NASA's most advanced Mars rover Curiosity has landed on the Red Planet. The one-ton rover, hanging by cables from a rocket backpack, touched down on Mars Aug. 5 to end a 36-week flight and begin a two-year geological investigation.

The Mars Science Laboratory spacecraft that carried Curiosity succeeded in every step of the most complex landing ever attempted on Mars, including the final severing of the bridle cords and flyaway maneuver of the rocket backpack.

“The wheels of Curiosity have begun to blaze the trail for human footprints on Mars. Curiosity, the most sophisticated rover ever built, is now on the surface of the Red Planet, where it will seek to answer age-old questions about whether life ever existed on Mars – or if the planet can sustain life in the future,” said NASA Administrator Charles Bolden. “This is an amazing achievement, made possible by a team of scientists and engineers from around the world and led by the extraordinary men and women of NASA and our Jet Propulsion Laboratory. President Obama has laid out a bold vision for sending humans to Mars in the mid-2030s, and today’s landing marks a significant step toward achieving this goal.”

See Mars, page 2

At left, the illustration shows the position of Curiosity’s cameras. Above, one of the first images Curiosity took was of its shadow on Mars.
Montgomery details Dryden MSL role

By Jay Levine
X-Press editor

When the Curiosity rover made its complex descent to Mars Aug. 5, it represented a moment of truth for researchers not only at the Jet Propulsion Laboratory in Pasadena, Calif., but for contributors across NASA and around the world.

Jim Montgomery, field test lead at JPL for the Mars Science Laboratory Terminal Descent Sensor, detailed Dryden contributions to flight testing the MSL's landing radar at a NASA Dryden colloquium July 25.

"JPL and NASA Dryden had a very strong partnership where we did some field testing of a core part of the Terminal Descent Sensor, or landing system," Montgomery said.

"When we land on Mars on Aug. 5 at 10:31 p.m. local time, you all should be very proud of your role."

The flight testing at Dryden helped validate the MSL's Terminal Descent Sensor, or TDS, a sophisticated pulse-Doppler landing radar system. The TDS functions were verified during a series of field tests over Mars-like terrain and using flight-like conditions expected during the descent and landing of MSL.

Because the TDS will operate over a large range of altitudes and velocities, different venues and methods were necessary to test it over a five-year period. From July 2006 to June 2011, those tests were ongoing at Dryden and other venues, including use of a commercial helicopter and the 100-meter tall Echo Towers at the Naval Air Weapons Station at China Lake, Calif.

Dryden hosted and supported two series of flight tests of the MSL rover's landing radar, the first under a helicopter in 2010 and a follow-on series with the radar housed in a Quick Test Experimental Pod mounted under the wing of a Dryden F/A-18 in June 2011.

"We would not have gone to Mars if we could not have made the F/A-18 campaign work. There were a lot of red flags and we were able to reduce that risk to an acceptable level," Montgomery said.

The most recent tests last year focused on the on-chute acquisition portion of the MSL's entry into the Martian atmosphere, when the spacecraft is suspended from its parachute. Data collected from the flights were used to finesse the MSL's landing radar software to ensure that it was calibrated as accurately as possible prior to Curiosity's landing.

"We did a wonderful verification and validation campaign. We had simulation, we had analysis, we had lab testing and, of course, the field testing. All of those pieces together make us very confident, but not overly confident, that the radar is going to do its job on landing day," he said.

The Mars Science Laboratory was launched on Nov. 26, 2011, and began its two-year mission Aug. 5.

"We are landing in Gale crater, which is very interesting from the scientific perspective," said Montgomery. "We are landing in a very deep crater with a mountain in the center. What's great about this is we get high-resolution images of the landing site, which is very interesting for researchers not only at the Jet Propulsion Laboratory in Pasadena, but also for researchers not only at the Jet Propulsion Laboratory in Pasadena, but also for researchers not only at NASA's Science Mission Directorate in Washington. The rover was designed, developed and assembled at JPL. JPL is a division of the California Institute of Technology in Pasadena.

See Montgomery, page 8

Follow the Curiosity

For more information on the mission, visit: http://www.nasa.gov/msl and http://marsprogram.jpl.nasa.gov/msl

Follow the mission on Facebook and Twitter at: http://www.facebook.com/marscuriosity and http://www.twitter.com/marscuriosity

Montgomery landed near the foot of a mountain three miles tall and 96 miles in diameter inside Gale Crater. During a nearly two-year prime mission, the rover will investigate if the region ever offered conditions favorable for microbial life.

"The Seven Minutes of Terror has turned into the Seven Minutes of Triumph," said NASA Associate Administrator for Science John Grunsfeld. "My immense joy in the success of this mission is matched only by overwhelming pride I feel for the women and men of the mission's team."

Curiosity returned its first view of Mars, a wide-angle scene of rocky ground near the front of the rover.

"Our Curiosity is talking to us from the surface of Mars," said MSL Project Manager Peter Theisinger of JPL.

"The landing takes us past the most hazardous moments for this project, and begins a new and exciting mission to pursue its scientific objectives," he said.

Confirmation of Curiosity's successful landing came in communications relayed by NASA's Mars Odyssey orbiter and received by the Canberra, Australia, antenna station of NASA's Deep Space Network. Curiosity carries 10 science instruments with a total mass 15 times as large as the science payloads on the Mars rovers Spirit and Opportunity. Some of the tools are the first of their kind on Mars, such as a laser-firing instrument for checking elemental composition of rocks from a distance. The rover will use a drill and scoop at the end of its robotic arm to gather soil and powdered samples of rock interiors, then sieve and parcel out these samples into analytical laboratory instruments inside the rover.

To handle this science toolkit, Curiosity is twice as long and five times as heavy as Spirit or Opportunity. The Gale Crater landing site places the rover within driving distance of layers of the crater's interior mountain. Observations from orbit have identified clay and sulfate minerals in the lower layers, indicating a wet history.

The mission is managed by JPL for NASA's Science Mission Directorate in Washington. The rover was designed, developed and assembled at JPL. JPL is a division of the California Institute of Technology in Pasadena.

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Mars

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See Montgomery, page 8
Thomson wins scholarship

Rachel Thomson is the Dryden Employee Exchange Council's 2012 John K. Russell Memorial Scholarship Award winner.

A 2012 graduate of Desert High School on Edwards Air Force Base, Thomson plans to major in kinesiology with an emphasis in pre-athletic training at California State University – Long Beach this fall. Along with her twin sister Katherine, Rachel was co-vice president of her high school class, both having earned a 4.3 grade-point average during high school. Rachel was ranked third academically out of 103 students in Desert High's class of 2012. The scholarship provides $2,000 per year for up to four years. See Scholarship, page 8

Brown gets a ‘Snoopy’

Dryden’s Alan Brown recently was awarded a Silver Snoopy pin by NASA astronauts Rick “C.J.” Sturckow, left, and Jeff Williams, right. Brown was recognized “for professionalism, dedication and outstanding support that greatly enhanced space flight safety and mission success.” As public affairs specialist and later as news chief, Brown coordinated visits, interviews and shared information with U.S. and international media during 10 shuttle landings.

Put your dukes up

Tara McCoy, at left, and NASA Summer Picnic coordinator Stephanie Allison box at the employee event in Tehachapi’s Central Park. Aside from the boxing ring, the other activities that packed a punch for attendees included a bounce house, volleyball, face painting, handbag toss, tug-of-war and a relay obstacle course. Also on tap were a barbecue lunch, a sack race and pinata.

Contracts awarded

On Aug. 3 NASA announced new agreements with three American companies to design and develop the next generation of U.S. human spaceflight capabilities, enabling a launch of astronauts from U.S. soil in the next five years. Advances made by these companies under newly signed Space Act Agreements through the agency’s Commercial Crew Integrated Capability initiative are intended to ultimately lead to the availability of commercial human spaceflight services for government and commercial customers.

The three partners and their award are $212.5 million for the Sierra Nevada Corporation of Louisville, Colo.; $440 million to Space Exploration Technologies, or SpaceX, of Hawthorne, Calif.; and $460 million for The Boeing Company of Houston.

“Today, we are announcing another critical step toward launching our astronauts from U.S. soil on space systems built by American companies,” NASA Administrator Charles Bolden said. “We have selected three companies that will help keep us on track to end the outsourcing of human spaceflight and create high-paying jobs in Florida and elsewhere across the country.”

The agreements are an initiative of NASA’s Commercial Crew Program and an administration priority. The objective is to facilitate the development of a U.S. commercial crew space transportation capability with the goal of achieving safe, reliable and cost-effective access to and from the International Space Station and low Earth orbit.
Rocket man

Engle and X-15 pilots verified, validated the methods to reach the space age

By Jay Levine

On the eve of one of NASA’s major space science milestones—the landing of its Mars Science Lab Curiosity rover on the Red Planet—retired Air Force test pilot and NASA astronaut Maj. Gen. H. Eugene engaged his involvement in several earlier spaceflight milestones during a recent Dryden visit.

Milestones are something Engle understands as he frequently reached them during his experiences as an X-15 pilot, a pilot in the prototype space shuttle Enterprise during the 1977 Approach and Landing Tests at Edwards Air Force Base, and as commander of two space shuttle missions.

Engle attended a number of events in the Antelope Valley including a tour and colloquium at Dryden, a visit to XCOR Aerospace at the Mojave Air and Space Port and as an honoree at the Lancaster JetHawks’ baseball team Aerospace Appreciation Night. Dryden pilot Troy Asher and Tom Jones, Dryden Supersonics project manager, provided another highlight of the event with two pre-game flyovers in a NASA F/A-18.

Engle had flown 16 flights in the rocket-powered X-15 as an Air Force pilot assigned to the joint NASA, Air Force, Navy and North American Aviation program. He flew the X-15 to an altitude of 280,600 feet and became the youngest pilot to qualify as an astronaut at age 32. Three of his X-15 Flights exceeded the 50-mile altitude requirement for an astronaut rating.

“It was the ultimate flying machine. No airplane can live up to what the X-15 did,” he said.

A key contribution of the X-15 was developing confidence that an unpiloted spacecraft could glide to a safe landing. Also, the maneuvers to slow the X-15 were nearly identical to those of the space shuttle from unpowered spacecraft could glide to a safe landing. Also, the maneuvers X-15 did, “he said.

Engle had another opportunity to validate the vehicle’s landing contributions to space flight during his Dryden colloquium.

“The mission was cut short and he was required to manually fly the orbiter from orbit to a landing,” said Engle.

Engle also enjoyed seeing an entry into the next generation of spacecraft.

“I enjoyed seeing their approach. With a small company it’s easier to engage the entire team in all of the phases of development. Their jobs overlap and they help each other. It is a wonderful environment to ensure the most efficient and safest machine. I think they are doing some innovative and creative things with that vehicle. Of course, I enjoyed sitting in the cockpit and imagining what might be of value to look back to and forward,” he said.

Engle had suggestions and answered questions from company representatives.

Dan DeLong, XCOR vice president and chief engineer, agreed that talking to Engle was productive.

“Our hypotheses and estimates were corroborated. Nothing was surprising, but it feels good that there are no blind alleys. He also gave us a heads up on what to look for during the flight test program,” DeLong said.

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Engle’s experiences bridge the X-15 and shuttle programs. Research from the X-15 and other experimental vehicles from Edwards and Dryden may help provide clues for solving some of the current and future mysteries uncovered by new vehicles that will expand people’s views of Earth and beyond.
Last shuttle mission to land here detailed

By Jay Levine
X-Press editor and
Alan Brown
Dryden Public Affairs

When Space Shuttle Discovery touched down at Edwards Air Force Base on Sept. 11, 2009, to conclude mission STS-128, no one could have foreseen that it would be the last of 54 such landings at the famed desert air base.

NASA astronaut Rick “C.J.” Sturckow, who commanded the mission, returned to Dryden July 13 to recap the mission for employees.

Sturckow recalled highlights of the 13-day supply mission to the International Space Station.

A veteran of four space shuttle missions, Sturckow had commanded the STS-117 shuttle mission in June 2007 that also concluded with an Edwards landing. Both landings were dictated by poor weather conditions at the primary landing site at the Kennedy Space Center.

Sturckow said launch of the space shuttle was exhilarating for the crew.

“It’s exciting riding a rocket. There is a lot of shaking and vibration that tapers off for the first two minutes of the flight. Then there was a bright flash (as the solid rocket boosters of the flight). Then there was a bright flash (as the solid rocket boosters separated) and we continued on the liquid rocket motors for six more minutes,” he said.

The rendezvous with the space station was another highlight, he said.

“The module contained science and storage racks, a freezer for storage of research samples, a new sleeping compartment, an air purification system and the Combined Operational Load-Bearing External Resistance Treadmill, or COLBERT,” he said. “It’s named after comedian and television host Stephen Colbert of Comedy Central’s “The Colbert Report.” Colbert had urged his viewers to post the name Colbert, which received the most entries, during NASA’s contest to name the space station’s Node 3.

Discovery’s mission included three space walks to replace experiments outside the European Space Agency’s Columbus laboratory. In addition, a new ammonia storage tank was installed and the used one returned to Earth.

Sturckow noted that the station performs a two-fold role, contributing to both scientific understanding and future solar system exploration.

“If we hadn’t flown the station, we could have never accomplished whatever it is we do next,” he said. “I think that will be one of the biggest contributions, in addition to all the great science that’s going on up there.”

The Walt Disney Company’s Buzz Lightyear toy astronaut that had been taken to the station on Discovery’s STS-124 mission in May 2008 was also brought back to Earth on Discovery during STS-128. While on the station, the astronaut supported NASA’s education outreach with a series of online educational programs developed to capitalize on the Toy Story star’s appeal.

The Lightyear toy is now enshrined in the Smithsonian National Air and Space Museum in Washington, D.C.

Currently deputy chief of the Astronaut Office at NASA’s Johnson Space Center in Houston, Sturckow officially retired from the United States Marine Corps as a colonel while on board the ISS during the STS-128 mission.

Fifteen of Discovery’s 39 missions landed at Edwards, the remainder at NASA’s Kennedy Space Center in Florida. The retired space shuttle is now enshrined at the Smithsonian National Air and Space Museum’s Udvar-Hazy Center near Washington, D.C.

Sally Ride, the first U.S. woman to fly in space, dies at 61

Sally Ride, the first American woman to fly in space, died July 23 at the age of 61.

Her website, Sally Ride Science, indicated her death was the result of pancreatic cancer.

Ride became the first American woman to fly in space when the space shuttle Challenger launched on mission STS-7 June 18, 1983.

Two years later, she flew again on the Challenger for the 13th shuttle flight, STS-41-G in October 1984. Her first shuttle mission landed at Edwards Air Force Base on June 24, 1983.

Ride, along with her fellow STS-7 astronauts, received accolades from assembled news media personnel, Dryden and Air Force employees and members of the public at Dryden during and after the post-flight news conference.

Ride left NASA in 1989 to teach physics at Stanford University and then at the University of California, San Diego. She founded Sally Ride Science in 2001, which creates classroom materials and training for teachers in science, technology, engineering and math.

NASA Administrator and "See Ride, page 7"
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Aerodynamic test bed returns to flight

By Gray Creech
Dryden Public Affairs

After a hiatus of about two years, Dryden's Gulfstream III aerodynamics research test bed aircraft, No. 804, was back in the air for a functional check flight.

The flight June 26 verified that the aircraft has maintained its basic mechanical and electronic functionality following completion of several minor modifications, such as wiring installation and upgrades. A series of research instrumentation checkout flights are scheduled, aimed at verifying the performance of newly installed instrumentation sensors, wiring, infrastructure, and power systems.

These upgrades are in support of its primary Adaptive Compliant Trailing Edge (ACTE) project, a joint effort between NASA and the U.S. Air Force Research Laboratory.

For ACTE, both of the G-III's conventional 19-foot-long aluminum flaps will be replaced with advanced, shape-changing flaps that form continuous bendable surfaces, improving the aerodynamics of the flaps. Made of composite materials by FlexSys, Inc., the improved flap should eliminate a major source of airflow noise generation.

When conventional flaps are moved, gaps exist between the forward edge and sides of the flaps and the wing surface. The ACTE flap will be gapless, forming a seamless transition region with the wing while remaining attached at the forward and side. If successful, this experiment will enable aircraft to be significantly quieter during takeoff, approach and landing.

The check flight followed completion of preliminary design reviews on both the ACTE project and on the Discrete Roughness Element (DRE) Laminar Flow Glove Experiment.

The DRE glove is designed to test rows of very small bumps called discrete roughness elements located near the glove's leading edge. They are designed to maintain natural laminar flow over most of the glove's surface. Laminar airflow over aircraft wings increases fuel efficiency by helping to reduce aerodynamic drag.

Kids take a look at where parents’ work

Kids are curious and NASA works to reach them by providing inspiring projects and programs that generate awe of the results of science, technology, engineering and mathematics. That extended to children of Dryden employees. Take Our Children to Work Day June 28 attracted 237 attendees, who toured Dryden's main campus at Edwards and the Dryden Aircraft Operations Facility in Palmdale. Some activities included an F/A-18 aircraft simulator, as seen at left, a tour of a NASA 747 Shuttle Carrier Aircraft, above, the Discovery Dome, and a presentation on life support suits.

Ride ... from page 6

former space shuttle astronaut Charlie Bolden offered his personal remembrances of Ride.

"Sally Ride broke barriers with grace and professionalism – and literally changed the face of America’s space program," said Bolden. "The nation has lost one of its finest leaders, teachers and explorers. Our thoughts and prayers are with Sally’s family and the many she inspired. She will be missed, but her star will always shine brightly!"

"Sally was a personal and professional role model to me and thousands of women around the world," added NASA Deputy Administrator Lori Garver. "Her spirit and determination will continue to be an inspiration for women everywhere."

Ride recalled her history-making space flight in an interview on the 25th anniversary of her flight in 2008.

"The fact that I was going to be the first American woman to go into space carried huge expectations along with it," Ride related. "That was made pretty clear the day that I was told I was selected for the crew. I was taken up to Chris Kraft’s office. He wanted to have a chat with me and make sure I knew what I was getting into before I went on the crew. I was so dazzled to be on the crew and go into space I remembered very little of what he said."

"On launch day, there was so much excitement and so much happening around us in crew quarters, even on the way to the launch pad," Ride said. "I didn't really think about it that much at the time – but I came to appreciate what an honor it was to be selected to be the first to get a chance to go into space."

For more on Sally Ride’s life and career, visit: http://go.nasa.gov/Ocn6h7
Scholarship ... from page 3

Rachel Thomson is the daughter of Michael and Jennifer Thomson of Lancaster, Calif. Thomson, a career aerospace and flight test engineer and manager at Dryden, currently heads the Science Mission Directorate at the Dryden Aircraft Operations Facility in Palmdale, Calif.

In addition to excelling in athletics, participating in or managing Desert High’s volleyball, football and wrestling teams and running on the school’s girls varsity track team. As a member of the varsity track team she was named the team’s most valuable player for two years.

Rachel’s sister Katherine, who was second only to Rachel in the scholarship selection committee’s rankings, will also be attending Cal State – Long Beach, where she plans to major in nursing. The sisters said they are close and share many of the same activities and interests, and even plan to room together at college.

“It’s exciting,” agreed Mike Thomson. “I’m very proud of both of them, they knew only one scholarship would be awarded, and yet they both put the effort into applying for it.”

Dryden Exchange Council scholarships are named for former employees of the center on a rotating basis. Scholarship funds are raised from council activities, including proceeds from vending machines, the Dryden Gift Shop and the Flightline Eatery sales and fundraising events.

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