Jet Propulsion Laboratory

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New Millennium lifts off with DS1

Technology validation for 21st century missions begins with Oct. 24 launch

Bursting through a dark gray cloud seconds after its Oct. 24 launch from Florida's Cape Canaveral Air Station, JPL's Deep Space 1 mission emerged to successfully blast off the first project in NASA's ambitious New Millennium Program.

Early signs indicated a successful start to the mission, which was launched at 5:08 a.m. Pacific Daylight Time (PDT) Saturday.

Now more than twice the moon's distance from Earth, the spacecraft was deemed to be in excellent condition in its fifth day of flight on Oct. 28.

Following the launch, a delay of about 13 minutes was experienced in picking up the spacecraft's first ground-station signal. To the simultaneous delight of flight controllers and a JPL launch-hour gathering of friends and family of mission personnel, telemetry was received from the spacecraft at the Deep Space Network's tracking station near Canberra, Australia, at 1 hour, 37 minutes after launch.

About seven hours after launch, the flight team sent commands instructing the spacecraft to transmit stored data capturing spacecraft conditions from the time of launch until the first signal was received. These data are expected to tell engineers if any condition on the spacecraft contributed to the delay in picking up the first signal.

At the time that ground controllers were looking for a spacecraft signal, the flight team was prepared to send contingency commands to the spacecraft, but the signal was eventually received about 5 minutes before the contingency plan would have been put into effect. The slight delay in signal acquisition is not expected to have any impact on the mission.

Spacecraft engineers on Wednesday, Oct. 28 successfully diagnosed and corrected a glitch that had resulted in one of Deep Space 1's solar panels temporarily pointing away from the Sun. Spacecraft operations were not affected because more than adequate power is provided by just one solar panel, said Deputy Mission Manager Dr. Marc Rayman at JPL.

Engineering data from the spacecraft is being analyzed to determine whether the glitch was due to a random error induced in the spacecraft's solar array electronics caused by natural radiation in space.

Spacecraft commands were also successfully sent Oct. 27 to begin preparation of various system components for the planned Nov. 9 start-up of the ion propulsion engine. In addition, a control device for the ion propulsion engine was turned on, the first step in the two-week process to condition the system for its first use.

On Oct. 30, the spacecraft is scheduled to execute its first turn in a maneuver designed to point the ion engine in a sunward direction to allow solar heating to "bake" off contaminants such as water vapor and other atmospheric chemicals that typically remain on spacecraft surfaces after launch.

Engineers have noted an improvement in the somewhat erratic behavior of the spacecraft's star tracker. The device—not one of the mission's 12 new technologies—from time to

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KENNEDY SPACE CENTER PHOTO

A Boeing Delta II rocket hurtles Deep Space 1 through the morning clouds after its Oct. 24 liftoff from Cape Canaveral Air Station, Fla.

Galileo shows another Jupiter moon may have ocean

Studies indicate similarities between Callisto, Europa

By JANE PLATT

Jupiter's second largest moon, Callisto, may have a liquid ocean tucked under its icy, cratered crust, according to scientists studying data gathered by JPL's Galileo spacecraft.

The Galileo findings, published in the Oct. 22 issue of the journal Nature, reveal similarities between Callisto and another of Jupiter's moons, Europa, which has already displayed strong evidence of a subsurface ocean.

"Until now, we thought Callisto was a dead and boring moon, just a hunk of rock and ice," said Dr. Margaret Kivelson, space physics professor at UCLA and principal investigator for Galileo's magnetometer instrument, which measures magnetic fields around Jupiter and its moons. "The new data certainly suggest that something is hidden below Callisto's surface, and that something may very well be a salty ocean."

This premise was inspired by Galileo data indicating electrical currents flowing near Europa's surface cause changes in Europa's

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Special Events Calendar

Ongoing

Alcoholics Anonymous—Meeting at 11:30 a.m. Mondays, Tuesdays, Thursdays (women only) and Fridays. For more information, call Occupational Health Services at ext. 4-3319.

Codependents Anonymous—Meeting at noon every Wednesday. For more information, call Occupational Health Services at ext. 4-3319.

Gay, Lesbian and Bisexual Support Group—Meets the first and third Fridays of the month at noon in Building 111-117. For more information, call employee assistance counselor Cynthia Cooper at ext. 4-3680 or Randy Herrera at ext. 3-0664.

Parent Support Group—Meets the fourth Tuesday of the month at noon. For location, call Jayne Dutra at ext. 4-6400.

Senior Caregivers Support Group—Meets the second and fourth Wednesdays of the month at 6:30 p.m. at the Senior Care Network, 837 S. Fair Oaks Ave., Pasadena, conference room #1. Call (626) 397-3110.

Friday, October 30

Halloween Fashion Show—To be held on the steps of Building 180 starting at 11:45 a.m. Each participant in full costume will receive a $5 gift certificate for ERC merchandise. The United Way canned food donation drive will also begin.

JPL Dance Club—Meeting at noon in Building 300-217.

The Flying Karamazov Brothers—The troupe of juggles presents its latest production, *Sharps, Flats and Accidentals*, at 8 p.m. in Caltech's Beckman Auditorium. Tickets are $32, $28 and $24. For information, call (626) 395-4652.

Open Enrollment Ends—Benefits open enrollment phone lines will close today. Call (888) 605-9622 to make all necessary changes to 1999 benefits plans. Confirmation letters will be sent the week of Nov. 9 to all employees who make changes.

Fri., Oct. 30-Sun., Nov. 1

"School For Husbands"—This Theater Arts at Caltech production featuring Caltech students, faculty and staff will be presented at the campus' Dabney Lounge Friday and Saturday at 8 p.m.; Sunday at 3 p.m. Tickets are $15.

Tuesday, November 3

JPL Gamers Club—Meeting at noon in Building 301-227.

JPL Genealogy Club—Meeting at noon in Building 301-169.

Wednesday, November 4

"A New Mars: The View From Mars Global Surveyor"—Project Manager Glenn Cunningham will speak at 8 p.m. in Caltech's Beckman Auditorium. For information, call (626) 395-4652.

Associated Retirees of JPL/Caltech—Meeting at 10 a.m. at the Caltech Credit Union, 528 Foothill Blvd., La Cañada.

Chinese Language Class—Meeting at noon in Building 306-400.

JPL Drama Club—Meeting at noon in Building 301-127.

Russian Language Workshop—Meets from 7 to 9 p.m. on the Caltech campus. Some knowledge or previous study of the language is essential. For location and further information, call Joyce Wolf at ext. 4-7361.

Thursday, November 5

"Amazon Journal"—Oscar-nominated filmmaker Geoff O'Connor will show excerpts from his documentary and discuss his book of the same title. To be held at Caltech's Beckman Institute Auditorium at 7:30 p.m. Admission is free.

JPL Gun Club—Meeting at noon in Building 183-328.

Friday, November 6

Inti-Illimani—The eight-member ensemble from Chile will perform traditional and contemporary music with a global influence. Held at 8 p.m. in Caltech's Beckman Auditorium. Tickets are $32, $28 and $24. For information, call (626) 395-4652.

JPL Dance Club—Meeting at noon in Building 300-217.

Friday, November 6

"Space VLBI: Zooming In On Black Holes"—Robert Preston, Space VLBI project scientist, will speak at 1 p.m.in von Kármán Auditorium.

Fri., Nov. 6-Sun., Nov. 8

"School For Husbands"—This Theater Arts at Caltech production featuring Caltech students, faculty and staff will be presented at the campus' Dabney Lounge Friday and Saturday at 8 p.m.; Sunday at 3 p.m. Tickets are $15.

Tuesday, November 10

JPL Scuba Club—Meeting at noon in Building 168-427.

JPL Stamp Club—Meeting at noon in Building 183-328.

"The Structure and Design of A User-Friendly Web Site"—Don Cheney, web developer, Section 393, will speak at noon in von Kármán Auditorium.

Wednesday, November 11

Chinese Language Class—Meeting at noon in Building 306-400.

JPL/Caltech Flying Club—The fall membership meeting will be held at 7:30 p.m. on the Caltech campus in 269 Lauritsen. Anyone interested in flying club aircraft or learning to fly is invited. A brief business meeting will be followed by presentations on the Edwards Air Force Base high-altitude physiology course and flying the DC-3. E-mail or call Bob Ferber at ext. 4-3463 or Greg Detweiler at Caltech at (626) 395-1697.

JPL Drama Club—Meeting at noon in Building 301-127.

JPL Amateur Radio Club—Meeting at noon in Building 238-543.

JPL Toastmasters Club—Meeting at 5:30 p.m. in the Building 167 conference room. Guests welcome. For more information, contact Mary Sue O'Brien at ext. 4-5090.

Russian Language Workshop—Meets from 7 to 9 p.m. on the Caltech campus. Some knowledge or previous study of the language is essential. For location and further information, call Joyce Wolf at ext. 4-7361.

SESPD Lecture Series—Robert Staehle of Outer Planets/Solar Probe Projects will discuss Europa Orbiter, Pluto-Kuiper Express and Solar Probe. At 11 a.m. in von Kármán Auditorium.

Thursday, November 12

JPL Astronomy Club—Meeting at noon in Building 198-102.

JPL Golf Club—Meeting at noon in Building 306-302.

"The Pathfinders"—This new video production , a fast paced, 36-minute documentary of the Mars Pathfinder mission, will be shown in von Kármán Auditorium at 11:30 a.m. and 12:30 p.m.

Friday, November 13

JPL Dance Club—Meeting at noon in Building 300-217.

"Italy"—This travel film will be presented at 8 p.m. in Caltech's Beckman Auditorium. Tickets are $9 and $7. For information, call (626) 395-4652.

Fri., Nov. 13-Sun., Nov. 15

"School For Husbands"—This Theater Arts at Caltech production featuring Caltech students, faculty and staff will be presented at the campus' Dabney Lounge Friday and Saturday at 8 p.m.; Sunday at 3 p.m. Tickets are $15.

Saturday, November 14

Caltech-Occidental Concert Band—A free concert featuring the music of Gershwin, Mozart, and Bernstein will be held at 8 p.m. in Caltech's Beckman Auditorium. For information, call (626) 395-4652.

Downtown, West L.A. headed north, GPS research suggests

By MARY HARDIN

Downtown and West Los Angeles are moving toward the San Gabriel Mountains and the metropolitan area in between is being and will be squeezed slowly over the next several thousand years, according to researchers using precise satellite surveying techniques at JPL.

The measurements suggest that new mountains may be forming to the south of the high San Gabriel Mountains.

The results come from the Southern California Integrated Global Positioning System (GPS) Network, an array of 60 current and 250 planned GPS receivers that continuously measures the constant, yet tiny, movements of earthquake faults throughout Southern California.

"We've known for some time that the area between the coastline and the Mojave Desert is being squeezed together by the constant movement of Earth's crust," said Dr. Donald Argus, a geophysicist at JPL. "This new research helps pinpoint the area that's being squeezed. Specifically, downtown and West L.A. appear to be moving toward the San Gabriel Mountains at about one-fifth of an inch (half a centimeter) per year."

Argus was scheduled to present his finding Oct. 29 at the annual meeting of the Geological Society of America in Toronto, Canada.

"While this research does not mean that an earthquake in Los Angeles is imminent, one possible conclusion is that the earthquakes that occur in Los Angeles might be concentrated in the northern part of the basin," Argus said.

The GPS surveying system uses radio signals transmitted from a constellation of 24 Earth-orbiting satellites that are jointly operated by the U.S. Departments of Defense and Transportation. Equipment on the ground receives signals from several satellites at a time, allowing scientists to pinpoint the position of a receiver to better than 0.4 inch (1 centimeter).

"The regional project is designed for exactly this kind of study. Our goal is to observe and monitor the slow, small motion, called strain, of the ground in greater Los Angeles," said JPL's Dr. Frank Webb, chair of the Southern California network. "This research helps us learn where earthquakes are more likely to happen, and helps with estimating the regional earthquake hazard in Southern California. It enables other agencies to make priorities about earthquake mitigation activities, including emergency preparedness and retrofit strategies."

There are now about 60 GPS receivers on the ground around Southern California with two new sites being added every week. The earthquake network began in 1990 with only four GPS receivers as a prototype project funded by NASA. It detected very small motions of Earth's crust in Southern California associated with other California earthquakes in June 1992 in the town of Landers and in January 1994 in Northridge.

The Southern California network includes a number of institutions using GPS for earthquake research. The consortium is coordinated by the Southern California Earthquake Center, a National Science Foundation science and technology center headquartered at USC. The array is operated by JPL, USC, the U.S. Geological Survey and the Institute of Geophysics and Planetary Physics at UC San Diego's Scripps Institution of Oceanography.

More information about SCIGN is available at: http://milhouse.jpl.nasa. gov. ❑

Astronauts chosen for JPL's SRTM mission

An international cadre of astronauts will support JPL's next Earth radar-mapping mission when NASA launches Space Shuttle Endeavour in September 1999.

The Shuttle Radar Topography Mission (SRTM) evolved from the Space Radar Laboratory missions that flew on two space shuttle flights in 1994. The effort is a partnership between NASA and the Department of Defense's National Imagery and Mapping Agency (NIMA). In addition, the German and Italian space agencies are contributing an experimental high-resolution imaging radar system.

A key SRTM technology is radar interferometry, which compares two radar images taken at slightly different locations to obtain elevation or surface-change information. SRTM will take two images at the same time—one from the radar antennas in the shuttle's payload bay, the other from the radar antennas at the end of a 60-meter (200-foot) mast extending from the shuttle. Combining the two images produces a single 3-D image.

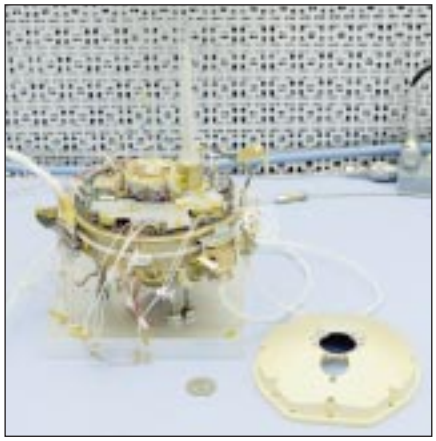
The SRTM 3-D pictures—called visualizations—of Earth's surface will be used by scientists for studies of flooding, erosion, land-slide hazards, earthquakes, ecological zones, weather

See SRTM, page 6

Next stop: KSC

Deep Space 2 Project Manager Sarah Gavit is interviewed in Building 125 clean room by channel 4's Conan Nolan during the last media viewing of the two probes before they are shipped to Kennedy Space Center for a Nov. 10 integration onto the Mars Polar Lander. Photo at right shows the small size of the device's aftbody. Deep Space 2, the second of several missions in the New Millennium Program, will crash into the surface of Mars at speeds of up to 645 kilometers per hour (400 mph) and must survive extremely low temperatures. The Mars Polar Lander is scheduled for launch Jan. 3, 1999, just 24 days after the Mars Climate Orbiter is launched.

BOB BROWN / JPL PHOTO LAB



McCleese, Zurek named to new positions

Dr. Daniel McCleese

Dr. Richard Zurek

Two JPL employees have recently been named to new management positions at the Laboratory.

Dr. Daniel McCleese has been named chief scientist and manager of the Office of Strategy and Science Program for the Mars Exploration Directorate, and Dr. Richard Zurek has been named manager of the Earth and Space Sciences Division.

McCleese is principal investigator on the Pressure Modulator Infrared Radiometer, an instrument on Mars Climate Orbiter due for launch in December that will study the red planet's climate and weather. McCleese chairs the Mars Expeditions Strategy Group, a NASA advisory panel that developed the exploration strategy that the space agency and its international partners are following in the search for evidence of life on Mars. The group provides guidance to NASA and JPL on the current series of missions to Mars, including future sample-return missions.

McCleese has a doctorate in atmospheric physics from Oxford University, where he was a Fulbright Scholar. He joined JPL in 1976 and managed the Planetary Atmospheres Section before serving most recently as manager of the Earth and Space Sciences Division.

Zurek will continue as project scientist for the Mars '98 mission, which will launch two spacecraft, Mars Climate Orbiter and Mars Polar Lander, in December 1998 and January 1999, respectively. He has served as lead scientist for JPL's Earth and Planetary Atmospheres Research Element since 1994. Zurek has studied the upper atmosphere of Earth and the atmosphere of Mars, using data from spacecraft including the Upper Atmosphere Research Satellite (UARS), Mariner 9 to Mars and the Viking orbiters and landers at Mars.

Zurek has a bachelor's degree in mathematics from Michigan State University and a doctorate in atmospheric sciences from the University of Washington, Seattle. Following post-doctoral appointments in research at the National Center for Atmospheric Research and the University of Colorado's Laboratory for Atmospheric and Space Physics, he joined JPL in 1976. ❑

News Briefs

Andrea Stein

Andrea Stein, manager of the Technical Information Section 644, has been awarded the 1998 Medal of Excellence Award by Women at Work, a non-profit career and job resource center based in Southern California.

Stein was scheduled to receive the award Oct. 29 at the Doubletree Hotel in Pasadena.

Employed at JPL since 1978, Stein was nominated for the award by JPL's Advisory Council for Women. The council said it based the nomination on Stein's exceptional leadership, fairness, judgment, decision making, dedication, innovation and communications skills.

She is a member of the Caltech Management Association, Society for Technical Communication, Planetary Society and Research Institutes Publishing Executives. ❑

Mel Roberts

Mel Roberts, acquisition operations and planning principal in the Engineering and Science Directorate, has received NASA's Technical Leadership Award for his leadership and advocacy in support of the agency's Small and Disadvantaged Business Utilization Program in the procurement area.

Roberts accepted the award at NASA's Minority Business and Advocates Awards Ceremony at Headquarters last month. During the ceremony, he also accepted an award on behalf of the Laboratory, as JPL was recognized for its outstanding performance in contracting and subcontracting to small, small disadvantaged, and women-owned businesses.

During FY '97, JPL met or exceeded all NASA-negotiated goals in those categories.

Roberts is contract technical manager for the JPL's technical support efforts personnel contracts (TSEPs), which involve 600 contractors and total about $300 million in value. He also serves as a liaison between JPL's technical divisions and program/project directorates to the Business Opportunities Office and Acquisition Division. ❑

JPL has named an asteroid in memory of CNN space correspondent **John Holliman**, who was killed in a car accident Sept. 12.

The asteroid, discovered by JPL astronomer **Eleanor Helin** on April 30, 1989 at the Palomar Observatory, will now be called 6711 Holliman. It has a diameter of about 10 kilometers (6 miles). The asteroid moves in an orbit between Mars and Jupiter.

Holliman reported extensively on the role JPL played in space exploration. He was the network's lead anchor for the Pathfinder mission to Mars in July 1997, reporting on the landing and the subsequent mission as the spacecraft sent back video from the planet's surface. ❑

The Caltech Concert Band seeks a few more players to fill out the group.

Particularly needed at this time, said director **William Bing**, are flute players and a bassoonist.

If interested, e-mail him at wbing@cco.caltech.edu. ❑

Galileo

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magnetic field. "This seemed to fit nicely with other data supporting the idea that beneath Europa's icy crust, a liquid ocean might be serving as a conductor of electricity," Kivelson said.

Armed with that information, Kivelson and UCLA colleagues Drs. Krishan Khurana, Raymond Walker and Christopher Russell set out to test a similar theory about Callisto, "although it seemed far-fetched at the time," Kivelson said. The team went back and studied data obtained during Galileo's flybys of Callisto in November 1996, and June and September of 1997.

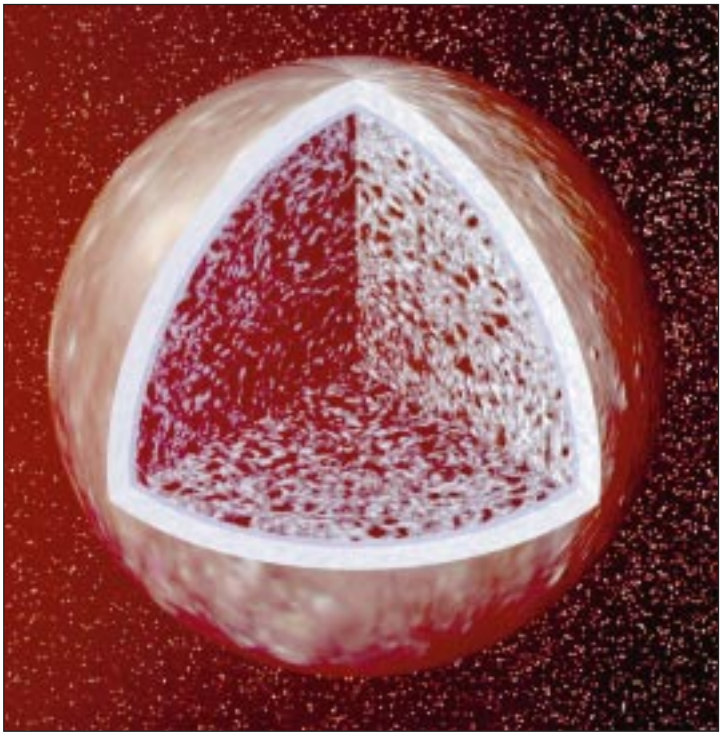
Kivelson and her colleagues found signs that Callisto's magnetic field, like Europa's, is variable, which can be explained by the presence of varying electrical currents associated with Jupiter that flow near Callisto's surface. Their next challenge was to discover the source of the currents.

"Because Callisto's atmosphere is extremely tenuous and lacking in charged particles, it would not be sufficient to generate Callisto's magnetic field; nor would Callisto's icy crust be a good conductor, but there very well could be a layer of melted ice underneath," Kivelson said. "If this liquid were salty like Earth's oceans, it could carry sufficient electrical currents to produce the magnetic field."

Lending further credence to the premise of a subsurface ocean on Callisto, Galileo data showed that electrical currents were flowing in opposite directions at different times. "This is a key signature consistent with the idea of a salty ocean," Khurana added, "because it shows that Callisto's response, like Europa's, is synchronized with the effects of Jupiter's rotation."

Although scientists consider the possible presence of an ocean on Europa as one factor hinting that life could have developed there at some point, it is doubtful that Callisto could harbor life, according to Galileo Project Scientist Dr. Torrence Johnson of JPL.

"The basic ingredients for life—what we call 'pre-biotic chemistry'—are abundant in many solar system objects, such as comets, asteroids and icy moons," Johnson explained. "Biologists believe liquid water and energy are then needed to actually support life, so it's exciting to find another place where we might have liquid water. But energy is another matter, and currently, Callisto's ocean is only being heated by radioactive elements, whereas Europa has tidal energy as well," from its greater proximity to Jupiter.



This artist's concept, a cutaway view of Jupiter's moon Callisto, is based on recent Galileo data that indicates a salty ocean may lie beneath Callisto's icy crust. The moon's cratered surface lies at the top of an ice layer, depicted here as a whitish band, which is estimated to be about 200 kilometers (124 miles) thick. Immediately beneath the ice, the thinner blue band represents the possible ocean, whose depth must exceed 10 kilometers (6 miles), according to scientists studying data from Galileo's magnetometer. The mottled interior is composed of rock and ice.

Galileo flies by Callisto four more times between May and September of 1999, which may yield more clues about the possibility of a Callisto ocean. However, Kivelson said that scientists will rely heavily on theoretical models to test their interpretations about Callisto.

Kivelson and her team also are reexamining magnetometer data from Jupiter's largest moon, Ganymede, to address the tantalizing concept that Callisto and Europa may not be the only moons of Jupiter with subsurface oceans.

The latest Galileo exterior images of Callisto, released on Oct. 13, and a new artist's concept of a cutaway view of the moon's interior are available on the Internet at http://photojournal.jpl.nasa.gov . ❑

DS1

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time appears to fail for a second or two, but for the most part is operating normally. This is not expected to impact the mission.

The flight team spent the first two days after launch transitioning the spacecraft from launch to flight configuration. Two of the new technologies that the mission was designed to flight-test were validated within the first two hours after launch—its solar concentrator arrays, which use cylindrical lenses to concentrate sunlight onto 3,600 solar cells; and a small deep-space transponder, or radio transmitter/ receiver.

Another key new technology to be validated for spaceflight, the ion engine, will be tested for the first time in approximately one week. Once it is in regular use, the engine will thrust for 50 percent of the primary mission.

During the mission, a total of 12 new technologies are scheduled to be validated for space missions of the 21st century. In addition to the solar concentrator arrays, small deep-space transponder and ion engine, the other technologies are:

• Autonomous navigation, which will allow the spacecraft to take over parts of its navigation formerly carried out by ground controllers;

• Remote agent, a software package capable of planning and executing many onboard activities with only general directions from ground controllers;

• Beacon monitor operations experiment, which simplifies the way that the spacecraft communicates information about its condition to ground controllers;

• Miniature Integrated Camera Spectrometer (MICAS), a 12-kilogram (26-pound) containing a camera, ultraviolet imaging spectrometer and infrared imaging spectrometer;

• Plasma experiment for Planetary Exploration (PEPE), which combines several instruments that study space plasma, or charged particles, most of which flow outward from the Sun;

• Ka-band solid-state power amplifier. The as-yet-seldom-used Ka-band, which thus far has proven more vulnerable to interference from weather on Earth, allows the same amount of data to be sent over smaller antennas with less power as compared with missions using lower-frequency, X-band transmitters;

• Low-power electronics, which involves low-voltage technologies, low-activity logic, low-energy architectures and micro-power management;

• Multifunctional structure, combining thermal management and electronics in one load-bearing structural element, in contrast to traditional spacecraft fabrication that separates these elements;

• Power activation and switching module, which combines eight power switches grouped in redundant pairs, capable of monitoring four electrical loads.

Deep Space 1 will attempt to fly by asteroid 1992 KD in July 1999. The asteroid, discovered by JPL astronomers Eleanor Helin and Ken Lawrence in 1992, was chosen from more than 100 flyby possibilities. The asteroid's diameter is believed to be about 3 to 5 kilometers (2 to 3 miles), and during the flyby the spacecraft's autonomous navigation system will attempt to guide it to within 10 kilometers (6 miles) of the asteroid's surface, making it the closest flyby of a solar system body ever attempted.

Scientists hope to learn more about 1992 KD's shape, size, surface composition, mineralogy, terrain, rotation speed and, perhaps, its interaction with the solar wind.

The Deep Space 1 spacecraft was designed and built by Spectrum Astro Inc. of Gilbert, Ariz. ❑

Cassini program team receives NASA's most prestigious honors

By MARY BETH MURRILL

The teams that made the most outstanding contributions to the success of JPL's Cassini mission to Saturn were presented with NASA's prestigious Group Achievement Awards in a recent ceremony held at JPL.

The event marked the first anniversary of the Cassini's launch Oct. 15, 1997.

"On behalf of the entire NASA team, I would like to congratulate the honorees and thank all of you for doing your part to open the air and space frontiers for our children," said NASA Administrator Daniel Goldin in congratulatory remarks sent to the Cassini program team.

"Cassini's launch and first year of flight have been characterized by flawless performance, and we want to honor the teams of people who've made that possible," said Cassini Program Manager Bob Mitchell.

Mitchell presented the awards to team leaders for groups representing the mission's science and mission design, the spacecraft development, orbiter instruments, mission and science operations, support services, spacecraft and instrument contractors, the Titan IV launch vehicle, the Huygens probe and science payload.

The winners:

Program Office: Program Office Team, Program Review Board, Launch Approval Team, Planning, Assessment and Integration Team.

Science and Mission Design Team: Science and Mission Design Office, Cross-Systems Engineering Team, Navigation Design Team, Public Outreach Team, Trajectory and Mission Design Team, Mission Engineering Team, Investigation Scientists.

Spacecraft Team: Spacecraft Office Team, Spacecraft Review Board, Antenna Subsystem Team, Assembly, Test and Launch Operations Team, Attitude and Articulation Control Subsystem Team, Cabling Design and Fabrication Team, Command and Data Subsystem Team, Electronic Packaging and Fabrication Team, Electronic Parts Team, Environmental Requirements and Test Team, Materials and Contamination Team, Mechanical Devices Team, Mechanical Ground Support Equipment Design and Fabrication Team, Mechanical Hardware Fabrication Team, Mechanical Systems Team, Mission Assurance and Safety Team, Power and Pyrotechnic Subsystem Team, Problem/Failure Operations Center, Propulsion Module Subsystem Team, Quality Assurance Team, Radio Frequency Instrument Subsystem Team, Radio Frequency Subsystem Team, Radioisotope Thermoelectric Generator and Radioisotope Heater Unit Team, Reliability Engineering Team, Structures Design and Analysis Team, Systems Engineering Team, Telecommunications Systems Team, Thermal Design and Implementation Team.

Instruments (Orbiter): Science Instrument Office Team, Payload Engineering Team, Science Calibra-tion Subsystem Team, Cassini Plasma Spectrometer Team, Cassini Radar Team, Composite Infrared Spectrometer Team, Cosmic Dust Analyzer Team, Dual Technique Magnetometer Team, Imaging Science Subsystem Team, Ion and Neutral Mass Spectrometer Team, Magneto-spheric Imaging Instrument Team, Radio and Plasma Wave Science Team, Radio Science Subsystem Team, Ultraviolet Imaging Spectrograph Team, Visible and Infrared Mapping Spectrometer Team, Interdisciplinary Scientists (Orbiter).

Mission and Science Operations: Mission and Science Operations Management Team, Mission and Science Operations Review Board, Data and Computing Services Element, Deep Space Network Team, Distributed Operations Interface Element, Real-Time Operations Element, Science Operations Element, System Engineering and Coordination Element, Uplink Operations Element, Flight System Operations Element.

Support Services: Acquisition Division Team, Contract Audit Team, Cost and Performance Analysis Team, Cost and Price Analysis Team, Documentation Services Team; Duplicating, Document Distribution, and Engineering Document Services Team; Facilities Team, Graphics Services Team; Office of General Counsel; Photographic/ Imaging Team, Property Team, Security and Protective Services Team, Shipping and Receiving Team, Transportation Team, Travel Accounting Team.

Cassini Spacecraft and Science Instrument Major Contractors: Actel Corporation (field programmable gate array), Adcole Corporation (sun sensor), AEC-ABLE Engineering Co., Inc. (magnetometer boom), AlliedSignal Aerospace Company, Guidance Systems Division (reaction wheels), Cincinnati Electronics (visual infrared mapping spectrometer), CTS Corporation, Microelectronics Division (solid state power switch), Foils Engineering (launch approval support), GEC Plessy Semiconductor, Inc. (CMOS logic devices), Harris Semiconductor Space Operations (CMOS logic devices), Honeywell, Inc., Hughes Aircraft Company, Hughes Electron Dynamics Division (X-band traveling wave tube assemblies), Johns Hopkins University, Applied Physics Laboratory (magnetospheric imaging instrument), Kaiser Marquardt, Inc. (Cassini Rocket Engines), Linear Technology Corporation (RAD-HARD high-reliability parts), Litton Guidance and Control Systems (electronic subassembly packaging and fabrication support), Litton Guidance and Control Systems Space Operations (inertial reference unit), Lockheed Martin Astronautics (propulsion module subsystem), Lockheed Martin Federal Systems (engineering flight computer, processors, and ASICs), Lockheed Martin Information Systems (power pyro subsystem), Microsemi Corporation (RAD-HARD high-reliability parts), Motorola, Inc. (deep-space transponders), National Semiconductor (RAD-HARD high-reliability parts), Officine Galileo (stellar reference units), Pressure Systems Incorporated (propulsion subsystem tank forgings), Q-Tech Corporation (oscillators), Schaffer Magnetics Incorporated (imaging science subsystem filter wheels), Southwest Research Institute (Cassini plasma spectrometer), TLD Systems (ADA software compiler), TRW Incorporated (solid-state recorders), University of Arizona (descent imager/spectral radiometer), University of Chicago (cosmic dust analyzer/high-rate detector), University of Colorado (ultraviolet imaging spectrograph), University of Iowa (radio and plasma waves subsystem), UTMC Microelectronics Systems, Inc. (ASICs).

Titan IV: Titan IV United States Air Force Management Team.

Huygens Probe Project Team: European Space Research and Technology Centre (Huygens Project Team), European Space Operations Centre (Operations Team), Aerospatiale (prime contractor), Aerospatiale Acquitaine (front shield), ALCATEL ETCA S.A. (power conditioning), Alenia (probe data relay), Alliant Techsystem Inc. (batteries), APCO Tech Systems (back cover structure), Austrian Aerospace (EGSE, MGSE, MLI), CAPTEC (software verification), CASA (structure, harness) CIR (payload simulator), CRISA (structural and thermal unit model), Daimler-Benz Aerospace (integration and test), Dassault Aviation (pyros), DNV (reliability, configuration, control), FCI Interconnections (connectors), Fokker Space BV (special model SM2), IGG Component Ltd. (high-reliability parts), Kongsberg Aerospace (system EGSE), LABEN (command and data handling), Logica (on-board software), Martin-Baker (parachutes), Oerlikon Contraves AG (shield structure and separation mechanisms), Saab Ericsson Space (antennas, receivers), Systron Donner (probe accelerometer), Terma Elektronik AS (timer unit), UPCO Technologies (PDD cartridge), Ylinen Electronics Co. (radar altimeter).

Huygens Payload: Aerosol Collector and Pyrolyzer Team, Descent Imager/Spectral Radiometer Team, Doppler Wind Experiment Team, Gas Chromatograph/Mass Spectrometer Team, Huygens Atmospheric Structure Instrument Team, Surface Science Package Team, Interdisciplinary Scientists (Probe). ❑

SRTM

Continued from page 3

forecasts and climate change. The data's military applications include mission planning and rehearsal, modeling and simulation. Other possible uses include optimizing locations for cellular phone towers and improving topographic maps for backpackers, firefighters and geologists.

The SRTM STS-99 crew is: Commander Kevin Kregel; Pilot Dom Gorie; and Mission Specialists Dr. Janet Kavandi, Dr. Janice Voss, Dr. Mamoru Mohri, and Gerhard P. J. Thiele.

Kregel was selected as an astronaut in 1992. He has logged more than 41 days in space during three missions.

After being selected as an astronaut in 1994, Gorie served as pilot earlier this year on STS-91, the ninth and final Shuttle-Mir mission of the U.S.-Russian Phase One Program.

Kavandi was selected as an astronaut in 1994 and flew on board Discovery earlier this year with Gorie on STS-91.

With STS-99, Voss will be making her fifth space flight.

Mohri, of the Japanese Space Agency, is a member of the 1996 astronaut class. STS-99 will be his second space flight.

Thiele, of the European Space Agency, is a member of the 1996 astronaut class. This will be his first flight. ❑

Lab's cross-cultural mentoring program kicks off

JPL employees are encouraged to participate in Laboratory's Cross-Cultural Mentoring Program, which supports NASA's and JPL's goal to build a work force that is representative, at all levels, of America's diversity.

On Oct. 26, Deputy Director Larry Dumas kicked off the semi-annual program with an e-mail encouraging participation. The program description and application were included.

The program, begun with a six-month pilot in 1995–96, was developed to enable managers and employees to become more open to a diverse way of thinking, behaving and communicating, and to become more aware of career development opportunities.

The program will match protégés with mentors in order to increase exposure of both groups to cultural diversity and expose each group to their experiences and work environments. Participation is voluntary.

Protégés and mentors will be given an orientation during which they will set mutual goals. The pairs will meet every two weeks for a period of one year to discuss various topics such as their culture, career goals, JPL cultural norms, and JPL procedures. Through the one-on-one interaction, the protégé will gain insight into JPL which will assist the protégé in career decisions.

Additionally, training sessions, group meetings and other activities will provide opportunities for engaging in discussions and sharing ideas.

Protégés in the pilot program reported having increased visibility, a better understanding of JPL processes and improved communication across differing backgrounds. The mentors reported increased understanding of cross-cultural differences and having an opportunity to impart "lessons learned."

To qualify as a protégé, the individual must be a minority or female at Staff or Senior level and be a regular, benefit-based, full time, exempt JPL employee with at least two years' JPL experience. Division mentoring representatives match protégés with mentors who are senior in experience and from different cultural backgrounds and divisions.

Deadline for applications to reach Fairhurst, mail stop T1703, is Nov. 11. The divisions will select the finalists for the 18 available protégé slots. All applicants are notified of their status on Jan. 7, 1999. The mandatory orientation meeting for mentors and protégés will be on Jan. 28.

Members of the design team are: Alice Fairhurst (chair, Section 195), Kent Frewing (310), Holly Hargis (340), Joy Hodges (724), Edwin Kan (341), Carmen Nunez-Morton (303), Phil Morton (341), Betty Preece (213), Tom Renfrow (389), Tuyet-Lan Tran (394), and Gail Watson-Ashe (387). The committee members represent the Advisory Council for Minority Affairs (ACMA), the Advisory Council for Women (ACW), JPL division mentoring representatives, and experienced mentors.

For more information about the program, contact Alice Fairhurst at ext. 4-3124 or check the Career Services and Professional development home page at http:// hr/development/careers/ .

Other web sites providing information include:

ACMA (http://vision.jpl.nasa.gov/ jpl/ACMA);

ACW (http://eis/acw);

African-American Resource Team (http://eis/~hdillard/aart)

Amigos Unidos (http://eis/au);

Asian-American Council (http://eis/aac)

Diversity Affairs Office (http://eis/hr/diversity/newsletter). ❑

Passings

Barry Cooper, 53, technical group supervisor for the Commun-ication & Messaging Systems Group in Section 394, died of heart failure Oct. 17 at Verdugo Hills Hospital.

Cooper had worked at JPL since 1970. One of his recent accomplishments at JPL was the delivery of the current Eudora system for e-mail.

He is survived by his wife, Tonja Harris of Section 314; daughter Rachael and sons Sammy and Kevin.

Memorial services were held Oct. 22 at Forest Lawn Memorial Park, Los Angeles.

Cooper's family requested that in lieu of flowers, donations in his name be made to Children's Hospital in Los Angeles. ❑

Roy Cox, 80, a retired security guard in Section 613, died of emphysema and pneumonia Oct. 13 at his home in Gig Harbor, Wash.

Cox joined the Laboratory in 1980 and retired in 1983. He is survived by his wife, Leticia; daughter Darlene Valosay and two grandchildren. ❑

Retirees

The following employees retired in November:

Daniel Bergens, 45 years, Section 507; **Allan Conrad**, 39 years, Section 785; **Paul Westmoreland**, 39 years, Section 900; **Richard Arguijo**, 36 years, Section 351; **Franz Borncamp**, 36 years, Section 920; **Fred Krogh**, 31 years, Section 395; **Edgar Svendsen**, 31 years, Section 507; **Herbert Fessinger**, 17 years, Section 195; **Joan Strange**, 11 years, Section 820. ❑

LETTERS

We would like to express our sincere appreciation and gratitude to our friends in the IBS, NBS and Acquisition divisions and all others who attended and contributed to our twins' baby shower. We are overwhelmed and touched by your generosity. Each and every gift we received is very needed. Extra special thanks to Audrey Ridley, Glenda Anderson, Susan Flanagan and Suzy Dollar for coordinating and organizing this truly memorable event.

Melanie and Richard Budiman

❑❑❑

Many thanks to all the friends who made my years at JPL so wonderful. Special thanks to those who attended my retirement luncheon and contributed to the great gifts. Maggie Porter did a superb job of arranging it. Thanks, Maggie. I will miss all of you at JPL a lot and will think of you often.

Fred Sanders

❑❑❑

Thanks to Linda, Joan, DiDi, Sheila, Donna, Debbie, Don and the others for throwing the best-ever retirement party, and the speakers for their kind words about my 45-year career at JPL. The gifts were wonderful too. My wife, Lillian, and I will have fond memories of the event for the rest of our lives.

Dan Bergens

FOR SALE

AIRLINE TICKET, R/T, for anywhere American Airlines flies in U.S., $475; FISH TANK, 10 gal., with everything, incl. 2 extra $50 spare filters, $45; PAINTINGS, modern art, orig. up to $1,000, sell $50-$100; SOFTWARE, Word 97 upgrade, $19; WordPerfect Suite 7.0, $25; Eudora 4.0, $19; Adobe Photodelux, $19; IBM Via Voice, $19; Snappy 3.0 video capture, never used, $49. 626/335-4409.

ARMOIRE, dark pine, approx. 73" H x 41" W x 24" D, lots of storage space, good condition, $100; COAT, leather, full length, size 10, burgundy, trench-coat style, excellent condition, $100. 249-6883.

BED, twin, with box springs in gd. condition, $50. 626/449-8461.

BED FRAME, king size, never used, $15/obo. 626/568-8298.

BEDSPREAD, king, periwinkle blue, lightly quilted, almost new, $30. 626/398-4960.

BICYCLE, Bertoni "Italian frame", 59cm, Shimano 600 grupo, clipless pedals, brand new Mavic clincher wheels, regal seat, pristine cond., $400; add shoes & helmet, $450. 213/660-9272, Carlos.

BICYCLE, Fuji 12-speed, medium size, good condition, aluminum wheels, Suntour shifters, $100 firm. 626/794-0886, Ted.

BICYCLE, vintage Bob Jackson touring tandem with nice components including decent brake, $1,000. 626/796-3314.

CAMCORDER, Sony Hi8, model CCD-TR700, exc. condition, $350. 626/355-8561.

CAMERA EQUIPMENT: 2-Canon F1 bodies; 2-135mm lenses; 2-50mm lenses; external light meter; strobe; various filters & accessories; special price for complete package, or sold separately. 541-1340, eves.

CARPET, wool, light slate blue, 12' x 13', pd. $750 10 yrs. ago; sell for $100. 626/357-8210.

CD PLAYER, Denon, 5-disc changer, exc. cond, $75; CD STORAGE TOWERS (2), hold about 200 CDs, black metal, $25. 626/966-0023, Gregg.

CEMETERY PLOTS (4), in Rose Hills Memorial Pk., Cypress Lawn Section; 2 gravesites for $1,400 or 4 for $2,500. 805/739-9204.

COMPUTER, Intel 286 8/12MHZ PC w/80MB HD, 2MB RAM, 15" color-enhanced VGA, 5 1/4" FD, computer stand, 1200 baud Hayes smart modem, keyboard, monitor, CPU cover; all in exc. cond., $200/obo. 626/446-6456.

COMPUTER, Packard Bell, 486 SX-25, w/Windows 3.1, extremely compact, no monitor, $75. 626/398-4960.

COMPUTER, PC CPU, 486 upgraded to 150 MHz Pentium, 1.2 MB drive, 16 MB memory, $300/obo. 626/577-6638, Suzanne.

COMPUTER, PowerMac 520c laptop, 16Mb RAM, 320Mb hard drive, 19.8 modem, Ethernet & SCSI, 2 batteries, external CD & Zip drive, software, $1,000/obo. 957-2898, Keith.

COMPUTER POWER CONTROL CENTER, 5 power switches + 1 master switch, 5 surge-protected outlets + 2 modem/fax/phone jacks, new, $20. 790-3899.

CRIB and (new) mattress, $75; crib bedding also available. 626/798-1839.

DIET TAPES, Jenny Craig, set of 14, $50. 790-3899.

DINING SET, Mediterranean style, large, with 6 high back chairs, 2 with arms. 790-4811, eves.

EXERCISE MACHINE, NordicTrack Achiever w/Fitwatch, exc. cond., $350. 805/255-5645.

FURNITURE: antique oak dresser w/mirror, $175; Singer sewing mach. w/wood cabinet, 40 yrs. old, $40; oak sq. side table, $40; comforter/blanket wood stand, $25; antique oak 3-drawer rectangular dresser, $225; all like new. 626/564-9155, after 5:30 p.m.

FURNITURE: 2 car seats, $20/ea.; washer, new, $250; gas dryer, $250; small microwave, $50; bedroom set, cal king frame w/matching dresser, 2 night stands, $500; dining table, round w/4 capt. chairs; changing table, $35; 13" color TV, $50. 548-5082.

LAMPS (night), 4 units, crystal ball shape; 2 are 1 ft. tall (7" dia), 2 are 1.5 ft. tall (9" dia); $30 for sm. pair, $50 for lg. pair, $70 for all/obo (909) 592-0780, Ana.

LAUNDRY CART, heavy duty, hotel-style wheeled but suitable for home use; heavy gauge chrome tubing, canvas bag, about 30" square w/ball bearing caster wheels; vg condition; over $100 when new, sell $40; 3 blks from JPL. 952-8803, Don or Carol.

MAGAZINES, Sky & Telescope back issues, About 100 from 1978-86, good condition, $50/obo. 626/296-0912.

ORGAN, Technics SX-EX50M, U & L manual each 44 keys, pedal 13 keys, 1-touch play, play sequencer, voice setting computer tone selector, techin-chord, tempo set, Autoplay chord, too many features to list, like new, $2,000/obo. 626/446-6456.

ORGAN, Yamaha 415 electronic console w/13 pedals, 3 keyboards, 144 rhythm patterns, pd. $7,500, sacrifice for $3,000. 790-3899.

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PERSIAN RUGS, assorted, different sizes and kinds, $100 to $1,690 each. 626/446-6456.
PERSONAL INFORMATION MANAGER, Seiko "Phone-Pal", $25. 790-3899.
PLATES, collector's, cute cat design, $5/ea. 805/297-5234.
PRINTERS, Epson FX-80 dot matrix, like new, $49/obo; Epson LQ-510 dot matrix like new, $99/obo. 626/446-6456.
SECURITY SYSTEM, home, DSC PC1500 w/motion detector, siren, YUASA battery, transformer, cent. control box & keypad, $50. 790-7062.
SHELVES, Mahogany "Barrister" style; antique, unusual collapsible design; 8 shelves in set plus top and base; $500 - prefer to sell as complete set. 626/796-3314.
SOFTWARE for Macintosh, all $25 and under. 790-3899.
SOFTWARE, Windows, never used: Windows 95 complete version ($49), Office 97 CD tutorial ($9), Print Studio Window Draw premier edition w/33,000 clip art bonus software ($19), Windows 95 tutorial ($9), Decent 2 ($9), Sealed Deluxe typing tutorial ($9), Compton's New Century CD encyclopedia ($9), HP gold blank recordable CDR ($3). 626/335-4409.
SPORTS COINS, '88 Topps, 36 unopened baseball packs; Ryan, Seaver, Bench, MacGwire, Bonds, Valenzuela; $20 for box; CARDS, '87, unopened, poss. MacGwire rookie + other major stars, $10 for 45 cards. 626/914-6083.
SPORTS EQUIPMENT, rower, like new, $50/obo; ski simulator, like new, $50/obo. 626/446-6456.
SPRINKLER VALVE ADAPTERS Lawn Genie automatic, model 756LG 3/4, new, $10 each. 790-3899.
STOOLS (2), like new, quality, hardly used, moving out sale, $290/pair/obo. 626/446-6456.
SWEATER, Coogi, from Australia, size small/medium, sells in Nordstrom for $325, new, $100. 790-3899.
TABLE, dining rm., round, mahogany, sits 8 w/two extensions, almost new, comes w/6 matching chairs, $700/obo; matching China buffet, $1,000/obo; all for only $1,500/obo. 909/592-0780, Ana.
TABLE TENNIS TABLE, Harvard, exc. cond., 1 yr. old, pd. $180, sell $80. 562/695-5197.
TV STAND, oak, on coasters w/storage below and VCR shelf, can easily accommodate up to 27", $50. 626/398-4960.
WATER JUG, Brita, 2-gallon unit with 4 unused filters, $20/obo. 626/568-8298.

VEHICLES / ACCESSORIES

BED LINER for small pickup truck, black plastic, good cond., best offer. 626/966-5391.
CAMPER SHELL for full-sz. Ford truck, incl. carpeted seats & storage units, blue, $600/obo. 626/797-5387.
'87 DODGE Ram van custom conversion, brown/gold, captain's chairs & more, runs great, dependable, 48,000 mi., $5,200. 249-3677.
'94 FORD Aspire, 2-dr. hatchback, red, 5-spd., a/c, CD/stereo, dual airbags, good cond., runs exc., no engine problems, 70K mi., $3,600 firm. 626/574-7398.
'95 HONDA Accord EX, loaded, mint condition, 24K mi., LoJack, 12-CD changer in trunk, rear spoilers, leather interiors, power moonroof/windows/ locks/seats/etc., regular maintenance, 4 door, cashmere, $18,500. 714/771-4737.
'94 HONDA Civic EX, black, 2 dr., sunroof, power locks, a/c, 5 speed, tinted glass, 45k miles, 75k warr., vg condition, all maint. papers, $10,500/obo. 790-7129.
'85 HONDA Shadow 700cc, V-Twin, shaft drive, automatic valve adjustment, 6 speed (w/overdrive), water cooled, excellent tires, low maintenance, reliable, good condition, red and black, includes street fairing and Tourmaster saddlebags, $1,800. 626/794-0886, Ted.
'81 HONDA CB 750K w/windjammer fairing, black/chrome, good cond., runs great, needs minor elec. wk., 40K mi., $800/obo. 626/574-7398.
'88 KAWASAKI Ninja 600, 10.5K mi., accessories incl. Arai helmet, kryptonite lock, $2,250/obo. 323/223-5086.
'97 MAZDA Protégé, dark blue w/tan interior, 41,000 mi., Mazda-maintained, $10,500. 626/294-0426.
'89 MAZDA MPV, gd. cond., new paint, tires, radiator, engine work; $4,950/obo. 626/799-0109.
'91 NISSAN Maxima SE sedan, pearl white, automatic V-6, power window, power lock, am-fm stereo, cassette, Sony 10-disc changer, sunroof, new tires, tint windows, very clean car, exc. condition, $7,600/obo. 626/584-0878, x116.
'83 NOMAD travel trailer, '93 interior, 24 ft., frnt lounge, slps. 4, SC, <1 yr. awning, air, microwave, TV ant, am/fm/cass., bath fan, equalize hitch incl., TR6276, $4,000. 626/355-6891.
'89 OLDS 88 Royale sedan, 4 door, original owner, exc. condition, $3,500. 626/355-8561.
'89 PONTIAC Grand Am SE, quad4 engine, pwr. windows & locks, am/fm/cass. stereo, orig. owner, $4,500/obo. 323/255-1106.
'85 PORSCHE 911 Carrera, 1 owner, all service records, 94K mi., $18,500. 619/429-1247.
'91 SUZUKI DR 350S, street & fwy.-legal enduro, grt. cond., new tires, brakes, chain & sprocket; Baja 4-gal. fuel tank; oil cooler; O'lean racing exhaust w/spark arrestor; great commuter, easy to park. 626/798-3041.
'98 TAHOE trailer by Thor, 24', queen-sz. bed, sofabed, dinette-bed, microwv., awning, air, stereo, all amenities, used 3x, $11,500. 805/533-4255.
'94 TETON 5th-wheel trailer, 40' Atlanta III, 3 slideouts, sbs fridge, conv. microwave, 2 a/c and furnaces, 2 roof fans, 7KW Onan gen., HWH hydraulic lifters, awnings, new tires, no smoking, mint cond., in Palm Springs. 760/345-3713.
'88 TOYOTA Corolla FX, 2-dr., white, new tires, runs great, registered to Sept. '99, will be smog-checked before sale, $2,099/obo. 626/744-2767.
'85 TOYOTA Celica GT liftback, red, 3D, 112,673 mi., a/c, cruise cont., am/fm, great cond., $1,800/ obo. 248-4003.
VW Jetta, red, fast, cute, $1,500. 248-0491.

WANTED

APARTMENT OR HOUSE in Pasadena, 3 bd., close to Caltech if possible. 626/791-7044.
BABYSITTER in Valencia, infant needs care MWF, must drive, flexible salary. 805/291-1602.
DISKS for SAT test prep, 3.5", Kaplan or Princeton. 626/969-6938, Mary.
ROOMMATE to share furnished 3-bd., 3-ba. Pasadena apt. with Caltech post-doc, move in immed., $400 + 1/3 util. 626/351-9641.
SHOPPERS, Elks Ladies Auxiliary will hold "Dress Party - Shop 'Til You Drop" Wed., Nov. 11, 5:30-8:30 p.m.; latest famous fashions for winter and holidays from Nordstrom, Robinson's-May, Macy's, Bloomingdale's; sizes 4-24; nothing over $38; no admission; 27 W. Huntington Dr., Arcadia, lots of parking in 2 rear lots.
SPACE INFORMATION & memorabilia from U.S. & other countries, past & present. 790-8523, Marc Rayman.
VANPOOL RIDERS, stops along the 118, off-site contractors welcome, vanpool # 20, Ext. 4-0307, Marilyn.

FREE

CLEAN FILL DIRT [mostly gravel-like], you haul; several cu yds., take as little or as much as you like; 3 blks. ESE of NY & Hill, Altadena. 798-5152.
DOG, smooth-coat chow, 1 yr. old, 50-lb. male, red-brown, affectionate, beautiful, healthy, needs good home. 562/496-4314.
FIREWOOD, you pick up. 626/794-2431.

LOST & FOUND

Found: Female Boxer mix, in East Lot Friday, Oct. 9, 2 years old; now in great health, obedience trained, likes cats; full medical records avail.; owners were contacted, not interested. 626/796-3466.

FOR RENT

EAGLE ROCK hilltop house, gorgeous, 3 bd., 2 ba., all modern, easy access to JPL/Caltech, $1,300. 213/254-5350.
LA CANADA house, 3 bd., 2 ba., living rm., dining rm., family rm., den, lg. fenced yard with patio & deck, basketball court, fruit trees, walk to JPL, water & gardener incl., 4532 Viro Rd.; $2,000. 790-8216.
LA CANADA house, 3 bd., 1 1/2 ba., new carpet, very clean, fenced yd., dbl. garage, near JPL, water and gardener pd., $1,900. 790-6382.
MONTROSE apt./room, furn., priv. entr., $350 + sec. dep. 249-0574.
PASADENA apt., 2 bd., 2 ba., cent. air, small patio, laundry facil., $775 + util. 626/351-9641.
PASADENA, lg. 1-bd. apt., spacious living rm., hwd. flrs., kitchenette, laundry facilities on premises, parking space, very charming, 569 N. El Molino, $650. 626/403-7171.
PASADENA townhouse-style apt., near PCC, 2 bd., 1 ½ ba., refrigerator, built-in range & oven, cent. a/c, carpets, drapes, disposal, laundry, covered parking, $725.
N. SAN GABRIEL townhouse, 20 min./JPL, 3 bd. + den, 2 ½ ba., LR w/fp, cent. a/c, 2-car garage w/auto opener, water/trash/gard. incl., no pets, $1,200. 626/821-2007.
N. SAN GABRIEL, with Temple City schools; elegant, 3 bd. + den/4th bd., 2.5 ba., fireplace, master suite, small charming garden, like new, no pets, 9050-E Arcadia Ave., $1,495. 626/939-3853.
ROOM in lg. house close to JPL, furn., shared ba., laundry & kitch. privileges, non-smoker, clean and must like dogs, $450 + 1/3 util. 626/ 797-5570.
SIERRA MADRE apt., 2 bd., 1.5 ba., quiet, view, balcony, $790. 626/355-7318.

REAL ESTATE

BIG BEAR, new cabin 2 blocks from lake, 2 bd., 2 ba., mud/laundry room, $129,000. 909/585-9026.
EAGLE ROCK condo, 1 bd., 1 ba., 820 sq. ft., light and airy end unit w/1 common wall on quiet cul-de-sac, cent. a/h, built-in microwave, range, dishwasher, convenient to L.A., Glendale, Pasadena; $87,500. 626/584-4188.
LA CANADA, walk to JPL, 2 bd., 1 ½ ba., den/office/dining rm., immac. privacy, concrete driveway, cent. air/heat, updated kitchen, $365,000, agt. 790-3508.
PALM DESERT, 2 bd., 3 ba., den, sep. din./lv. rms., on golf course at Palm Valley, 12" tile floor w/bordered carpet, marble frplc., Corian kitch./ba., mirrored walls, custom built-in wall units, $310,000 furnished. 362-0571.
PALM DESERT, exquisite, 2 bd., 2 ba. villa, for vacations or long term, newly remodeled, w/skylight, patio & 2-car garage; located across the Living Desert, great private, secure resort w/tennis cts., multiple pools & spas, clubhouse facilities; great locality, around 2 top resorts. 909/620-1364.

VACATION RENTALS

BIG BEAR, 7 mi. from slopes; full kitchen, f/p, 2 bd., 1 ba., sleeps 6; reasonable rates; 2-night min.; no smokers, no pets; exc. hiking, biking, fishing nearby. 909/585-9026, Pat & Mary Ann Carroll.
BIG BEAR cabin, walk to village, quiet area, 2 bd., sleeps 8, compl. furnished, F/P, TV/VCP, $75/night. 248-8515.
BIG BEAR LAKE cabin, near lake, shops, village, forest trails, 2 bd., sleeps up to 6, fireplace, TV, VCR, phone, microwave, BBQ and more, JPL disc price from $65/night. 909/599-5225.
BIG BEAR LAKEFRONT lux. townhouse, 2 decks, sleeps 6, tennis, pool, spa. 949/786-6548.
CAMBRIA, ocean front house, exc. view, sleeps up to 4, $125/night for 2, $175/night for 4. 248-8853.
CORNWALL, ENGLAND, August 1999 total solar eclipse; prime location campsite on the path of totality; includes lecture series by Caltech, JPL and UK astronomers; http://www.ctg-windows.co.uk/ eclipse.html. 626/356-2998.
HAWAII, CANCUN, FREEPORT or JAMAICA, 4 nights/5 days in a 5-star resort, $50/nt. 848-7445.
HAWAII, Kona, on 166 feet of ocean front on Keauhou Bay, private house and guest house comfortably sleep 6; 3 bd., 2 ba., swimming, snorkeling , fishing, spectacular views, near restaurants, golf courses and other attractions. 626/584-9632.
HAWAII, Maui condo, NW coast, on beach w/ocean vw., 25 ft. fr. surf, 1 bd. w/loft, compl. furn., phone, color TV, VCR, microwave, dishwasher, pool, priv. lanai, slps. 4, 4/15-12/14 rate: $95/nite/2, 12/15-4/14 rate: $110/nite/2, $10/nite/add'l person. 949/348-8047.
LA JOLLA, ocean view, steps to gorgeous beach, 1 bd., sleeps 4, fully equipped kitchen, linens, hot tub; Thanksgiving week, Nov. 23-27. 626/844-4670, Sandie or Mike.
LAKE TAHOE, N. shore, 2 bd., 2 1/2 ba., sleeps 6; great location, all amenities; private sandy beach; walk to golf, fishing 150 yds. from front door; 2 miles to casinos; available in Oct./Nov.r at very special rates (3-day min.). 626-355-3886, Rosemary or Ed.
MAMMOTH condo, studio + loft, 2 ba., fireplace w/wood supplied, Jacuzzi, sauna, game rm., color cbl. TV/VCR, full kitchen w/microwave, terrace, view, amen. 714/870-1872.
MAMMOTH condo, 2 bd. + loft, 3 ba., slps. 8, spa, full kitch., TV/VCR, covered prkng; walk to Cyn. Lodge; JPL disc. 249-8088.
MAMMOTH condo, in Chamonix at lifts 7, 8, 16, 17; 2 bd., 2 ba., slps 6, fireplace w/wood, fully equip. elec. kitch. w/microwave & extras, TV, VCR, cable fm stereo, pool & sun area, outdoor Jacuz., sauna, game, rec., laundry rms., walk to shops, lifts; special midwk. rates. 249-8524.
OCEANSIDE, on the sand, charming 1 bd. + condo, panoramic view, walk to pier/marina, pool, spa, game rm., sleeps 4. 949/786-6548.
PACIFIC GROVE house, 3 bd., 2 ba., fp, cable TV/VCR, stereo/CD, well-eqpd. kitch. w/microwv., beaut. furn., close to golf, beaches, 17 Mile Dr, Aquarium, Cannery Row, JPL discount. 626/441-3265.
PALM DESERT, exquisite, 2 bd., 2 ba. villa, for vacations or long term, newly remodeled, w/skylight, patio & 2-car garage; located across the Living Desert, great private, secure resort w/tennis cts., multiple pools & spas, clubhouse facilities; great locality, around 2 top resorts. 909/620-1364.
ROSARITO BEACH condo, 2 bd., 2 ba., ocean view, pool, tennis, short walk to beach on priv. rd., l8-hole golf course 6 mi. away, priv. secure parking. 626/794-3906.
S. LAKE TAHOE Keys waterfront home, 4 bd., 3 ba., sleeps 12+, fireplace on 2 levels, decks overlook priv. dock/ski lifts, gourm. kitch., bikes, sail and paddle boats, 3 color TVs, VCR, stereo w/tape/disk, in/outdoor pools, hot tub and beach; tennis, 10 min./skiing, casinos/golf, 1 hr./wine country; $995/wk. high season [15 June to 15 Sept; 22 Nov. to 1 March]; $495/wk. low seas., + $90 cleaning fee; 3-day min. 626/578-1503, Jim Douglas.

NOTICE TO ADVERTISERS

All housing and vehicle advertisements require that the qualifying person(s) placing the ad be listed as an owner on the ownership documents.

Universe

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