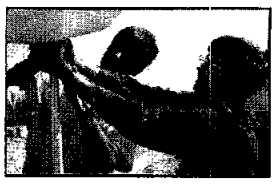
NASA
National Aeronautics and Space Administration
**Lyndon B. Johnson Space Center**
Houston, Texas



## Mars Camp

Two JSC workers do their part to encourage young scientists and engineers with a simulated trip to Mars. Story on Page 3.

## Top technicians

Two JSC workers were among the people of the year honored by the Clear Lake Council of Technical Societies. Story on Page 4.

# Space News Roundup

Vol. 31 June 19, 1992 No.25

## STS-46 'one big physics experiment'

**By James Hartsfield**

*Atlantis* crew members for STS-46 last week described their upcoming mission as a unique test flight and said they're ready to face both the expected and unexpected in orbit.

"What we are doing is making a test flight of a totally new type of technology," STS-46 Payload Commander Jeff Hoffman said. "In a sense, we're all working as test pilots and also as scientists, and that's what makes this flight so unique."

Along with Hoffman, the STS-46 crew includes Commander Loren Shriver, Pilot Andy Allen, Mission Specialists Marsha Ivins, Franklin Chang-Diaz and Claude Nicollier of the European Space Agency, and Italian Payload Specialist Franco Malerba.


Scheduled for a mid-July launch, the mission will deploy the European Retrievable Carrier on the first day of flight, and spend the ensuing few days deploying a satellite from a 12.5-mile-long tether. The final days of the mission will look at the interaction of atomic oxygen in low-Earth orbit with various materials.

The Tethered Satellite System, developed in coordination with the Italian space agency, will explore the possibilities of using a tethered spacecraft combination to generate electricity in orbit and the fundamental capabilities of using space tethers.

"This is all one big physics experiment, and we're going to be right in the middle of it," Hoffman said.

"This mission has married the two aspects of the shuttle—operations and science investigations," Chang-Diaz said. "In this flight, we've brought them together and created a new realm we call operational science. As a plasma physicist myself, this is a plasma physicist's dream, and I'm very excited to be taking part."

The crew lauded the work of trainers at JSC, and described the difficulties involved in practicing the unknown.

Please see ***ATLANTIS***, Page 4

JSC Photo by Benny Benavides

**Texas Gov. Ann Richards exchanges remarks with one of the expert panels that spoke Monday before the House Subcommittee on Space at the Texas Medical Center in Houston as subcommittee members applaud her testimony.**

## Galileo success prospects good

Galileo project officials say that the best prospect for deploying the Jupiter probe's balky high-gain antenna is still to come, but that even if that fails they have found a way to perform a "very good" mission.

"If we have to, we can fly a low-gain antenna mission that will perform an excellent exploration mission at Jupiter and accomplish the majority of our science goals," said Galileo Project Scientist Torrence Johnson.

Galileo Project Manager Bill O'Neil said flight controllers at NASA's Jet Propulsion Laboratory plan one more attempt to budge the antenna through a thermal cycle at the end of this month.

If that is not successful in freeing the three ribs of the umbrella-like parabolic dish that have been stuck for 14 months, he said, the best chance will occur in December.

Galileo, deployed in October 1989 from the Space Shuttle *Atlantis*, is scheduled to make a gravity-assist flyby of Earth on Dec. 8 that will put it into a direct transfer orbit to Jupiter, arriving there on Dec. 7, 1995. During the flyby, the spacecraft will be close enough to the Sun that its temperature will increase to levels at which it was built, which should decrease the amount of friction that is holding the three stuck ribs in place.

"A very good prospect we have is that shortly after the Earth 2 encounter, we have a period of time of about a month between the middle of December to the middle of January where we are going to be able to get the antenna as warm as it was," O'Neil said.

In addition, controllers have developed a plan to "hammer" the antenna deployment mechanism by cycling its motors on and off 1,000 to 2,000 times and more than double the forces in the system.

Should those efforts fail, flight controllers and Deep Space Network tracking experts have developed several techniques of improving the data that is returned to the Earth by way of the low-gain antenna. They plan to increase the bit-rate by a factor of 10, program the spacecraft to compress its data, increase the sensitivity of the receiving antennas and array the Deep Space Network to capture a greater portion of the low-gain's wide signal.

Please see **GALILEO**, Page 4

## Local medical heavyweights back station

**By Kari Fluegel and Kelly Humphries**

Prominent medical researchers told a congressional subcommittee meeting in Houston on Monday that research aboard Space Station *Freedom* is "vital" to the future and could be helpful in developing cures to a host of deadly diseases.

U.S. Reps. Ralph Hall, John Rhodes, Jim Chapman, Dana Rohrabacher, Tom DeLay and Mike Andrews heard more than three hours of testimony from Houston medical experts, astronauts and Gov. Ann Richards. The testimony will become part of the record used as Congress debates NASA and space station appropriations this summer.

Renowned heart surgeon Dr. Michael DeBakey and Dr. Charles LeMaistre, president of the M.D. Anderson Cancer Center, were among the physicians who testified before the House Committee on Science, Space and Technology's Subcommittee on Space at the Texas Medical Center.

"As long as you're supporting research you're going to support the development of new knowledge and that I think is one of the most important things we have to emphasize here," said DeBakey, who is chancellor and chairman of the Department of Surgery at the Baylor College of Medicine. "The whole concept of the space station is vital to us for the future."

DeBakey cited life-saving spin-offs such as heart pacemakers, miniature cameras that can be used by doctors to see inside hearts, arteries, bowels and bladders, and advanced fabrics used in surgery as some of the most important benefits that have come out of the space program and related research.

"We can't always predict what's going to come out of a scientific activity as broad and as deep as the space station scientific activity is," he said. "History is replete with many examples of scientific developments that later became so important to medicine and humanity that when it was developed it was not directed for that purpose at all."

DeBakey urged the sympathetic subcommittee members not to pit the funding request for *Freedom* against the needs of veterans and housing programs, saying that such research is beneficial to everyone. He also testified that Spacelab experiments also have provided information important in the search for a cure for the AIDS virus.

"If we stop supporting this kind of research activity we're simply not going to have available to us the kind of knowledge that comes from research that leads to so many very important developments."

LeMaistre likened his cancer center's work to that of NASA, and said that both will succeed or fail based on long-term funding support and sustained public confidence.

"There's an analogy between NASA and M.D. Anderson that is very striking," he said. "Each of them is committed to a single overriding goal, each of them is still relatively young, each has returned remarkable dividends on tax dollars that have been invested in them and each of them has a record of program spin-offs that's very impressive. They benefit society in so many different and unexpected ways. That's the key —you can't see ahead to how these things are necessarily going to happen."

Please see **HEARING**, Page 4

Turbopump seal gets seal of approval

## *Columbia* set for Thursday launch

**By Kyle Herring**

An issue relating to a suspect seal on a main engine turbopump was resolved earlier this week clearing a technical hurdle for *Columbia*'s 12th mission carrying the United States Microgravity Laboratory.

Questions about the seal surfaced when a test pump at the Stennis Space Center did not start due to failure of the "tip" seal, a secondary o-ring seal in the high pressure oxidizer turbopump.


A review of paperwork early this week proved that the seal on *Columbia*'s number three engine had been thoroughly checked during the period of time when the engine nozzle was changed.

The test pump seal is the "fleet leader," meaning it has more run time than any other seal in the program. The test pump seal has been run 11 times. *Columbia*'s pump seal has been run seven times.

With resolution of the seal issue, routine prelaunch work continued at launch complex 39A, including installation of the main engine heat shields and leak checks of the main propulsion system.

Ordnance installation was completed enabling the commands necessary to separate the solid rockets and external tank from the orbiter during the launch phase.

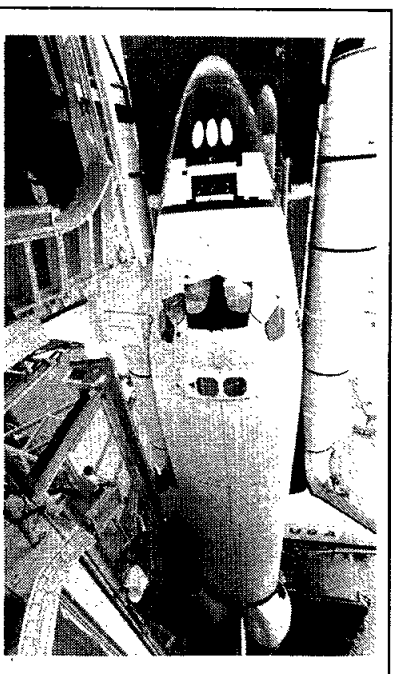
Work not typical for the days prior to start of the countdown included checkout of the regenerative carbon dioxide removal system and the extended duration orbiter cryogenic pallet in the aft payload bay.

Until now, carbon dioxide removal has been handled by canisters containing lithium hydroxide in the middeck floor. With the new system, a permanently mounted charcoal filter device removes carbon dioxide from the cabin air and vents it to the vacuum of space.

The EDO pallet enables Columbia to initially carry four additional tank sets of hydrogen and oxygen used to produce electricity for experiments and orbiter systems.

Smooth progress in processing NASA's oldest orbiter sets the stage for start of the countdown Monday for a Thursday launch at 11:07 a.m. CDT. The STS-50 crew, led by Commander Dick Richards, is scheduled to arrive at the Kennedy Space Center on Monday morning for last-minute training exercises before launch.

This mission is planned to be the longest in shuttle program history at nearly 13 days. Landing would occur on July 8 at Edwards Air Force Base.



NASA Photo

**The Space Shuttle *Columbia* is poised on Kennedy Space Center's Launch Pad 39A, undergoing final preparations for Thursday's STS-50 launch.**

## Space Center Houston trams take to streets

Space Center Houston will begin operating trams on JSC's streets next week, heralding the Oct. 16 grand opening.

After Space Center Houston is open, each of the eight trams will take 100 passengers to visitor areas at Bldgs. 30, 32, 9N, 29 and Rocket Park.

The single-tram practice runs are designed to identify any potential safety and traffic flow problems before the full fleet of trams begins co-existing with JSC traffic every day.

JSC Security Specialist Debra Griffin said the practice runs should benefit everyone in the long run.

"We are asking for patience on the part of the employees, because this is new to everyone, " Griffin said. "The trams are slow moving and both vehicles and pedestrians need to be careful as we get used to what are going to be some significant changes to the traffic patterns here."

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# Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Gift Store from 10 a.m.-2 p.m. weekdays. For more information, call x35350 or x30990.

EAA New Braunfels River Raft Trip (8:30 a.m.-10 p.m. July 11, includes transportation, 2-3 hour raft trip, barbecue dinner): $36.

Fiesta Texas Park (San Antonio): adult, $19.50; child 4-11, $13.55.

Sea World (San Antonio): adult, $18.90 (child free with paying adult); child 3-11 $13.55.

Astroworld, $16.95 and $14.95 (child under 54 inches), $44.95 (season pass) and Waterworld, $9.50.

Six Flags, $16.95 (one-day) and $22.95 (two-day).

Movie discounts:

General Cinema, $4;
AMC Theater, $3.75;
Loews Theater, $4.

Metro passes, stamps, Walt Disney Club memberships also available.

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# Gilruth Center News

**Sign up policy** — All classes and athletic activities are first come, first served. Sign up in person at the Gilruth Center and show a badge or EAA membership card. Classes tend to fill up four weeks in advance. For more information, call x30304.

**EAA badges** — Dependents and spouses may apply for photo identification badges from 6:30-9 p.m. Monday through Friday. Dependents must be between 16 and 23 years old.

**Weight Safety** — Required course for employees wishing to use the Gilruth weight room is offered from 8-9:30 p.m. June 30. Cost is $5.

**Defensive driving** — Course is offered from 8 a.m.-5 p.m. July 11. Cost is $19.

**Aerobics** — High/low-impact classes meet from 5:15-6:15 p.m. Tuesdays and Thursdays. Cost is $32 for eight weeks.

**Exercise** — Low-impact classes meet from 5:15-6:15 p.m. Mondays and Wednesdays. Cost is $24.

**Aikido** — Martial arts class meets twice weekly. Cost is $35 per month.

**Fitness program** — Health Related Fitness Program includes medical examination screening, 12-week individually prescribed exercise program. Call Larry Wier, x30301.

**Crime prevention** — Citizens Against Crime, a private company, will present a free program entitled "Living in a Dangerous World" at 5:30 p.m. June 25 in the Gilruth Center.

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# Dates & Data

## Today

**Juneteenth picnic** — The JSC Black Cultural Association will present its annual Juneteenth Picnic from 3-9 p.m. June 19 at the Gilruth Center. Tickets, on sale until June 15, are $10 for adults, $4 for children under 12. The JSC BCA Ron McNair Scholarship Award will be presented. For tickets or more information, call JSC Black Program Manager Charles Hoskins at x34831.

**UNIX meeting** — The JSC UNIX Systems Administration Group will meet at 2 p.m. June 19 in Bldg. 12, Rm. 256. Demetrios Yannako–poulos of Lockheed will discuss "The Vi Editor." For more information, call Mark Hutchison, x31141.

**Cafeteria menu** — Special: barbecue link. Entrees: deviled crabs, broiled codfish, liver and onions. Soup: seafood gumbo. Vegetables: buttered corn, green beans, new potatoes.

## Monday

**Cafeteria menu** — Special: chili and macaroni. Entrees: barbecue sliced beef, parmesan steak, spare rib with kraut. Soup: French onion. Vegetables: ranch beans, English peas, mustard greens.

## Tuesday

**AFCEA meets** — The Air Force Communication and Electronics Association will meet at 11:30 a.m. June 16 at the Holiday Inn on NASA Road 1. Col. Jeffrey Ellis, operations research systems analyst at Ft. Bliss, Texas, will discuss "Army Air Defense Programs." Luncheon tickets are $12 for members and $14 for non members; call Veronica Mullins, 283-7342, or Luz Wood, 283-8308, for reservations.

**Loral NMA meets** — The Loral chapter of the National Management Association will meet at 5:30 p.m. June 23 in the Gilruth Center. James McIngvale of Gallery Furniture will speak. Call Jim Christiansen, 335-6988, Joe Betters, 335-2506, or Suzanne Carter, 335-50957.

**Cafeteria menu** — Special: corned beef hash. Entrees: meatballs and spaghetti, liver and onions, baked ham with sauce. Soup: split pea. Vegetables: buttered cabbage, cream style corn, whipped potatoes.

## Wednesday

**Toastmasters meet** — The Spaceland Toastmasters club will meet at 7:15 a.m. June 17 in the Bldg. 3 cafeteria. For more information, call Darrell Boyd at x36803.

**Astronomy seminar** — JSC Astronomy Seminar will be held from noon to 1 p.m. June 24 in Bldg. 31, Room 129. For more information, contact Al Jackson at 333-7679.

**Cafeteria menu** — Special: barbecue link. Entrees: cheese enchiladas, roast pork and dressing. Soup: seafood gumbo. Vegetables: pinto beans, Spanish rice, turnip greens.

## Thursday

**Blueprint for Space** — A graphic and artifact exhibit focusing on the earliest planning of America's space program will be on display in the north lobby of the Bldg. 2 Visitor Center beginning June 25. The exhibit features original spacecraft drawings by Wernher von Braun, reproductions of the 1950s Collier's magazine covers and artifacts from rocket pioneer Dr. Hermann Oberth.

**SCS meets** — The Society for Computer Simulation will meet at 11:45 a.m. June 25 in the Lockheed Plaza 3 first floor Pic Rm. William L. Buford, director of the Orthopeadic Biomechanics Lab at the Unitersity of Texas Medical Branch, Galveston, will discuss "Interactive Graphical Simulation of the Human Hand."

**Cafeteria menu** — Special: chicken fried steak. Entrees: roast beef with dressing, fried perch, chopped sirloin. Soup: beef and barley. Vegetables: whipped potatoes, peas and carrots, buttered squash.

## June 26

**Cafeteria menu** — Special: fried chicken. Entrees: fried shrimp, baked fish, beef stroganoff. Soup: seafood gumbo. Vegetables: okra and tomatoes, buttered broccoli, carrots in cream sauce.

## July 1

**Astronomy seminar** — JSC Astronomy Seminar will be held from noon to 1 p.m. July 1 in Bldg. 31, Room 129. For more information, contact Al Jackson at 333-7679.

## July 7

**Expert systems workshop** — JSC's Software Technology Branch and IBM Corp. are sponsoring a series of workshops on verification and validation of knowledge-based systems at the Gilruth Center. The next workshops will be from 8 a.m.-4:30 p.m. July 7, 9, 14 and 16. For more information, call Chris Culbert, 283-8080; Bebe Ly, 283-8072; David Hamilton, 282-3857; or Scott French, 282-8346.

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# Swap Shop

Swap Shop ads are accepted from current and retired NASA civil service employees and on-site contractor employees. Each ad must be submitted on a separate full-sized, revised JSC Form 1452. Deadline is 5 p.m. every Friday, two weeks before the desired date of publication. Ads may be run only once. Send ads to Roundup Swap Shop, Code AP3, or deliver them to the deposit box outside Rm.147 in Bldg. 2. No phone or fax ads accepted.

### Property

Sale: Brittany Bay, 4-2.5-2A, 2 yr old, cul-de-sac, dual AC alarm system, built-ins, 2436 sq ft, $105K. x36814 or 554-2955..

Lease: Webster condo, 2-1, FPL, appl, vaulted ceilings, mini blinds, pools, storage, W/D conn, $475/mo. x31275 or 486-0315.

Sale/Lease: CLC/Baywind II condo, 2-2-2, redecorated, lg outside unit, windows, W/D, security, $575. 280-8796 or 283-5471.

Rent/Sale: University Trace condo, 1 BR, 832 sq ft, up/down unit, FPL, W/D, cov parking, new paint/carpet, $450/mo or $28K. James, 286-1934.

Sale: Friendswood, 3-2-2, open floor plan, high ceilings, FPL, 5 ceiling fans, fresh paint, cov patio, fenced, $65K. x31177 or 996-8721.

Lease: Camino South, 3-2-2, avail Aug, $825. x36212 or 286-1825.

Rent: Bay Knoll, 4-2.5-2, 2500 sq ft, neutral carpet, cul-de-sac, no pets, no smokers, $1300/mo. Bill, x35443 or 480-9565.

Rent: Galveston beach house, D/W/M, C A/H, furnished. Ed Shumiak, x37686.

Rent: Bay Forest, 2 BR, 1 bath in 3-2-2 house, hot tub, space in gar, no smoking, avail July 5, $400 + 1/2 util. Beth, 283-5232 or 488-0576.

Sale: Channelview, 2-1.5, 2 story, new carpet and paint, fan, burglar bars, alarm, new 6" fence, corner lot, $49K. x38796 or 457-5217.

Sale: Med. Ctr/Astrodome condo, 2-1, mirrowed wall, appl, W/D, 3rd floor balcony view, cov car port, sec gate, owner finance, $25K. x38796 or 457-5217.

Sale/Lease: Clear Lake, Baywind II condo, 1-1, $27.9K. Leon, 512-869--0389.

Rent: University Green, 2-2-2, 1 floor townhome, furn, avail Jul 1, $950. Mike or Carol, 488-4493.

Sale: Friendswood, Regency Estates, 3-2-2A, lg lot, Victorian, landscaped, $93K. Rick, 335-4415.

Sale/Lease: Clear Lake Bay Glen, 4-2.5-2, 2070 sq ft, formals, sec sys, lease $1150/mo + dep, sale nego. 333-7150 or 488-5284.

Sale: South Shore, new 4-2.5-2a, both formals, FPL, energy efficient, gas, cul-de-sac. Tim, x31456 or 538-1596.

Lease: Webster/Ellington, 2-1 condo, $450/mo, water paid. Eric x38420 or Dave x38156.

Lease: Pipers Meadow, 3-2-2, fenced, deck, refrig, lg den, FPL, sec sys, gar door opener, $925/mo. George, x31275 or 486-0315

Sale: Camino South, 3-2-2, 1450 sq ft, $68.5K. Mike, 282-3156 or 286-2387.

Lease: League City, The Landing, 3-1.5-1, fenced, mini blinds, $600/mo + dep. 486-9811.

Rent: Medical Center, 2 story condo, 2-1.5, lg ktichen, FPL, fans, monitored alarm, avail July 1, $695. Charlie, 286-1168 or 333-7804.

Sale: 71+ acre Ranch, La Moca Hwy 83 Webb County No of Laredo, 2 blinds for hunting, 2 deer feeders, 2 BR on 9' stilts, water well, CPL electric pwr, mineral rights, $120K. 326-1833.

Sale: Countryside, 3-2.5-2A two story, lg corner lot, covered deck, all bdrms up, int util room, CCISD, $66.9K. 554-7623.

### Cars & Trucks

'83 Maxima, grey w/grey tint, 77K mi, sun roof, loaded, ex cond, $3K. x38709 or 286-5106.

'68 Porsche 912, yellow w/blk int, 911 w/4 cyl, $9K OBO, consider trade. Tony, 479-0161.

'80 Jeep CJ7 Larado, V8, A/C, PS, PB, 2 tops, steel drs, 63K mi, radials, new auto trans, good cond, $4.7K. 283-1118 or 480-7226.

'83 BMW 318i, 48K mi, new tires, new int, $4K OBO. Irene, 286-0206 or 483-2123.

'92 Pontiac Firebird, 3K mi, 305 V8, auto, loaded, take over payments. 472-7345.

'88 Ford Ranger XLT, 41K mi, ex cond, 6 cyl, extras, $6K OBO. x33814 or 486-9760.

'88 Ford Escort GT, 5-star rims, tint, alarm, 5 spd, A/C, AM/FM/cass, PS/PB, tilt, cruise, $3995. x33291 or 481-9523.

'90 Convertible Dodge Dakota PU, 13K mi, like new, pwr locks, pwr windows, PS, A/C, alarm, service contract, $11.9K OBO. x49744 or 333-9742.

'82 BMW 320i, classic silver, 5 spd, alarm, tint, ex mech cond, AM/FM/cass, no rust, $3.4K. John, x53092 or 488-2756.

'90 Nissan Sentra, A/C, tint, stereo, alarm, new tires, $6.1K, x39045 or 333-9168.

'88 Nissan PU, red, A/C, PS, AM/FM/cass, 5 spd, 83K mi, $4.3K. 661-3994 or 992-5724.

'80 450SL Mercedes, new factory paint, blk w/blk leather int, good cond, $7.5K. 474-5914.

'59 Chevy PU for restoration or parts; '80 Chevy Van, good condition, auto; '76 Datsun B210 2 DR Sedan. 771-1012.

'83 Ford Escrot GL, 5 spd, 2 DR, 98K mi, new tires, good cond, $995 negotiable. 996-1105.

'84 Audi 5000 Sedan, 4 DR, 45K mi, ex cond, $4.8K OBO. 480-8721.

'92 Saturn SC, teal, PL, PW, A/C, AM/FM/cass, w/eq, ABS, sunroof, cruise, 5 spd. Dwayne, 283-5386.

'90 King of Road 40' fifth wheel, 2 sideouts, BR queen; C/A; icemaker, W/D, awning, storm windows, '91 Ford F-350 460 XLT Lariet dually, 10K mi; $58K for both. 409-935-2781.

'88 Nissan Sentra, 2 DR, 5 spd, red, A/C, AM/FM/cass, new tires, 62K mi, ex cond, slight body damage, $4.2K OBO. Walt, x35939.

### Boats & Planes

18' Coleman polyurethane canoe, $300. Sean, 283-9323.

'81 Catamaran, 5.0 meter, G-Cat sailboat, Harkin blocks 7:1, custom boom, 2 trampolines, trlr w/new tires, bbq pit, 4 jackets, $2.5K. Darrell, 283-1118 or 480-7226.

'88 Bayliner 1700 Capri ski boat, open bow, V-hull, convertible top, 85hp force, Magnum custom drive-on trlr, garaged, $6K. Ed, 486-0705.

Trainer 60 airplaine w/super Tyger 50 eng, 6 channel Futaba radio w/case, ex cond, $440. 554-6082.

'85 31' Chris Craft Sportsman, twin Mercruiser eng, lw eng hrs, ex cond. 339-1197.

'69 16' Tri-Hull 85 hp outboard, $950; 1/2 partnership in C35 Bonanza, good cond, IFR. x38740 or 992-3827.

'85 Invader skiboat, 18' IO, 205hp Merc, depth finder, AM/FM/cass, ski gear, shorelander trlr, $6,250. John, 488-2756.

'82 Citation fish/ski boat, 125hp Volvo I/O, new int, new paint on trlr, $3.5K. Monte, 280-2532.

### Cycles

'83 Honda Night Hawk 550, blk, runs good, low mi, $1,750. OBO, consider trade for economy car or truck. Tony, 479-0161.

Men's bikes, Schwinn LeTour 10 sp, $125; Raleigh Chill 18 sp ATB, $400. Blaine, x32765 or 486-9825.

10 sp Raleigh Rapide, $75 OBO. Walt, x36353.

Honda Hobbit, less than 1300 mi, $375. Rick, 335-4415.

### Audiovisual & Computers

IBM PS/2, model 50Z, 2 meg RAM, coprocessor, color VGA, 5-1/4 & 3-1/2 drives, mouse, SW, $850. x36814 or 554-2955.

Panasonic microcomputer w/mono monitor, 30 MB HD, 2 FD, graphic card, clock, manuals, $675. 488-5564.

Apple III w/built-in drive, ext drive, BO. Walt, x36353.

IC's, prototyping boards, wirewrap sockets & tools, PC board making supplies, $125; composite mono monitor minus pwr supply & case, $10; Commodore 64 and junk C64 for parts, $25; Kaypro II-83 w/C, Wordstar, $200; Sinclair ZX-81 plus 64K RAM, $30; PCXT keyboard, $10. Jesse, 332-6681 or 332-8869.

AT&T 6300 PC, mono, 10 MB HD, two 5-1/4 FD, math coprocessor, modem, manuals, BO. 488-4102 x133.

Video games, Nintendo, Sega Genesis, Turbo Grafics 16, $15; Nes A Adv joystick, $15; Sega Genesis game system plus Rapid Fire controller, make offer. Greg, 554-6200.

60 MB IBM ESDI hard drive/controller for IBM PS.2 model 50Z/70, $200 OBO. David, x37056 or 486-97521.

Lobo Max-80 computer, 64K, CP/M or LDOS OS, 8" drive, some SW, $75; Hayes Smartmodem, $50; Epson FX-80 printer, $75; Gorilla mono, $25, all hardware manuals. Ronnie, x32539 or 538-1649.

### Photographic

35 mm Minolta SRT101 f1.4 58 mm lens w/case, Vivitar zoom 85-205mm f3.8 lens w/case, Tiltall professional tripod, $100. 282-6432 or 796-1833.

### Pets & Livestock

AKC reg male Shelty, avail for stud. 286-5106.

Persian kittens, wht, blk, blue, cream, big eyes, heavy coat, $225-500, stud service, champion Persians, black, cream, fee nego. Kristy, x31468 or 286-0146.

AKC English cocker spaniel, male, buff, born 10-21-85, free to good home. Dave, x33109 or 332-9955.

Lg covered rabbit hutch w/5 cages, $125; Angora bunnies, 6 wks, $25. Pat, 668-9721.

AKC Lab pups, born 3/13, YLW, 1st shots/dewclaws, strong FTC bloodline, $125; 244-9682 or 534-2176.

Mini-lop rabbits, Gailo, 554-6200.

### Musical Intstruments

Used "King" coronet, ex cond. $175. Dawn Meider, 334-4808.

### Household

Rattan floral pattern sofa, lovesheat, chair w/ottoman, coffee table & end table, $500 OBO; dining table & 4 chairs, negoitable, blue leather sofa, $500 OBO. 280-5850 or 333-9078.

King sz bed complete w/matt, box springs, steel frame matt, approx 2 yrs old, $350; 120 sq yds of good carpeting, 2 yrs old, $357; barometer w/humidity/temp, $10; antique blue venetian glass ceiling fixture, 4 lights, $100. 488-5564.

Full sz sofa & loveseat, $175. 282-4699 or 488-8086.

Clothes washer, new drive belt, almond, $65; Queen sz pine wareless waterbed w/heater & liner, $150. x36212 or 286-1825.

Persian carpet, 100% silk, handmade, 3.5 x 5.5, $4K; Persian carpet, wool w/silk flowers, handmade, 10 x 12, $3.5K. 488-0345

Upholstered occasional chair, $25 OBO. 332-0442.

King sz waterbed, dark pine, full motion matt, heater, pad, sheets, BO. Ted, 282-2808 or 286-9820.

Amana microwave oven, good cond, multiple settings, lg capacity, $80. Tom, 286-2713 or 282-3803.

Blk metal desk, formica top, 30" x 60", good cond, 2 book cases, $125. 486-9525.

Sofa & loveseat, $120; full sz bed, $150; VCR, 100. Tod, x36471 or 332-3724.

Chaise lounge, dusty rose velvet, overstuffed chair, grey velvet, antique style, good cond, $75/ea OBO. 538-3320.

Sears 30.4 cu ft upright frostless freezer, wht, ex cond, $300. 484-8241.

Couch $50; chair, $25; kitchen table, $15; small & lg coffee tables, $15/$20; barstools, $15/ea, stereo turntable, $10; kitchenware BO. 332-8785 or 282-3546.

2 oak bookcases, 72" x 36" 14", antique, solid pull down door, $450/ea OBO; computer desk, L-shaped, 5' x 3' wood, holds computer, monitor, printer & books, $70 OBO. 488-5092.

### Lost & Found

Lost, gold class ring sometime in May, reward, Don, x38869.

### Wanted

Want gas dryer and washing machine. Norman, x38808.

Want small PA system w/speakers and 8-channel mixer/amp. Gerry, 554-7606.

Want working & nonworking appli, rerig, W/D, lawnmowers & A/C. 479-1608 or 476-0612.

Want 4-to-6 person inflatable dinghy w/keel. Debbie, x30816 or 333-4740.

Want female roommate to share a 3 BR house in Lakeside, $370/mo incl util + 1 month dep. Ann, 282-3790.

Want riders for vanpool, West Loop Park and Ride to NASA. Richard, x37557.

Want cheap work car, minor repairs OK, Phil, 280-2239 or 333-1017.

Want coo-coo clock in good cond; twin sz bed in good cond. 480-3424.

Want students to join a Russian language class begin/intermed level. Rick, x36042 or Keith, x38024.

Wanty carpool/vanpool from Heights to JSC. Susan, x35785 or 861-6646.

### Miscellaneous

Radio controlled airplanes, three high perform Pattern airplanes ready to fly, Tiporare, Phoenix 8, Challege IV. Carlos, x38879 or 554-7727.

Oceanic aquarium, 135 gal, 6 mo old, incl underground filtration system, hood, oak stand w/storage, coral gravel, pump, was $1.2K, now $800 nego. Pat, 797-0345 or 482-3410.

Memorabilia, old signs, Coke, mis oil companies, good cond, some dated. Judy, x39138 or 482-1850.

Blk, 2 genuine sheepskin seat covers for BMW/Mercedes Benz Sedan, was $185, BO; pwr amp for BMW radio, $100. Blaine, x32765 or 486-9825.

Lt wood DR table w/insert leaf & 4 chairs, $200; LR set, sofa, chair, ottoman, coffee table & end table, 2 lamps, $250; 40 channel CB radio w/antenna, $40; MC helmet, $40; solid wood coffee table, $50, pet porter, $35; dog pen, 6 x 3 x 6, w/dog house, $75. Terry, x33814 or 486-9760.

Drafting table w/outlet, $150; Marine radio, $100; cordless recording phone, $80; set of drinking glasses, $15; set of dishes, $15; storm door, $200, gas edger, $25; smoked glass mirror, 12 x 12 blocks $10 for all. John or Gay, x53092 or 488-2756.

Two round-trip tickets on Continental Airlines to Seattle, WA , leaving July 29, returning Aug 2, 1992, $175/ea OBO. 326-2378.

World Engines Expert 7 channel aircraft R/C system w/AMA gold-stickered xmitter, dual-conversion receiver, three good servos, $100. Jesse, 332-6681 or 332-8869.

RV, boat or util trlr tires, four, F78-14 ST bias ply, load range C, 1750 lb max at 50 PSI, approx 10K mi, $25/ea. Bob, 282-4510 or 482-5984.

One Super Trwin waterbed w/all assys w/bookshelf type headboard, $275; one toolbox for small PU, $50. Tom, x31710 or 538-1581.

Frig, $320; W/D, $325; stereo cabinet, $70; piano, $335; workbench, $20; sofa & 2 chairs, $70; wood BR set, dresser w/mirror, end tables, chest of drawers, BO. 941-8149.

Crystal miniature 3" airplaine, made in Austria, new, original box, $30. 486-8716.

Precious moments figurines, girl w/puppies, and other key pieces, greenbook prices. 332-2344.

Airline ticket, one-way Nashville to Houston on Southwest, $75; rocking chair, $25; hall tree, $25. 244-5035.

Blk satin cocktail dress, ruffled peplum waist, open back w/draped pearl strands, wht sequins, beaded flowers attached to shoulders, was $150, now $90. Connie, 484-2192.

Hammond 15 x 30 universal sunroof, new, $50 OBO. David, x37056 or 486-9751.

Soma matt, $300; lg dog kennel, $60; CB radio, $55; solid oak DR table, no chairs, $150; corner twin bed unit w/table, $250; 4 car seats, infants & toddlers, $25-40; baby clothes to 2T. 480-8721.

Roundtrip airline ticket anywhere Southwest Airlines fly, good for one year, $200. Phil, 280-2239 or 333-1017.

Sports memoribilia, unopened sports cards, old Sports Illustrated, Legends Magazines. Duane, x36145 or 428-7419.

4' x 6' floor standing blackboard, $75; Corning china cookware, $40; 1-1/2 ton A/C, $200; 16 mm movie projector w/sound, $50; Art Deco slide projector, $20; Sony Walkman AM/FM radio only, $10; elem school calculators, $5. 225-4064.

Golf clubs, Wilson Staff, irons 2-PW, $65; woods 1, 3, 4, 5, $55; free bag. 333-2332 or 326-4688.

7' Brunswick Bristol II billiard table, ex cond, slate top; incl cue rack, cues, Belgian balls, chalk, brushes, was $1250, now $750. Regina, 992-3916.

Engagement ring, 18k yellow gold, round dia solitaire, .68 carats, w/6 round dia, .18 carats, was $1.5K, now $1K OBO. x30874.

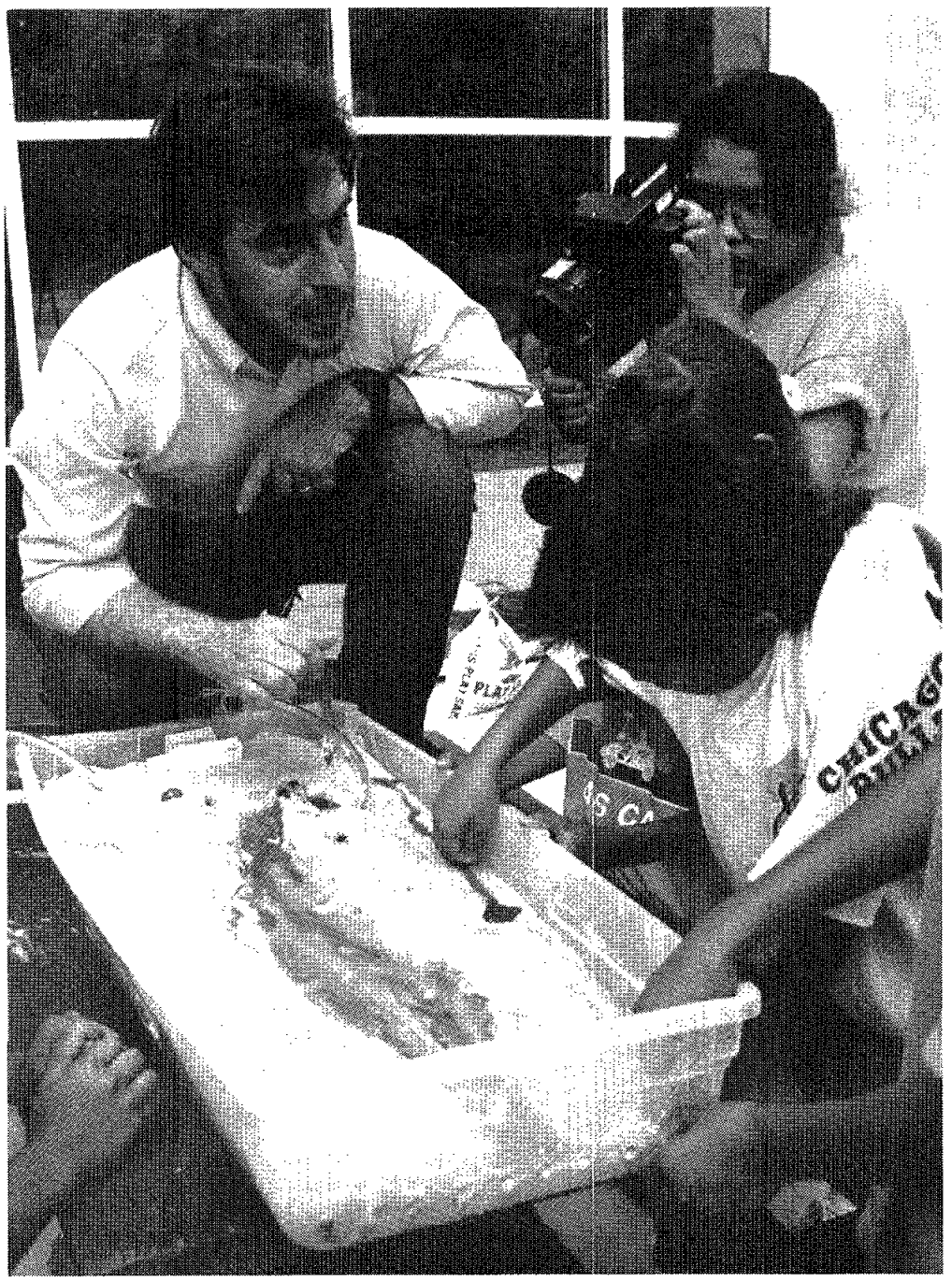
Double bed, $50 OBO; Buescher flute, $50. x35785 or 280-8394.

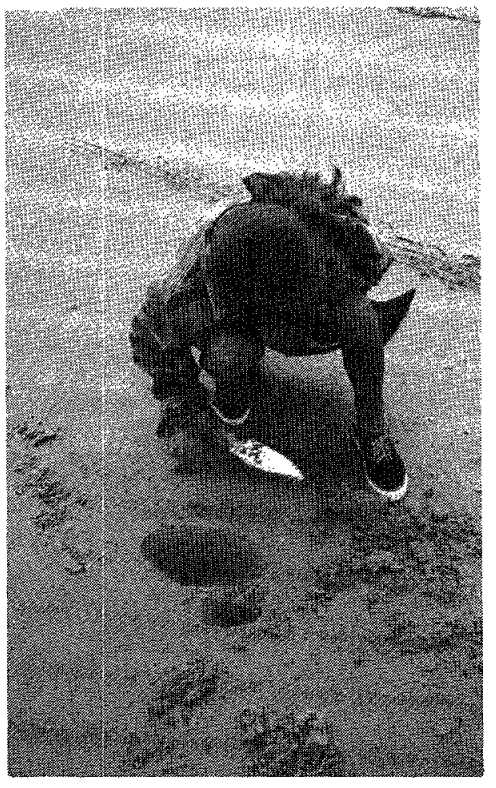
Soloflex w/all attach, ex cond, $625. 486-5734.

Briggs & Stratton gasoline edger, $60. x37494.

Rain-gutter attached overhead auto rack w/rachet-strap tie-down, $20; rubber two-man raft, pump, paddles, $15; Pioneer receiver, 4 spkrs, nonworking Sanyo turntable, $75; books, dishes, clothes, sportscoats, household items. Ronnie, x32539 or 538-1649.

Toys, Japanese tin astronauts, robots, space vehicles; also want to buy tin autos from '50s & '60s. Todd, x30251.



**Top: Students from Twin Wells Indian School near Holbrook, Ariz., learn about lava flows by pouring hot wax through a tube onto sand, a demonstration put together by Dr. Ben Schuraytz of the Lunar and Planetary Institute. From left are LPI's Dr. Paul Schenk, Yvette Yazzie, Jeremy Haskie and Schuraytz. Next: The Mars rover crew shows off its prize discovery — a small shark — on the beach at Galveston. From left are Malcolm Cook, Leo and Juanita Bryan, Terri Barton, Sophina Burnside, Kaylene Yazzie, Jeremy Haskie, Yvette Yazzie and Jolynn Biltah. Above left: Sophina Burnside's core sample is recorded photographically. Above right: Kaylene Yazzie digs through layers of sand on a Galveston Island beach during one of three sorties.**

# Home to Mars

## JSC couple shows Navajo students how similar their part of the world is to a world millions of miles away

**By Kelly Humphries**

It was a cold and generally miserable day on the beach at Galveston, particularly for a group of fifth grade students used to the hot, dry climate of their Navajo reservation in Arizona.

But spirits were high as the seven students drove their "Mars rover" up and down the beach, taking core samples of the beach sand, collecting artifacts, and reporting their findings back to their base station via citizens band radio and camcorder transmissions.

The biggest discovery of the day — at least for the kids — was that of a small shark that wouldn't fit in the rover's sample boxes and had to be draped across the hood of the rover like a hunting trophy and returned to the base station.

For the organizers — Charlie and Judy Allton, a couple of JSC employees who went the extra mile to enrich the lives of some youngsters they didn't even know — the biggest discovery may have been the interest in math and science that they had kindled.

"We called it Mars Camp because we thought if we had a name it would be catchy," said Judy Allton. "The purpose was to teach them about a mission to Mars by studying the human requirements for long space missions. Charlie and I just felt like it would be neat to share some of the excitement of space exploration with kids who otherwise wouldn't have the opportunity, and these kids were really remote so we figured it would be a whole new experience for them."

The Alltons found the students at Twin Wells Indian School near Holbrook, Ariz., through Dr. Roberta Bustin, a chemistry professor at Arkansas College in Batesville, Ark. Bustin is one of 25 American Society of Engineering Education Summer Faculty Fellows working at JSC this summer in a program that provides NASA with additional research capabilities and gives the summer faculty members a chance to update their knowledge with hands-on experience. Bustin, who is analyzing cosmic debris and has been summering at JSC for almost a decade, had worked at the Twin Wells school several years ago.

"The big problem with kids from the reservation is dropping out after the elementary level," said Charlie, who works on extravehicular activity equipment in the Crew and Thermal Systems Division and has been with NASA at JSC for 25 years. "Many quit after the eighth grade. Our long-term goal is to generate a career interest that will sustain them through the period when it is difficult for reservation kids to stay in school."

With about $3,000 of their own money, a lot of hard work and the help of some of their friends, the Alltons put together a week in May in which the students made their first airline flight, saw their first ocean and had their first contact with America's space program.

"We took a look at the amount of food and water it would take to go to Mars on a two-year plus journey. We tried to teach a little mapping, navigation and simple geometry. We took a look at what would be involved in the mission and the sampling, we took a look at Mars geology and studied the big huge canyons and volcanoes and the mystery of the drainage basins most likely created with water, and where is the water now," said Judy, a Lockheed employee who provides lunar rock curation support for the Solar System Exploration Division.

"We could draw a lot of analogies to features the kids are familiar with in Arizona," Judy said. "They've got the Grand Canyon. They've got Meteor Crater. They've got a large volcano, San Francisco Peaks near Flagstaff and Mt. Taylor, which is important to the Navajos in New Mexico. They've got lava flows at Sunset Crater, where they had taken a field trip. A lot of that arid drainage is similar at first look to Mars features, although the scale is much different, but it was something they could identify with."

The highlight of the trip was the simulated Mars landing and exploration, but leading up to that the students participated in a simulated comet probe mission at the Challenger Center, learned about Mars geology from Dr. Ben Schuraytz of LPI, who gave them hands -on demonstrations of how volcanoes, cratering and wind and water erosion work together to mold a planet's surface.

"They were very receptive to hands-on demonstrations," Judy said. "They got the meaning from context and they could see from looking. They were very perceptive, interested, polite, we had no problem with discipline. A couple of them got homesick and said they wanted to go home to Mars because we had made so much of the Mars analogy."

The list of loaned equipment was quite long — everything from TV transmitters and CB radios to a van and a very good microscope. They also checked out educational materials from their departments and enlisted the help of the Challenger Center and the Lunar and Planetary Institute. The Alltons' fellow church members, Tom and Robin Manison, donated a bunkhouse at their Camp Manison, a commercial campground just outside Friendswood.

"As many things do, it kind of snowballed," Judy said. "People are really interested in helping."

The couple built their Mars Camp around activities the kids would enjoy and relate to. Since driving isn't something most fifth graders get to do, the modified golf cart that became a Mars rover was a natural, said Charlie, a mechanical engineer. He recruited Dale Wolfe, a retired Boeing electrical engineer to help him wire the cart for all of its electrical equipment, and Dana Helvy, who works in JSC's Tracking and Communication Division, to help him obtain two television transceivers and make them mobile on the rover. They piled tools, rakes, a core sampler and a magnetic sampler on board, and the students were ready to explore. They transmitted their findings back to a folding table base camp equipped with a television monitor and CB radio from as much as 1,500 feet away.

Although they have not received any feedback from Juanita Bryan, the teacher at the church-run boarding school, Charlie and Judy believe they accomplished what they set out to do.

The final report prepared by Terri Barton, Jolynn Biltah, Sophina Burnside, Malcolm Cook, Jeremy Haskie and Kaylene and Yvette Yazzie seems to support the Alltons' conclusion:

"We came to learn about Mars and to simulate a mission to Mars. We did this by driving a rover to explore for samples. The sand we collected was not like Mars. Mars sand is red. Mars has lava, clay and iron rust. We think the sand on Mars may be finer and blow around in the wind. The beach was soft and damp. Mars is rocky and dry. We were cold on our mission, but it is much colder on Mars."

"I think we gave these kids an interest that might keep them in school where they wouldn't otherwise go," Judy said. "They don't live in an environment where they can have access to that kind of instruction. The Navajo people could use students who learn science and math to go back as teachers." ❑

# NASA astronomers find evidence of planets around nearby stars

Two NASA astronomers have found evidence of planets or other bodies around eight stars they have studied in a star-forming region of the Milky Way galaxy, 450 light years from Earth.

Drs. Kenneth Marsh and Michael J. Mahoney of NASA's Jet Propulsion Laboratory disclosed their findings in a presentation before a session of the American Astronomical Society meeting in Columbus, Ohio, last week.

The scientists said their discovery of unseen companions around low-mass stars in the Taurus-Auriga region of the Milky Way resulted from the study of data from the Infrared Astronomy Satellite acquired in 1983 and data from ground-based observatories acquired mostly from 1981-1983.

Taurus-Auriga is a giant gas and dust cloud complex, farther out from the center of the galaxy than Earth's solar system, and is one of two star-forming regions near Earth. The stars they studied are called T Tauri stars. They have about the same mass as the Sun. T Tauri stars are believed to be young and are usually found in groups embedded in clouds of gas and dust.

Earth's solar system is believed to have formed similarly, with the planets accreting from the matter in the solar disc left over after the formation of the Sun.

By looking in the infrared part of the spectrum at the variations of from the T Tauri solar discs, Mahoney and Marsh said they found evidence of gaps indicating that a body had accreted and swept an orbit around a young star, forming a gap in the disc.

Eight such stars were identified. In some cases, wide gaps were found, suggesting a fairly massive companion such as a low-mass star or a brown dwarf. A brown dwarf is a body that might have become a sun if it had sufficient mass for nuclear reactions to begin in the core. For three stars, however, the gaps were much narrower, indicating much less massive companions that could be planets. These three stars were T Tauri, HK Tauri and UY Aurigae.

In looking at infrared emissions from the discs, Mahoney said, they also found that the dust temperatures at the outer gap boundaries were near -56 Fahrenheit, near the condensation temperature of water under interstellar conditions. "That is an important quantity in models of planet formation," Mahoney said.

Looking at gaps in the stellar discs is a new way of finding evidence of star companions, the scientists said. Previously astronomers looked at the perturbations of some stars, to see if the "wobble" of the stars could be caused by the gravitational influence of nearby bodies.

Marsh said that although the data they used also were studied by other scientists, they were more interested in star formation and were not looking for planets. "But we are in an environment where people are very interested in planets," he said.

A paper by the scientists, for Unseen Companions Around T Tauri Stars," which describes their is to be published later this year in the Astrophysical Journal (Letters). The research was carried out at JPL under a contract with NASA.

## Mission Control viewing hours

The Mission Control Center viewing room will be open to JSC and contractor badged employees and their families during portions of the 13-day STS-50 mission.

Based on a Thursday launch, employees will be allowed to visit the MCC Friday, from 11:30 a.m.-2:30 p.m.; Saturday and Sunday, from 1-4 p.m.; Monday, from 11:30 a.m.-2:30 p.m. and 5-7 p.m.; Tuesday and Wednesday, from 11:30 a.m.-2:30 p.m.; Thursday, July 2, from 11:30 a.m.-2:30 p.m. and 5-7 p.m.; Friday, July 3, Saturday, July 4, and Sunday, July 5, from 1-4 p.m.; Monday, July 6, from 11:30 a.m.-2:30 p.m. and 5-7 p.m.; and Tuesday, July 7, from 11:30 a.m.-2:30 p.m.

For the latest information on the schedule, call the Employee Information Service at x36765.

Special cafeteria hours also will be in effect during the mission.

The Bldg. 3 cafeteria will be open from 7 a.m.-4 p.m. weekdays, except launch day, and from 11 a.m.-4:30 p.m. weekends and holidays. The Bldg. 11 cafeteria will be open from 6:30 a.m.-2 p.m. weekdays, except launch day, and 7-10 a.m. weekends and holidays.

## Roundup taking week of July 3 off

Space News Roundup will not be published on July 3 because of production and distribution scheduling problems associated with the Independence Day holiday.

Swap shop ads for July 10 will be accepted until 5 p.m. June 30.

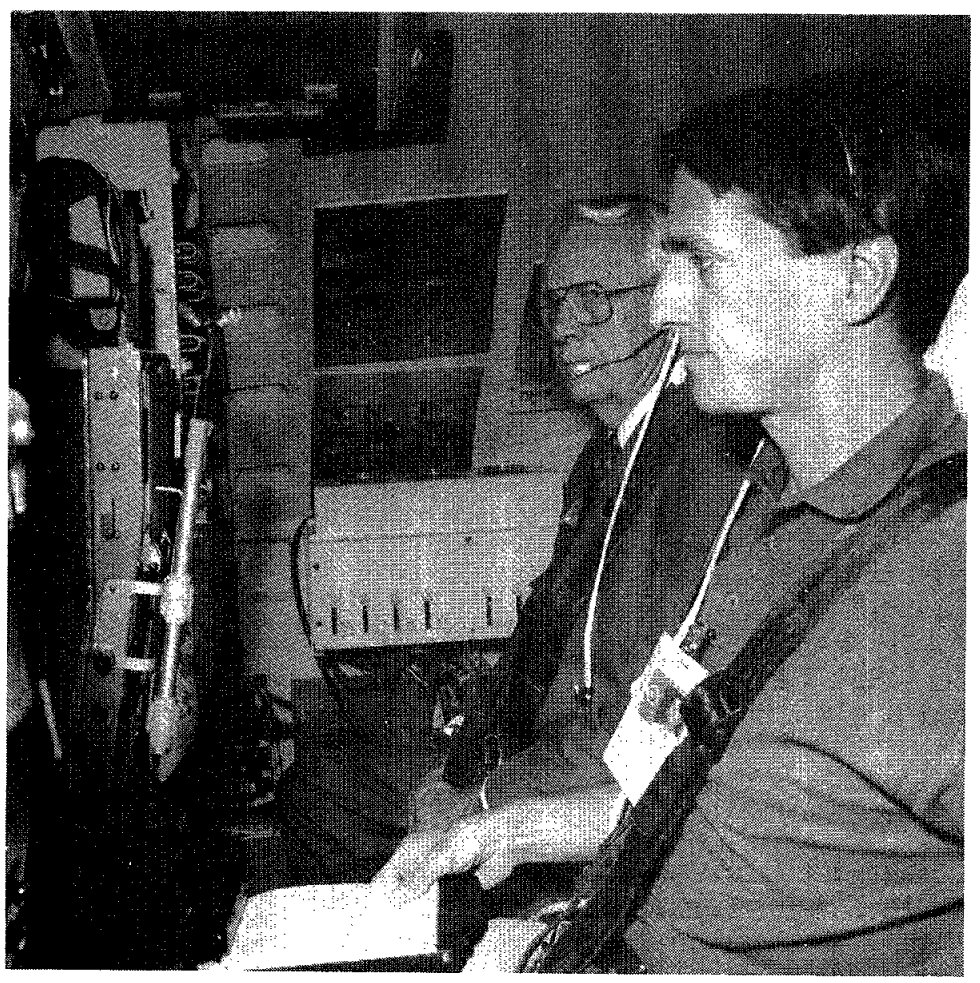
Dates and Data items for the week of June 26 will be accepted until 5 p.m. today. Dates and Data items for the July 10 Roundup will be accepted until 5 p.m. July 2.

## Hurricane workshop on emergency plans

JSC hurricane planning managers have scheduled a hurricane workshop next week.

The workshop, from 9 to 11 a.m. Wednesday in the Bldg. 30 auditorium, is open to all NASA/JSC and contractor emergency planning representatives.

Participants will receive an overview of the NASA/JSC severe weather and hurricane plan and contribute to diiscussions on employee awareness, evacuation vs. sheltering and emergency planning in general. For more information, call Bob Gaffney at x34706.



JSC Photo by Benny Benavides

**SENATE SEAT — Sen. Wendell Ford, D-Kentucky, goes through a simulation in the Shuttle Mission Simulator during a visit to JSC's Bldg. 5 on Monday. Sitting beside the senator is Astronaut Don Thomas. Commander for the simulation was J.O. Creighton and pilot was Jim Halsell. The senator toured the manned space flight center while in Houston to meet with Gov. Ann Richards.**

## Nagy, Harlan earn Technical Societies' highest awards

The Clear Lake Council of Technical Societies named its three top people of the year on Friday at its annual awards banquet.

Dr. Kornel Nagy of Engineering's Structural Design and Test Section was honored as technical person of the year; Charles Harlan, director of the Safety, Reliability and Quality Assurance Office, earned the title of technical administrator of the year; and Dr. Colin Atkinson of the University of Houston-Clear Lake was honored as the technical educator of the year.

Nagy was recognized as the design leader of NASA's Space Station *Freedom* pre-integrated truss concept development team, which developed a configuration that simplified space station on-orbit assembly and checkout.

The selection committee — made up council advisers Roy Pezoldt, executive director of the Clear Lake Economic Development Foundation; Dr. Glenn Goerke, UHCL president; Bill Hayes, deputy general manager of McDonnell Douglas' Space Station Division, and Robert Young, president of Lockheed Engineering Sciences Co. — also applauded Nagy's leadership in the development of the shuttle crew escape pole.

Harlan was lauded as the driving force behind a major change in the JSC community culture that emphasizes prevention rather than inspection. He was cited as a leader in bringing Total Quality Management to JSC and for helping implement the dual career ladder at JSC.

Dr. Colin Atkinson, an assistant professor of software engineering at UHCL was credited with making an immediate and significant impact on the Clear Lake community by contributing to the Mission and Safety Critical Computing Project at UHCL that focuses on design and development of critical systems for space station.

# Hearing testimony supports space station research

**(Continued from Page 1)**

LeMaistre said research increasingly points to changes in genes brought on by the environment and lifestyle as the main cause of cancer.

"We need to know how to shut this process down before cancer occurs," he said. "We need every opportunity, including those in space, to look at this."

He gave two examples of space research that can be helpful in the fight against cancer—studies of ozone layer depletion and the effects of long-term isolation on the human body.

Chronic exposure to ultraviolet radiation, which the ozone layer shields the Earth from, can lower the body's resistance to cancer and its ability to resist the spread of cancer, he said, and there is evidence that humans living in isolation suffer from immune system dysfunctions that can lead to serious health problems.

"Studies conducted in space represent a chance to learn more about how the human immune system is controlled by factors we know little about," LeMaistre said.

Dr. Millie Hughes-Fulford, who flew as a payload specialist aboard *Columbia* on the STS-40 Space Life Sciences-1 mission, said the space program is much more than a source of new medical knowledge.

"I am convinced that the space program, even without the biological and medical benefits, is a great benefit to mankind in so many other ways. Our space program can be a potent element in energizing our economy, renewing our pride as a nation, helping our school children become involved students, and it could be the vehicle through which we reach global peace," she said.

"The world economy is based on high technology," Fulford said. "Technology comes from scientific research in medical science, materials processing, electronics, applied sciences of chemistry, physics and engineering. Scientists need funding to survive, work and produce new technology. We, as a great nation, must renew our commitment to that research."

Gov. Ann Richards started the hearing by urging subcommittee members to see Space Station *Freedom* as more than a futuristic dream machine.

"For 30 years, NASA has accepted and met the challenges it was assigned," Richards said. "First to launch satellites. Then to send an American into space and bring him home safely...to achieve human orbit around the Earth...to take us to the Moon...to send mechanical scouts into our solar system...to establish a shuttle between the heavens and the Earth. And as each of those goals was accomplished, we got an unexpected bonus—technologies that improved the lives of the Earth-bound and created jobs and industries we could not have imagined."

Dr. Richard Wainerdi, president of Texas Medical Center, said space program engineering researchs holds the promise of improving the lives of many people who are being pitted against the space station. The same robotic sensation feedback systems being worked on for remote manipulation in space may help amputees, paraplegics and quadriplegics through improved prosthetic limbs.

Two children who have benefited from the Limbs of Love Foundation of Houston demonstrated the use of their prosthetic limbs for the subcommittee as an example of technology that can be developed through partnerships among the biomedical and space flight research communities.

# *Atlantis* crew confident about tether, training

**(Continued from Page 1)**

"We've had an entirely new body of training we've had to get our hands around," Shriver explained. "Our simulation teams have been trying to simulate each phase of deploy and docking operations. We don't think there's any danger of having anything happen to where we'd have to take some drastic action within the space of a few seconds. It simply doesn't happen that quickly."

"When the tether moves back and forth, it's like the pendulum of a clock: it has a frequency to it. It takes 45 minutes for it to get through one cycle; you could get bored to death looking at it," Hoffman added. "If you see something developing, you've got plenty of time to correct it.

"We can't duplicate the dynamics of a tether in space on the ground," he said. "Our simulations are based on physics, and we know that we're going to see things in space that we haven't seen in the simulator. But, a lot of very smart people on the ground have distilled the physics down to the most important things. And that gives us confidence that the things we really need to know how to do, we've had a chance to practice.

"When we go up, we're going to see how well the computers on the ground match up with the big computer that is the universe."

The applications that may be possible with tethers in orbit are fantastic, Chang-Diaz said, and are well worth examining. "For generating electricity with a tether, it can slow down the two bodies connected to it. Also, if we can reverse current in the tether, the two bodies could speed up, and it could actually propel the bodies to a higher orbit," he explained.

Nicollier, the first ESA astronaut to fly as a mission specialist, will oversee deployment of the EURECA platform on the first day of flight.

EURECA is different from NASA's Long Duration Exposure Facility, although both allow experiments extended periods in orbit. "The big difference is that EURECA is an active spacecraft and will be controlled from the ground," Nicollier said.

**Space News Roundup**

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Dates and Data submissions are due Wednesdays, eight working days before the desired date of publication.

Editor .....Kelly Humphries
Associate Editor .....Kari Fluegel

## Galileo closing on Earth for last flyby

**(Continued from Page 1)**

"We have found a way to accomplish the majority of the orbiter science objectives, including the return of several thousand high-resolution images of the Jupiter system, without the high-gain antenna," O'Neil said

Galileo's velocity with respect to the Sun is 42,000 miles per hour and gaining at the rate of 100 mph a day. Galileo is about 177 million miles from Earth and closing about one-and-a-quarter million miles a day.

Except for the still-undeployed high-gain antenna, Galileo's onboard systems and science instruments are performing nominally.