



Dr. Marc Rayman, Deep Space 1 deputy mission manager and chief mission engineer, left, makes a point at a JPL Space Science Update Aug. 3 as Dr. Bob Nelson, Deep Space 1 project scientist, looks on.

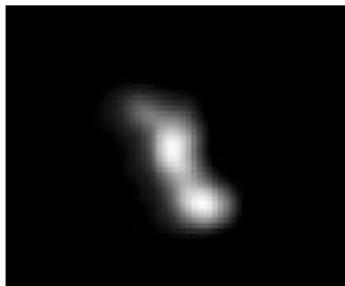
Successful DS1 flyby sheds light on asteroid mystery

By JOHN G. WATSON

NASA's Deep Space 1 experimental spacecraft successfully flew approximately 26 kilometers (16 miles) above the surface of asteroid 9969 Braille at 9:46 p.m. Pacific time Wednesday, July 28 (04:46 Universal Time July 29), using a sophisticated new space autopilot system, exceeding 100 percent of the mission's objectives.

An exultant operations team looked on as preliminary data returned to the Deep Space 1 operations control area in historic Building 230, indicating that the AutoNav autopilot system skillfully flew the spacecraft to a face-to-face closeup with asteroid Braille.

This was by far the closest flyby of an asteroid ever attempted and



PIA01345

This image not only combines the two photos of asteroid 9969 Braille that were taken approximately 15 minutes after the flyby, but also enhances the resulting image through digital imaging techniques.

yet one more accomplishment in JPL's long history of encounters with previously unexplored solar system bodies.

"This is a dramatic finale to
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NASA budget remains contentious

By MARK WHALEN

The "ways and means" of congressional budgets became big news at JPL last week when a House Appropriations Subcommittee voted to slash \$1.3 billion from NASA's budget for fiscal year 2000, including cuts that would have devastated JPL planetary, Earth sciences and Origins Program missions. These actions led NASA Administrator Daniel Goldin to raise the possibility of having to shut down one to three NASA centers.

A few days later, the full House Appropriations Committee voted to restore \$400 million to the NASA budget, saving the Space Infrared Telescope Facility (SIRTF), Europa Orbiter and Mars missions. However, Goldin is continuing to appeal to Congress to restore the entire budget request, and has warned that other impacts to centers, including JPL, are not off the table if the agency must absorb a significant budget cut.

As *Universe* went to press, there were reports that the full House vote would not take place until September. This bill would authorize FY 2000 funding for the Veterans Administration, Department of Housing and Urban Development and independent agencies, which includes funding for NASA.

The Senate, meanwhile, is scheduled to take up its own budget bills in September, after which the House and Senate will negotiate a final budget to send to the White House for President Clinton's signature.

In an all-staff communiqué to JPL, Director Dr. Ed Stone stressed the importance of Congressional context. "It is important to stress

that the appropriations committee vote is one phase of a long legislative process that requires both the full House and Senate approval," Stone told the Lab. "It is just as important to emphasize that these discussions are part of a larger ongoing political dialogue in Washington—and around the country—that are far from resolved. Undoubtedly, you will hear speculation in the media and elsewhere in the days to come. That, too, is part of this process."

The NASA budget issue has received much attention in both the local and national news media in the last two weeks, including a Los Angeles Times editorial titled "NASA Deserves Better." Other stories have been featured on ABC TV's "Good Morning America," ABC News and MSNBC. In addition, Los Angeles PBS affiliate KCET channel 28 is planning a segment on the JPL budget on its "Life and Times" program.

Stone also issued to the press a thankful acknowledgement to U.S. Rep. James Rogan (R-Glendale) "for his efforts on JPL's behalf in restoring funding for SIRTF, the Mars program and advanced technology. These are critical components of the Laboratory's program of space exploration." Rogan persuaded the House Appropriations Subcommittee chairman to restore \$400 million for space science pro-

Dr. Richard O'Toole, manager of JPL's Legislative and International Affairs Office, discusses the budget process for NASA and JPL on **page 3**.

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News Briefs

Perry Bankston, manager of the Device Research and Applications Section 346, has been selected to receive the American Institute of Aeronautics and Astronautics' (AIAA) Aerospace Power Systems Award for 1999.

He was honored for his career achievements and leadership the research, development and application of aerospace power technology, including solid-state microdevices and materials, electric space power sources and energy storage devices.

Bankston, an associate fellow of the organization who is also the manager of the Spacecraft Power Program in the Technology and Applications Programs Directorate, received the award Aug. 3 in Vancouver, British Columbia, Canada. □

Dr. Thomas Sterling of the High Performance Computing Group in Section 385 has coauthored the MIT Press Book "How to Build a Beowulf: A Guide to the Implementation and Application of PC Clusters." His coauthors are **John Salmon** and **Daniel Savarese** of Caltech and **Don Becker**, formerly of the Goddard Space Flight Center.

A Beowulf computer system consists of a cluster of PCs interconnected by commodity network components and runs the Linux operating system. The use of low-cost commodity components to build a Beowulf cluster computer is recognized as a major advancement in delivering a powerful computer for low cost.

Sterling's book details the hardware, software and program-

ming environments used in a Beowulf system, as well as presenting selected applications run on existing clusters.

The effort has been funded by the NASA High Performance Computing and Communications Program. The book is in its second printing and is being translated into Japanese. □

The Child Educational Center (CEC), a non-profit, full-day child care center supported in part by JPL and Caltech, is now enrolling infants and toddlers for the fall.

The center, located within a half-mile of JPL in La Canada, has been accredited by the National Association for the Education of Young Children since 1988. JPL and Caltech families receive a tuition discount and priority enrollment. Additional tuition assistance funds are available to many families. Limited enrollment openings also exist for the pre-school and school-age (kindergarten through

sixth grade) program.

For more information, call the CEC at ext. 4-3418 or see their web site at <http://eis.jpl.nasa.gov/hrext/cec>. □

The next JPL/Red Cross blood drive will be held in von Kármán Auditorium on Aug. 10 from 10 a.m. to 3:15 p.m. and Aug. 11 from 7 a.m. to 12:15 p.m.

Sign-up sheets will be available prior to the blood drive at the ERC, Occupational Health Services, and Occupational Health Services' home page at <http://eis/medical>.

If you have not signed up ahead of time, or wish to change your appointment, call the Pasadena Red Cross (626) 799-0841, ext. 630.

The Red Cross collected 144 pints of blood in the May JPL blood drive, said **Dr. Donald Sweeney**, manager of JPL's Occupational Health Services Office. He said 432 lives will benefit from that collection. □

Special Events Calendar

Ongoing

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

Codependents Anonymous—Meeting at noon every Wednesday. 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. 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, August 6

JPL Bicycle Club—Meeting at

noon in the Building 167 conference room.

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

JPL Perl Users Group—Meeting at noon in Building 301-127.

Tuesday, August 10

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

Wednesday, August 11

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

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

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.

SESPD Lecture Series—"Sharing Our Discoveries and Achievements with the Public: JPL's Education and Outreach Programs" scheduled for today has been canceled. A reschedule date is to be announced.

Friday, August 13

Dodger Baseball—Last day to

purchase tickets at the ERC for the Aug. 27, 7:10 p.m. game against the Chicago Cubs. Tickets are \$13.

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

Wednesday, August 18

"Investing for Retirement: Challenges That Face Women"—TIAA-CREF representative Cindy Wilson will discuss asset classes, stocks, bonds and saving enough for retirement. The information presented will be of benefit to all employees. At 9 a.m. and 2 p.m. in the Building 167 cafeteria.

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

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

Thursday, August 19

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

Friday, August 20

JPL Perl Users Group—Meeting at noon in Building 301-127.

'Bowl concert to honor JPL/NASA

By BETTY SHULTZ

The people and accomplishments of JPL and NASA will be the focus of a unique and special multimedia concert at the Hollywood Bowl on the evenings of Sept. 3 and 4. George Daugherty, creator and conductor of "From the Bowl to the Moon and Beyond," has selected stunning video and images from the human and robotic space program and set them to the music of Holst's "The Planets."

In addition to JPL and NASA images, footage from Tom Hanks' movie series "From The Earth to the Moon" will be included in the concert. As part of the program, NASA astronauts and JPL project personnel will be recognized.

This concert is part of the "Family Concert" series at the Bowl, created by Daugherty. He characterizes this as a "hybrid" form of symphony concert, with high-quality music combined with beautiful, poignant images from the space program over the past 40 years.

JPL is working collaboratively with the Hollywood Bowl to integrate the Mars Millennium Project outreach program—an

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“ NASA is still facing a \$900 million reduction, which is of great concern to Dan Goldin—and to us. The thing to stress is that this is a process, and it’s not over until it’s over. A lot can still happen.

” It would be easy to let headlines distract people away from their work. But we’re already in a lot better shape than we were [July 26]. People should know that NASA is doing all it can to defend its budget.

NASA budget watch: An ongoing challenge

By MARK WHALEN

Keeping on top of the breaking news from Capitol Hill about proposed budget cuts is Dr. Richard O’Toole, manager of the Laboratory’s Legislative and International Affairs Office. In the Q&A below, O’Toole shares some of his insights into the complex workings of congressional budgets, and how they might affect NASA and JPL.

Question: *What’s the latest news from Washington on the budget?*

Answer: Well, first of all, what you need to realize is that the budget is a fast-moving target. The status of things can change daily, so what I have to say here in *Universe* may be old news by the time this is published. But here’s where we are as we talk today, Aug. 4.

As everybody must know by now, on July 26 a subcommittee of the House Appropriations Committee voted to take \$1.3 billion out of NASA’s budget. About half of those cuts were made in the space science area, which meant we could have taken a big hit—as much as a quarter or a third of our funding for next year was at risk. On July 30, the full committee voted to restore \$400 million of the \$1.3 billion budget cut. That helped JPL a lot, because most of the restored programs were JPL programs.

Fully restored are SIRTf, with \$100.8 million, and Mars program future planning—for the ’03, ’05 missions and beyond, at \$75 mil-

lion. Also, \$225 million was added back to cover what was taken out of technology and research, but still leaves a \$95 million shortfall in those two programs—\$60 million in technology and \$35 million in research.

That’s pretty good for JPL. But NASA is still facing a \$900 million reduction, which is of great concern to Dan Goldin—and to us. The thing to stress is that this is a process, and it’s not over until it’s over. A lot can still happen.

In other words, the budget is far from final, isn’t it?

Yes, and that is very important to remember. This is simply where we are in the process, but we’re a lot better off than we were July 26.

If all of those programs named in the current budget remain either deferred or cancelled, what would be the net impact on JPL’s overall budget?

A rough estimate is that the Laboratory would lose about \$105 million for FY 2000, about 10 percent of our budget. If we do lose that \$105 million, that means a loss of between \$20 million and \$25 million in the burden budget. Some cutbacks would have to occur there as well. So it’s still very significant.

Which JPL programs are still threatened?

In the focused technology area of space science, Pluto/Kuiper Express, Solar Probe and



PHOTO BY SCOTT CHAVEZ

Dr. Richard O’Toole

Far Infrared and Submillimeter Space Telescope (FIRST) have not been restored at this time. Future planning for the Discovery Program has not yet been restored to its original funding level, so Deep Impact could be canceled if the current budget holds. In Earth science, the Gravity Recovery and Science Experiment (GRACE), CloudSAT and LiteSAR have not yet been restored.

In addition, there is a secondary effect—which we have not yet calculated—of cuts at NASA’s Goddard Space Flight Center in the Earth Observing System leading to reductions in our Earth science instrument program.

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Budget

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grams.

Last Friday’s vote by the House Appropriations Committee did not, however, restore the White House’s full budget request for NASA. The House budget as currently marked up would cancel the following projects:

- The Discovery Program received a \$60 million reduction in funding, which would cancel the JPL-teamed Deep Impact mission.
- JPL Earth sciences programs

that would be cancelled include CloudSat, LightSAR and the Gravity Recovery and Climate Experiment (GRACE), as well as secondary impacts on the Laboratory’s Earth science programs as Goddard Space Flight Center assesses its budget reductions.

• Three missions under the budget heading of “focused technology”—Pluto/Kuiper Express, Solar Probe and FIRST—would also be cancelled.

“Year after year, NASA is touted for doing more and more with smaller budgets and held up as a

model of good government,” Goldin said in response to the original \$1.3 billion budget proposed cut. “NASA employees get up every day to achieve what most think is impossible. They have risen to the challenge of smaller budgets. And this is the reward the NASA team gets? Not only is this cut devastating to NASA’s programs, it is a knife in the heart of employee morale.”

Among other implications for the agency’s reduced budget, the administrator noted that for the past seven years, the NASA budget has declined and, because of

inflation, the agency’s buying power is already down by one-third; also, over the past five years, NASA’s streamlining efforts have saved the taxpayers \$35 billion.

“This cut destroys the technology base built by NASA,” Goldin said. “Our ability to further reduce costs and increase scientific productivity would end. NASA is one of only a few investments our nation makes to ensure a bright future, a strong economy and the technology base to achieve it. I won’t feel better until every nickel is restored,” he said. □

GALEX development moves forward

Critical design review held for ultraviolet telescope science instrument

By MARK WHALEN

One of the keys to better understanding the universe is to look into its past. A Caltech/JPL-led international mission now under development will explore the evolution of galaxies and the origins of stars and heavy elements to help complete our picture of the history of the cosmos.

The Galaxy Evolution Explorer (GALEX), targeted for launch in September 2001 from Kennedy Space Center, will map the history of star formation by looking back in time billions of years to point out where galaxies were evolving and star formation was very active. The 29-month mission will survey cosmic history from the present back to 20 percent of the age of the universe since the Big Bang about 15 billion years ago.

Scientists believe galaxies formed early in the universe's history. Once formed, galaxies continued to manufacture stars out of gas to build the galaxies we see today. GALEX seeks to chart and begin to understand this building process. To do this, GALEX will utilize a 50-centimeter (20-inch) ultraviolet telescope, a very sensitive and accurate way to measure star formation.

The instrument will allow detection of the most massive stars, which are hotter and have shorter lives than smaller stars. The number of these hot stars, and therefore the ultraviolet brightness of a galaxy, is directly related to the total number of stars recently formed in each galaxy. By measuring many galaxies at different distances (and therefore at different times in their history), GALEX will put together a statistical picture of the average star formation history in any given galaxy, and of all galaxies in the universe together.

"The major question we want to try to answer is how galaxies evolved over time," said GALEX Principal Investigator Prof. Chris Martin of Caltech. "We will find some that are always forming new stars; to understand how that works, we first need to understand when it all happened." The history of the formation of these massive stars is also the history of the formation of elements heavier than

hydrogen and helium that formed the building blocks of life in the universe, since these are formed by massive stars.

Martin said GALEX will obtain broadband imaging data for about 10 million galaxies, some of them billions of light-years from Earth. In addition, he said, "There's some controversy about whether some galaxies are still forming. Ours would be the mission with the best chance to discover any recent star formation."

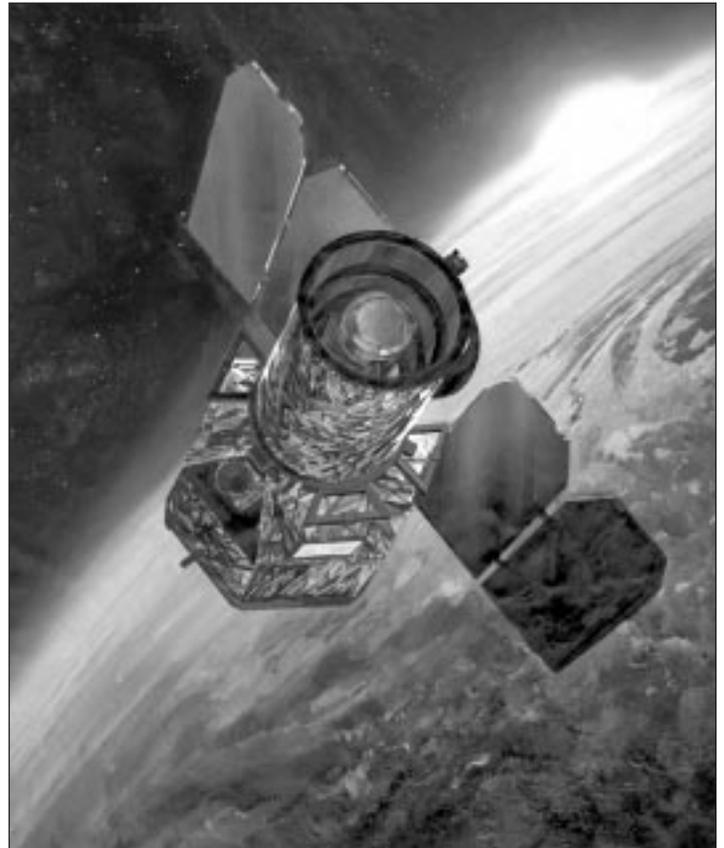
GALEX will also do the first ultraviolet imaging all-sky survey. This survey should produce a million quasars, hundreds of thousands of white dwarf stars, and many other interesting objects that are hot and therefore radiate strongly in the ultraviolet.

A critical design review covering the GALEX instrument was convened at JPL in June, followed by a review at industrial partner Orbital Sciences Corp. in Maryland for the spacecraft, ground data system and operations portions of the mission. The review board examined the project in detail to determine the team's readiness to proceed with fabrication.

"The board was very pleased with our progress, and complimented the team for accomplishing so much in such a short amount of time," said GALEX Project Manager Dr. James Fanson of JPL.

In addition to overall project management, JPL is responsible for developing the instrument electronics and software, structure, mechanisms, and optical assembly, as well as for performing integration and testing of the instrument. Incorporating near- and far-ultraviolet detectors developed by the University of California, Berkeley, and three high performance optical assemblies supplied by Laboratoire d'Astronomie Spatiale in Marseille under sponsorship of the French national space agency, GALEX utilizes many state of the art technologies.

"The GALEX instrument is every bit as complex as the Wide Field/Planetary Camera-2 aboard the Hubble Space Telescope, but will cost about one tenth as much," said Fanson, who added that GALEX's data rate will be twice that of Hubble and the Space



GALEX is scheduled for launch in September 2001.

Infrared Telescope Facility (SIRTF) combined.

Caltech is responsible for science operations and data analysis, with support from Yonsei University in Seoul, Korea.

The next milestone in the mission's development will be the delivery of the flight telescope from Light Works Optics this fall. Other portions of the science instrument will follow, with assembly, integration and test activities to be performed through next summer. In December 2000, following calibra-

tion, the instrument will be delivered to Orbital Sciences Corp. to be integrated with the spacecraft bus.

"This mission represents a uniquely close working relationship between JPL and the campus," Fanson noted. "It's a good example of how JPL and the campus can collaborate on future flight projects."

The mission was selected for development in 1997 at a cost of \$70 million under NASA's Small Explorer Program, administered by the Goddard Space Flight Center in Maryland. □

Lab prepares for next ISO audit

ISO 9001 certification requires surveillance audits to be conducted every six months, and JPL is preparing for the next such audit, which will begin the week of Sept. 27.

Det Nortske Veritas (DNV) Certification Inc., the auditing firm hired by NASA to certify all NASA centers as ISO 9001 compliant, will return to JPL for the first surveillance audit since the Laboratory's registration audit last March.

The Enterprise Process and Standards Program Office (501) is

responsible for maintaining JPL's ISO 9001 certification. The office conducted the seventh round of internal assessments from July 12 to 15 to prepare JPL for the upcoming DNV surveillance audit.

Ten teams of 58 assessors reviewed 575 documents and interviewed 539 employees, said Dr. Jerry Sutor, manager of the Enterprise Process and Standards Program Office. All process domains were reviewed during the

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JPL benefits from private sector expertise

By JOHN G. WATSON

A newly formed Commercial Advisory Council will advise JPL on ways that the Laboratory's research and technology development can be of maximum value to U.S. business and industry.

The council includes aerospace and financial management business and technology leaders. Chaired by Dr. A.M. Zarem, JPL's Distinguished Visiting Executive in Science and Technology, the council is comprised of the following founding members:

Robert Hanisee, managing director, Trust Company of the West;

Dr. Robert Spinrad, former vice president, technology strategy, Xerox Corp. (retired);

Richard Troop, founding partner, Troop, Steuber, Pasich, Reddick & Tobey, LLP;

Dr. Edward Tuck, principal, Falcon Fund; general partner, Kinship Partners II; and director, TriQuint Semiconductors;

Dr. Max Weiss, former vice president and general manager, Electronic Systems Division, Northrop Grumman Corp.

"JPL seeks to find new ways to cooperate with industry in joint research and development, promoting entrepreneurship and new business growth," said JPL Technology and Applications Programs Director Michael

Sander, to whom the council reports. "A key aspect of such an effort is to get the best, candid and constructive counsel from exceptional leaders in the private sector."

"U.S. industry will ultimately be the key beneficiary of the council's advice," said Merle McKenzie, manager of JPL's Commercial Technology and Regional Development Program. "We expect new strategies for radically improved commercialization of JPL research and technology development to emerge from our work with the council"

For further details about JPL's Commercial Technology Program, visit <http://techtrans.jpl.nasa.gov/tu.html>. □

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an amazingly successful mission," said Dr. Marc Rayman, chief mission engineer and deputy mission manager. "The encounter with Braille has allowed us to complete the testing and validation of 12 new technologies and to return some exciting science as a bonus.

"JPL can be proud that one of its missions has now visited the smallest solar system body ever targeted."

Ten minutes after the flyby, when the spacecraft signals reached Earth after a 10-minute journey, the team burst into spontaneous applause at the news that the spacecraft was turning back to face the asteroid, a clear signal that the flyby had succeeded.

Making the encounter all the more memorable—and serving as a testimonial to the team's quick ability to think on its feet—was the fact that the spacecraft experienced a "safing" event earlier in the day, starting at about 5 a.m. PDT on July 28 and ending at about 11 a.m. PDT. A small software glitch, now fully diagnosed, was detected by Deep Space 1's fault-detection software, which triggered a protective program that causes several events: the spacecraft halts non-critical activity, orients its solar panels toward the Sun, points light- and heat-sensitive instruments away from the Sun and reverts to its low-gain antenna while awaiting new commands.

"This has been by far the most challenging and dramatic day on the project," said Rayman. "The last 16 hours before the flyby were really, really exciting. We had the safing event, we recovered from it and we managed to squeeze in a trajectory correction maneuver to update Deep Space 1's flight path.

"The entire operations team deserves great praise for its heroic response to an event that otherwise would have eliminated any chance of conducting the encounter," he added.

Science results were downlinked in a series of telemetry sessions through Friday morning, July 30. The results from an infrared sensor within the spacecraft's inte-

grated spectrometer and imaging instrument proved to be startlingly significant, for they showed nearly matching compositional fingerprints between near-Earth Braille and Vesta, a much larger asteroid in the main asteroid belt between Mars and Jupiter.

"This clear link between Vesta and Braille is an important finding," said Dr. Laurence Soderblom, from the U.S. Geological Survey, team leader for Deep Space 1 experiments using the spacecraft's integrated spectrometer and imaging instrument.

Thus the novel spacecraft not only passed a technology milestone by flying itself past Braille, but also it now has scientists pondering a deep-space "family tree" mystery.

Scientists are wrestling with a thorny question: is Braille a chip off the old block, Vesta, or are the two siblings that originated elsewhere, perhaps thrown off a larger body long since destroyed?

The scientists made their finding from three sets of data collected by the spacecraft's infrared spectrometer. Called spectra, a form of data resulting from the instrument breaking light into component colors much

like a prism does (usually displayed as graphs), the data sets cover different parts of the asteroid and were taken just after closest approach.

Braille's longest side is now estimated at 1.3 miles (2.2 kilometers) and its shortest side appears to be 1 kilometer (0.6 miles). This elongated asteroid was expected to be irregular, and two black-and-white photographs taken approximately 15 minutes after closest encounter have

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A symbol of the future

The Mars Surveyor Program has chosen the winning entries in its contest to select logos for the 2001 mission. The winning entry at right, designed for decals and T-shirts, was chosen because of the unique design incorporating all three aspects of the mission into one logo.

Mars Surveyor 2001, which will include an orbiter, lander and rover, is scheduled for launch March 30, 2001.

Two first-place winners were selected, along with a second place winner and a tie for third place. All winning entries have been posted online at <http://mars.jpl.nasa.gov> on the Mars 2001 page.



O'Toole

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How can a single year's budget affect projects that are still years away?

For example, the language of the subcommittee was to cancel the Discovery program. When you have a program like Discovery, that's a line item that carries an ongoing annual cost. It's not legally binding, however, because Congress has to approve the program year after year. The \$60 million reduction in future planning for Discovery doesn't necessarily cancel the program, but it reduces the wedge that goes to Discovery every year, indefinitely.

OK, now that we've discussed the specific impact on JPL, can you step back and give us some background on how these Washington budgets come to be?

Sure. First the White House, with assistance from the Office of Management and Budget (OMB), puts together its budget. It typically starts in the summer of the year before that budget takes effect. For example, the fiscal 2001 budget is being worked right now by the White House. The president presents the budget to Congress the following February.

NASA and OMB then negotiate over the summer and fall, prior to the time the president issues the budget the next February. NASA tries to explain the impacts of what OMB has given them and what programs would fit into the budget. There is a lot of trading off, with consideration to explicit constraints as set by Congress. NASA is guided by its strategic plan, and science advisory groups help to determine priorities.

What happens next?

The White House comes up with its budget. Of course, Congress has its own ideas about budgets. Hammering out the differences is, of course, where we are now. What complicates matters is what's called budget caps. These cap constraints, established in 1997, specify that Congress can't spend more than a certain amount of money. The only way the caps can be exceeded is if Congress changes the law.

Why were the budget caps were put in place? What is the budget limit now?

The reason for the caps was to eliminate the nation's budget deficit. We've eliminated the deficit already; the trouble is, they didn't know that back in '97, so the strict spending caps were put in place to lead to a balanced budget in 2002. The spending cap for FY 2000 on domestic discretionary programs was \$538 billion. The actual spending level in FY '99 was \$544 billion. So there is about \$6 billion less available for FY 2000. On top of that, both Congress and the White House have agreed to increase defense spending by nearly \$18 billion. This means the impact on the rest of the programs is a shortfall of up to \$24 billion. That's why NASA—and other federal agencies—are facing budget cuts.

Where does NASA's budget fit in?

NASA's budget is allocated by a subcommittee that also provides funds for the Veterans Administration, Department of Housing and Urban Development, and other independent agencies. This subcommittee was allocated \$66 billion for all of the programs under its jurisdiction for FY 2000, compared to \$72 billion for FY '99. So they are facing a \$6 billion shortfall. That's why they're asking NASA to take a cut of about 10 percent

compared to FY '99. It's important to point out that no one singled out or targeted NASA in this whole process.

So where did the full Appropriations Committee find the \$400 million it has already restored to NASA's budget?

The full committee, which met on Friday, July 30, did not have any additional funds beyond those offered to the subcommittee. It added \$400 million back into NASA's budget by taking \$400 million back out of another program within its jurisdiction, the Americorps, which is the president's youth service program.

But we keep hearing about budget surpluses. Why can't Congress allocate more money to NASA or other federal programs?

We're back to the question of the spending caps. There's money, yes, but there's also the spending cap law. That has to be worked through to some resolution. What is done with that money is very much up to the discretion of Congress and the White House, but it would technically break the spending caps if it was spent on federal programs as the law now stands.

So what happens next?

Now that we're out of full House committee, the full House votes next. Then attention is turned to the Senate. The Senate has yet to start its FY 2000 NASA budget process; they have decided to defer their budget work until after the Labor Day recess. The Senate will come up with its own budget number for NASA. Then both Houses of Congress will have to get together and agree upon a final number before the bill goes to the White House. The president, of course, has the option of signing or vetoing.

What would happen if the bill were vetoed, but not overridden, by Oct. 1, the beginning of the fiscal year?

There would be a short-term continuing resolution for a period of weeks while Congress and the White House negotiate a compromise on spending and tax policy. This would allow the government to continue to operate at the lower of the fiscal '99 or fiscal 2000 level.

How might that affect JPL's work?

We've been through this before, and it's not a problem for projects whose budgets are flat or declining. For example, SIRTf would be OK, because the lower of the two budgets fully funds them on what they planned. But projects such as Mars '03/'05 and Europa would only be allowed to spend at last year's level. So a short-term resolution wouldn't hurt that much, but if it went on for months, that could mean problems for some of our projects in meeting their development milestones.

Any prediction on how it's going to turn out?

None at all. The thing to understand—and to take comfort in—is that this is a process. It would be easy to let headlines distract people away from their work. But we're already in a lot better shape than we were just a week ago. People should know that NASA is doing all it can to defend its budget. Dan Goldin has said he won't rest until every nickel is restored. What we here at JPL can do to support him is to concentrate on our work and our missions—and share NASA's concern that the whole program needs to be restored to preserve balance in NASA between the human, space science and Earth science programs. We're all committed to that overall goal. □

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helped to confirm this.

By contrast, Vesta, discovered in 1807, has a diameter of about 500 kilometers (310 miles). The fourth asteroid ever discovered, Vesta shares with Braille a high visual reflectivity, or albedo. In fact, Vesta is the most reflective of the main-belt asteroids.

Apart from flyby findings, project scientists have determined that Braille is one of the asteroids that drift in and out of Earth's orbit over eons and that it will return to Earth's vicinity within a few thousand years.

Diagnosis of an apparent target-tracking problem that impacted visible imaging (the taking of black-and-white photos) during the flyby continues. Preliminary results suggest that a combination of the asteroid's highly irregular

shape, its orientation relative to the Sun and the camera's response under these unusual conditions are responsible.

Launched Oct. 24, 1998, Deep Space 1 is the first mission under NASA's New Millennium Program, which tests new technologies for future space and Earth-observing missions. The technologies that have been tested on Deep Space 1 will help make future science spacecraft smaller, less expensive, more

autonomous and capable of more independent decision-making so that they rely less on tracking and intervention by ground controllers.

Of the 12 new technologies on board, all but the spacecraft's autonomous navigation system had been completely tested since launch. With the asteroid encounter, AutoNav finished its last 5 percent of testing. Science return was a bonus for this technology validation mission. □

ISO

Continued from page 4

assessment, he said, adding that 10 projects were also assessed specifically for compliance to key requirements of NASA Program Guideline 7120.5a, "NASA Program and Project Management Processes and Requirements."

Walk-throughs were conducted to determine the degree of ISO compliance for 53 laboratories, Suitoer said.

Several areas that had not been part of the last several rounds of internal assessments—Institutional Computing and Information Services (ICIS), Facilities, Occupational Safety, and numerous human resources activities—have now been included and received "their first taste of what has become normal business for JPL," Suitoer said.

Ninety-six corrective action

notices were assigned for resolution as a result of the latest internal assessment. Peter Barry, the ISO 9001 internal assessment coordinator and corrective/preventive action manager, said the notices address areas where actions are not in harmony with process, project or line organization requirements.

The results of the internal assessment were encouraging, according to Suitoer. "Most companies suffer some backsliding after their successful registration audit and JPL was no different. However, the amount of backsliding was less than expected and the known problem areas can be addressed before the September surveillance audit."

For more information about ISO 9001 and the upcoming surveillance audit, see the ISO 9001 web site at <http://iso.jpl.nasa.gov>. □

Certifying the achievement



JPL Chief Engineer John Casani, left, and Director Dr. Edward Stone display a plaque that honors the Laboratory's recent ISO 9001 certification.

Passings

William Rubendall, 81, a retired plumber in Section 662, died of emphysema May 29 at St. Luke's Hospital in Pasadena.

Rubendall worked at JPL from 1951-83. He is survived by his wife, Virginia, son Gerald, one granddaughter and two great grandchildren.

Services were private. □

Richard Guzman, 71, a retired carpenter in Section 662, died of cancer June 3 at his home

in Idyllwild.

Guzman joined JPL in 1962 and retired in 1984. He is survived by his wife, Mary, four children and five grandchildren.

Services were private. □

Orville Cheatwood, 80, a retired crew chief in Section 353, died of heart failure June 18.

Cheatwood worked at the Lab from 1951-82. He is survived by his daughter, Debra Prather.

Services were private. □

Queen Allen, 50, a senior property administrator in Section

642, died of a stroke June 24 at a nursing home.

Allen had worked at JPL since 1969. She is survived by sons Wayne and Marcus; two sisters and five

brothers.

Services were held at Lincoln Avenue Baptist Church; burial was at Mountain View Cemetery in Altadena. □

Concert

Continued from page 2

official White House Millennium Council youth initiative—into the pre-program activities. Local and Los Angeles-area students will have the opportunity to attend the concert rehearsal, free of charge. At the same time,

teachers will be made aware of the purpose of the Mars Millennium Project, which challenges students across the nation to imagine what life could be like in the year 2030 in a community on Mars. Teachers can then integrate this activity into their classroom curriculum.

Tickets for this concert are now on sale at the ERC. □

LETTERS

Kelly and I wish to extend our thanks to ERC for the beautiful plant, and to our friends and co-workers here at JPL for the kind words and support we received upon the recent death of my mother (Kelly's grandmother), Dorothy Dettloff. Your warmth and thoughtfulness at this time is sincerely appreciated.

Nancy Feagans

□□□

Thank you to the ERC for the beautiful plant and the warm words of sympathy. My grandfather will be greatly missed. I am touched that JPL would take the time to make such a thoughtful gesture. Thank you also to my colleagues for their support and kindness. God bless you all.

Tasha Turner

□□□

My family, extended family and I would like to thank our friends, colleagues and co-workers for the beautiful flowers, their support and many wishes of sympathy after the passing of my stepfather, mother, brother and two sisters. We would like to thank and extend our appreciation to the employees of Allied Signal (Pasadena Operations) who worked with Charlie Brown in Bldg. 605. Charlie was very proud of working for NASA, JPL and Allied for most of his career. He often talked of the friendship shared with his co-workers and the many spacecraft he had the opportunity to support. We would like to thank ERC for the beautiful plant sent to our home. Let's cherish the time and memories we had with them and thank you all.

David Hodges

□□□

I would like to thank all those present and former co-workers who attended my retirement luncheon. Special thanks to Reba Hart for planning and coordinating this memorable event. We plan to use the thoughtful gift on future camping trips. I wish all of you at JPL well as you continue to solve those impossible problems.

Al Schoepke

FOR SALE

APPLIANCES, washer \$50; dryer \$50; stove \$75; microwave oven \$25; all electric. 626/357-7583.
 AQUARIUM, approximately 60x23x14 inches with rocks, filters, pumps, lights and artificial plants etc., holds approximately 60 to 80 gallons, \$185 new, only \$90. 626/288-1650, before 9 p.m.
 BABY ITEMS: Graco swing set w/bassinnet \$40; crib rocker \$10; Baby Bjorn carrier \$25. 323/342-0607, Grace.
 BEDSPREAD, twin-sized, extra long w/matching pillowcases, \$20. 626/398-4960.
 BIKE RACK, Rhode Gear, Super Cycle Shuttle (2-bike), trunk mount, \$75. 626/796-5216.
 BREADMAKER, Welbilt, 1-1/2# loaf, \$40. 626/398-4960.
 BRICKS, used, approximately 1,100, \$.20/ea. 626/357-6955.
 CHINA SET, 60-pieces, \$70/obo. 909/592-0780, Ana.
 CLOTHES, new, Halston, black floor-length, size 12, Royal blue, size 14, \$25/ea. 626/398-4960.
 COFFEE TABLE, white marble, 23x69", \$120. 626/797-6982.
 COLLECTIBLES, McDonald's '80s 'internat'l' bears, set of 4, \$25; McDonald's '99 beanie babies, 12 in set, \$35; baseball or football cards, 200 assorted, major players, stars, inserts, rookies, specify team or player and they will be included, \$20; autographed 8x10 Randy Moss rookie of the year w/cert. of authenticity, \$75. 626/914-6083.
 COMPUTER, "Antique" '80s IBM PC, AT system 1800, single 5.25" floppy drive, green LED monitor, 286 processor, \$50. 626/793-7771, Andy.
 COMPUTER, Mac II FX, Conner 140 MB HD, 780 kb 3.5" FD, 1.4 MB 3.5" FD, 20 MB RAM, system 7.5.3, 32-bit addressing, 14" color monitor (16 colors), Global Village Teleport 33.6 fax/modem, Netscape Communicator, \$100. 541-0062.
 COMPUTER MONITOR, 14" hi-res. 1024 x 768, 1 yr old, works great, \$20/obo. 909/394-7628, Brian.
 COUCH, sectional, beige background, well cared, 2 wood end

tables w/glass top, and lamp, all match & exc. cond., \$250/obo. 909/593-5838.
 CRADLE, Jenny-Lynn style, perfect for the new arrival or for dolls and toys, \$40. 661/255-8216.
 DESK, big brown, \$45/obo. 849-7445.
 DINING TABLE, rectangular pine, w/6 chairs, hutch, and server, \$1,300; MOVING BOXES, 1.5 cu. ft, 3 cu. ft, 4.5 cu. ft, + a few larger boxes, all used once, gd shape, folded flat. 626/914-7853.
 EXERCISE MACHINE, Soloflex, great shape, safe exercise w/o heavy weights, \$150. 626/447-6423.
 EXERCISE MACHINE PARTS, Soloflex, 2 foam pads, \$15; weight straps 2-25", 2 10's 1-5 \$20; 20 lbs., assorted reg. plates, \$0.20 lb. 626/798-7339.
 FREEZER, whirlpool, 15.1 cubic ft., manual defrost, 5 shelves, 10 yrs old but immac., needs new gasket seal on dr., \$125/obo. 249-9437, eves.
 FURNITURE, small cherry wood desk with one drawer, \$30; glass patio table with 4 plastic strap chairs, \$65; stair stepper exercise machine, used only twice, \$50. 957-4746, Tammy.
 FURNITURE, lg custom Formica desk, \$30; glass din. rm table, \$35; bar cabinet, \$40; end tbl., \$10; portable TV, \$25; patio umbrella, \$25; big, old microwave, \$15; Chefmate bread mach., \$40. 626/799-6196.
 FURNITURE, 5-drawer chest \$35, nightstand \$30, bookshelf \$25, laminate construc. 626/796-5216.
 GUITAR, acoustic, Harmony Monterey arch top, f-holes, from the '50s, tiger-stripped, great condition, includes hard case, \$165. 626/798-7339.
 LIGHT FIXTURES, Hurricane, ceiling, swag or mount, glass chimney, white shade, w/down spot light, very nice, \$25/obo. 909/593-4046, in La Verne.
 JEWELRY, misc., some vintage (earrings, brooches), 14K gold chains (15-18"); \$5-20; amethyst ring set in 14K w/sm. diamonds, size 6: \$75/obo; pearl ring set in 14K, size 5-1/2, \$30; watch, new: Capezio w/6 color-ring attachments, retail: \$125, \$40/obo.; watches, women's (3) circa 1940-60: \$10 ea. 626/398-4960.

Continued on page 8

MISC., doors, 3 - 6'8" x 28", \$50/ea.; windows, 14 tempered glass, var. sizes \$25 - \$50/ea; new, clr. Douglas fir, craftsman style, tile, red quarry, 5 boxes 8 x 8 x 1/2", \$90; bar sink, brass over copper 20" x 15", \$40; FM wireless intercom. \$30; tire chains (new) \$10; encyclopedia set \$10. 248-2807.

MISC., Advent utility speakers w/stands, gd cond., \$80/pair; BMX-style bike, silver, new seat, good treads, vg overall condition, \$40. 952-8455.

MODEM, Apple Geoport adapter fax/modem, Model M1694 express for power Mac, \$25. 541-0062.

PHOTOGRAPHS, 40" x 30", color, framed; 2 tall-ship pics by a prof. photog., vg cond., 1 of a Span. ship in SF bay, one of a German ship nr. Puerto Rico, \$70/ea., \$120/both/obo. 626/568-8298.

PIANO, Wurrlitzer spinet, w/bench, \$975. 952-8455, Karen.

PICTURE FRAMES, three made of brass, 22" x 28", \$6/each, set \$15/obo. 626/568-8296.

PRINTER, Xerox Diablo 630 daisywheel w/print wheels/ribbons, exc. cond., works great, \$110/obo. 626/568-8298.

PRINTER, color, Lexmark 1100 w/orig. ink cartridge over half full, \$65/obo. 626/797-3156.

SOFA & LOVESEAT, country French design, \$300. 541-0131, Gany. SUITCASES, Samsonite, from the '50s, brown, 2 available, \$20 & \$15, \$30/both. 626/798-7339.

TABLES, glass; four 2-shelf tables with brass feet; 3 make up a coffee table (one round 2.5-ft. diameter, two "half-moon"); fourth is round end table, 2.5-ft diam., \$125/obo. 909/592-0780, Ana.

TENNIS RACKET: Prince Magnesium Pro, never been used, with cover, \$30. 626/836-4960.

TV, RCA 17 in., color, remote works fine, \$75; Hitachi 13 in., color/remote works fine, \$65. 951-3653.

TV, 13" RCA, \$30. 661/297-5234.

TV STAND, oak, on casters, accomm. up to 27" TV, storage & VCR space: \$50/obo. 626/398-4960

WALL SECTIONAL, stunning Danish Modern solid teak, glass doors and black panels, approx. 7' high, \$350/obo. 323/722-4412.

WEDDING DRESS, exc. cond., used once, in garment bag, white, straight, long sleeves, bow in the back, \$40/obo. 626/568-8298.

WINE RACK, Redwood, single-bottle depth, 6 ft. high by 12 ft. long, and 4 ft. high by 5 ft. long, will also include chiller unit, \$500/obo. 626/355-8706.

VEHICLES / ACCESSORIES

'91 ACURA Integra GS, white, 4-dr., auto, air, all options, grt sound sys, CD ch., sec. & keyless entry, tinted, sliding moonroof, much more, 93K miles, all rec., dependable, economical for commuting to work, reduced to \$6,950. 626/440-1069.

AIWA face off car stereo w/5 1/2 speakers 2 mo. old, perf. cond., CD port, 40w/channel, \$175. 626/296-7323 or pager 310/841-1990, Jessica.

AUTO MANUALS, Honda Accord 1986 shop manual; Datsun 240Z 1970 service manual. 952-8455, Karen.

'89 BUICK Century, vg. cond., white, 6 passenger, auto trans., air, lg. trunk, 1 owner, great for students, \$3,300. 626/447-7215.

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

Editor

Mark Whalen

Photos

JPL Photo Lab

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Ads must be submitted on ad cards, available at the ERC and the Universe office, Bldg. 186-118, or via e-mail to universe@jpl.nasa.gov. E-mail ads are limited to six lines.

Ads are due at 2 p.m. on the Monday after publication for the following issue.

To change an address, contact your section's administrative assistant, who can make the change through the HRS database. For JPL retirees and others, call Xerox Business Services at (626) 844-4102.

'98 CHEVY S-10 LS, truck, regular cab, white, 8,500 miles, 5-speed manual, dual airbags, ABS brakes, A/C, alloy wheels, Sony CD player with AM/FM radio, tinted windows, under warranty, excellent condition, \$11,600. 952-0047.

'86 CHEVY Suburban, 7/4 ton, 454 78, tow pkg., all pwr., front/rear a/c, 3rd seat, lim. slip diff., alloy whls, HD trailer hitch, roof rack, vg cond., all maint. records, \$6,000/obo. 247-0831, Jim.

'84 CHEVY Silverado, 3/4 ton pickup, 454 CI Engine, Rack, AT, P/W, A/C, Sony, clean, runs good, \$4,200. 957-8463.

'95 DODGE Intrepid ES, 3.5V6, emerald/gray, tan leather int., 53k mi., pwr. seats & windows, climate ctrl, trip computer w/compass & temp. trac ctrl, alloy wheels, 7-spkr. stereo cass., sports susp., remote entry, exc. cond., very clean, \$9,900/obo. 626/432-1990, Kevin.

'88 DODGE Aeries, 4 dr., vg. cond., \$2,100. 626/446-8551, Jim.

'65 FORD T-Bird, classic beauty, new paint w/warr., pwr windows, am/fm cass., runs perfect, exc. interior, needs driver who appreciates it, \$5,800. 626/296-7323 or pager 310/841-1990, Jessica.

'85 GRUMMAN 14' alum boat w/trailer & 25 Hp Merc. outd. motor, \$1,500/obo. 909/599-2598.

HUBCAPS, Cadillac, wire, late '70s/early '80s, 3 avail., \$30/ea. 626/798-7339.

'92 HONDA Accord EX, p.s., p.d.l., p.w., sunroof, wheels, auto, a/c, 4-dr., gd fam. car, \$8,000/obo. 323/722-4412 or pgr. 323/280-1550.

'88 HONDA Accord LX, AT, power windows &door locks, runs well, 104M miles, original condition, \$3,900/obo. 626/443-9774.

'84 LAZY DATZ motorhm., rear dinette, pop-up roof sleeper, exc. storage & sleeping spaces, blue bk wholesale, \$6,000. 626/445-6320.

'86 MITSUBISHI Mirage, hatchback 4-speed trans., needs clutch and brakes, engine is fine, great gas mileage, \$300. 626/296-7323 or pager 310/841-1990, Jessica.

'75 OLDS Cutlass Salon, 2-dr., hardtop, silver, interior exc., exterior vg., no collision damage or rust, red vinyl roof, 350 engine, HD suspension, overhauled a/c, new BFG T/A tires, rare model, best offer over \$3,000. 626/446-4771.

'73 OLDS Delta 88 Royale, 4-dr., hardtop, 455 engine, dual exhaust, exc. cond., interior like new, 80K miles, orig. paint, overhauled a/c, vinyl roof, new tires, smooth, quiet, powerful and large, best offer over \$3,000. 626/446-4771, Bruce.

'97 PLYMOUTH Grand Voyager SE, 7 pass/5 dr, auto, dk. grn., 55K mi., loaded, keyless entry, CD/8 spkrs, cc, airbags, front/rear A/C; sep driver/pass, temp cntrls, tinted, roof rack; exc. cond.; all records; Blu Bk. \$21K, sell \$14,900/obo. 626/836-4960.

'85 SUBARU XT-GL, 2-dr., 5-spd. std., 96K mi., \$1,000/obo. 248-5343.

TIRE CHAINS, for '94 Ford Ranger, never used, \$20. 626/798-7339.

TIRES, Goodyear 185-70R14, new, \$20; mini-spare, 13" for Toyota, etc. incl. wheel, new, \$20 mini-spare, 195-14, new, \$10. 626/797-6982.

'86 TOYOTA Camry LE, 4-door metallic champagne exterior, beige interior, a/c, new tires, 57K miles, exc. cond., 2nd owner, \$14,500. 626/799-2475.

'91 TOYOTA Previa van, burgundy, 91K miles, air, cassette, exc. cond., \$8,875/obo. 731-0470.

'90 TOYOTA Corolla, blue, 260K mi., vg cond., \$2,300. 562/464-0446.

'88 TOYOTA Celica conv., new tires, ignition, front brake pads, \$6,000/obo. 626/963-8271.

'85 TOYOTA Camry, new motor, parts, new smog, slight door damage, otherwise mint original, \$3,800. 562/464-0446.

'93 VW Corrado SLC VR6, classic green/beige leather, ABS, sunroof, a/c, alloy wheels, premium sound am/fm/cassette, all options, exc. cond., orig. owner, \$14,500. 247-0831, Jim.

'91 YAMAHA Virago 1100, black with gray accent, lots of chrome, Jardine pipes and foot controls, \$3,550/obo. 626/355-6350, Paul.

LOST & FOUND

Found: Photo negatives on path west of ERC. Ext. 4-5325, Anita.

FREE

CAT, gorgeous black and silver, female, approx. 1 yr. old, small & kittenish, extremely friendly, clean, house-trained, spayed and vaccinated, FIV+ but currently very healthy. 248-2855.

WANTED

JAMES BOND CARD #13, Dr. No, will swap for # 39. 626/798-7339. POTTERY, Old Calif. dinnerware, i.e. Bauer, Pacific, Catalina, etc., from the '40s, bright colors and rings. 626/796-1286, Lori. RIDE, from Canyon Country to JPL on routine basis. 805/299-4453. SPACE INFORMATION/memorabilia from U.S. & other countries, past & present. 790-8523, Marc Rayman.

VOLLEYBALL PLAYERS, coed, all levels, every Tues. night 8-10 at Eagle Rock High School, \$4/peir night. 956-1744, Barbara.

FOR RENT

ALTADENA, attached studio apt., 2 miles to JPL, nice yard, area for gardening, all util. incl., stove, refrig., \$500. 626/798-0329.

CANOGA PARK, house, 2-bd., 1-ba., garage, laundry hook up, large yard, 40min/JPL, \$800 + util. 626/791-9049, Suzi.

EAST PASADENA, nr. Caltech, 2 bd., 2 ba., sitting rm., kitchen, w/dining area, stove & refrig., laundry hookups, living rm. and dining rm. area, lg. garage, enclosed backyard., pd water and gardener, avail. Sept. 1, \$1,100. 626/794-0455, eves/weekends.

GLENDALE, townhouse style 2-story, c/a, 2-bd., 2.5 ba., kit/blt-ins, built in '87, 1-yr. lease, \$850. 240-1523.

LA CANADA, guest house w/own addr./mail service, 1 bd., off-st. parking, water, gardeners, shared access to tennis court, avail. Sept. 1, \$840. 952-1304.

LA CRESCENTA house, 2-br., 1-ba., fr./bk. yards, 2-car gar., cent. air/heat, laundry machines, full kitchen., hw floors, fireplace, nice neighb'h'd, north of Foothill Blvd., 15 min./JPL; details and photos at <http://people.we.mediaone.net/dhc>,

\$1,200 + util. 203-2982, Dan, dhchang89 @alum.mit.edu. LA CRESCENTA, 2 bd., 1 ba., 2-car detached gar., FP, patio, fenced backyard, quiet street, gd neighborhood, \$1,350. 249-9522. MONROVIA condo, share furn, 2 br., 1.5 ba., full privileges, kitchen, laundry, central heat/ac, close to shops and street fair, no utilities paid, \$375 + security deposit. 626/357-5189, Kevin. N. ALHAMBRA, large 1+bd. duplex in gd. residential area, 700 square feet, clean, carpeted, 1-car gar., stove, window air cond., water, trash, gardener provided, \$625. 683-9935, eves. PASADENA, room in 3-bd., 3-ba. apt., share w/2 male students, fully furn., a/c, laundry, parking, 2 mi. from PCC & Caltech, \$425 + 1/3 util. 626/351-9641.

PASADENA, nr. PCC, 2-bd., 1 1/2-ba., townhse styl., cent. a/c, built-in range/oven, refrig., cpts, drapes, carpet., Indry., cvrd. pkgng, \$725. 790-7062.

PASADENA apt., nr. Caltech, 2 bd., 2 ba., cent. a/c, crpts, drapes, refrig., blt-in range/oven, cov. parking, \$975. 626/355-0417.

PASADENA condo, avail. Sept. 1, 6 mi./JPL from 355 S. Los Robles, 2 bd., 1 ba., cathedral ceiling, balcony, pool view, \$1,150 + sec. dep. 626/791-1604.

SUNLAND, 4-bd., 2-ba. house, hardwd flrs., fireplace, stained glass, mtn view, quiet st., fenced yd, spacious, new paint, \$1,395. 548-0588.

REAL ESTATE

ALTADENA, 2-br., 2-ba., mtn-view home w/pool, spa, C/A, seclusion, newer kitch., etc., great location, 12 min/JPL/Caltech, \$329,000/obo. 626/797-3156.

BIG BEAR, new cabin 2 blocks/lake, 2 bd., 2 ba., mud/laundry room, \$129,000. 909/585-9026.

LA CANADA, 3-bd., 2-ba., plus family rm; cnt. heat/air, hardwd flrs., newly decorated inside, new landscaping; \$399K. 244-8253.

PASADENA townhome, built in '98, nr Rose Bowl, 3.5 mi./JPL, gated community, approx. 1,400 sq. ft., 3 bd., 2.5 ba., 2-car attached garage, alarm, ceiling fans w/lights in all bdms, covered balcony off the master bd., wood floors everywhere, all Corian counters, large enclosed backyard fully landscaped w/auto. sprinklers, palm/fruit trees, pool, Jacuzzi, basketball court, \$275,000/obo. 626/568-8298.

VACATION RENTALS

BIG BEAR, 7 mi. from slopes, full kitch., 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 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/per night. 909/599-5225.

BIG BEAR LAKEFRONT, 1-bd., 1-ba. condo, sleeps 4, full kitchen, gym, indoor pool, Jacuzzi, BBQ areas, Oct. 22-29, \$75/night. 323/296-6641.

BIG BEAR LAKEFRONT lux. townhome, 2 decks, tennis, pool/spa, beaut. master bd. suite, slps. 6. 949/786-6548.

CAMBRIA, ocean front house, sleeps up to 4, exc. view. 248-8853.

HAWAII, Kona, on 166 feet of ocean front on Keahou bay, private house and guest house comfortably sleep 6; 3-bd., 2-ba., rustic, relaxing and beautiful, swimming, snorkeling, fishing, spectacular views, near restaurants, golf courses, other attractions, space avail. after Sept. 22. 626/564-9632.

HAWAII, Maui condo, NW coast, on beach w/ocean vw., 25 ft. fr. surf, 1 bd. w/loft, compl. furn., phone, color TV, VCR, microw., dishwasher, pool, priv. lanai, slps. 4, 4/15-12/14 rate: \$95/nite/2, 12/15-4/14 rate \$110/nite/2, \$110/nite/addl person. 949/348-8047.

LAKE TAHOE, North shore, only 2 summer weeks left, extra special discounts for last week of Aug. or first week of Sept., 2 bd., 2 1/2-ba., sleeps 6-7, priv. sandy beach, pool, great loc., all amenities, grt. hiking, kayaking, river rafting, bike trails; 2 mi./N. shore casinos, JPL disc. 626/355-3886, Rosemary or Ed.

MAMMOTH, Chamonix condo, 2 bd., 2 ba., sleeps 6, elec. kitchen, microwave & extras, fireplace, cable, VCR, FM stereo, pool/sun area, o/d Jacz, sauna, game, rec., laundry rms, BBQ, conv. to shops, hiking, summer events, daily/weekly rates. 249-8524.

MAMMOTH condo, studio + loft, 2 ba., fireplace w/wood Jacuzzi, sauna, game rm., color CB, TV/VCR, full kitch. w/microwave, terrace, view, amen., low summer rates. 714/870-1872.

MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft, sleeps 6-8, fully equipped kitch. incl., microwave, D/W, cable TV, VCR, phone, balcony w/mtn view, Jacz., sauna, streams, fishponds, close to Mammoth Creek, JPL discount. 626/798-9222 or 626/794-0455.

MAZATLAN, 7 nights, wk. of Oct. 11-18, '99, Pueblo Bonito Resort on the beach, 1 bd., sleeps up to 6, partial kitch., \$750. 626/917-0231.

OCEANSIDE, on the sand, charming 1 bd. condo, panoramic view, walk to pier or harbor, pool, spa, game rm., sleeps 4. 949/786-6548.

PACIFIC GROVE hse, 3 bd., 2 ba., fp, cable tv/vcr, stereo/CD, well-eqpd kit w/microw, beaut. furn, close to golf, bches, 17 Mile Dr, Aquarium, Cannery Row, JPL discont. 626/441-3265.

ROSARITO BEACH condo, 2 bd., 2 ba., ocean vw., pool, tennis, short walk to beach, 18-hole golf 6 mi. away, priv. secure parking. 626/794-3906.

SOUTH LAKE TAHOE KEYS, waterfront, 4-bd., 3-ba., handicapped access, sleeps 12+, fireplace on two levels, decks overlooking private dock, & ski lifts, gourmet kitchen, bicycles, 20' sail & paddle boats, 3 color TVs, VCR, stereo, assn. indoor & outdoor pools, hot tub & beach, 8 lighted tennis courts, 10 min. to skiing, casinos, golf, one hour to Western Sierra wine country, 3-day minimum; \$1,095/week for high season, 15 June to 15 Sept; 22 November to 1 March; \$495/week low season, plus cleaning fee of \$90. 626/578-1503, Jim Douglas.

SAN FRANCISCO, Nob Hill honeymoon suite (sleeps 2 max), full kitchen, maid service, concierge. \$125/nite; \$750/wk. 626 797-3156.