By Jay Levine  
X-Press editor

People from all over California enthusiastically watched the skies for a glimpse of space shuttle Endeavour and its host, NASA's 747 Shuttle Carrier Aircraft, Sept. 21 as they flew by a number of communities and landmarks on their way to Los Angeles International Airport.

Endeavour arrived a day earlier at Edwards Air Force Base on the last stop of its final ferry flight. NASA Dryden employees and family members were welcomed to see the orbiter on Dryden's back ramp, news media were on hand to catch the landing and a "NASA Social" introduced Dryden to a number of new friends, followers of NASA social media accounts.

Dryden has been a part of Endeavour's support from STS-49, its first mission that landed at Edwards in 1992, and was the staging area for the last leg of its final ferry flight.

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Event highlighted Dryden’s work

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It’s hard to stage an event for millions of your closest friends. For that reason, NASA Socials are designed to give participants a look behind-the-scenes at how the agency works to share with their followers and reach audiences that ordinarily would not have the same access.

For 38 attendees of the NASA Social at Dryden on Sept. 19-21, the sense of awe and wonder of the Space Shuttle Program was experienced first hand. Social media members had rare access to the landing of Endeavour atop its host 747 on Sept. 20 and the shuttle’s departure for the final leg of its ferry flight Sept. 21 over key California landmarks before landing at the Los Angeles International Airport.

NASA Social participants experienced a three-day event as a result of a weather delay. NASA Social participants had the opportunity to learn about Dryden’s historic role in the shuttle program. For example, the Approach and Landing Tests at Dryden with the shuttle prototype Enterprise in 1977 validated that the shuttle could land unpowered. All but one of the early shuttle landings were at Edwards Air Force Base and the shuttles returned from space to a California welcome 54 times during the operational shuttle program.

In addition, social media members saw some of the latest developments in aeronautics and technology and heard about elements of NASA’s future in aeronautics and space exploration.

More than 2,300 social media representatives, who have accounts on Twitter, Facebook and Google+, signed up for one of the limited number of slots at the Dryden event. NASA social media lead John Yembrick, moderator of the event, said attendees were given a number of unique opportunities to learn about NASA.

“The level of enthusiasm of the participants shows the benefits of doing these events in person with on-line engagement. We have had 30 NASA Socials and they are all unique, but this was one of the finest we have hosted. They have a great communications team at Dryden. I am impressed with the work they have done to go above and beyond to work for this social media experience,” Yembrick said.

NASA Socials have an important role.

“These events make NASA more accessible and communicates our story to a more general audience that perhaps has not heard it before,” he added.

Social media representatives came from all over the United States including Arizona, California, Georgia, Illinois, Massachusetts, Nevada, New Jersey, New York, Ohio and Texas. The social media representatives’ backgrounds included educators, social media strategists, videographers and numerous other vocations/avocations.

The social had meaning for Kaci Heins, a teacher from Flagstaff, Ariz. “It (Endeavour) was the first shuttle I saw up close. It was very emotional and I teared up,” she said. Participants such as Andy Rechenberg appreciated the special access.

“I know a lot about NASA, but I didn’t know how many aircraft and space projects flew here,” said Rechenberg, who hails from Cincinnati, Ohio.

He was excited about learning more about NASA future space work, but the Endeavour landing rated high.

“I was speechless when we were able to tour the NASA 747 with Endeavour on top. It was off the charts to be inside the SCA. You couldn’t ask for more. Almost everything I see when I come to NASA Socials is hard to put into words. The NASA Social Media team outdid themselves. Expectations started high and stayed there,” Rechenberg said.

Lisa Mattox, Dryden social media lead, said the weather delay afforded participants additional opportunities.

“It was an enthusiastic group. When the Social Media event was...
Dryden technical publications are available at the Dryden Research Library. Items that are restricted in distribution, such as International Traffic in Arms Regulations, or ITAR, are available in paper form at the research library.

Publications distributed to the public are also available electronically at: http://nserc.nasa.gov/Organizations/Library/index.html

Dryden-developed technical publications are listed by month.

**September 2012**


**August 2012**


**ER-2 flew new instruments**

During a few weeks in September, an ER-2 high altitude research aircraft operated from NASA’s Wallops Flight Facility in Wallops Island, Va., and took part in the development of two future satellite instruments. The aircraft flew test models of these instruments at altitudes greater than 60,000 feet and gathered information researchers can use to develop ways to handle data future spaceborne versions will collect.

NASA Wallops was the temporary home of one of NASA’s ER-2 research aircraft. The ER-2 from NASA’s Dryden Aircraft Operations Facility in Palmdale carried two instruments, the Cloud-Aerosol Transport System (CATS) and the Multiple Altimeter Beam Experimental Lidar (MABEL). CATS and MABEL are test beds for instruments to be carried by future satellite missions, and because they are both high-altitude laser instruments they will share space on the ER-2 in part as a way to lower costs for both teams.

**Dryden researchers publish work**


Brian R. Taylor authored “A Full-Envelope Air Data Calibration and Three-Dimensional Wind

**Stream ran across Mars**

NASAs Curiosity rover mission has found evidence of a stream once ran vigorously across the area on Mars where the rover is driving. There is easier evidence for the presence of water on Mars, but this new evidence – images of rocks containing ancient streambed gravels – is the first of its kind.

Scientists are studying the images of stones cemented into a layer of conglomerate rock. The sizes and shapes of stones offer clues to the speed and distance of a long-ago stream’s flow.

“From the size of gravels it carried, we can interpret the water was moving about 3 feet per second, with a depth somewhere between ankle and hip deep,” said Curiosity science co-investigator William Dietrich of the University of California, Berkeley. “Plenty of papers have been written about channel on Mars with many different hypotheses about the flow in them. This is the first time we’re actually seeing water-transported gravels on Mars. This is a transition from speculation about the size of streambed material to direct observation of it.”

The finding site lies between the north rim of Gale Crater and the base of Mount Sharp, a mountain inside the crater. Earlier imaging of the region from Mars orbit allows for additional interpretation of the gravel-bearing conglomerate. The imagery shows an alluvial fan of material washed down from the rim, streaked by many apparent channels, sitting uphill of the new finds.

**X-Press**

**News at NASA**

The ER-2, which is based at NASA’s Dryden Aircraft Operations Facility in Palmdale, arrived at NASA’s Wallops Flight Facility in Virginia for flight research of science instruments that is now completed.

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Endeavour’s last mission covered a lot of California

Californians gazed at the morning sky Sept. 21 in an attempt to see the Endeavour and NASA 747 Shuttle Carrier Aircraft fly over their community. The final leg of Endeavour’s flight from Kennedy Space Center, Florida, to Los Angeles International Airport offered many people an opportunity to witness the historic flight.
Dryden hosts space shuttle SRB casings

Two space shuttle solid rocket booster casings arrived at Dryden Aug. 29 after a transcontinental trip from the Kennedy Space Center in Florida. The inert boosters are each more than 149 feet long and more than 12 feet wide. Two modified tractor-trailer rigs were used to haul the boosters overland.

Now owned by the California Science Center in Los Angeles, the boosters will remain in storage at Dryden until the science center’s planned exhibit hall to house the space shuttle Endeavour is built. The boosters will be mounted alongside Endeavour in a vertical configuration, similar to what they would have been during launch into space.

The largest solid rocket motors ever developed, the four-segment space shuttle solid rocket boosters weighed about 193,000 pounds empty and 1.3 million pounds when loaded with more than 1.1 million pounds of propellant. The boosters were each capable of producing 2,650,000 pounds of thrust at liftoff, and provided the additional thrust needed for the first two minutes after launch to enable the space shuttles to escape the gravitational pull of Earth.

The Air Force Research Laboratory Propulsion Directorate at Edwards Air Force Base developed the solid rocket booster propellant. The propellant was composed primarily of atomized aluminum powder fuel and ammonium perchlorate oxidizer bound together with a synthetic rubber compound.

Two giant cranes were used to lift each of the two space shuttle solid rocket booster casings prior to placing it into its temporary storage location outside Dryden’s former shuttle hangar. The Mate/Demate Device used for stacking the orbiter and its host 747 at Dryden is in the background at right.
Flight into history.

The nine-day STS-49 mission included the capture of the inoperable INTELSAT VI communications satellite and replacement of its rocket motor. It took three attempts to capture the satellite for repair. This mission marked the first time three space shuttle astronauts walked in space simultaneously, and it also was the first time four space walks took place on the same shuttle mission.

Former Dryden public affairs chief Don Haley recalled the arrival of Endeavour’s first landing, which occurred on May 16, 1992.

“To celebrate that first flight and landing, public affairs contacted schools from the Antelope Valley to the coast to invite students to view the landing here at Dryden,” Haley recalled. “We would have had hundreds of buses and many thousands of school kids watch the landing from the ramp, but the flight was postponed for a couple of days and many of the school districts couldn’t recover and recycle for the new landing day,” he said.

However, about 3,500 students were still able to view the landing, according to the May 29, 1992 issue of the X-Press. The landing also attracted about 15,000 visitors to Dryden and an estimated 100,000 people watched the conclusion of Endeavour’s maiden flight from the east shore viewing site on Rogers Dry Lake at Edwards.

“With the Endeavour going now to the (California Science Center) museum, it’ll be nice for those kids who watched that first landing here to visit the Endeavour display once it’s set up and show their kids and grandkids the shuttle they saw land at Edwards many years ago,” Haley said. “It might even draw a tear or two.”

Former Dryden Center Director Ken Szalai recalled attending Endeavour’s rollout ceremony in Palmdale.

“It demonstrated a strong...
government leadership commitment to human spaceflight after the tragic loss of the crew of Challenger,” he said.

The landings of shuttles were all special, as everyone wanted to see the orbiters return to land at Edwards.

"Although I was director of Dryden when Endeavour returned, I was just one of thousands watching the skies for the thruster bursts about 50,000 feet right above us and anticipating the double sonic boom," Szalai recalled. “I joined in the involuntary cheer when we spotted the orbiter on a steep final approach. As an engineer, I looked down, and up, and knew they had the runway made up.

“I watched Buck Rogers and other fantasy rockets on TV and on the silver screen as a kid," he added. “But this was a REAL spacecraft returning from orbit. Wow!”

Like the sea-faring ship for which Endeavour was named, Szalai noted similarities between the two ships and their mission.

"Cpt. Cook commanded the H.M.S Endeavour on a lengthy worldwide scientific expedition. Capt. Dan Brandenstein commanded the first flight of USA’s Endeavour," he recalled. “It was a fantastic spacecraft, which did remarkable things that could not be imagined when the sailing ship left port in the 18th Century. But some things were the same. [Both NASA] had a visionary leader who commissioned the voyage, scientific curiosity, a strong commander and a courageous crew," Szalai said.

Endeavour’s new home at the California Science Center in Los Angeles will provide opportunities for Californians to see the vehicle designated as orbital vehicle OV-105.

“We will be able to take our children and grandchildren to see Endeavour, to talk of Wernher von Braun, Alan Shepard, John Glenn, Neil Armstrong, Dan Brandenstein, all those who explore the unknown, and the voyages of Endeavour," Stalai reflected. “Perhaps one of these children will open their eyes wide, imagine, dream, and [someday] lead a crew to an unknown place in the starry sky in the future.”

Dryden space shuttle operations manager George Grimshaw supported Endeavour’s first space mission in 1999, the 36th shuttle landing at Edwards.

“I was the driver/technician in the convoy command vehicle,” Grimshaw recalled. “Endeavour was the first orbiter to use a drag chute during landing and the first orbiter with improved nose wheel steering – both recommendations from the Rogers Commission following the (the) Challenger accident. As Endeavour touched down on the runway, we were closely watching as the chute deployed. A couple of years earlier we had used NB-52B 008 to test the drag chute system, so it was great to see it in use on the shuttle,” Grimshaw said.

Endeavour returned from space and landed at Dryden seven times, its last appearance on Nov. 30, 2008. But as with all good things, the Space Shuttle Program came to an end.

“Endeavour’s first flight, landing and ferry were exciting, not just because it was a new orbiter, but because it owed its existence (and legacy) to Challenger,” Grimshaw reflected.

“As always, it was great to see Endeavour again (on its final ferry flight stopover), but this time with mixed emotions, knowing this was the last time," he said. “I think it will be even more difficult the first time I see Endeavour as a museum piece. Even so, I’m glad she will be on display here in Southern California for millions of people to see and experience up close – for the first time for most of them.

“I have supported the shuttle program in varying capacities with the Air Force and NASA since 1979,” Grimshaw added. “It was a great program to be a part of and to be associated with.

“The shuttle was an inspiration to the world and a symbol of the greatness and capability of America and will hopefully continue to inspire current and future generations of Americans as we continue to work in and explore space,” Grimshaw concluded.