



12-1-95 JSC 34-47 Z IAS  
National Aeronautics and Space Administration  
Lyndon B. Johnson Space Center  
Houston, Texas



**Two down**  
The second shuttle-Mir docking mission is documented in photographs. Photos on Page 3.



**Reaching out**  
Cooperative education students from JSC drum up interest in science, math, aerospace. Photo on Page 4.

# Space News Roundup

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No. 47

## Endeavour rolls for mating to boosters, tank

By James Hartsfield

Preparations of *Endeavour* are proceeding smoothly at Kennedy Space Center to kick off the 1996 shuttle flight schedule with a planned launch of STS-72 around Jan. 11.

With two space walks and two rendezvous operations—one to retrieve the Japanese Space Flyer Unit satellite and another to deploy and retrieve the OAST-FLYER experiment package—STS-72 is set to be a fitting start for what is planned to be among the most versatile years of shuttle flights ever.

*Endeavour* was on the move this week, rolling from the Bay 3 shuttle processing hangar Wednesday to the Vehicle Assembly

Bldg., where it will be hoisted vertical and mated to the STS-72 solid rockets and fuel tank. Early this week, technicians closed the payload bay doors, weighed the spacecraft and measured the center of gravity. After a short stay in the VAB, *Endeavour* is scheduled to be rolled out to Pad 39B on Tuesday.

The STS-72 crew—Commander Brian Duffy, Pilot Brent Jett and Mission Specialists Leroy Chiao, Winston Scott, Koichi Wakata and Daniel Barry—will travel to KSC Dec. 12 for the Terminal Countdown Demonstration Test, a



dress rehearsal at Pad 39B.

Meanwhile, *Columbia* is in the Bay 2 processing hangar being readied for what is to be the second flight of 1996, STS-75, a reflight of the Tethered Satellite System.

Work on *Columbia* this week included servicing the Freon coolant loops and removing the forward reaction control system for maintenance. The main engines are to be installed Dec. 12 and the work on the forward steering jets is expected to be completed by Dec. 19. STS-75 is targeted for a launch around Feb. 22, 1996.

Elsewhere, *Atlantis*, fresh from the second shuttle trip to the Russian Mir Space Station on STS-74, is in the Bay 1 hangar beginning preparations for STS-76, the third flight of 1996 and the third docking with Mir.

Technicians will remove the IMAX camera from *Atlantis'* cargo bay this week as well as the Orbiter Docking System. Upcoming work includes removal of the main engines and mechanical arm around Dec. 12.

*Discovery* remains at the Rockwell shuttle factory in Palmdale, Calif., undergoing a series of inspections and modifications that include work to prepare it for dockings with the International Space Station.

## Rendezvous, trajectory czar Bill Tindall dies

Howard W. "Bill" Tindall Jr., the former director of Flight Operations at the Manned Spacecraft Center who colleagues say contributed more than anyone individually to the success of Apollo, died Nov. 20 in Orleans, Mass.

Tindall, 70, of Dallas, retired from NASA in 1979 after 31 years of



Tindall

working on real-time computer programming and orbital trajectory development for Project Mercury, leading the development of Gemini rendezvous techniques, and designing lunar

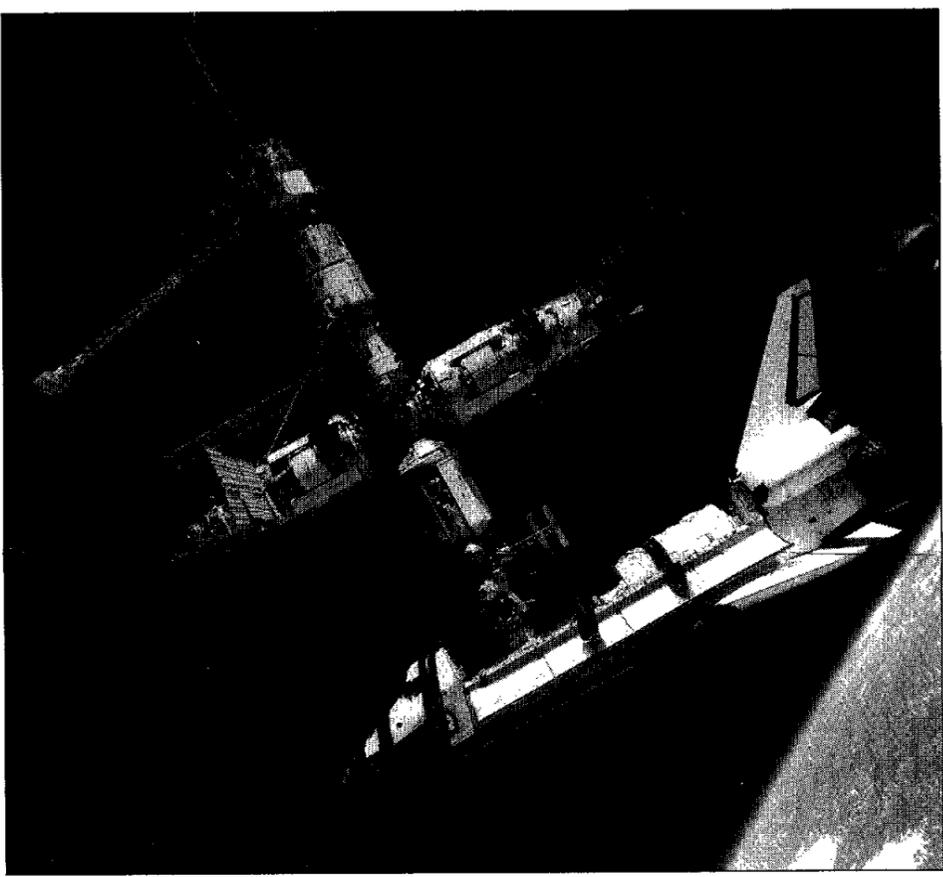
orbiting and landing trajectories. After retirement, he was a consultant on NASA's unmanned deep space probes and on a new air traffic control system for the Federal Aviation Administration that has yet to be implemented on a broad scale, former MSC Director Christopher Kraft said.

According to Kraft, Tindall was a unique and highly intelligent human being, well-liked and well-spoken.

"He was very highly respected from everyone from center directors to program managers to astronauts," Kraft said. "It would be very difficult for me to find anyone who contributed more individually to the success of Apollo than Bill Tindall."

Born in New York City in 1925, Tindall served on Navy destroyers in the latter part of World War II before entering Brown University, Providence, R.I., and receiving a bachelor's degree in mechanical engineering in 1948. That same year, he

Please see **TRAJECTORY**, Page 4



Russian Space Agency photo courtesy of NASA

The Space Shuttle *Atlantis* prepares to undock from Russia's Mir Space Station on July 4 as Cosmonaut Nikolai Budarin flies in formation in a Soyuz spacecraft, photographing the event.

## Images provide Soyuz-eye view of July undocking

Several new photographs of the first joint space flight effort between the United States and Russia are now available via the Internet.

The color photographs include views never before seen of the Space Shuttle *Atlantis* docked to the Mir space station and two of *Atlantis* shortly after undocking from the station.

The photographs are available via the World Wide Web as part of the Today@NASA section of the NASA Home Page at <http://www.hq.nasa.gov>. The images, plus a new high-resolution version, will be available in the STS-71 archives section of the NASA Shuttle Web at <http://shuttle.nasa.gov/sts-71> and on the JSC Digital Image Collection at <http://images.jsc.nasa.gov/html/home.htm> in the near future.

The photographs were taken from a Soyuz spacecraft by Mir-19 Cosmonaut Nikolai M. Budarin on July 4, 1995, near the end of the first docking mission between the space shuttle and Mir during STS-71.

*Atlantis* docked to the Mir station on June 29, 1995, and undocked on July 4, 1995. Joining the STS-71 crew for *Atlantis'* return home was the Mir-18 crew, which included Astronaut Norm Thagard, the first American to live and work aboard the orbiting Russian station.

Any use of these photographs in publications should carry a photo credit of "Russian Space Agency photo courtesy of NASA."

## Stardust gets 'go' as next Discovery flight

A spacecraft designed to gather samples of dust spewed from a comet for return to Earth and detailed analysis has been selected to become the fourth flight mission in NASA's Discovery program.

Known as Stardust, the mission also will gather and return samples of interstellar dust that the spacecraft encounters during its trip through the Solar System to fly by a comet called Wild-2 in January 2004.

Stardust was one of three Discovery mission proposals selected for further study as part of a February 1995 announcement by NASA that a Moon-orbiting mission called Lunar Prospector had been selected as the third Discovery flight.

"Stardust was rated highest in terms of scientific content and, when combined with its low cost and high probability of success, this translates into the best return on investment for

the nation," said Dr. Wesley Huntress, NASA associate administrator for Space Science.

The Stardust mission team is led by Principal Investigator Dr. Donald Brownlee of the University of Washington in Seattle, with Lockheed-Martin Astronautics, Denver, as the contractor building the spacecraft. NASA's Jet Propulsion Laboratory will provide project management.

Comet Wild-2 is known as a "fresh

comet" because its orbit was deflected from much farther out in the Solar System by the gravitational attraction of Jupiter in 1974.

Stardust will approach as close as 62 miles to the comet's nucleus.

"Space scientists are intensely interested in comets because we believe that most of them are well-preserved remnants from the earliest days of star and planetary formation."

Please see **STARDUST**, Page 4

## NASA scientists gain insight into disease

Understanding could lead to vaccine against parasite that afflicts millions

Scientists at NASA's Marshall Space Flight Center have taken an important step in understanding the molecular structure of a disease that afflicts 200 to 300 million people and is second only to malaria in cause of death worldwide. The disease, known as *Schistosomiasis*, is caused by parasites found in contaminated water.

"We were able to determine a three-dimensional atomic structure of an important enzyme from one of four species of parasites known to cause schistosomiasis," explained Dr. Daniel Carter, research director and chief of MSFC's Biophysics and Advanced Materials Branch of the Space Sciences Laboratory. "That allowed us to identify critical parts of

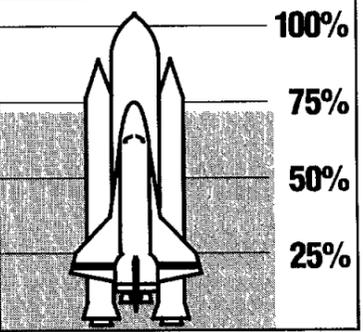
the enzyme's surface structure which elicit the immune responses to the disease. This important step seems to offer the most potential for developing vaccines that protect people against the entire species of schistosomiasis parasites, not just one species," said Carter.

Using highly specialized X-ray equipment and protein crystallization techniques developed for space-based microgravity research, biophysics researchers were able to locate key positions of individual atoms in the enzyme, also a major target for drugs used in the treatment of schistosomiasis, and build a computer picture or blueprint of the schistosoma enzyme structure.

The determination of the enzyme structure offers the possibility of combining such techniques as the use of disease fighting drugs with the development of preventative vaccines to form an effective barrier against the transmission of schistosomiasis.

"Building a person's immunity is one way to fight schistosomiasis," explained Carter. "Many people are repeatedly infected with the disease. If we can break the life cycle of the parasite by vaccinating people against transmission of the disease, we can make a major step toward eliminating the threat of schistosomiasis in those parts of the world where it poses a major health hazard."

Please see **RESEARCH**, Page 4



1995 GOAL: \$460,000



## Two crews to brief employees

The new schedule for post-flight briefings includes a change to next week's date for a presentation by the STS-74 crew, and a new date for the STS-73 briefing that was postponed.

The STS-73 crew—Commander Ken Bowersox, Pilot Kent Rominger, Mission Specialists Cady Coleman, Mike Lopez-Alegria and Kathy Thornton, and Payload Specialists Al Sacco and Fred Leslie—will share memories of their United States Microgravity Laboratory-2 mission from 2-3:30 p.m. Wednesday in Teague Auditorium.

The STS-74 crew—Commander Ken Cameron, Pilot Jim Halsell, and Mission Specialists Chris Hadfield, Please see **STS-74**, Page 4

JSC

## Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Store from 10 a.m.-2 p.m. Monday-Thursday and 9 a.m.-3 p.m. Friday. For more information, call x35350 or x30990.

**EAA Christmas Dinner/Dance:** Dec. 9 Tickets cost \$22.50.

**Dickens on the Strand:** Dec. 2 and 3. Tickets cost \$6.30.

**Houston Aeros Hockey:** Houston Aeros vs. Utah Grizzlies at 7 p.m. Dec. 29 in the Summit. Tickets cost \$12.50.

**Sea World:** Tickets cost \$23.50 for adults and \$16.25 for children 3-11.

**Space Center Houston:** Discount tickets, adult, \$8.75; child (3-11), \$7.10.

**Metro tickets:** Passes, books and single tickets available.

**Movie discounts:** General Cinema, \$4.75; AMC Theater, \$4; Sony Loew's Theater, \$4.75.

**Stamps:** Book of 20, \$6.40.

**Sweetwater Pecans:** \$5.60 per bag.

**JSC history: Suddenly, Tomorrow Came: A History of the Johnson Space Center.** Cost is \$11.

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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 NASA badge or yellow EAA dependent badge. Classes tend to fill up two weeks in advance. Payment must be made in full, in exact change or by check, at the time of registration. No registration will be taken by telephone. For more information, call x30304.

**EAA badges:** Dependents and spouses may apply for photo identification badges from 7 a.m.-9 p.m. Monday-Friday; and 8 a.m.-4 p.m. Saturdays. Dependents must be between 16 and 23 years old.

**Aerobics:** Classes meet 5:15-6:15 p.m. Tuesday, Thursday and Friday and 9:30-11 a.m. Saturdays. Cost is \$35 for 11 weeks.

**Women's self defense:** Martial Arts training for women only from 5-6 p.m. Tuesdays and Wednesdays. Cost is \$25 a month.

**Weight safety:** Required course for employees wishing to use the weight room is offered from 8-9:30 p.m. Dec. 12 and 26. Pre-registration is required. Cost is \$5.

**Exercise:** Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays.

**Aikido:** Martial arts class meets from 5-7 p.m. Wednesday. Cost is \$25 per month. New classes begin the first of each month.

**Ballroom dancing:** Cost is \$60 per couple. For additional information call the Gilruth Center at x33345.

**Country and Western dancing:** Beginner class meets 7-8:30 p.m. Monday. Advance class meets 8:30-10 p.m. Monday. Cost is \$20 per couple.

**Fitness program:** Health Related Fitness Program includes a medical examination screening and a 12-week individually prescribed exercise program. For more information, call Larry Wier at x30301.

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## Dates & Data

### Today

**Cafeteria menu:** Special: meat sauce and spaghetti. Total Health: baked potato. Entrees: rainbow trout, liver and onions, beef cannelloni, ham steak, fried cod fish, Reuben sandwich. Soup: seafood gumbo. Vegetables: steamed broccoli, breaded okra, cut corn, black-eyed peas.

### Monday

**Cafeteria menu:** Special: turkey and dressing. Total Health: herb flavored steamed pollock. Entrees: breaded veal cutlet, chicken fajitas, steamed pollock, beef, French dip sandwich. Soup: beef and barley. Vegetables: Brussels sprouts, mixed vegetables, egg plant casserole, winter blend vegetables.

### Tuesday

**ABWA meets:** The Clear Lake Area Chapter of the American Business Women's Association will meet at 5:30 p.m. Dec. 5 at Space Center Houston's Silver Moon Cafe. For more information call Nancy Hutchins at x34006.

**Cafeteria menu:** Special: pepper steak. Total Health: barbecue chicken. Entrees: baked lasagna, pork chop and fried rice, turkey a la king, baked chicken, fried cod fish, French dip sandwich. Soup: black bean and rice. Vegetables: breaded squash, steamed spinach, baby carrots, navy beans.

### Wednesday

**STS-74 crew:** STS-74 Commander Ken Cameron, Pilot Jim Halsell and Mission Specialists Bill McArthur, Chris Hadfield and Jerry Ross will discuss their visit to Mir at 2 p.m. Dec. 6 in Teague Auditorium. The briefing will be preceded by the presentation of the crew's Space Flight Medals.

**Astronomy seminar:** The JSC Astronomy Seminar will present Dr. Wendell Mendell discussing "The

Vision 2020 Design Project for the 1995 Session of the International Space University" at noon Dec. 6 in Bldg. 31, Rm. 129. For more information, call Al Jackson at 333-7679.

**Cafeteria menu:** Special: Mexican dinner. Total Health: steamed pollock. Entrees: broccoli cheese quiche, spare ribs and sauerkraut, steamed fish, Reuben sandwich. Soup: seafood gumbo. Vegetables: Spanish rice, pinto beans, peas, broccoli.

### Thursday

**PMA luncheon:** The NASA/Houston Chapter of the Performance Management Association will host the second in a five-luncheon series on the Implementation of Earned Value Management Systems at JSC at noon Dec. 7 at the Gilruth Center. JSC Comptroller Wayne Draper. JSC Director of Business Management Terri Hesse and Space Station Business Manager Dan Tam will speak. For more information, call Susan Widmer at x34299.

**Cafeteria menu:** Special: hamburger steak with onion gravy. Total Health: baked potato. Entrees: corned beef, cabbage and new potatoes, chicken and dumplings, meat ravioli, French dip sandwich. Soup: broccoli cheese and rice. Vegetables: navy beans, cabbage, cauliflower, green beans.

### Friday

**Cafeteria menu:** Special: tuna noodle casserole. Total Health: broiled chicken breast. Entrees: deviled crabs, broiled pollock, liver and onions, broiled chicken with peach half, Reuben sandwich. Soup: seafood gumbo. Vegetables: Italian green beans, cauliflower au gratin, steamed rice, vegetable sticks.

### Dec. 12

**Photo club meets:** The Bay Area Photo Club will meet at 7:30 p.m. Dec. 12 at the Faith Covenant

Church. For more information call Kelly Prendergast at x37655.

### Dec. 13

**MAES meets:** The Society of Mexican American Engineers and Scientists will meet at 11:30 a.m. Dec. 13 in the executive dining room in the Bldg. 3 cafeteria. For more information call Michael Ruiz at x38169.

**SSFF meets:** The Space Station Future Fighters will meet at noon Dec. 13 at the Freeman Memorial Library at 16602 Diana. For information call David Cochran at 335-0185.

**Astronomy seminar:** The JSC Astronomy Seminar will present and open discussion meeting at noon Dec. 13 in Bldg. 31, Rm. 129. For more information, call Al Jackson at 333-7679.

### Dec. 14

**SSQ meets:** The Society for Software Quality-Houston Chapter will meet at 5:30 p.m. Dec. 14 at the Ramada Kings Inn Crown Room. Contact Leon Sartz at 335-4191 for more information.

**Airplane club meets:** The MSC Radio Control Airplane Club will meet at 7:30 p.m. Dec. 14 at the Clear Lake Park Community Bldg. For additional information call Bill Langdoc at x35970.

### Dec. 19

**NTA meets:** The National Technical Association will meet at 6:30 p.m. Dec. 19 at Texas Southern University School of Technology Rm. 316. For more information call Carrington Stewart at x31404.

### Dec. 20

**Astronomy seminar:** The JSC Astronomy Seminar will present Dr. Ramesh Narayan speaking about "Gravitational Lenses" at noon Dec. 20 in Bldg. 31, Rm. 129. For additional information, call Al Jackson at 333-7679.

## 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 AP2, or deliver them to the deposit box outside Rm. 181 in Bldg 2. No phone or fax ads accepted.

### Property

Sale: 130 cleared acres, 5 pastures, 15 mi east of Tyler, house, hay & horse barns, all amenities. 488-5058.

Sale: Taylor Lake Estates wooded lot 90' x 135', can finance, \$39.5k obo. Don, x38039 or 333-1751.

Lease: El Lago, 3-2-2, 1900 sq ft, den w/fireplace, new paint, near schools, no pets, \$975/mo. 474-3473.

Sale: Townhome, near Texas Medical Center, 2-2.5, quiet, security, vacant, \$79.9k. Jack H. Cohen, 488-3171.

Sale/Lease: Condo, 2-1, upstairs, appliances, security, \$595/mo. Stephanie, 486-8228.

Rent: South Lake Tahoe cabin, 3-2, modern kitchen, W/D, cable TV/VCR, microwave, sleeps 8, short drive to casinos, skiing, \$75/nightly except holidays. x41065 or 326-2866.

Rent: Galveston condo, furnished, sleeps 6, Seawall Blvd & 61st ST, swimming pools, cable TV, weekend/weekly/daily rates. Magdi Yassa, 333-4760 or 486-0788.

Rent: Beach house, fully furnished, ocean view, Crystal Beach, Galveston County, sleeps 10, cable TV, fireplace, weekend/weekly. 486-1888.

### Cars & Trucks

'84 Buick Le Sabre LE, high miles, runs great, oil changed every 3k mi, \$1.2k obo. Mike, x31239 or 992-3522.

'89 Toyota Corolla SR5, special Limited Edition coupe, 2 dr, loaded, sunroof, CD changer, \$4,995 obo. 244-8048.

'93 Dodge Ram 1/2 ton pickup, old

body style, 360 V8, 2 WD, extended cab, loaded, camper shell, 29k mi, white/red int. \$13.9 obo. x41065 or 326-2866.

'90 WW 2-horse bumper-pull trailer, extra tall, fully enclosed, combination tack/dressing room, heavy mats, removable partition, great condition, burgundy color, \$2.5k. Dee Dee, 334-2506.

'87 Chrysler New Yorker, A/C, power windows, power locks, excellent condition, \$2.7k. 212-1476 or 996-6735.

'85 Pontiac Grand AM, 89k mi, runs great, \$1.6k. 212-1476 or 996-6735.

'77 Olds Omega, engine great, body rough, lots of power, runs well, \$450. 480-3467.

Honda Accord LX, auto, A/C, power windows, power steering, power locks, stereo, \$4,950. 488-7771.

'74 Mercedes 280, 1 family owned, sunroof, 113k original miles, excellent condition, make offer. 333-1789.

### Cycles

'86 Honda Magna 700cc, excellent condition, low miles, \$2.5k. 488-6526.

Racing bike, Centurion Lemans RS, 12 speed Sugino shifter, Did-Compe brakes, Araya tires, electronic odometer, \$150. x35180 or 326-3706.

### Boats & Planes

'95 Kawasaki 750 Jetski wet bike, 5 months old, \$5.6k. Rudy, 473-0090.

Sunfish sailboat w/racing sails, all nice, \$300. 326-3706.

### Audiovisual & Computers

Pentium 75 & 100, new in box, full warranty, excellent condition, \$1,699/\$1,899; 386 w/color monitor, \$365; 286 w/color monitor, \$225. don, x38039 or 333-1751.

Citizen printer "CSX-140" w/GSX color option, excellent condition, \$199. Magdi Yassa, x333-4760 or 486-0788.

Sony 27" color Trinitron TV, \$450; Magnavox 26" color TV, \$275; DCM speakers, \$120 pair, Sony 5-disc CD player, \$140; Symphonic 3-head VCR, \$100; ERC stereo receiver, \$30; Konica copier, \$200; Panasonic 1124i

dot-matrix printer, \$175. Gus, x33425 or 286-3402.

Mac Se 4 MB, \$295. 488-7771.

### Lost & Found

Lost from COD Chili cook-off at Gilruth Center, brown folding chair w/padded seat, it's part of a card table set. Patti, x31197.

### Household

6 Cargo style dining room chairs, medium pine w/lt mauve back & seat, \$150; oak entertainment pier/curio cabinet, 75"Hx24"Wx16.5"D, \$100. 482-0482.

Hoover upright vacuum cleaner, excellent condition, \$45. 486-8266.

Whirlpool washer & dryer, both high capacity, 10 months old, \$500 obo. 474-3667.

G.E. heavy duty washer, almond color, 3 cycle, 3 water levels, looks & works good, \$100 obo. Sam, 332-3168.

Coldspot 14' refrigerator/freezer, good condition, manual defrost, \$100. 333-3992.

Various wicker furniture, table, chairs, buffet; antique Tiger eye oak; antique white iron bed, end tables, 1 drawer, chair, ladder back rope seat. Jim, x38624 or 475-9671.

Executive desk, \$500; antique sewing machine & table, \$100; antique pine dining table, \$500. Gay, x35019.

Comfortable sofa, top condition, off-white/blue/mauve, protective coating at purchase, recliner in each end, new \$900 sell \$375. x31352 or 409-945-3501.

Dining table, 42" glass top, attractive blond wood base, \$95. x35031.

Sears Kenmore washer & dryer, electric, good condition, almond color, \$75 each. 532-1673.

G.E. electric oven, 27", copper tone built-in wall mount, works great, \$50. Linda, 484-0987.

Beautiful whitewash wood entertainment center, fits 30" TV, \$00 obo; Steel copier roller desk, \$80. Gus, x33425 or 286-3402.

Whirlpool refrigerator, almond, 17 cubic feet, separate top freezer, works

well, \$150. Jim, x34318.

### Wanted

Want personnel to join VPSI Vanpool, departing South Braeswood Park & Ride lot, 6:50 a.m. for JSC & offsite locations, 7:30 - 4:30 shift. Susan Gaynor, 282-5447 or Al Ruder, x34997.

Want personnel to join VPSI vanpool departing Meyerland Park & Ride at 7:05 am for JSC. Van pool consist of on-site personnel working 8 am/4:30 pm shift. Don Pipkins, x35346.

Want In-line skates, w/or w/o pads & gloves, women's size 9 or 9.5, Bauer, California Pro or similar brand, good cond. 866-4083.

Want housemate to share 3-2.5, 4 story waterfront townhouse with 1 other person, amenities include community pool, private hot tub & tanning bed, 2 bars, 2 decks over looking canal, boat slip, shared study, enclosed garage, \$595/mo + 1/2 utilities, avail 12/01. Terry, x39234 or 338-1443.

Want stereo & entertainment center, buffet. 480-8622.

Want Nintendo games, low priced. 488-5962.

### Miscellaneous

Peugeot 12 speed men's bicycle, 50 cm PH-10 Carbolite frame, alloy components, ex cond, \$100. 486-8266.

Day-Timers Planner, leather, zipper notebook, full 8.5 x 11 size, desk paper punch, \$30; 14k diamond cut rope bracelet, 2.5mm wide, 7" long, \$50. Eric, x31917.

Nissan pickup tailgate, ex cond, black, \$100; chrome bumper, \$75. 771-0955.

Russian language tutor, native speaker. Julia Sochinska, 333-3012.

Black bed liner for Toyota truck, \$100. 480-3424.

2 weekend nights for 2 at Best Western Motel on W Bay Area, \$50 regularly \$120+, good to 4/01/96. Jack, x33741 or 488-1222.

2 Bally's President & First Lady Gold Charter memberships, annual dues, \$81.08/\$500 each obo. Ernie, x38053. Utility cabinet, approx 16"x18"x36",

light stain, \$15; 5.k Btu Kenmore A/C, needs some work, \$25; furnace blower, motor works, \$15. Sam, 332-3168.

Vitamaster Air Bike w/function monitor, excellent condition, model #9831S, \$75. Stan or Ros, 280-8484.

Browning .40 cal hi-power semi-auto handgun w/2 10 round clips, like new in the box, \$600. Jim, 991-0533.

Coleman gas comp lanterns slightly used, \$15; never used, \$25; Coleman gas camping heater in box, \$25. Gary, x40276 or 488-1043.

Apollo 11 commemorative books published '69 by Gulf Oil, mint condition, \$20 each. Gary, x40276 or 488-1043.

Ray Ban sunglasses, black frame w/temple that hook behind the ears, excellent condition, new \$100 sell \$55. x34509.

Casio full size keyboard w/stand, excellent condition, \$125; Franklin Soccer table, new \$30; 4 white iron chairs, \$75; wine cart, excellent condition, \$150. Debbie, x36034 or 332-5709.

Wedding set .25c w/5 small diamonds, \$500; Nordictak, World Class series exercise equipment, new \$1.3k sell \$800. Karen, x36228 or 409-848-1615.

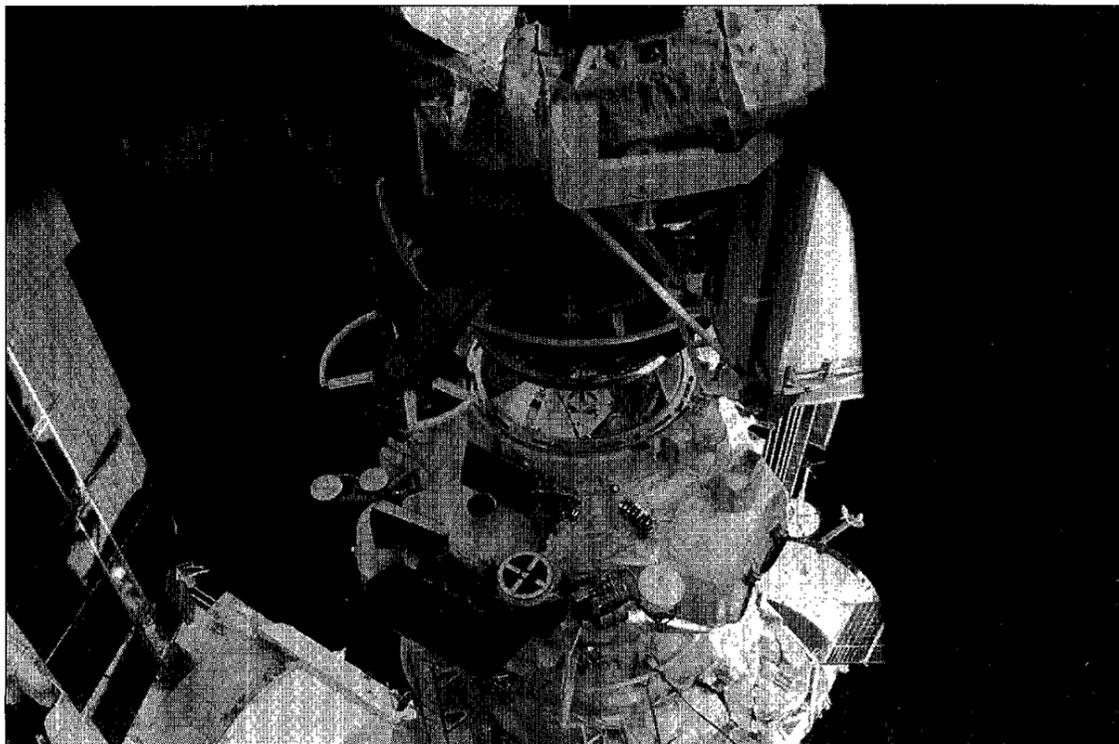
Ladies Blue fox jacket, excellent condition, \$300. Linda, 484-0987.

Books, Frederick Forsythe, set of 4, Winston Churchill, set of 6, John Jakes, set of 8, Homer's Odyssey & Iliad, all hardbacks in great shape, \$5 each; political books by Bob Woodard, Oliver North & Dan Quayle, \$5 each. Sharon, x38506.

Browning A-bolt 7mm mag w/Leupold 3x9 50mm objective scope, matte finish w/synthi stock, gun case, gun sling, \$600 obo. Ken, x40280 or 996-0618.

Contemporary home office furniture, black w/rosewood trim, desk, \$20; computer stand, \$20; file cabinet, \$20; papasan chair & ottoman w/blue cushions, \$45; dot matrix printer, \$15. 480-5404.

Suzuki Samurai chrome bumper set, easy to install, new \$385 sell \$175. 480-5404.



# Major Milestone

## STS-74 marks new level in operations between U.S., Russia

**T**he STS-74 mission marked a significant milestone in the cooperation between the U.S. and Russia and the building of an International Space Station. The STS-74 astronauts successfully attached a permanent docking port to Mir's Kristall module for easier access for future missions.

On Flight Day 3, Mission Specialist Chris Hadfield used *Atlantis'* robot arm to grapple the Russian-built module and hoist it high over the payload bay. He then maneuvered the docking module to a position only four or five inches above the capture ring of the Orbiter Docking System in the forward section of the payload bay. At that point, Commander Ken Cameron pulsed *Atlantis'* jets, essentially flying the ODS capture ring to mate it with the docking module. With the docking module installed on the ODS and its operating systems checked out, atten-

tion turned to an early morning meeting of the two spacecraft.

Docking occurred as the two spacecraft flew over the Chinese-Mongolian border. Two and a half hours later, the hatches between Mir and *Atlantis* were opened and the two crews greeted one another in the docking module.

For three days, the crews worked side by side transferring equipment, hardware, food, water and other supplies. All told, 2,132 pounds of resupply material was transferred to Mir, while 817 pounds of scientific material and hardware returned to Earth on board *Atlantis*.

Throughout the rendezvous, docking and joint operations, the crew collected photos to share. From left to right, top to bottom:

1) Onboard cameras capture the a low-angle view of the docking module just before contact with the Kristall module.

2) Before departing, *Atlantis* flew two revolutions around Mir as the astronauts on board documented the condition of the space station with their on-board cameras. With Earth's horizon providing the backdrop, astronauts get a full view of Mir from *Atlantis* soon after the two spacecraft began separation.

3) Cameron, left, floats into the Mir's core module to join Cosmonaut/Researcher Thomas Reiter.

4) The tradition in-flight crew portrait is taken in the docking module. Front row from left are, Pilot Jim Halsell, Mission Specialist Bill McArthur, and Cameron. Back row from left are, Mission Specialists Chris Hadfield and Jerry Ross.

5) Mir 20 crew members from left are Gidzenko, Reiter and Flight Engineer Sergei Avdeuev. The Mir 20 crew have been

onboard Mir since Sept. 5.

6) Cameras capture a close-up view of the docking module attached to the Orbiter Docking System.

7) Cameron checks procedures on *Atlantis'* flight deck during rendezvous operations.

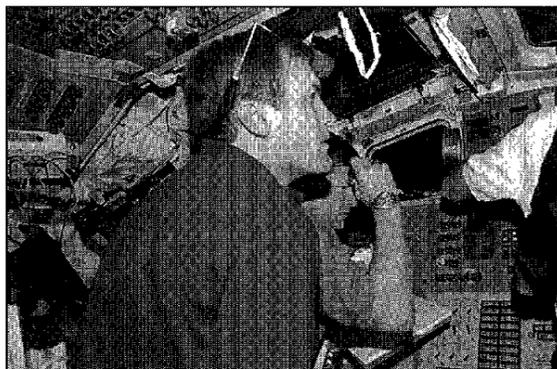
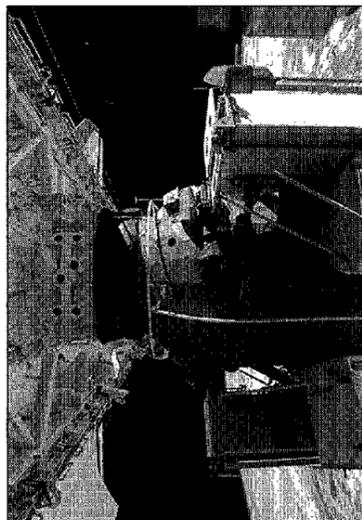
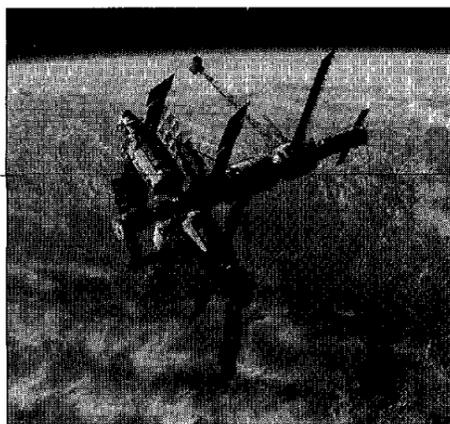
8) Hadfield makes his way from one module to another among supplies and docking hardware onboard Mir.

9) Ross works out on the bicycle ergometer on *Atlantis'* mid deck.

10) STS-74 Commander Ken Cameron, right, and Mir 20 Commander Yuri Gidzenko shake hands marking the second historical docking between the two countries.

11) Halsell joins Cameron on the flight deck during rendezvous operations.

12) McArthur checks computer readouts on *Atlantis'* flight deck during the mission. □



# NASA awards life, biomedical science research grants

NASA announced Tuesday the selection of 46 proposals to receive two- and three-year grants for ground-based or space-borne life sciences research totaling approximately \$15 million.

Seven of the proposals were from Texas and JSC.

The purpose of the grants is to encourage science and technology research in the space life sciences. The grants funded through this annual NASA research announcement support a program of research that conducts experiments on Earth and

in space to provide the basic understanding of the role of gravity in biological processes.

Sponsored by NASA's Office of Life and Microgravity Sciences and Applications, Washington, D.C., the grants offer investigators the opportunity to take advantage of NASA's life and biomedical sciences research facilities to improve the understanding of fundamental biological processes.

NASA received 380 proposals in response to the research announcement. The proposals were subjected

to an external peer-review through assembled panels made up of scientific and technical experts. The selected proposals represent the following areas: space biology (16); space physiology and countermeasures (11); environmental health (2); space radiation health (3); space human factors (3); advanced life support (5); advanced extravehicular activity systems (1); advanced technology development (2); data analysis (2) and interdisciplinary proposals (1).

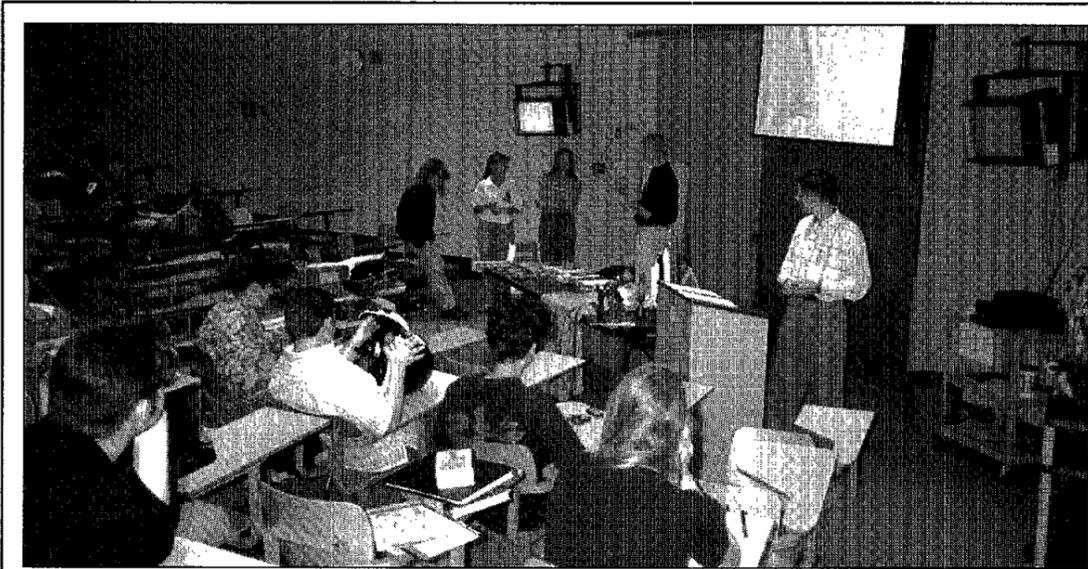
NASA's life and biomedical sciences grants provide investigators

with the opportunity to study and characterize basic biological mechanisms in ways not possible on Earth. By using access to space as a research tool, NASA-sponsored research will advance fundamental knowledge of the way in which weightlessness, radiation, and other aspects of the space flight environment interact with biological processes. These grants also seek to enhance the application of this knowledge to procedures and technologies that enable humans to live, work and explore in space and to

benefit the health and well-being of people on Earth.

Texas scientists selected for NASA life sciences research grants are:

Daniel L. Feeback, Ph.D., Suzanne M. Fortney, Ph.D., Kenneth C. Jenks, James C. Maida, Duane L. Pierson, Ph.D., and Kwangjae Sung, Ph.D., all of JSC; Clarence P. Alfrey, M.D., Ph.D., Baylor College of Medicine, Houston; Arny A. Ferrando, Ph.D., Shriners Burns Institute, Galveston; and Stanley J. Roux, Ph.D., The University of Texas at Austin.



**TEXAS CITY OUTREACH**-Cooperative education students Robert Koudelka, right, and Drew Matter, second from right, reach out to biology students at Texas City High School last month as part of an annual effort to interest high school students in science, engineering and aerospace careers. Koudelka, a Purdue electrical engineering student, is working in the Engineering Avionic Systems Division, while Matter, a Georgia Tech mechanical engineering student, is working in Mission Operations' Extravehicular Activities Branch.

## Astronaut interviews continue with third group

The third of several groups of prospective astronauts will be at JSC next week for orientation, interviews and medical evaluations.

The third group of 20 includes Stephen A. Becker, Ph.D., Los Alamos, N.M.; Dr. Jay C. Buckley, Jr., Hanover, N.H.; Stephen G. Di Domenico (Captain, USAF), Henderson, Nev.; Patrick E. Duffy (Major, USAF), Beavercreek, Ohio; David A. Dunaway (Lt. Cdr., USN), Ridgecrest, Calif.; John E. Gochenaur (Major, USAF), Centerville, Ohio; Christopher A. Habig (Major, USAF), Waldorf, Md.; Scott J. Kelly (Lieutenant, USN), Lexington Park, Md.; Sandra H. Magnus, Smyrna, Ga.; Caitlin P. Mullen, Ph.D., Annapolis, Md.; John L. Phillips, Ph.D., Los

Alamos, N.M.; John C. Rader (Lt. Col., USMC), Mission Viejo, Calif.; Michael C. Ruff (Major, USAF), Millbrook, Ala.; Piers J. Sellers, Ph.D., Greenbelt, Md.; Thomas D. Stuart (Lt. Cdr., USN), Fairfax Station, Va.; Todd T. Tamura (Captain, USAF), Colorado Springs, Colo.; Rex J. Walheim (Captain, USAF), Palmdale, Calif.; John K. Watson, Houston; Peggy A. Whitson, Ph.D., El Lago; and Robert A. Wilson (Major, USAF), Lancaster, Calif.

Astronaut candidate selections are conducted approximately every two years. The number of candidates selected depends upon the space shuttle flight rate, overall program requirements and astronaut attrition.

## Dailey to address local NMA

Gen. John R. Dailey, NASA acting deputy administrator, will speak at the next meeting of the NASA JSC National Management Association.

The JSC community is invited to attend the Dec. 13 meeting at the Gilruth Center ballroom, beginning with a social hour at 5 p.m., dinner at 6 p.m., and Dailey's presentation at 6:30 p.m.

Reservations must be made by Wednesday. Contact Kathleen Kaminski, x38706, for reservations.

The National Management Association is dedicated to the development and recognition of management as a profession and

the promotion of the American Enterprise System. It is the largest professional association of its type in the world, with approximately 70,000 members in 265 chapters.

As a special benefit for new members who join during the month of December, the NASA JSC NMA will waive the usual \$20 initiation fee. This organization offers all NASA employees the opportunity to develop leadership skills and team-building experiences through monthly meetings, professional development courses, seminars, and other activities. For more information on the JSC NMA, contact Kaminski.

## Trajectory pioneer famous for 'Tindallgrams'

(Continued from Page 1)

began his career with NASA's predecessor, the National Advisory Committee for Aeronautics, at Langley Research Center, Va.

While at Langley, he handled wind tunnel instrumentation problems and participated in Project Echo as a specialist in orbit computations and determinations, and then in formulating plans and real-time computer programs in support of Project Mercury.

He moved to Houston in 1961, becoming responsible for all Gemini mission planning in the Flight Operations Directorate and as assistant chief of the Mission Planning and Analysis Division on a temporary assignment to the Gemini Program Office. He chaired the Trajectories and Orbits Panel, considered one of the key groups for Gemini flight design.

"The Gemini Trajectories and Orbits Panel is where it started and it carried on into Apollo," said Apollo Astronaut Buzz Aldrin. "There was a period when that meeting was suspended and so many of us in mis-

sion planning felt lost for a period of several months until that panel was reinstated with a memo in typical Tindall fashion, entitled 'T&O Rides Again.' Everyone sensed a relief because they knew mission planning was in good hands again."

Such memos, dubbed "Tindallgrams," were written in an irreverent style that captured the hearts of detailed and complicated discussions about a variety of key space flight topics and explained them eloquently.

Tindall became an expert in orbital mechanics, Kraft said. He was primarily responsible for development of rendezvous techniques for Gemini, and when Apollo took center stage he began working on lunar trajectories. In 1966, Apollo Spacecraft Program Manager George Low made Tindall responsible for all guidance and navigation computer software development by the Massachusetts Institute of Technology.

In 1967, Low put him in charge of a group called Mission Techniques for Apollo designed to bring together everyone in mission techniques and

hardware development and coordinate flight crew procedures, mission rules, mission planning, spacecraft and control center computer programming and Apollo operations handbooks.

"That's where famous Tindallgrams came from," Kraft said. "He would have meetings weekly, daily on all of these processes for going to and from the Moon from a planning point of view. He would record issues, arguments as well as results in what got to be known famously as Tindallgrams. Those were the hardened core of Apollo as far as operations planning was concerned."

"He had a brilliant way of analyzing things and the leadership that gathered diverse points of view with the utmost fairness," Aldrin remembered. "He listened to all points of view and then made and carried out astute decisions."

In 1970, Tindall was appointed deputy director of Flight Operations, and in 1972, he became director, planning all phases of flight operations activities. Funeral services were held in Dallas.

## Stardust mission to return dust from comet

(Continued from Page 1)

tion," Huntress said.

"Stardust should also give us some unique guidance about how to focus the science we plan to conduct a few years later with a surface lander on a different comet during the international Rosetta mission."

Stardust will be launched on an expendable launch vehicle in February 1999 for a total mission cost to NASA in real-year dollars of \$199.6

million. The return capsule carrying the dust samples would parachute to Earth for landing on a dry Utah lake bed in January 2006.

Stardust will use an unusual material called aerogel to capture the dust samples. This porous, extremely low density material is somewhat like glass in that it is made of silica—a pure form of sand—and it has about the same melting point. Although aerogel does not absorb moisture,

the strangely fluorescent substance can absorb large amounts of gas or particle matter.

The spacecraft also will carry an optical camera that should return cometary images with 10 times the clarity of those taken of Halley's Comet by previous space missions, as well as a mass spectrometer provided by Germany to perform compositional analysis of the samples in-flight.

## Research could help fight other diseases

(Continued from Page 1)

The research has paid dividends in other areas as well, Carter said. "Information gained in the search for a particular atomic structure often helps us learn more quickly about other research targets," he said. "For instance, a three-dimensional crystal structure of a schistosomiasis enzyme joined with atomic structural components of Human Immunodeficiency Virus type 1 (HIV-1) has

also been resolved. This structural, building-block approach to HIV research has helped us learn more about the structure of HIV proteins, which have proven difficult to crystallize and thus study more thoroughly."

Schistosomiasis research at MSFC was performed in collaboration with the Institute of Applied Microbiology in Vienna, Austria, and the Center for Advanced Research in Biotechnology of the National Institute of Standards

in Washington, D.C.

Also known as bilharzia, schistosomiasis is a disease caused by any of four parasitic flatworms or flukes. Persons can become infected with schistosomiasis when they wade or swim in contaminated fresh water by exposure to skin-penetrating, free-swimming larvae in parts of Brazil, Egypt, sub-Saharan Africa, southern China, the Philippines and Southeast Asia. There is no vaccine.

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Editor ..... Kelly Humphries  
Associate Editor ..... Karen Schmidt

## Correction

A photograph that appeared on Page 6 of the Nov. 24 Space News Roundup incorrectly identified a woman conducting the blood sugar testing.

Reta Warren, a Medical Technologist, American Society of Clinical Pathologists, drew the sample. Warren is the laboratory manager for the JSC Clinic.

## STS-74 talk Thursday

(Continued from Page 1)

Jerry Ross, and Bill McArthur will brief employees on the second shuttle-Mir docking mission from 10-11:30 a.m. Thursday in Teague Auditorium.

Immediately prior to each briefing, the crews' accomplishments will be recognized by the presentation of the NASA Space Flight Medals.