

InSight taking shape

Lander is readied for early 2016 launch

By Mark Whalen

Every space mission is unique. JPL's next mission to Mars, being readied for launch next winter, is no exception.

When InSight lifts off March 4 on its mission to study the interior of the Red Planet, it will be the first launch to Mars that can possibly be viewed from rooftops at JPL.

InSight will be the first NASA Mars

mission launched from anywhere but Florida. After it lifts off from Vandenberg Air Force Base in Santa Barbara County in pre-dawn darkness, the rocket's glare could for the first time be visible from JPL.

For principal investigator Bruce Banerdt, it's been a long wait, but his patience will soon be repaid. The mis-

sion will for the first time probe deep beneath the Red Planet's surface to investigate Mars' evolution. A seismometer and a heat-flow probe will study the interior.

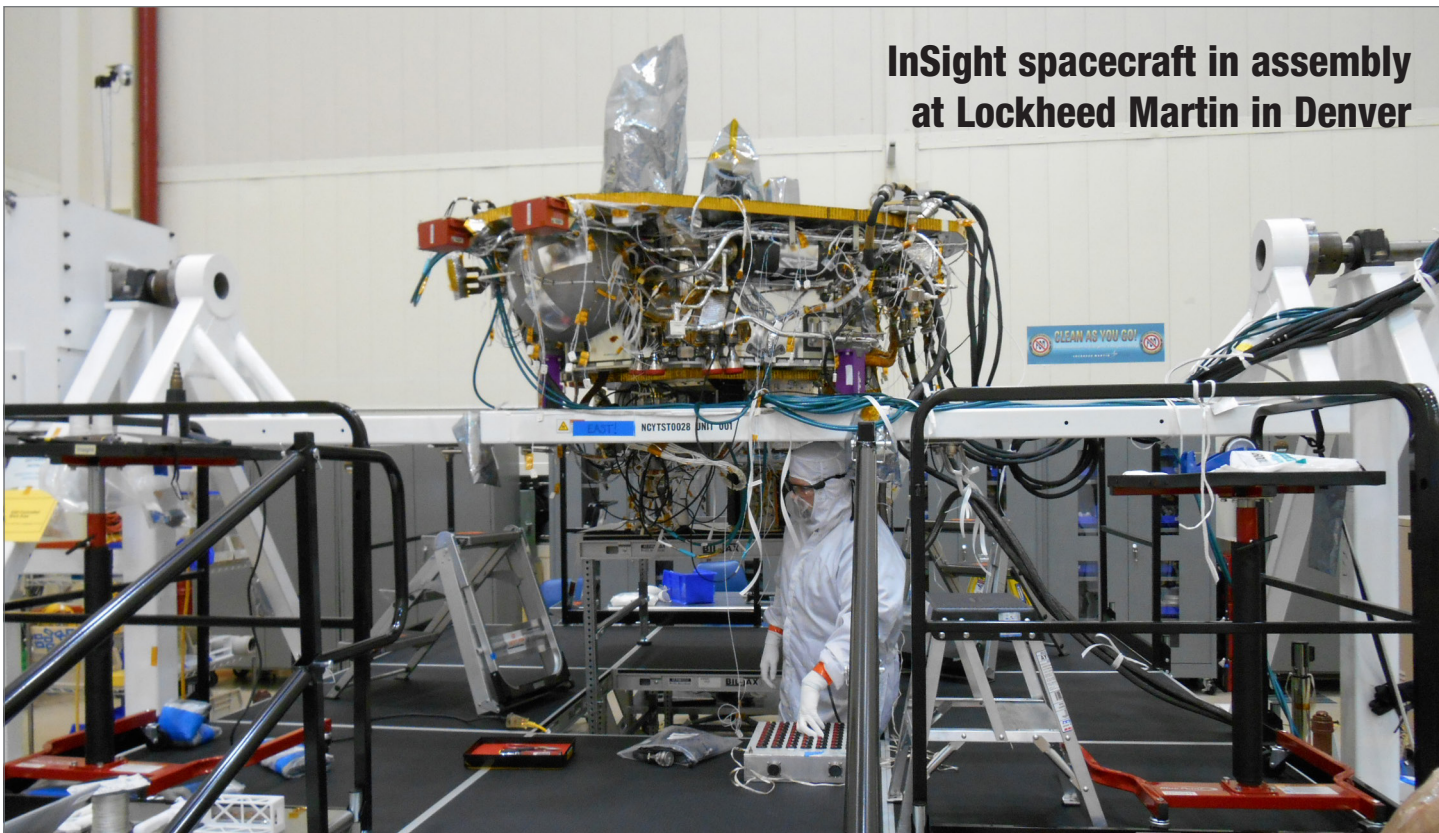
"This has been a personal crusade of mine for about 30 years," said Banerdt. "I started working on the development

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InSight's parachute is tested at NASA's Ames Research Center

InSight spacecraft in assembly at Lockheed Martin in Denver



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of a micro-seismometer with the Microdevices Lab back in the late '80s. "I and some of the other scientists on my team have probably proposed to every single Mars mission and to every Mars proposal opportunity since the early '90s," he added. "I didn't think it would take me 30 years to get there."

InSight's seismometer readings and other measurements will add to understanding about Earth, as well as Mars, by answering questions about how rocky planets formed.

"I've always been interested in it because the seismology can provide answers to some of the geophysical questions I've been working on since graduate school," Banerdt added. "At that time I was trying to use gravity and topography data from Viking to calculate tectonic deformation on Mars, but the fidelity of my simulations was

limited by our total ignorance of the thickness of the Martian crust. Seismology is the best method for getting the information that will finally enable those analyses, and will allow us to address other aspects of Mars related to internal structure, such as crust and core formation and the overall thermal evolution of the planet."

With 11 months to launch, the team is scrambling to acquire, test and integrate the mission's full suite of instruments, auxiliary sensors and other payload elements, some of which are provided by European partners. Many of the pieces have been delivered and have been integrated and tested with the full system at Lockheed Martin in Denver, said Project Manager Tom Hoffman. "There are many activities remaining as we are just now starting to build up the spacecraft and get into an environmental test program," he said.

"The big milestones are the delivery

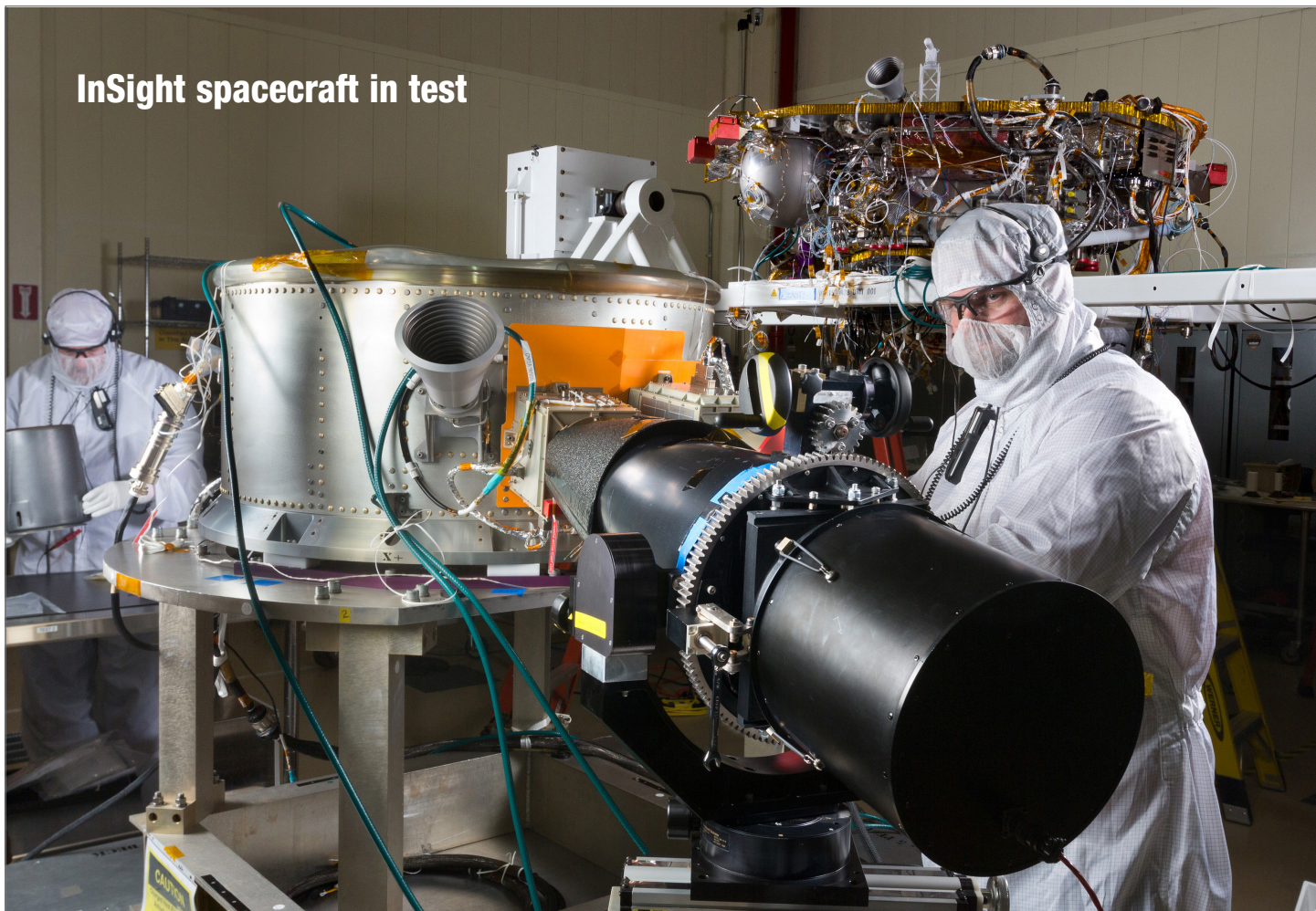
of the final payload and spacecraft elements; then we will perform the key and unique system-level tests," said Hoffman, noting among them surface-system verification, instrument deployment and system-level environmental tests. "InSight is the first spacecraft to remotely deposit instruments on another planet, so this is a critical activity," he added.

Banerdt said the InSight spacecraft's basic structure and propulsion system are completed, along with most of its landing radar, communications system, batteries and the solar arrays that will power the spacecraft on the cruise from Earth to Mars. Some of the spacecraft's electronics are also complete, but the flight computer is playing catch-up, he said.

InSight will place its seismometer and heat-flow probe on the Martian

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InSight spacecraft in test



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surface with a robotic arm developed by JPL.

“We’re hoping to get the equivalent look at Mars’ interior as we had on Earth back in the 1930s,” said Banerdt. “At that time, seismology was a young science, and they have developed a lot of the techniques we have today. But they had the advantage of being able to observe for many years.”

The science has advanced quite a bit, for both planets.

“Our seismometer is sensitive enough to detect movement of our lander’s solar arrays creating induced vibrations transferred through the lander feet,” noted Hoffman. “We want to be as immobile as possible and not induce any noise into the environ-

ment from the lander that will disturb our science measurements. We have worked hard to eliminate this and all of the other potential noise sources. Lack of motion is our friend once we have deployed the instruments and finished the commissioning phase of the mission.”

InSight is funded through NASA’s Discovery Program of innovative missions and is based on the Lockheed-built Phoenix lander, which operated on Mars for almost six months in 2008. Updated avionics and larger solar panels are the major differences in the design.

Of the mission’s 20 co-investigators, four are from JPL: Matt Golombek, Troy Hudson, Bill Folkner and Sami Asmar.

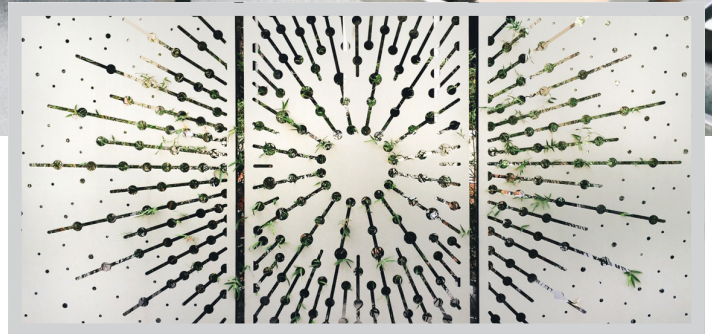
The nearby access to Vandenberg will provide a big advantage for the team, as it will allow those who supported mission development to participate directly by witnessing the launch, said Hoffman. “A lot more people who worked on the mission can attend the launch with their friends and families,” he said. “Seeing a launch is a great culmination for the development team and an exhilarating start for the operations team.”

“It’s starting to get real exciting, like on a roller coaster,” said Banerdt. “You spend a long time going up that first incline, then look over the top, just before it starts to go down—that’s what I feel like right now. Because between now and launch it’s going to be a real roller-coaster ride.” ■



BRIGHTENING THE LAB

The latest installation from JPL visual strategist Dan Goods and his team **honors former JPL Director Frank Malina**, who was renowned for his kinetic artwork. The “Science Patio” sits in front of Building 183. *Photos by Lois Kim.*



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The Malina exhibit joins other artwork such as The Pulse on the first floor of Building 180, which flashes light as a reaction to live communications among more than 30 spacecraft and the Deep Space Network; “left field” at the Innovation Foundry; and the Earth Orbiting Missions Operations Center in Building 264. *Photos by Dan Goods.*

Murphy gets heliophysics post



Neil Murphy

Neil Murphy, manager of the Strategic Universities Research Partnership Program in the Office of the Chief Scientist, has been elected to a subcommittee of the NASA Advisory Council that advises the Heliophysics Division.

This is the first year of Murphy's three-year appointment on the committee. He attended a recent meeting of the Heliophysics Subcommittee that included overviews of the current flight program, the soon-to-be-released heliophysics roadmap, and discussions about the organization of research and analysis programs. Findings from the meeting will be forwarded to the NASA Advisory Council for their consideration.

Murphy joined JPL in 1992 as a Galileo experiment scientist. He has led the Space and Astrophysical Plasmas Group and Heliophysics Advanced Concepts Office, and was science lead for JPL's Advanced Project Design Team (Team X).

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Philip Eckman

Philip Eckman, 83, a retired electrical engineer, died Jan. 30.

Eckman joined JPL in 1956. He contributed to many of JPL's major missions starting in the 1960s, including Ranger, Surveyor, Voyager, Mariner, the Shuttle Radar Topography Mission, the Spaceborne Imaging Radar-C/X-band Synthetic Aperture Radar project and Venus/Mercury 1973, NASA's first gravity-assist mission. He also managed the east coast unit of the Technology and Applications Program Office.

Overall, Eckman worked at JPL for 27 years, with a hiatus of 18 months to work for the National Aeronautics & Space Council in Washington, DC and a 12-year period when he served as director of research and development for the CIA. He retired in 1998.

Eckman is survived by his wife, Helen; daughters Anne and Elizabeth; son Paul; stepdaughter Tessa; and grandchildren Ryan, Trevor, Hope and John.

Retired manager David Norris, 81, died Feb. 25.

Norris joined JPL in 1967. During his 28-year career, he contributed to JPL's Mariner missions in the 1960s and 1970s as well as the Space Infrared Telescope Facility (now known as the Spitzer Space Telescope). He also served as deputy manager of the Instruments Division and manager of the Infrared and Environmental Instrumentation Section.

Norris received three NASA Exceptional Service Medals for his work at JPL.

He is survived by his wife, Elena; sons David Jr., Matthew and Mark; daughter Rachel; three grandsons and five great-granddaughters. Funeral services were held at Rose Hills Memorial Park in Whittier.

Gary Weber, 81, a retired plant services engineer with JPL Facilities, died Feb. 25.

Weber worked at JPL from 1955 to 1995. He is survived by his wife, Lou, and two daughters.

Letters

Thanks to all for your kind expressions of sympathy and condolence after the passing of my mother. Thank you also for the beautiful plant that was sent to our home.

Tomas Martin-Mur

Thank you to all my JPL friends and colleagues who shared kind words of condolences at the loss of my brother, Jaimee. The plants and flowers that you sent are beautiful and are so appreciated.

Kendra Short

My family and I would like to thank JPL and Section 203 for the beautiful plant and all the kind words following the recent passing of my grandmother. All your thoughtfulness is greatly appreciated.

Gregory Pruitt

Classifieds

Ads submitted April 4–10. To submit an ad, e-mail universe@jpl.nasa.gov.

For Sale

CAMPING EQUIPMENT: stoves, sleeping bags, shower, cooking utensils, air beds, chairs, lanterns, blender, torches, tarps, etc. 818-272-3262, Valerie.

ELECTRIC BICYCLE, silver 2011 Hebb/eZee, runs great; see <http://losangeles.craigslist.org/sgv/bik/4973193616.html>; \$600. Text Evan, 626-344-5876, Evan.Manning@gmail.com.

FURNITURE, tan sofa and loveseat in great condition; both recline, have cup holders and storage space embedded; please inbox me for pictures; \$900/obo. Johanna.camino@yahoo.com.

MISC.: Pedometer, mini steam iron, Rollerblades, neck and shoulder massager, walkie talkie, Garmin Nuvi GPS. 818-272-3262, Valerie.

MISC.: Verizon Actiontec wireless router, model M1424-WR rev. D; see <http://losangeles.craigslist.org/sgv/ele/4922718382.html>; \$20; 2 oriental style carpets, \$10 and \$30, see <http://orangecounty.craigslist.org/hsh/4883321179.html>. Peter: 310-850-7845, pmkroger@verizon.net.

STOVE, O'Keefe & Merritt, 40," vg condition, white porcelain with 4 burners, chrome griddle, oven (right side), Grillelevator broiler (left side), porcelain & chrome cook light with power outlet, drop-in salt & pepper shakers, working clock and timer, vanishing shelf/cover, storage drawer under broiler; \$450/obo. 626-798-6262.

Vehicles / Accessories

'06 CHEVY Corvette, Monterey red, 3LT Z51 options w/dual roof, 6-speed automatic w/paddle shift, 62K mileage, in vg condition, \$23,000. sandiezsutton@gmail.com or Mike at 818-281-1671.

'06 GMC Yukon XL Denali, 168,000 miles, fully loaded, all-wheel drive, towing package, satellite radio, DVD entertainment system (incl. 2 remotes & 4 headsets), 5-disk CD changer, navigation system, OnStar, moonroof; one owner, well cared for, records available upon request; see <http://www.autofaironline.com/modules.php?name=Classifieds&file=detail&cat=61&de=16335>; \$9,350/obo. 661-755-1043.

'03 TOYOTA Solara, 4-cylinder, 5-speed manual, ~167K miles, \$2,000/obo. Erich.R.Lee@gmail.com

Wanted

PUPPY, Labradoodle. 818-634-4332.

SPACE INFO/memorabilia from U.S. & other countries, past & present, for personal use (see <http://www.youtube.com/watch?v=S7PvjGp7mCU>). mrayman@alumni.princeton.edu, 818-790-8523, Marc Rayman.

Lost & Found

LOST: activity notes, April 2006–March 2007. SOSNotez@riseup.net.

For Rent

SIERRA MADRE, quiet, private detached 1 bdrm. /1 bath old house w/driveway, patio, big storage space; renovated, furnished with new wood floor, new window a/c, washer, dryer, refrigerator, microwave, stove inside; walking distance to downtown, bus to JPL; available viewing after May 20; \$1,350 + deposit. 909-634-0528, Sue.

Vacation Rentals

BIG BEAR lakefront, luxury townhome, 2 decks, indoor pool/spa, beautiful master bdrm. suite, sleeps 6. 949-786-6548.

JACKSON HOLE, WY: Luxurious bed and breakfast nestled on 3 acres of solitude on the Snake River and down the road from the Jackson Hole Mountain Resort and the south entrance to Grand Teton National Park; see <http://www.bentwoodinn.com/>; mention JPL for employee discount. info@bentwoodinn.com, 307-739-1411.

MAMMOTH, Snowcreek, 2 bd., 2 ba. + loft, sleeps 6-8, fully equip'd kitchen incl. microwave, D/W, cable TV, VCR, phone, balcony w/mtn. vw., Jacz., sauna, streams, fishponds, close to Mammoth Creek, JPL discount, no pets. 626-798-9222, 626-794-0455 or valeriee@caltech.edu.

MAMMOTH, Snowcreek, beautiful updated condo, 2 bd., 2 ba. + loft (sleeps 6-8), great location by pond and meadow, new appliances, TVs, DVD players, free wireless Internet access and washer/dryer, no pets. 818-952-2696 or BigMtnPrettySky@gmail.com.

OCEANSIDE condo, on the sand, watch the beautiful sunsets, charming, 1 bedroom, panoramic view, walk to pier or harbor, pool/spa, game room, sleeps 4 max, all amenities. 949-786-6548. ■



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