

Shuttle schedule

NASA has issued a new mixed fleet manifest that includes the space shuttle schedule through fiscal 1995. Chart on Page 3.



Quick response

Flight Crew Operations becomes the first JSC organization to use the new Go the Extra Mile Award. Story on Page 4.

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Station options compare apples to apples

Goldin pleased with integrity of unprecedented, comprehensive process

NASA presented its three space station options this past week to the blue-ribbon panel that will recommend a course of action to President Clinton on the direction of America's space program.

All three options fell short of meeting the White House targets of building a fully functional station for \$5, \$7 and \$9 billion, but NASA Administrator Daniel S. Goldin said he was pleased with the work of the three teams and with what he called "an

unprecedented process."

The three basic options would cost between \$11.9 and \$13.3 billion between 1994 and 1998, Deputy Associate Administrator for Space Flight Bryan O'Connor and the Space Station Redesign Team reported in a briefing before the White House Advisory Panel headed by Dr. Charles Vest, president of the Massachusetts Institute of Technology. Two versions of Option A would meet the \$9 billion target in

their early "power station" stages, which could support a docked shuttle for up to 20 days, the team reported.

By comparison, spending on Space Station *Freedom* during that same period would be \$17.6 billion, factoring in costs such as shuttle integration, facilities, payload development, assured crew return vehicles and some research operations support and the results of an independent cost assessment.

Goldin said one of the reasons the

estimates were higher than the targets was that they represent a painstakingly honest approach, laying out real costs and real options to the President, Congress and the American people so that they can compare apples to apples. He refused to pick favorites among the options, which were submitted to the Clinton administration on Thursday by the advisory panel.

"This is an unprecedented process," Goldin said. "NASA is going to

give the President options without pre-biasing the situation and saying we choose this one or that one. This is the most comprehensive package ever presented to a President for a space program. I think it would be inappropriate to violate the integrity of that process, for the NASA administrator to even say that he has a favorite configuration. We must have a balanced input to the President, it would be wrong to do anything else,"

Please see **COST**, Page 4

New manifest includes flights through 1995

NASA has issued a new mixed fleet manifest that includes an updated flight schedule for space shuttle missions through fiscal year 1995.

The manifest includes an additional five flights in calendar 1993, a total of eight shuttle flights in calendar 1994 and five flights in the first nine months of calendar 1995.

The missions represent a broad range of scientific and technical objectives, ranging from the first flight of the Wake Shield Facility for ultravacuum research and the Hubble Space Telescope revisit and repair mission this December, to the first joint U.S./Russian Mir space station docking and Spacelab Life Sciences flight in June 1995.

Along the way, it includes the first through fifth flights of the Spacehab commercial middeck augmentation module, the second Spacelab Life Sciences Astro ultraviolet telescope and International Microgravity Laboratory missions, as well as the second U.S. Microgravity Payload and U.S. Microgravity Laboratory missions.

Complete shuttle crews are detailed through the STS-59 mission in April 1994.

The space shuttle portion of the manifest is reprinted on Page 3 of this week's Space News Roundup in a new format designed to be useful for the many employees who now use daily planners to help organize their time and work. However, the dimensions of the Roundup page would not allow the planner pages to be printed full-size. To hold down reproduction costs, Center Operations' Management Services Division

Please see **MANIFEST**, Page 4



JSC Photo by Jack Jacob

GALLANT PROPOSAL — Merrell McDaniel, a secretary in JSC's Information Resources Management Integration Office, says "yes" to Terry Bruch, a carpenter for FD Services, as she checks out her engagement ring. Seven years before to the day, she had told Bruch she would have to be swept off her feet by a knight in shining armor riding a white horse. Bruch arrived in Bldg. 12 for his June 3 proposal on a white stick horse. The wedding is planned for next spring.

Endeavour gets 'go' for Sunday morning launch

NASA managers last week set this coming Sunday as the new STS-57 launch date for *Endeavour* and its six-person crew on a mission highlighted by the retrieval of the European Retrievable Carrier and the first flight of the commercial Spacehab facility.

The launch window opens at 8:37 a.m. JSC time and extends for 1 hour and 11 minutes. The limited launch window time is based on EURECA retrieval requirements. The seven-day mission may be extended by one day, which would give two members of *Endeavour's* crew the opportunity to perform a space walk.

The decision to go with a June 20 date followed the completion of work to remove and replace the liquid oxygen turbopump from *Endeavour's* No. 2 main engine. The pump changeout, which delayed a planned June 3 launch, was undertaken when an inspection stamp was found in a high-stress area of a retainer spring within the pump.

Launch countdown is scheduled to begin at 1:30 a.m. CDT Thursday after the arrival of the crew — Commander Ron Grabe, Pilot Brian Duffy and Mission Specialists G. David Low, Nancy Sherlock, Janice Voss and Jeff Wisoff — at KSC.

This past week, technicians finished securing the new turbopump to the engine and performed leak checks on the engine and the entire main propulsion system.



Cohen to receive AIAA's von Braun Award

JSC Director Aaron Cohen will be the 1993 winner of the American Institute of Aeronautics and Astronautics' von Braun Award for Excellence in Space Program Management.

Klaus D. Dannenberg, chairman of the AIAA Honors and Awards

Committee, said the prestigious award is "in recognition of steady and consistent leadership, creativity and excellence in program management that have produced outstanding results and advances in this nation's space program."

The award, which will be pre-

sented Sept. 23 during the AIAA Space Programs and Technology Conference and Exhibit at the von Braun Civic Center in Huntsville, Ala., consists of an engraved bronze medal, a certificate of citation and a rosette pin.

Named in honor of space flight

pioneer Wernher von Braun, the award recognizes individuals for outstanding contributions in the management of a significant space or space-related program.

Before becoming JSC director, Cohen led the development of the space shuttle orbiter.

Hubble measurements close in on age of universe

Astronomers working with NASA's Hubble Space Telescope announced Wednesday results of a major step to measure the Hubble Constant and the age of the universe.

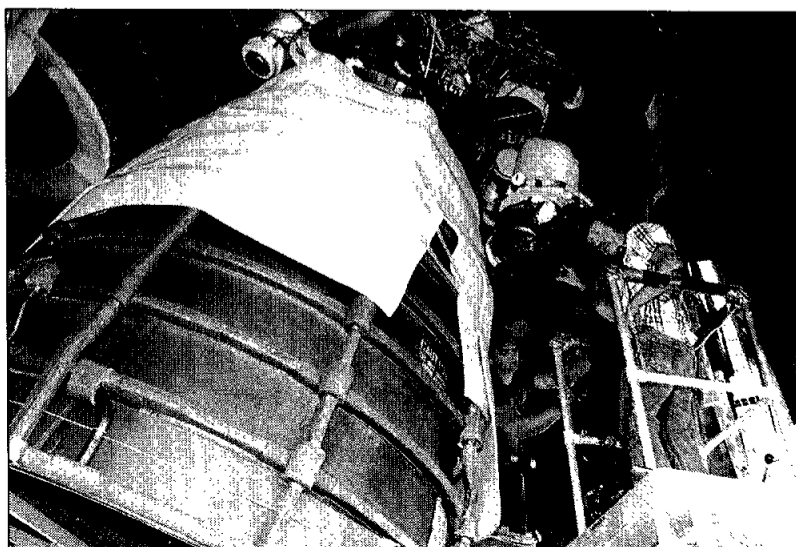
The team has discovered Cepheid (variable) stars in its first target, the spiral galaxy M81, and measured the distance of the galaxy to be 11 million light years. They quote a 10 percent uncertainty in this result (plus or minus approximately one million light years). Previous estimates of the galaxy's distance have ranged from 4.5 to 18 million light years.

Cepheids are pulsating stars that become alternately brighter and

fainter with periods ranging from 10 to 50 days. Astronomers have known for more than 50 years that the periods of these stars precisely predict their total luminous power, which allows their distance to be measured.

The Hubble Constant (H₀) is the ratio of the recession velocities of galaxies to their distances in the expanding universe. The age of the universe can be estimated from the Hubble Constant and currently is thought to lie between 10 and 20 billion years. A more precise measurement of the Hubble Constant is required to narrow this range.

Please see **HUBBLE**, Page 4



NASA Photo

Kennedy Space Center Technician Bob Petrie, left, and Lead Technician Ralph Aarberg remove the high-pressure oxidizer turbopump from *Endeavour's* main engine No. 2 prior to the installation of a replacement pump. Both men work for main engine contractor Rocketdyne.

Tile material may aid bone transplants

The same material that keeps the space shuttle from burning up when it returns from space may be useful in treating medical problems on Earth.

Scientists from Ames Research Center are working with physicians from BioMedical Enterprises Inc. and the University of Texas Health Science Center, both of San Antonio, to determine whether the shuttle's ceramic surface insulation materials can be used as an implant for human skeletal reconstruction.

"We're still a long way from having a bone implant that's ready for human use," said Howard Goldstein, senior staff scientist in Ames' Thermosciences Division. "But we

Please see **SHUTTLE**, Page 4

JSC

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.

Splash Town USA — Discount tickets: \$10.50.
Astroworld — Discount tickets: adult, \$18.95; children under 54 inches, \$15.95.
Waterworld — Discount tickets: \$9.95.
Sea World in San Antonio — Discount tickets: adult, \$19.75; child (3-11), \$13.15.
Fiesta Texas, San Antonio — Discount tickets: adult, \$18.35; child (6-11) \$12.75.
Space Center Houston — Discount tickets: adult, \$7.50; child (3-11) \$4.50; commemorative: \$8.75.
Metro tickets — Passes, books and single tickets available.
Movie discounts — General Cinema, \$4.50; AMC Theater, \$3.75; Loews Theater, \$4.
Upcoming events: EAA River Raft Trip.

JSC

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.

Defensive driving — Course is offered from 8 a.m.-4:30 p.m. July 17. Cost is \$19.

Weight Safety — Required course for employees wishing to use the Gilruth weight room is offered from 8-9:30 p.m. June 15. Pre-registration is required; cost is \$5.

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 class meets from 5:15-6:15 p.m. Mondays and Wednesdays. Cost is \$24 for eight weeks.

Aikido — Martial arts class meets Tuesdays from 6:15-8 p.m. Cost is \$15 per month.

Scuba — Classes meet Tuesdays and Thursdays for four weeks beginning June 17. Cost is \$190, with a \$50 deposit required at registration.

Golf — Classes will meet Mondays for seven weeks at the Clear Lake Golf Course beginning June 7. Cost is \$90. Loaner clubs are available for those who need them.

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

Volleyball workshop — A beginner's volleyball workshop will meet from 2-4:45 p.m. Saturdays for eight weeks beginning July 10. Cost is \$25.

JSC

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

Rent: Galv condo, furnished, sleeps 6, Seawall Blvd & 61st St, cable, wknd/wkly/dly. Magdi Yassa, 333-4760 or 486-0788.

Rent: Arkansas cottage, overlooks Blue Mountain Lake, furnished, wooded, 4 acres, screened porch, antiques, \$250/wk, \$50/day. x33005 or 538-4141.

Sale: Pearland/Sunset Meadows, 3-2-5-2, formals, study, lg master BR, upgrades, 2 story brick, 2.5 yrs old, \$110k. Jim, 482-8800.

Sale: Friendswood, 4-2-5-3 custom, 3/4 wooded acres, 3 yrs old, 3100+ sq ft, game rm, study, alarm, extras, \$200's. 992-1338 or 333-6045.

Sale: Hill Country near Austin/Dripping Springs, wooded, undeveloped, great views, 26.87 acres, \$54k. Robert, x32597 or 332-1734.

Sale: Camino South, 3-2-2, new carpet, ceramic tile kitchen, lg living rm, lg lot w/trees, cul-de-sac, \$75k. 486-0303.

Rent: Colorado, condo, furnished, sleeps 6, hiking, biking, fishing, golf, mountains, horseback, low summer rates thru Oct. 488-4453.

Lease: CLC, 1 BR condo, FPL, W/D, cov'd parking, appl, sec alarm, upstairs, another condo avail. Jim Briley, x44632 or 488-7901.

Sale: LaGrange, 2-1 cottage, 5 wooded acres, extras, \$35k. Jennifer, x38668 or 286-0507.

Lease: Friendswood/Forest Bend, 3-2-2, ceiling fan, patio, fenced, solar screen, new roof, no pets, \$695/mo. 482-6609.

Rent: Sagemont, 4-2-2, 1-1.5 stories, recently rebuilt, \$675/mo. Minh, 484-2456 or 333-6806.

Sale: Dickinson Bayou waterfront, 4-2-5-2, pool, trees, WB, FPL, volleyball, extras, \$224k. x34354 or 337-1640.

Sale: Lake Livingston lot, community pool, elec, water, sewer, \$2.8k OBO. 488-0719.

Sale: Oakbrook, 4-2-2, lg yard w/shade trees, cul-de-sac, updated kitchen, blinds, fans, jacuzzi, \$109k. 482-8800.

Sale: Nassau Bay, 3-2-2, 2200 sq ft, FPL, deck, new paint, \$115k. x32458 or 333-9518.

Sale: 20 acres between 35 and 528 in north Alvin, 14x80, 3 BR mobile home, well, septic, barn, 16 acres of hybrid grasses, \$110k. David, 929-7120 or 388-2992.

Lease: Pearland/Southdown, 3-2-2, 1500 sq ft, outside storage, deck, no pets, \$700 + dep, avail July 1. 485-8994.

Sale: LC, Countryside South, 4-2-2, no approx assumpt, lg fenced lot, cul-de-sac, covered deck, \$73.9k. x38843 or 409-925-5011.

Rent: Southern Colorado, 2 BR, furn, sleeps 5, close to skiing, fishing, national forest, no smoking, no pets, dly/wkly/monthly. Bob, x30825 or 998-7372.

Sale: CLC Seafarer TH, 2-2.5, new carpet, vinyl, paint, 1376 sq ft, overlooks golf course,

garage, ex cond. 980-9876.

Sale: Univ Place TH, 2-2.5-1, FPL, \$74k negotiable. Dave, x38156 or Herb, x38161.

Trade 2 adjacent lots in Newport on Lake Houston for equity in house, late model car, or stock. Joe, 333-7357 or 944-6513.

Sale/Rent: Egret Bay, waterfront, 1-1, FPL, fans, W/D, dishwasher, micro, balcony, cov parking, boat camp, dock, entry gate, \$530+ dep. Karl, x33031 or 286-9822.

Sale: Dickinson, 4-3-2D, lg wooded fenced lot w/horseshoe dr, park boat or MH, \$122k. Shirley, 335-1607 or 335-0641.

Cars & Trucks

'89 Honda Accord LX, burgundy, 4 dr, auto, AC, pwr, cruise, 45k mi, \$8.5k. Ray, x38030.

'89 Toyota Corolla LE, 4 dr, sunroof, red, AC, 5 spd, AM/FM/cass, mag wheels, 55k mi, \$6.2k. 270-9704.

'86.5 Nissan 4x4 PU, king cab, AM/FM/cass, tint, ex cond, \$6k; '59 Chevy PU for restoration or parts. 334-2335.

'78 Porsche 928, brwn w/leather int, auto, ex cond, 75k mi, \$8.5k. Bill, x48889.

'84 Toyota PU, 60k mi, \$3k. x34256 or 486-3967.

'85 Chevy S10 PU, long bed, auto, OD, AC, PB, 8k on new motor, \$1950 OBO; '79 26' Shasta MH, loaded, 460 eng, fully self contained, \$7.5k OBO or trade for 33+ ft 5+H wheel. Mike, 409-925-2330.

'85 Audi 5000S, gray, approx 120k mi, fair cond, orig owner, \$1.5k. Tom, x37251 or 481-0052.

'71 Chevy Nova, classic, V8, orig owner, \$4.5k. 480-1998.

'92 Acura Integra LS, 18k mi, cruise, pwr windows, pwr locks, rear spoiler, rosewood. 922-4014.

'71 Triumph Spitfire, two seater, manuals, extra parts, \$1.1k OBO. 280-2505 or 488-6688.

'79 Caprice Classic, 4 dr, 350/4bbl, looks bad, runs good, AT, PS, PB, P/W/L, no rust, AC clutch broke. Doug, x48851 or 486-7412.

'75 Volkswagon, 1/4 ton PU, shop made w/dump bed, new eng, new tires, no rust, \$2.5k. 409-925-3030.

'91 Jeep Renegade, red/blk, loaded, hardtop, 7 yr warr, 14k mi, \$13.7k; '90 Lincoln TC, Signature Series, w/ht/glyr, loaded, all options, 43k mi, \$15.4k. 534-4607.

'88 Ford Escort, 4 dr, AC, auto, pwr, ex cond, \$2.6k OBO. Carl, 334-6495.

Boats & Planes

'81 U.S. Yachts 22' sloop w/4.5 hp engine, hull just cleaned, ex cond, \$4k. Russ, x45979 or 554-5904.

Hi-Fly windsurfer w/2 sails, \$350 Bill, 554-6242.

'18' G-Catamaran, trlr and access incl, good cond, \$650 OBO. x30385.

'89 180BR SeaRay, V6, 175hp, 30 hours, access incl, ex cond, \$11.5k. Ray, x41063 or 334-4124.

'18' Hobie Cat, magnum wings, trlr, new tags, 2 harnesses, 6 life jackets, ex cond, \$3.1k. Lance, 996-5658 or Steve, 992-3472.

Cycles
His/hers 18 spd mountain bike, Sears Brand, 26", 26", \$250/pr. 484-4304.

'88 Hurricane, 19k mi, \$2.7k OBO. x34204 or

JSC

Dates & Data

Today

Space Society meets — The Clear Lake Area Chapter of the National Space Society will meet June 14 at 7 p.m. at the Freeman Memorial Library. Rich Kolker will discuss "Single Stage to Orbit Vehicles." The meeting is free and open to the public. For more information, contact Marianne Dyson at 486-4747.

Cafeteria menu — Special: hamburger steak. Entrees: beef Burgundy over noodles, barbecue smoked link, vegetable lasagna, steamed fish, French dip sandwich. Soup: cream of chicken. Vegetables: buttered corn, steamed spinach, vegetable sticks, navy beans.

Tuesday

Cafeteria menu — Special: turkey and dressing. Entrees: baked meatloaf, barbecue spare ribs, liver and onions, baked chicken, French dip sandwich. Soup: black bean and rice. Vegetables: steamed broccoli, California vegetables, breaded squash, savory dressing.

Wednesday

Toastmasters meet — The Spaceland Toastmasters Club will meet June 16 at 7 a.m. at the House of Prayer Lutheran Church on the corner of Bay Area Blvd. and Reseda Drive. Call Jim Morrison at 480-9793 for more information.

Astronomy seminar — The JSC Astronomy Seminar will conduct an

open discussion meeting at noon June 16 in Bldg. 31, Rm. 129. For more information, call Al Jackson at 333-7679.

Cafeteria menu — Special: Mexican dinner. Entrees: Parmesan steak, beef cannelloni, catfish and hush puppies, steamed fish, Reuben sandwich. Soup: seafood gumbo. Vegetables: peas and carrots, ranch beans, mustard greens, Spanish rice.

Thursday

IEEE videoconference — The Institute of Electrical and Electronics Engineers Galveston Bay Section will host a satellite videoconference on "Maintaining the Technical Currency of Our Workforce" at noon June 17 at the Gilruth Center. Cost is \$50 for members, \$15 for student members. For more information, call Frankie Hap at 333-6064.

Cafeteria menu — Special: smothered steak. Entrees: chicken and dumplings, corned beef and cabbage, broccoli cheese quiche, steamed fish, French dip sandwich. Soup: navy bean soup. Vegetables: steamed cabbage, cauliflower au gratin, buttered carrots, lima beans.

Friday

Juneteenth Picnic — The NASA/JSC Black Cultural Association will host its "Annual Juneteenth Picnic/Ron McNair Scholarship Fundraiser from 3 to 9 p.m. June 18 at the Gilruth Center. Deadline for purchasing tickets is noon June 11.

The ticket price include a barbecue dinner, dessert, drinks and entertainment. A softball tournament also will be held. For more information, contact Charles Hoskins, x30607; Judith Elam, x34028; or Jackie Wilson, x30278.

Cafeteria menu — Special: baked meatloaf. Entrees: baked scrod with Hollandaise, broiled chicken, pork and beef egg rolls, steamed fish, Reuben sandwich. Soup: seafood gumbo. Vegetables: stewed tomatoes, seasoned spinach, cut corn, macaroni and cheese.

Monday

Cafeteria menu — Special: Italian cutlet. Entrees: chicken a la king, enchiladas with chili, baked lasagna with meat, steamed fish, French dip sandwich. Soup: split pea and ham. Vegetables: Brussels sprouts, oriental vegetables, buttered carrots, lima beans.

June 20

TSP briefing — A briefing on the Thrift Savings Plan is scheduled for 9:30 a.m. June 20 in Bldg. 45, Rm. 119. Open season for TSP runs through July 31. For more information, call the Employee Services Section at x32681.

June 22

Blood Drive — The NASA Blood Drive will continue from 8:30 to 11:30 a.m. June 22 at IFC, 16511 Space Center. For more information, contact Don Martin at 280-3858.

phonemate ans machine, 1 yr old, \$30; semi-motionless full waterbed w/mirrored hdbd, matching nite stand, \$100. Carmen, 282-4045.

Child's table and chair, \$35. 486-5247.
Couch/love seat, \$250; coffee/end tbl, \$75; dining table, 4 chairs, \$100; dresser, 2 nite stands, \$250. 283-1157.

Country blue sofa/chair, ex cond, \$450 OBO. Chris, 992-4870.

GE electric stove/oven, builtin style, \$200. Teena, x37787 or 422-6369.

Stackable W/D, good cond, 120V conn, \$75 OBO; professional PA sys, many pcs. Mark, x45696 or 333-0425.

Twin sz Balloons/Confetti comforter/sheet set, fitted/flat sheets, primary colors w/wht background, wnt pillowcase, \$25. x35188.

Fiks Reed rattan breakfast set, 48" tbl, 4 chairs, new paint, \$450; custom loveseat/sleeper, ex cond, \$200. 326-4395.

Contemp butcher block style dining tbl, 4 chairs, ex cond, \$125; matching coffee/end tbl, mauve colored, \$175. x32129 or 333-5113.

Wanted

Want 2 ton AC condenser unit. x33786 or 835-3200.

Want motorcycle helmet, full face for dirt bike riding. 332-9105.

Want 6x6 glass bricks in quantity; parquet floor tiles, 6x6 or 12x12; dutch door or good instructions on how to best make one. x30003.

Want female roommate, nonsmoker to share house in Seabrook, \$300/mo + 1/2 util and dep, no pets. Ann, 326-4618.

Want roommate for short-term lease, prefer male to share house w/2 professionals in LC lg BR, 1/3 util, 1/3 cable, 1/2 phone, nonsmoker a plus, \$317/mo. Judith, 333-7503 or 332-5140.

Want Starwars spaceships, toys, figures, books. Ron, 482-1385.

Want one or two folding camp cots. 326-2307.

Want responsible male to rent room in Friendswood w/kitchen privileges, \$250/mo, util paid. x47049 or 480-3424.

Want gas generator, portable, 3.5-4kw. Andy, 332-9105.

Want male roommate, split pymts, lg 2-2, Pirates Landing Apts, \$590+ util. 943-9664.

Want CGA color monitor. 992-5745.

Want cheap big truck for hauling. Nina, x31612.

Want "Little Tykes" elephant slide. Donna, x39300 or 331-3017.

Miscellaneous

Men's gray wool interview suit, 36 reg, \$45. Trey, x47982 or 992-1076.

Sewing machine, dressmaker deluxe, zig zag, \$20; Pentax VCR, 4 head, Hi-Fi VHS needs audio repair, \$50; microwave, \$60; bike rack, auto trunk mount, holds 2 bikes, \$40; swivel barrel LR chairs, uphol in burnt orange fabric, good cond, \$50/ea. 996-6062.

Fiberglass truck cap for full sz PU, good cond, \$350. 996-1442.

Cement mixer, elec, heavy duty, \$150. Jack, x37082.

Couch, 6 pc sect, \$300 OBO; Pres & First Lady membership, \$400 OBO; Singer sewing machine/maple cabinet, \$100. 482-9601.

Canon Typestar 6 electronic portable typewriter w/case, extras, \$90 OBO. 282-6432 or 796-1833.

Wedding gown/veil, gown w/train, lace, toole fingertip veil, long lace sleeves, sz 7, was \$700, now \$150. 282-2965.

'60 Kenmore sewing machine in cabinet, \$50; '68 Sears phone stereo in 70" mahogany cabinet, \$100. Rick, 946-4034.

Smith Corona typewriter with spell checker, \$125. Terry, x32264 or 486-9760.

Ivory wedding gown w/pearls, sequins, v-neck, chapel length train, sz 6-8, veil/petticoat, \$400. x36696 or 332-9102.

Office desk, 60" x 30", 5 drwrs, chair, \$85. 333-6225 or 480-2973.

Panasonic microwave, 1 cu ft, turntable, 800 w output, \$65; Qn Anne off wnt wedding gown, decorated w/pearls, beads, sequins, fits sz 6-8, was \$900, now \$350. 335-2388 or 488-5561.

Solid oak game tbl, \$125. Donna, 486-4855.

Pwr wheels classic convertible, good cond, \$30; sz 3 Barbie rollerskates, ex cond, \$10; knee/elbow pads, \$5. 339-2056.

Sliding glass patio door, 80x72, \$30; 2 4x5" solid glass windows, \$10/ea. Charlie, x34754 or 554-7116.

Oceanic 30 gal fish tank, access, \$100 OBO; Jacobson 5 hp self propelled lawnmower, 4 yrs olds, runs great, \$150 OBO. 337-4440.

Graco baby swing, silent windup, \$35; backpack baby carryall, \$30; infant car seat, up to 20 lbs, \$20. x39159.

Parting out '81 Olds 98, 4 dr, pwr seats, pdl, pwr windows; Chevy TH350 auto trans, 500 mi on rebuild, best offer. Kyle, x39442.

Beeman/Feinwerkbau 300s match pellet rifle, 1mm C-T-C groups at 10m, ex cond, \$650. David, 929-7120 or 388-2992.

Karate sparring gear for head/hands/feet/shins, \$75. x38843.

Radial arm saw, 12", 3.5 hp, Dewalt, was \$1.3k, now \$1k. 996-0033.

Soloflex w/leg lift attach, 1 yr old, \$950. Phil, x48255.

Tilt trlr, single axle, galv w/wench, 500 lb capacity, \$400. 409-925-3030.

Sheep skin, \$10; elec blanket, \$5; child's karate uniform w/kick shoes, \$10. Nina, x31612.

Stainless steel DE swimming pool filter, \$100. Ralph, 409-765-7665.

Hanging stained glass light fixture w/matching tulip globe for ceiling fan, \$175. Donna, x39300 or 331-3017.

Astroworld/Waterworld Season Pass Combo, \$75 OBO; RCA 27" color stereo tv, wood console, 4 yrs old, \$600 OBO; Smith Corona word processor w/built-in printer, \$500 OBO; After 5 dress, sz 5, blk velvet/hot pink, \$60; After 5 dress, pale pink, floor length, sz 5-7, \$75. Diane, x47129.

Portable hot tub, cover, elec heater, holds 5, 2 benches, 1 lounge, make offer; wood exec desk, oak office chair, good cond, \$250. x37667 or 326-2864.

Soloflex style wt bench, arm/leg curl, press stations, pwr bands, heavy duty retainer pins, ex cond, less than 6 mo old, \$7.5k OBO. Mark, x45696 or 333-0425.

1993 SPACE SHUTTLE MANIFEST

Mission:	57	51	58	60	61
Date:	June	August	September	December	December
Orbiter:	<i>Endeavour</i>	<i>Discovery</i>	<i>Columbia</i>	<i>Discovery</i>	<i>Endeavour</i>
Payload:	EURECA-1R SPACEHAB-01 CONCAP IV-01 SHOOT GBA (11)	ACTS ORFEUS-SPAS-01 LDCE-02	SLS-02	SPACEHAB-02 WSF-01 (CAPL/GBA(4)) (ODERACS-1R) (BREMSAT)	HST SM-01 IGBC-04
Inclination:	28.5°	28.5°	39°	57°	28.5°
Altitude:	250	160	153	190	310
Duration:	7 + 1	9+1	14	8	11
Crew CDR:	Ronald J. Grabe	Frank L. Culbertson, Jr.	John E. Blaha	Charles F. Bolden, Jr.	Richard O. Covey
PLT:	Brian Duffy	William F. Readdy	Richard A. Searfoss	Kenneth S. Reightler, Jr.	Kenneth J. Bowersox
MS:	G. David Low (PLC) Nancy J. Sherlock Janice E. Voss Peter J. K. Wisoff	Daniel W. Bursch James H. Newman Carl E. Walz	M. Rhea Saddon (PLC) Shannon W. Lucid William S. McArthur, Jr. David A. Wolf	Franklin R. Chang-Diaz N. Jan Davis Sergei Krikalev (Russia) Ronald M. Sega	F. Story Musgrave (PLC) Thomas D. Akers Jeffrey A. Hoffman Claude Nicollier Kathryn C. Thornton
PS:		Martin J. Fettman			

1994 SPACE SHUTTLE MANIFEST

Mission:	62	59	63	65	66	64	67	68	
Date:	March	April	June	July	September	September	December	December	
Orbiter:	<i>Columbia</i>	<i>Endeavour</i>	<i>Discovery</i>	<i>Columbia</i>	<i>Endeavour</i>	<i>Discovery</i>	<i>Columbia</i>	<i>Atlantis</i>	
Payload:	USMP-02 OAST-02 DEE SSBUV/A-03 LDCE-03	SRL-01	SPACEHAB-03 SPTN 201-02 IEH-01	IML-02	ATLAS-03 CRISTA-SPAS-01 SSBUV/A-04	LITE SPTN 204 GBA (12)	ASTRO-02	SRL-02	
Inclination:	39°	57°	51.6°	28.5°	57°	57°	28.5°	57°	
Altitude:	160	120	200	160	160	140	190	120	
Duration:	14	9	8	13	10	9	13	9	
Crew CDR:	John Casper	Sidney M. Gutierrez							
PLT:	Andrew Allen	Kevin Chilton							
MS:	Sam Gemar Marsha Ivins Pierre Thuot	Linda M. Godwin (PLC) Jay Apt Michael R. Clifford Thomas D. Jones		Richard J. Hieb (PLC) Leroy Chiao Donald A. Thomas Chiaki Mukai					
PS:									

1995 SPACE SHUTTLE MANIFEST

Mission:	69	70	71	72	73
Date:	January	May	June	July	September
Orbiter:	<i>Discovery</i>	<i>Endeavour</i>	<i>Atlantis</i>	<i>Discovery</i>	<i>Endeavour</i>
Payload:	SPACEHAB-04 SPAS-III	WSF-02 IEH-02 OAST-FLYER GBA (12)	SL-M	TDRS-G CMSE-01	SPACEHAB-05 SPTN 201-03 OAST-03 SSBUV/A-05
Inclination:	57°	28.5°	51.6°	28.5°	28.5°
Altitude:	135	190	TBD	160	160
Duration:	7	9	9	5	10
Crew CDR:	6	6	TBD	5	5
PLT:					
MS:					
PS:					

SPACE SHUTTLE MANIFEST GLOSSARY

ACTS	Advanced Communications Technology Satellite	ORFEUS	Orbiting and Retrievable Far and Extreme Ultra-violet Spectrometer
ASTRO	Ultra-Violet Astronomy Telescope	SHOOT	Super Fluid Helium On Orbit
ATLAS	Atmospheric Laboratory for Applications and Science	SL-M	Joint U.S./Russian Mir Docking, Spacelab Life Sciences
BREMSAT	BREMAN Satellite	SLS	Spacelab Life Sciences
CAPL	Capillary Pump Loop Experiment	SPACEHAB	Commercial middeck augmentation module
CMSE	Candidate Materials Space Exposure	SPAS	Shuttle Pallet Satellite
CONCAP	Consortium for Materials Development in Space	SPTN	Shuttle Pointed Autonomous Research Tool for Astronomy
CRISTA	Cryogenic Infrared Spectrometer Telescope for Atmosphere	SRL	Space Radar Laboratory
DEE	Dexterous End Effector	SSBUV	Shuttle Solar Backscatter Ultraviolet Instrument
EURECA	European Retrievable Carrier	TDRS	Tracking and Data Relay Satellite
GBA	Gas Bridge Assembly	USML	United States Microgravity Laboratory
HST	Hubble Space Telescope	USMP	United States Microgravity Payload
ICBC	IMAX Cargo Bay Camera	WSF	Wake Shield Facility
IEH	International Extreme-UV Far-UV Hitchhiker		
IML	International Microgravity Laboratory		
LDCE	Limited Duration Candidate Exposure		
LITE	Lidar In-Space Technology Experiment		
OAST	Office of Aeronautics and Space Technology		
ODERACS	Orbital Debris Radar Calibration Spheres Project		

Enlarge 104% to fit Franklin Planner

Cost of station options adds operations, reserves

(Continued from Page 1)

Goldin added.

The full House of Representatives is scheduled to take up the NASA budget authorization and the station redesign in floor debates as early as Tuesday, and appropriations on June 25 prior to the scheduled August recess. The Senate also may take up the NASA budget before the recess.

Option A, the modular approach that would build up slowly using the space shuttle in a long-duration capacity while protecting the ability to add increased capability, would cost \$13.3 or \$12.8 billion, the lesser depending on use of a Lockheed

Bus-1 off-the-shelf spacecraft.

Option B, the Space Station Freedom-derived option that used current space station elements scaled back to meet the redesign team's requirements on cost and schedule, also came in at \$13.3 billion.

Option C, the large, seven-level pressurized vehicle that would be placed into orbit with a single launch using existing shuttle components, was at the low end with \$11.9 billion.

"Getting down to the \$5, \$7 and \$9 billion level was obviously a more daunting challenge than we were able to realize," said Mal Peterson,

who headed the separate team that developed NASA's cost estimates and folded the work of an independent cost assessment team into its findings.

"We performed the mission to the best of our ability and we did not put ourselves in a position of trying to meet the fiscal targets the next year," Goldin said. "We took an exercise that not only went out to the end of the decade, but we also took a look at the operations costs. We've put a prudent amount of reserves in dollars and weight, power and schedule into the plan so that we don't have to keep replanning and rescheduling."

The options would provide for program stability, something that NASA and its international partners believe is essential to a successful space station program. International participation also is a must, Goldin added.

"We cannot redesign the space station every year," Goldin said. "We believe an international space station is crucial. We're leaving the Cold War era and entering a new era. We have to have peace. And America can't have a macho space station by itself."

Goldin said he believes in the American spirit and that we will have a space station, but that there is no

way to make it be everything to everybody. Each of the options has advantages and disadvantages, and the disadvantages are relative to the various groups involved.

"Clearly, there is heartburn for a number of our international partners," Goldin explained. "Believe me, there's going to be heartburn in a number of different places in this country and there's going to be heartburn with a number of members within the political system. But our job is not to make everybody happy. NASA has spent 25 years making everybody happy and look where it has gotten us."

Mission Control viewing room hours for STS-57

The Mission Control Center viewing room will be open to JSC and contractor badged employees and their families during STS-57.

Based on a Sunday launch, employees will be allowed to visit the MCC Monday from 11:30 a.m.-2:30 p.m. and 5-7 p.m.; Tuesday, from 11:30 a.m.-2:30 p.m.; Friday, from 11:30 a.m.-2:30 p.m. and 5-7 p.m.; and Saturday, from 1-5 p.m. There will be no viewing opportunities on Wednesday because of the retrieval of the EURECA satellite, or Thursday because of a planned space walk.

Employees must wear their badges and escort family members through the regular public entrance on the northeast side of Bldg. 30. Children under 5 will not be permitted. No flash photography or loud talking will be permitted at any time.

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

Cohen to address AFCEA Thursday

JSC Director Aaron Cohen will be the featured speaker at the next meeting of the Armed Forces Communications and Electronics Association Houston Space Chapter.

Cohen will discuss "Future Directions for JSC" at the meeting, which will begin at 11:30 a.m. Thursday at Lakewood Yacht Club, 2426 NASA Road 1.

Today is the deadline for reservations. Luncheon cost is \$12 for members and \$14 for nonmembers. Call Linda Hinton at 282-7682.



Mark Brown, left, deputy chief of Flight Crew Operations' Station-Exploration Support Office, presents the first JSC Go the Extra Mile Award to Mike Fossum in Bldg. 4S.

Fossum gets first fast bucks

JSC's first Go the Extra Mile Award went to engineer Mike Fossum of Flight Crew Operations' Station-Exploration Support Office last Friday.

Mark Brown, deputy chief of the office, handed a \$100 voucher and a GEM Award certificate to Fossum for ensuring a full discussion of the capabilities and limitations of each option in the space station redesign process. Fossum was FCOD's representative to the Option C team at JSC.

FCOD was the first organization to test the newly announced GEM Award and its quick, 48-hour turnaround. JSC managers now have the ability to recognize and reward employees, and quickly present them with a vouchers that can be cashed in

at the Imprest Fund Cashier in Bldg. 1.

Human Resources' Awards Office expects to be busy processing some 750 to 1,000 GEM Awards before the end of the fiscal year. Reaction centerwide to the new award so far has been favorable.

All JSC civil service employees are eligible for the small cash awards, which range from \$50 to \$200 (before taxes). Although approval is at the directorate and program management level, organizations are being encouraged to delegate the authority to lower levels. Organizations also are encouraged to create a peer nomination process.

For more information, call Helen Harris at x38411.

Scientists find evidence of water on Jovian moon

Scientists have found water molecules frozen in the surface ices of Jupiter's moon Io.

"This is the first strong evidence of solid water on the surface of this satellite," said Dr. Farid Salama, University of California, Berkeley, who led the project at Ames Research Center.

The absorption lines for water were found in the infrared spectrum of Io by scientists onboard NASA's Kuiper Airborne Observatory. The KAO has a unique ability to conduct infrared astronomy while flying above 99 percent of Earth's atmospheric water vapor.

"We have finally seen the spectral signature of something for which we've been looking for years — water on Io," said Dr. Jesse Bregman of Ames, who developed the spectrograph used with the KAO telescope.

Io is the only body in the solar system, except Earth, known to have intense volcanic activity. The Voyager spacecraft discovered active volcanoes on Io more than a decade ago. Patches of sulfur and sulfur dioxide frosts cover the satellite. The water ice is combined with the more abundant sulfur dioxide ice on Io's surface.

Scientists know that Io's thin atmosphere consists mainly of gaseous sulfur dioxide, but they have been uncertain about the main components of its surface. Their most fundamental question concerned the basic element, hydrogen, Salama said.

Although most of Jupiter's satellites are covered with water ice, we assumed that the 'hot', volcanically active moon Io had lost all of its original water through vaporization and escape of the gas molecules from the surface, Sandford said.

"We want to know whether volcanic vents release the hydrogen or if proton bombardment produces it within the frozen sulfur dioxide layer," he said.

The favored theory is that the water results from volcanic activity on Io and that some water vapor venting occurs, leading to a mixing with sulfur dioxide in the vent. When the hot gas mixture expands out of the vent it condenses into ices that fall back onto Io's cold surface.

NASA's planned next generation airborne observatory—the Stratospheric Observatory for Infrared Astronomy—could give even higher resolution.

Hubble measurements may help determine value of constant

(Continued from Page 1)

"In our two observed fields in M81, we have found a total of 32 Cepheids. Decades of previous work from the largest ground-based telescopes have only succeeded in measuring periods for two Cepheids," said Dr. Wendy Freedman of the Carnegie Institution of Washington. "HST's superior resolution and its ability to schedule observations when and where they are required give HST a special advantage in this work."

Messier 81 is a large spiral galaxy in the constellation Ursa Major. It is a rotating system of gas and stars similar to the Milky Way galaxy, but approximately twice as massive. This galaxy achieved prominence 3 months ago when the brightest northern supernova of this century was discovered.

The astronomers used the Hubble's Wide Field/Planetary Camera to study two fields in M81. In each field they took 22 20-minute exposures spread over 14 months to

find the variable stars and measure their periods and brightness.

The project is one of several so-called "key projects" designated top priority scientific goals for the Hubble Space Telescope. This extragalactic distance scale key project aims to discover Cepheids and measure the distances to galaxies to determine an accurate value of the Hubble Constant.

Dr. Jeremy Mould, Principal Investigator for the team, said, "This is the first step in a major program of

measuring distances of galaxies with the Hubble Space Telescope. When the telescope is serviced later this year, and the new Wide Field & Planetary Camera is installed with its corrective optics, we plan to use the same technique on galaxies up to 50 million light years away, which will allow us to measure the Hubble Constant, the rate of expansion of the universe.

"We have three years of work ahead of us and, until the project is substantially complete, I won't spec-

ulate on what value of H0 this work will yield."

Although this HST key project has the explicit goal of getting H0, other astronomers have used Hubble to search for Cepheids. Previous HST observations carried out by a different group also demonstrated HST's unique capability by resolving 27 Cepheids in another galaxy. The announcement was made at the 182nd meeting of the American Astronomical Society in Berkeley, Calif.

Manifest includes expendables plan

(Continued from Page 1)

will distribute full-sized copies of the planner pages to all on-site civil service and contractor employees in a follow-up distribution.

Employees are urged to use these reprints rather than duplicating the Roundup page, which is expected to save about three-fourths of the cost that would be incurred if employees copied their own. Other interested parties may request a copy by calling the Documentation Management Branch at x34007.

The Payload Flight Assignments NASA Mixed Fleet document also contains information about expendable launch vehicle payload flight assignments and payload requests through 1999.

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

Swap Shop ads are due two weeks before the desired date of publication. For more information, call 483-8648.

Editor Kelly Humphries
Associate Editor Kari Fluegel

Shuttle material may help in bone transplants

(Continued from Page 1)

have data that show the tile material has excellent promise for use as a bone implant."

Goldstein led the research, development and evaluation of the ceramic, known as reusable surface insulation, in the 1970s and 1980s. He also will lead Ames' RSI research team on the new project.

"The theoretical attraction of shuttle insulation is that it is biocompatible," said Dr. Dani Goldwater, manager of commercial space programs at Ames. "It also provides a porous framework, which allows infiltration by normal bone cells and deposition of bone mineral. The result could be complete integration of the implant into normal bone," she said.

Goldstein cautioned, however,

that "a lot remains to be done before we can demonstrate the many potential uses of RSI as a bone implant." For example, scientists must improve the material properties of the ceramic fiber composite. They also will have to increase the pore size of the material for use as a bone scaffolding, while increasing its strength and maintaining biocompatibility.

Dr. Casey Fox, BioMedical Enterprises Inc., and Dr. Thomas Aufdemorte, University of Texas Health Science Center, first must determine the safety, efficiency and applications for these materials as bone implants. After developing and testing the product in the laboratory, they will work to get U.S. Food and Drug Administration approval for use in humans. Fox

expects the development, testing and market approval process to take about six years.

If tests are successful, "the ultimate result of this research might be the production of implants that can substitute for or supplement natural bone," Fox said. "The contribution to the relief of human suffering is potentially enormous."

Fox said physicians perform between 1.2 million and 1.7 million orthopedic and dental procedures each year that could benefit from the availability of the bone implant material.

People with bone disorders resulting from trauma, disease and degenerative skeletal changes associated with aging are likely to benefit from successful development of this bone implant, he said.