR Products sailplane 17 times over an eight-week period from July through mid-September. The model sailplane was modified to incorporate a small electric motor and an autopilot, the latter reprogrammed to detect thermals or updrafts.

“Energy of the airplane is measured by its speed and altitude, explained Steve Jacobson, a project engineer. “Energy can be increased by applying more motor power or flying through a thermal. If the autopilot software detects an increase in aircraft energy without an increase in motor power it knows it has detected a thermal. Once the software has detected a thermal, the aircraft is commanded to fly in a circle that centers the path on the estimated location of strongest lift.”

Once it was launched, Dryden aerospace technician Tony Frackowiak flew the 14-foot-wingspan model to an altitude of about 1,000 feet and then handed off control to the sailplane’s autopilot. The autopilot software flew the aircraft on a pre-determined track over the northern portion of Rogers Dry Lake until it detected an updraft. As the aircraft rose, the engine automatically shut off and the aircraft circled to stay within the convective lift resulting from the thermal updraft.

“I have some experience flying radio-controlled sailplanes and working the lift manually as an RC (remote-control) pilot,” Frackowiak said. “The autopilot looked like it was doing a good job of detecting and using the lift in certain conditions.”

Allen said the small UAV added 60 minutes to its flight time by soaring autonomously, using thermals that formed over the dry lakebed. Nicknamed Cloud Swift after a bird known for feeding on insects found in rising air masses, in 23 updrafts the modified model sailplane gained an average altitude of 565 feet, and in one strong thermal ascended 2,770 feet. Cloud Swift used the Piccolo Plus autopilot hardware and guidance software, which was customized by Allen.

“The flights demonstrated that a small UAV can mimic birds and exploit the free energy that exists in the atmosphere,” Allen said. “We’ve been able to gather useful and unique data on updrafts and on the response of the aircraft in updrafts. This will further the technology and refine the algorithms that are used.”

“The software was developed using a simulation model of thermals compiled from real atmospheric data,” Jacobson added. “This unique model is the first thermal model of its kind.”

Allen noted that a small, portable UAV with long-endurance capabilities could fulfill a number of surveillance roles, including those in forest fire monitoring, traffic control and search-and-rescue missions. He said the technology also could have applications in flight on Mars, where dust devils have been observed. In fact, Allen will be participating in the U.S. Geological Survey Earth and Mars Dust Devil workshop in Flagstaff, Ariz., later this month.



EC05-0198-03

NASA photo by Carla Thomas



EC05-0198-23

NASA photo by Carla Thomas

Study ... from page 1

center would be part of the development effort. For Dryden, he mentioned a role in researching a system that would allow the CEV to abort after launch if necessary. In addition, he specified that vehicle-landing operations could take place at Edwards Air Force Base.

"As we've said in several prior briefings, (the CEV) needs to land on the west coast of some country, because we want the service module to go in the water, rather than landing on people's heads or on their cows," Griffin said.

An animated film illustrated Griffin's comments as he spoke. A landing sequence depicted in the film showed drogue chutes deploying from the CEV, its heat shield dropping off, airbags and three main chutes deploying.

"We're targeting this concept with Edwards Air Force Base as the landing point. That's the Compass Rose out at Edwards, if you've ever been there," he said, referring to the film. The Compass Rose is a manmade lakebed feature from which pilots take navigational headings.

"In this concept for touchdown, we use the airbags and the chutes to cushion the descent. Ultimately, it will be up to the contractor to decide the exact surface-contact method – some combination of airbags, retro-rockets or other means as required."

Both the crew and cargo versions being proposed for the CEV will feature much of the current infrastructure and technology used in the space shuttle program, including shuttle main engines and extended but essentially identical solid rocket boosters.

Some new twists include solar arrays on the command and service modules, a first for U.S. spacecraft, and a new upper stage for the cargo version.

In order to meet these CEV objectives, Griffin said the space shuttle program will retire in 2010 and first flights of the CEV are anticipated to begin in the 2014 timeframe, though NASA has targeted 2012 for the first CEV flight. Current plans do not include any requests for additional funding for the Agency, but availability of funds will drive the CEV's completion, Griffin added.

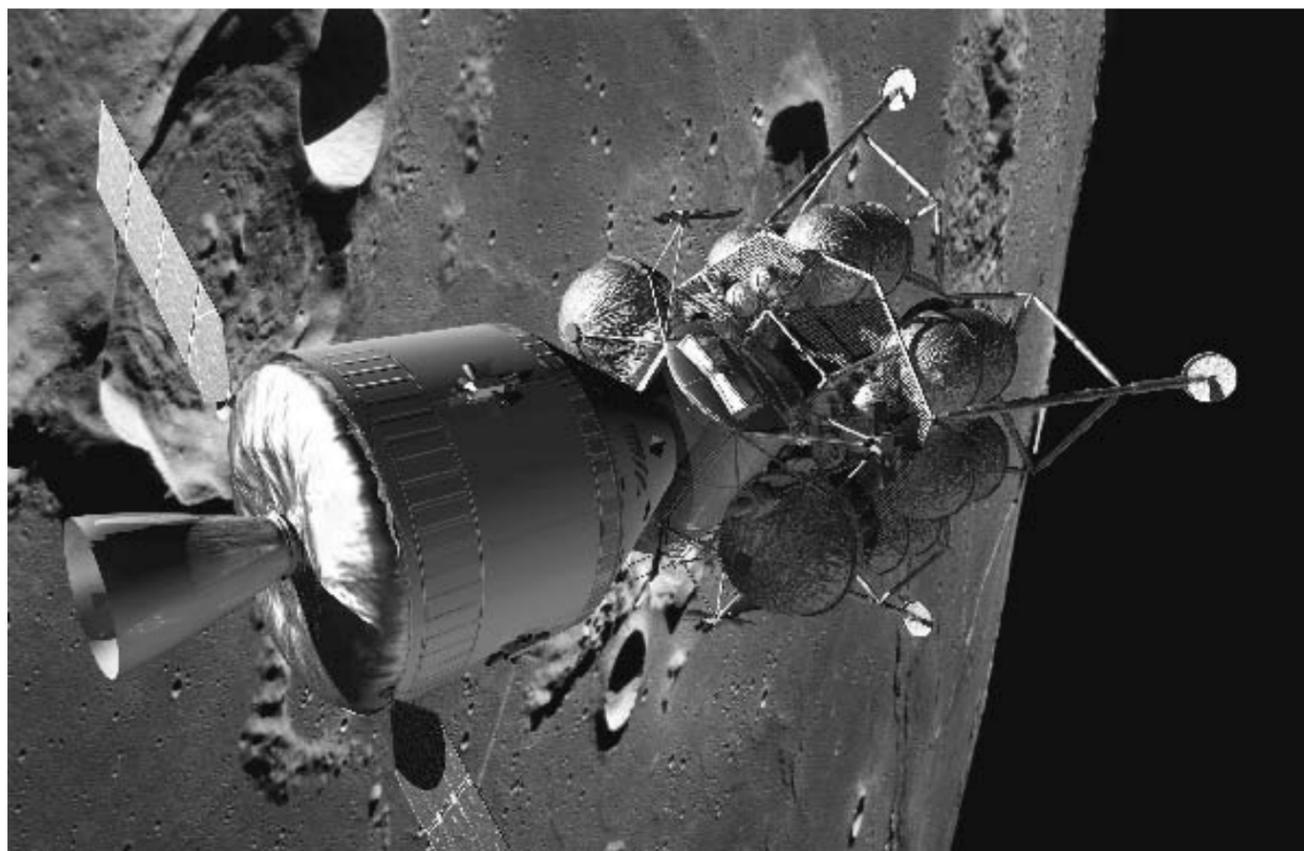
Center Director Kevin Petersen reiterated most of Griffin's remarks at a Sept. 27 Dryden Town Hall. In an optimistic assessment of how Dryden will fit into the work of the CEV development program, he said a team was being formed to examine the possibilities.

"We have a lot of 'moonscape' out here we can help them out with," Petersen joked.

Dryden was selected as the lead under Johnson Space Center, Houston, for abort-system testing. Once a prime CEV contractor team is chosen, by spring of 2006, he said, additional details about the scope of the work will emerge.

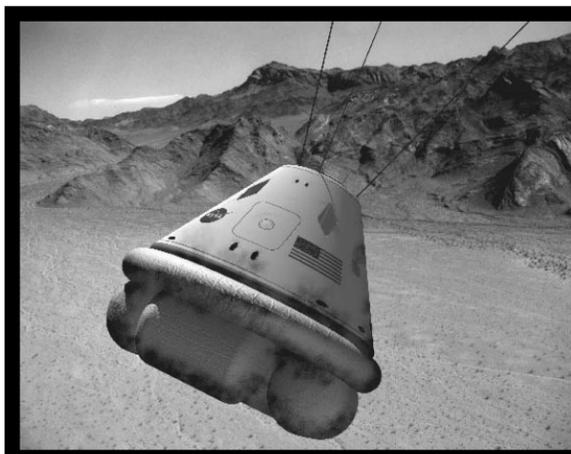
Dryden's Jim Stewart, the Center's mission director for the Exploration Systems mission directorate, said that additional work also is on the horizon as a result of ongoing talks with representatives from Johnson.

How research on a system to abort after launch will be conducted and what roles Dryden will fill have not been determined,



NASA/artist's concept courtesy John Fassanito and Associates

In this illustration, the proposed Crew Exploration Vehicle is seen with its solar panels deployed and docked with a lunar lander in orbit.



The proposed Crew Exploration Vehicle is expected to look and land much like the Apollo capsules. Missions could potentially conclude with a landing at Edwards Air Force Base.

NASA/artist's concept courtesy John Fassanito and Associates

CEV at a glance

Here is a list of the proposed Crew Exploration Vehicle's key elements:

- Using Apollo spacecraft as a blueprint will shorten development time, permit safe travel for up to six crewmembers (called for in Mars exploration planning) and the capsule will feature increased stability at landing as well as reduced reentry pressures compared with those of the space shuttle.
- NASA officials said the proposed spacecraft could be configured as either a crew or cargo module.
- Apollo will be the blueprint, but the proposed vehicle will offer advancement. The proposed CEV is considered safer and more reliable than current methods of space travel and the proposal being developed for its use includes sending a crew of four to the lunar surface, as compared to two during the Apollo missions. The CEV also will be able to land anywhere on the moon and could support a permanent presence there while future missions to Mars are considered.
- The CEV will be able to dock with the International Space Station and other exploration elements, use a liquid oxygen/methane service module propulsion system (yet to be developed) and return to dry land, or in the ocean as a backup plan. Methane was chosen for the module's propulsion to plan for the future when Martian atmospheric resources can be converted into fuel.
- Robotic missions in the short term will do advance scouting and robotic tools will be developed for astronauts' use on the moon during the first CEV lunar mission, set for 2018.
- NASA officials estimate the safety of the CEV to be on the scale of 10 times greater than that of the space shuttle.

Stewart said. The abort tests will include multiple missile launches – how many has not yet been determined – at different altitudes and conditions.

Dryden is beginning to assign people to a CEV project team that will attend meetings at Johnson Space Center to discuss the prospects for additional work, some possibly beginning as early as 2007.

Once the configuration of the abort system is clear from the winning proposal, Stewart estimates that in 2006, more than two dozen Dryden employees will be a part of the effort to prove the abort system for use in manned space flight. The work is expected to continue through 2008 and possibly longer, depending on the number of launches.

"The abort system is a critical element of the CEV and the exploration program. These tests are required and they have to be done successfully," Stewart said.

And although Apollo set the standard for abort systems and the one to be developed for the CEV will be similar, "obviously Apollo was a different vehicle and a different launch condition," Stewart said. "It won't be exactly the same, but it's similar. It (Apollo) is the best reference we have."

In addition to the Dryden workforce, staff at Marshall Space Flight Center, Huntsville, Ala., will contribute propulsion expertise to the development effort and engineers at Kennedy Space Center, Fla., will contribute to work on the module-recovery process.

Again referring to the successful blueprint developed by the Apollo program, Stewart said multiple rocket launches will prove the abort systems for the CEV. While no rocket site has yet been chosen for the tests, White Sands Missile Range, N.M., was the site for similar testing of the Apollo abort systems, he added.

Pathfinder-Plus ... from page 3

As an experimental-technology demonstration aircraft, it was necessary for flights with the slow-moving Pathfinder-Plus to be conducted across a work area for uninhabited aerial vehicles over the northern portion of the dry lake. The flight data will help researchers validate turbulence models.

The flights originally were scheduled for September 2004 but were delayed a year due to record-breaking rainfall that flooded the

lakebed and left it unusable until recently for flight operations.

Bob Curtin, vice president and director of AeroVironment's Design Development Center in Simi Valley, Calif., said the pioneering solar aircraft will be offered to a major aerospace museum for preservation and public display following its retirement.

"Pathfinder was built in the early 1980s to experiment with an airplane that could potentially stay up for months at very high altitudes,"

Curtin reflected, noting that he helped build portions of the Pathfinder when he was in high school a quarter-century ago.

"Through its career, we gradually flew it higher and higher on solar power, culminating in a flight to over 80,000 feet in 1998. It's getting harder to fly because it's getting very old. So we're retiring the airplane – this was probably its last flight."

Curtin said data collected from the recent tests would be invaluable during the design

of AeroVironment's next stratospheric unmanned aircraft, the Global Observer.

Funding for the Pathfinder-Plus turbulence flight tests was obtained through the Vehicle Systems program of NASA's Aeronautics Research mission directorate. AeroVironment personnel conducted aircraft modifications and the flight series, while Dryden's Flight Systems Demonstration Project was responsible for test-range operations, ground safety and mission success.



EC05 207-10 NASA Photo by Jim Ross
 Former Dryden research pilot Ed Schneider and his wife Ginger flank the latest honor bestowed on "Fast Eddie" – Schneider's plaque on the City of Lancaster Aerospace Walk of Honor.

Schneider ... from page 1

the happiest years of our lives," Schneider said in remarks to the audience gathered at Lancaster's Boeing Plaza for the induction ceremony. And he was quick to acknowledge those who helped him achieve the honor.

"Without the support of all the people at Dryden, especially the mechanics and technicians, I wouldn't be standing here today."

Schneider was the first pilot in history to conduct multi-axis thrust-vector flight, in NASA's F-18 High Alpha Research Vehicle.

A U.S. Naval officer from 1968 to 1983, Schneider graduated in 1973 from the Naval Test Pilot School at Patuxent River, Md., the youngest graduate in the institution's history. He was an engineering test pilot on 11 naval research programs, a test pilot school instructor and the F-4 program manager and senior test pilot at the Naval Aviation Depot, North Island, Calif.

He joined NASA in 1983 as Dryden's project pilot, flying in the SR-71 and F-104 high-speed research programs, with the F-18 systems research aircraft, the B-52 launch aircraft, the NASA Learjet and others, eventually becoming chief test pilot. In 2000 Schneider took a position as T-38 instructor and WB-57F research pilot at Johnson Space Center, Houston, performing Earth sciences and classified missions. He retired in 2004.

Schneider is a Fellow and Past President of

the Society of Experimental Test Pilots and recipient of the American Institute of Aeronautics and Astronautics Chanute Flight Award, the NASA Distinguished Service Medal and the NASA Exceptional Service Medal. He is the youngest pilot to be inducted into the James B. Taylor Jr. Memorial Carrier Test Pilots Hall of Honor in Charleston, S.C.

If he seemed destined for the path that led him to the Walk of Honor, perhaps it was because he was clear from early stages of his career on what he wanted to achieve.

As a Navy test pilot, "I had read Tom Wolfe's book, 'The Right Stuff,' and dreamed of coming to Edwards to work with some of the best people in the business," he said following the Walk of Honor ceremonies.

"It's a real privilege to be honored alongside those people, many of whom were my heroes."

The annual Walk of Honor event is sponsored by the City of Lancaster. Financial support is provided by The Boeing Company, Northrop Grumman and Lockheed Martin Aeronautics, Wells Fargo Bank, Verizon Communications, Clear Channel Broadcasting Worldwide, High Desert Broadcasting, High Desert Medical Group, Waste Management Inc. and Southern California Edison.

Peter Merlin of the Dryden History Office contributed to this article.

Way to go, Vance!



EC05 175-8 NASA Photo by Tom Tschida



EC05 172-8 NASA Photo by Tom Tschida

Former Apollo-Soyuz and space shuttle astronaut Vance Brand, above, waving, was honored by the Lancaster JetHawks Class A California League baseball team during its annual Aerospace Appreciation Night in August. Brand, currently deputy associate director of aerospace programs at Dryden, and fellow astronaut/research pilot Gordon Fullerton flew two low-level passes over the stadium in a NASA T-38 just before game time. Brand then returned to autograph hundreds of "bobblehead" dolls made in his likeness for appreciative fans like these two prospective research pilots featured at left.

Exchange Events

The Dryden Exchange Council is sponsoring the following activities:

Pizza nights, at Round Table Pizza in Lancaster, are set for Nov. 15, 16 and 17. Coupons for a meal are \$10, and purchase one large two-topping pizza and choice of four sodas, one pitcher of beer or one carafe of wine.

A trip to Laughlin, Nev., is planned for Dec. 2-4. Cost is \$72 per person, based on double occupancy. Tickets include round-trip transportation, two nights at the Colorado Belle Hotel and Casino, one breakfast buffet and one lunch or dinner buffet. There is an added \$18.50 fee for single rooms. The bus will depart at 1 p.m. Dec. 2 and return at 6 p.m. Dec. 4, with no unannounced stops on the return trip.

The Dryden Yuletide Gala will be held Dec. 10 at the Holiday Inn in Palmdale, 38630 5th St. West, with doors opening at 6 p.m., dinner at 7 p.m., raffle drawings

at 10 p.m. and the party continuing until 11:30 p.m. Tickets go on sale in the Dryden Gift Shop Oct. 31 and are \$15 per person if purchased before Nov. 10. From Nov. 14 until ticket sales end on Dec. 1, tickets are \$18 per person.

Ticket price includes a two-entrée buffet dinner, dessert, two cocktails and opportunities to win door prizes from local merchants such as the Antelope Valley Mall, The Outback Steakhouse, Best Buy, Target and Barnes & Noble books. A cash bar also will be provided. Music will be by DJ Linnie.

Tickets and information for all events may be obtained by calling the Dryden Gift Shop, ext. 2113, or Jessica Lux-Baumann, ext. 3820.

Retirees who would like to visit Dryden should contact Darlene Homiak at (661) 276-3064 at least 72 hours in advance of their visit.

Graduation ... from page 2

sion and values aligned with NASA's vision, mission and values and how this alignment was key in helping to strengthen their ability to be effective leaders.

The LDP mission is to create powerful leaders who align with NASA's vision, mission and values and who create results that

matter to the American public. Program elements include developmental assignments, a class project, individual coaching and training and briefings by NASA and outside leaders. Participants, who must be civil servants in grades 13 to 15, are competitively selected at the Agency level.

The NASA X-Press is published for civil servants, contractors, retirees and people with interest in the work of the Dryden Flight Research Center.

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