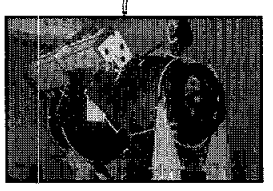
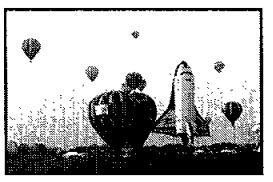
National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
Houston, Texas



Returning to Mir

Cooperation with JSC and Russian engineers help take the station plans to new levels. Story on Page 3.

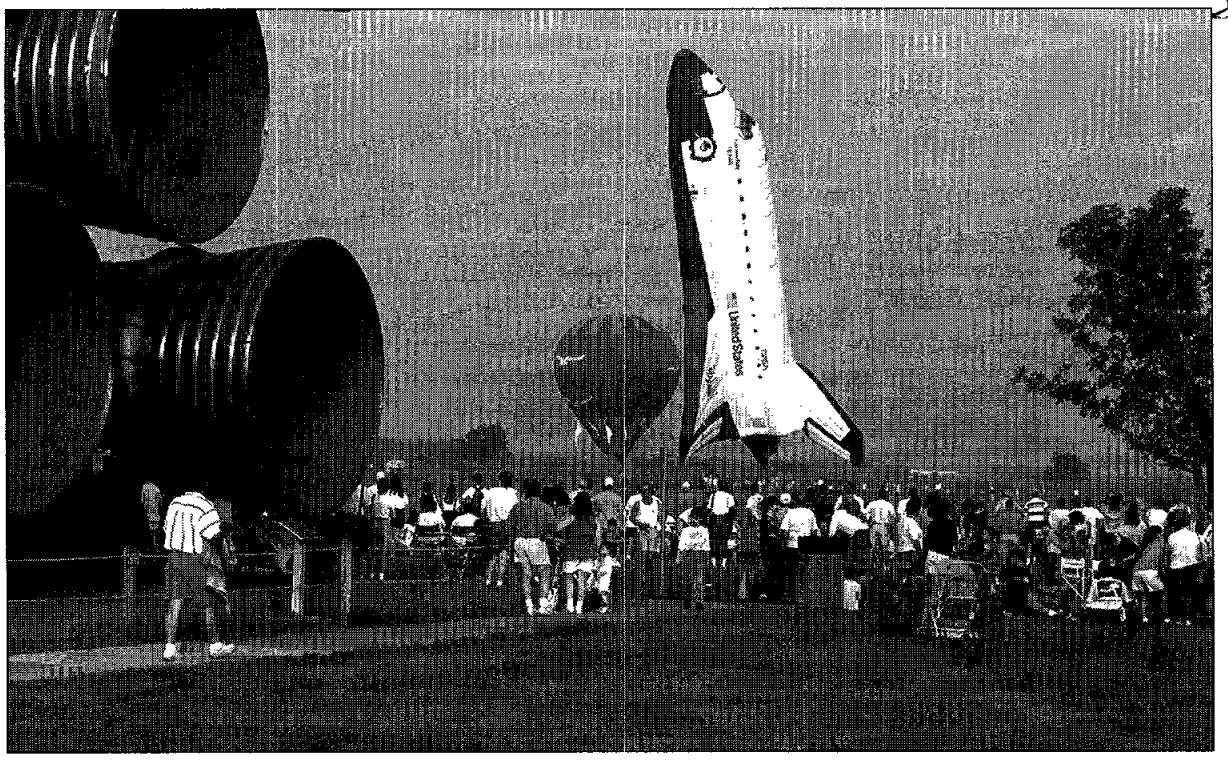


A lot of hot air

The Ballunar Festival attracted a variety of hot air balloons to compete for prizes. Photo on Page 4.

Space News Roundup

Vol. 34 **September 1, 1995** No. 35



CELEBRATION—The JSC Open House and Ballunar Festival held last weekend drew a crowd to enjoy several attractions available. Participants enjoyed several types of food, bands played in the afternoon, arts and crafts were displayed, hang-gliders performed in the sky and balloon competitions were conducted throughout the weekend. At the Open House many individuals listen to recounts of previous mission from former and current astronauts and visited the many labs on-site. Top, The Nassau Bay Shuttle Balloon debuts at Rocket Park. Right, Many families enjoy several spacesuit displays in Bldg. 7. Technicians donned spacesuits to give both children and adults and inside look at spacesuit systems.

JSC Photo by Benny Benevides

Satellite pair will study sun, semiconductors

Endeavour and its five astronauts are scheduled to deploy two satellites this weekend as they begin a 11-day mission to study the Sun, semiconductor production and techniques to build the International Space Station.

An on-time launch, scheduled for 10:04 a.m. CDT Thursday, would lead toward a landing at 6:33 a.m. Sept. 11.

Commander Dave Walker, Pilot Ken Cockrell and Mission Specialists Jim Voss, Jim Newman and Mike Gernhardt, will deploy and retrieve both the SPARTAN-201 solar science satellite and the Wake Shield Facility, and conduct two space walks.

Based on an on-time launch, the SPARTAN-201 solar science satellite will be released into orbit Friday, the second day of the mission, by robot arm operator Gernhardt for a 48-hour free flight to train its instruments on the solar corona and the Sun's effect on Earth-bound communications systems. Gernhardt will pluck SPARTAN out of orbit on the fourth day of the mission, again using the Canadian-built robot arm to grapple the satellite following its scientific investigations.

The next day, Monday, Newman will take over operation of the robot arm, unberthing the Wake Shield Facility from its truss structure in the cargo bay to begin "cleansing" it of atomic oxygen particles as *Endeavour* streaks around the Earth at more than 17 thousand miles an hour.

The pristine condition of the WSF is vital to its ability to grow thin films during its 54-hour flight free from *Endeavour*. Those films, to be used to prove the technology concept for enhanced semiconductor production, will grow in a chamber on the wake side of the WSF, in what researchers say will be the most perfect vacuum environment ever created as the satellite plows through Earth orbit, churning up a wake of atomic oxygen behind it, much like a motorboat in water.

The WSF also will serve as a target for dozens of jet thruster firings right before its retrieval. At distances of 400, 300 and 200 feet at the conclusion of *Endeavour*'s rendezvous with the WSF, Walker and Cockrell will fire the shuttle's jets at the saucer-shaped satellite to collect data researchers have requested about the effect of plume impingement on orbital satellites. The Wake Shield will be left attached to the robot arm overnight following its retrieval for an experiment the next day involving the study of the effect of charged particles in low Earth orbit on orbiting spacecraft.

The final highlight of the mission will come two days before landing, when Voss and Gernhardt venture into *Endeavour*'s cargo bay for a six-hour space walk, the second for the shuttle program this year.

Voss and Gernhardt will take turns evaluating the thermal

Please see ***COLUMBIA***, Page 4

Study shows feasibility of plant life support systems

The science fiction concept of plants providing a complete life support system for the crews of lunar and deep-space missions came a step closer to reality with the successful completion of a life sciences experiment that studied potato production in a self-contained environment.

"We have demonstrated that a bioregenerative life support system really can support humans in an enclosed environment over a long period of time," said Gary Stutte a Kennedy Space Center plant physiologist. "Our long-range goal is to prove that a plant-based life support system is as reliable as the mechanical systems found in today's spacecraft."

KSC scientists conducted a successful 418-day experiment in the Biomass Production Chamber of the Controlled Environment Life Support System. The experiment investigated how well a biogenerative life support system can perform on a continuous basis over an extended period of time. This experiment was the longest test of a major component of a bioregenerative life support system ever completed.

During the experiment, the potato plants produced enough oxygen to support one crew member on a continuous basis, while also removing excess carbon dioxide from the atmosphere, Stutte said. In addition, the potato crops produced enough food to supply 55 percent of the caloric needs of an astronaut, along with enough purified water for a total of four crew members. A larger chamber could be used to provide all the consumables for the crew for as long as a mission might last, Stutte said.

"The major advantage of the bioregenerative life support system is that it does not need to be resupplied with food, water and air, nor does it require expendable water or air filtration systems as present-day mechanical spacecraft life support systems do," said Dr. Bill Knott, chief scientist of Biological Programs for the NASA/KSC Biomedical Operations Office.

Instead, the current system recycles plant waste and nutrients. This recycled material sustains the plant crops, which in turn produce the oxygen, water and food that the crew would need for an indefinite period of time.

Once the analyses of the KSC experiments are complete, they will be provided to JSC, Knott said. JSC research personnel will then use this data to conduct research on the effectiveness of bioregenerative life support systems with human subjects.

Please see ***POTATOES***, Page 4

Shuttle program consolidates contracts

By Karen Schmidt

Space Shuttle Program officials are attempting to separate operations from development as they move to consolidate contracts under a single prime contractor over a period of about five years.

The restructuring is designed to eliminated management and project office activity and give the prime contractor the responsibility for operations while NASA maintains development and program management, said Associate Administrator for the Office of Space Flight J. Wayne Littles and Shuttle Program Director Bryan O'Connor, who briefed aerospace industry representatives on the plans last week.

"We are looking at separating operations from development," Littles said. "The program has some 85 contracts right now that are totally or partially funded by shuttle. We intend to consolidate some of those contract activities and select a single prime contractor incorporating those contracts that are appropriate to operations."

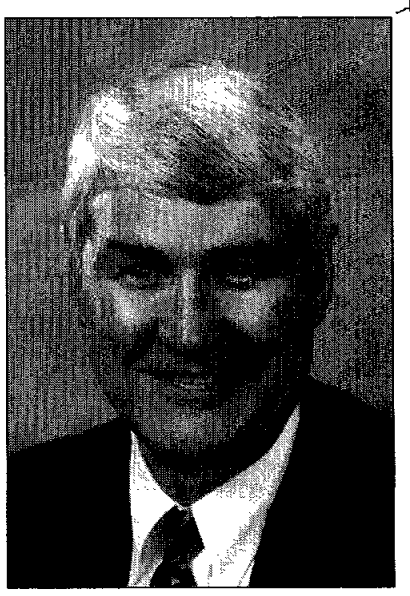
The single prime contractor would take over ground operations including launch/recovery, element process, ground systems and facilities, solid rocket motors, integration vehicle processing, processing logistics and payload integration. Flight operations affected by the restructuring would include flight preparations, training, facility operations, flight software, mission execution and payload integration.

"Basically all the contracts are managed by the centers and program offices at JSC and KSC. We will fold all the operations under one umbrella," Littles said.

Contracts that are funded by multiple sources would be restructured based on their space flight operations. Littles emphasized that a carefully planned and controlled transition is essential.

"How long the process takes depends on a number of things," Littles said. "It will depend on the experience level of the technical expertise that is brought on board by the prime contractor, by the management of that contract and by our

Please see **TRANSITION**, Page 4



Donald Robbins

Robbins joins UH

Donald Robbins, acting director of Space and Life Sciences accepted an assignment to work with the University of Houston staff at their central campus.

"I am really excited about this opportunity," Robbins said. "I really enjoy teaching and this gets me closer to students."

Robbins assumed administrative duties Monday in the Office of Sponsored Programs at UH and will begin teaching physics at the beginning of the year. He has taught part-time over the last seven years and will remain full time during this one year assignment.

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.

Schlitterbahn: Tickets cost $17.80 for adults and $15.30 for children 3-11.

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

Six Flags: Tickets cost $23.70 for a one day pass, $31.75 for two day pass and $20.30 supersaver not valid on weekends in June July and August.

Astroworld: Tickets cost $18.10.

Waterworld: Tickets cost $9.25.

Splashtown: Tickets cost $11.05.

Fiesta Texas: Tickets cost $20.35 for adults and $15.80 for children 4-11 and seniors over 55.

Moody Gardens: Discount tickets for two of three different attractions: $9.50

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.

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

Upcoming Events: University of Houston vs. Baylor Oct. 14. Tickets cost $8. University of Houston vs. University of Texas Nov. 11. Tickets cost $15.50.

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 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.

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. Sept. 12 and Sept. 28. Pre-registration is required. Cost is $5.

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

Aerobics: High/low impact class meets from 5:15-6:15 p.m. Tuesdays and Thursdays. Cost is $32.

Aikido: Martial arts class meets from 6-7 p.m. Tuesdays and Wednesdays. 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.

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.

JSC

Dates & Data

Today

Cafeteria menu — Special: tuna noodle casserole. Total Health: baked potato. Entrees: steamed salmon steak, baked chicken, fried cod fish, ham steak. Soup: seafood gumbo. Vegetables: French cut green beans, cauliflower with cheese, green peas, black-eyed peas.

Monday

Labor Day: Most JSC offices will be closed in observance of the Labor Day holiday.

Tuesday

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

Cafeteria menu — Special: fried chicken. Total Health: vegetable lasagna Entrees: Salisbury steak, steamed pollock, vegetable lasagna, French dip sandwich. Soup: split pea and ham. Vegetables: mixed vegetables, French cut green beans, pinto beans, vegetable sticks.

Wednesday

Toastmasters meet: The Spaceland Toastmasters will meet at 7 a.m. Sept. 6 at House of Prayer Lutheran Church on Bay Area Blvd. For additional information, contact Elaine Trainor, x31034.

Blood drive: Rockwell will host its annual blood drive from 8-11:30 a.m. and 1-2:30 p.m. Sept. 6 at 600 Gemini. For information call Margy Pelonero at 282-3418.

Astronomy seminar: The JSC Astronomy Seminar will meet at noon Sept. 6 in Bldg. 31, Rm. 129. An open discussion meeting is planned. For more information, call Al Jackson at 333-7679.

Cycle club: The Space City Cycle Club will meet for a 25-mile ride beginning at 6 p.m. Sept. 6 at the University of Houston Clear Lake soccer field. For more information on this ride and weekend rides call Mike Prendergast at x45164.

Cafeteria menu — Special: stuffed bell pepper. Total Health: baked potato. Entrees: stir fry chicken & rice, wieners & beans, fried fish, western special, beef, chicken sausage, Reuben sandwich. Soup: seafood gumbo. Vegetables: buttered rice, Italian green beans, corn O'Brien, peas and carrots.

Thursday

Cafeteria menu — Special: barbecue smoked link. Total Health: roasted turkey breast. Entrees: turkey and dressing, beef stroganoff, steamed pollock, French dip sandwich. Soup: tomato Florentine. Vegetables: Spanish rice, lima beans, buttered squash, oriental vegetables.

Friday

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.

Sept. 12

Photo club meets: The Bay Area Photo Club will meet at 7:30 p.m. Sept. 12 at the Faith Covenant Church. For more information call Kelly Prendergast at x37655.

PSI meets: Clear Lake/NASA Area Chapter of the Professional Secretaries International will meet at 5:30 p.m. Sept. 12 at the Holiday Inn on NASA Road 1. June Bennett Larsen will discuss 'How Do I Sound? Improving Voice and Articulation.' Certified Professional Secretaries can earn one CPS recertification for this session. Tickets cost $15 and includes dinner. For more information call Elaine Kemp at x30556.

Sept. 13

Toastmasters meet: The Spaceland Toastmasters will meet at 7 a.m. Sept. 13 at House of Prayer Lutheran Church on Bay Area Blvd. For additional information, contact Elaine Trainor, x31034.

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

Astronomy seminar: The JSC Astronomy Seminar will meet at noon Sept. 13 in Bldg. 31, Rm. 129. A video will be shown featuring R. Kennicutt discussing "HST Extragalactic Distance Scale." For more information, call Al Jackson at 333-7679.

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

Cycle club: The Space City Cycle Club will meet for a 25-mile ride beginning at 6 p.m. Sept. 13 at the University of Houston Clear Lake soccer field. For more information on this ride and weekend rides call Mike Prendergast at x45164.

Sept. 14

Software meeting: The Society for Software Quality will meet at 5:30 p.m. Sept. 14 at the Ramada Kings Inn on NASA Rd. 1. Robert Savely will discuss "State of the Art Artificial Intelligence." Cost is $10 for members, $14 for non-members. Reservations must be made by Sept. 11. For more information call Dot Royer at 335-5888.

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

Property

Sale: Clear Lake Forest, 4-2.5-2, glass walled den w/hi ceiling, FPL, formals, family room, new roof/paint/carpet/paper. 333-5300 or 326-2307.

Rent: Tranquility Lake condo, 2-1-1C, W/D, fans, FPL, secure complex, pool view, $600/mo. Joe, 241-9411 or 488-2798.

Sale/Lease: Queens Court II, Nassau Bay, town house, 3-2.5-2, $93.3k or $975/mo. Marilyn, 333-1700.

Sale/Lease: Cloisters condo, 2-2, 2 car parking, FPL, W/D. 339-0904.

Sale: Lot in League City, Maria off Texas, $5k. 333-5493.

Lease/Sale: Egret Bay Villas, 1-1-2CP, FPL, patio, ceiling fans, W/D, appl, security gate, boat ramp, avail 9/1, $475/mo. 335-1451.

Sale: Holly House townhouse, near Texas Medical Center, 2-2.5-2, 1648 sq ft, security guard + alarm sys, avail immed. Jack H. Cohen, 488-3171.

Lease: Clear Lake condo, 2-1-1CP, appl, security, cable, ceiling fans, pool, $660/mo. 280-0410.

Lease: Cloisters condo, 2-1-1CP, refrigerator, W/D, security, $660/mo. 280-0410.

Rent: Lake Travis cabin, private boat dock, central air & heat, equipped, accommodates 8, fall $550 wkly or $120 dly. 474-4922.

Rent: Arkansas cottage on Blue Mt Lake, huge stone FPL, screened porch, $250 wkly $50 dly. Corcoran, x33005 or 334-7531.

Rent: Beach house, Crystal Beach, Galveston Co, large deck, all amenities, 4-2, sleeps 12, wknd/dly rates. 486-1888.

Cars & Trucks

'79 Buick LeSabre, not good looking but runs well, good work car, $800. 482-5621.

'85 Honda Accord, white, $4k obo. 482-6650.

'91 CRX, red, 5 spd, pullout radio/cass, A/C, clean. Kyle, 996-1264.

'74 VW thing, white, new engine/battery, good tires, $3k obo. Dick, 335-6842 or 286-4444.

'87 Ford Mustang convertible, 4 cyl, auto, 100k mi, cruise, AM/FM/cass, blue/white inter, $4k. obo. Cindy, 480-8116.

'89 VW Jetta GL, Wolfsberg Ed, blue, 56k mi, 1 owner, ex cond, $5.2k. Tom, x33651 or 280-8084.

'87 Nissan 200-SX XE hatchback, red, ex cond, auto, pwr, cruise, sunroof, A/C, AM/FM/cass, spoiler, 97k mi, 1 owner, $4.2k obo. 282-3229 or 286-4547.

'69 Mach I Mustang, red, 302 eng, rebuilt '94 by Sun's Racing Team, headers, flow masters, new carb/radiator/brakes, $4.2k. 478-4340.

'84 Toyota Tercel, 2 dr hatchback, auto, new batt/brakes/tires, runs good, good work car, $1.2k. x45888 or 996-0697.

'85 Toyota 4-Runner, white, 4WD, 4 cyl, EFI, 5 spd, A/C, ex cond, $5.5k. Nathan, x34308 or 332-9382.

'93 Subaru Impresa, 7.3k mi, met. blue, A/C, tinted windows, $7.8k obo. 991-2302.

'93 Dodge Ram PU ext cab, loaded, 360 V-8, 2WD, camper shell, 29k mi, $15.5k obo. x41065 or 326-2866.

'88 Ford Mustang, $5.7 obo. Steve, 479-4463.

'94 Camaro, maroon, A/C, cruise, AM/FM/cass, 37k mi, $10.5k. x31443 or 997-8044.

'86 Ford E150, 8 passenger van, 302 V-8, dual A/C, ex cond, $3.2k. 333-3127.

'86 Buick LeSabre, 4 dr, dk blue, V-6, A/C, runs good, $2.7k. Bob, x30143 or 286-7288.

'74 VW Beetle, daily driver, good mechanical cond, new tires/shocks, $1,349 obo. 538-2275.

'66 VW Beetle, new interior/headliner/upholstery & carpet, cherry red paint, rebuilt 1600 cc, 56k mi, $2,449 obo. 538-2775.

Cycles

'80 rebuilt Honda 900 Custom, 1 owner, garaged for 2 yrs, lots of parts. Jeff, x32578 or 488-2543.

'86 Honda Magna, 700cc, low mi, ex cond, $3k. 488-6526.

'87 Yamaha Rima scooter, low mi, ex cond, $400. Bill, x31574 or 333-3352.

'83 Goldwing Aspencade 1100GL Road bike, full dress, elect dash, CB/AM/FM/cass, intercom w/2 helmets, trunk, side bags, cover, rain suit, silver/gray, runs like new, $3.2k obo. Tom, x32572 or 992-2544.

Boats & Planes

Fiberglass sailboat, 22', 5hp OB, 2 jib sails, potty, $3.5k or trade for power boat or house boat on trailer, 4 free sailing lessons. x37441 or 339-2834.

Sovereign, 24', main, jib, 125% genoa, depth sounder, head, stove, electric start Johnson OB, $5,750. Mike, 282-2787 or 286-1691.

Sol Cat catamaran, 18', w/trailer, sail box, $1.2k. M. Bird, 941-2968 or 923-3410.

Canoe, 16'5", 2 paddles, 2 life vest & car carrying kit, $400 obo. 333-7826 or 486-0542.

Viking deck boat, 19', ski pole, Bimini top & cover, 135 hp Johnson, good cond, w/trailer, $4.8k. 333-8411.

Audiovisual & Computers

JVC tape deck w/Dolby NR, $55; TEAC equalizer, $50; Goldstar portable videocassette player, $50; Apple Image writer II color printer, $75; Mac CD Rom, $10. Bobby, x44444 or 488-4382.

Quicken 3 for MacIntosh, $15. 484-1778.

Alpine AM/FM/cass deck w/auto-revere, Blaupunkt speakers, $130. 280-9461.

Mac Pro Plus extended MacIntosh keyboard, $100; 9 - 44 Mb cartridges, $25/ea; Sy Quest 44 Mb, SCSI drive, $150; Radius color video card for Mac SE/30, PDS slot, $65. 480-3424.

Kenwood 7000, car CD player, AM/FM stereo w/in dash CD, detachable face, $75. 335-1451.

Citizen printer "CSX-140" w/GSX color option, $199. Magdi Yassa, 333-4760 or 486-0788.

Packard Bell Pentium, 60 MHz multi media computer, 8 Mb RAM, 420 HD, 2 x CD ROM, 14.4 fax modem, 15" SVGA monitor, pre-loaded S/W, HP 560 color printer, ex cond, $1.7k obo. 470-9387.

Hewlett-Packard Deskjet 500 Printer, $190 obo. x31034 or 332-5790.

Super NES w/3 games, $100. 334-3941.

MacQuadra 700, 16 Mb/450 Mb, 2MV RAM, ethernet, 3 Nubus slots, accelerated to 66 MHz, extended kb, mouse, no monitor, $1.2k; 3 - 14.4 kb external data/fax modems, $50 ea; 2 - Daystar 128k casche cards for Q700 or Q900, $50 ea. Doug, 765-7713.

AT&T 6300 PC, 2 complete systems, color monitors, 1 dot matrix printer, software, $250 both. Ron, x30881 or 480-6771.

X, K, Ka radar detector, $35. 710-9931.

Peavey CS800 power amp, 400 watts/channel, bi amping capabilities, $450 obo. James, x33571 or 337-5583.

Licensed Microsoft Office standard, version 1995, orig disks, doc, pkg, $100 firm. Andy, x31596.

Peavey Bass amp & head, amp ahs 2 - 15" black window speaker, $700. 440-7963.

Musical Instruments

Story & Clark console piano, ex cond, 13 yrs old, maple color, $1.2k. C. Lam, x37223 or 280-9880.

Clarinet, Selmer B flat, wood, ex cond, $375 obo. Leah, x34544 or 480-8780.

Baldwin Spinet piano, ex cond, $700; Fender M-80 chorus amp, $300. 482-6650.

Snare drum & stand, chrome, ex cond, $75. 488-2283.

Normandy 4 B-flat wood clarinet w/case, ex cond, $425. 334-3941.

Pets & Livestock

Bunnies, adorable, need good homes. Sandra, 326-2557.

AKC Labrador puppies, blacks and yellows, 6 weeks on 9/1, males $200, females $250. Cara, x32144.

Household

Upright freezer piano, ex cond, $700. 482-6650.

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

Med to dark brown full sz bed w/headboard, matching dresser w/mirror, china cabinet, dining room table w/leaves, & 4 chairs, including full sz mattress & box springs, $175 obo. x35711 or 480-4821.

Pastel sofa w/loose back pillows & stainguard, $300; jelly cabinet & microwave cart, pine, $125. 554-5492.

G.E. refrigerator, 2.5 cu ft, w/ice trays, ideal for dorm, ex cond, $75. 488-2283.

Loveseat, ex cond, floral pattern, $200; Zenith 25" TV, wood console, w/remote, $200. Steve, x36725.

Queen sleeper sofa, $250; swivel rocker, $70; coffee table3, $40; black end table, $10; W/D elect, $175. Debbie, 532-1772.

Solid oak desk & credenza, oak dining table w/4 chairs, 26,000 BTU A/C, Tappan oven, qn brass bed, antique dresser. 644-1740 or 998-2313.

Wooden chair, rocker & end table set, $65; wicker rocker w/cushions, $40 obo. 332-9094.

Stained glass bifold doors, 60", $199. Mike, x34710.

Bassett double dresser; 19" color TV; 25" TV; student desk; stereo. 489-1235.

China cabinet, $500 obo. Warren, x34204 or 480-2954.

Loveseat, black/brown/tan patch work, clean, very comfortable, $150. 484-2050.

Chester drawers, child's desk, white, $50. James, x36666 or 487-5730.

SW style multi-colored couch, good cond, $300 obo; wooden coffee table, $40 obo; wooden end table, $35. Robert, x36402 or 286-0434.

Antique framed mirror, 28"x50", $100; pr oriental style table lamps, $40; loveseat, ex cond, $275; sm antique washstand, 29"x29", glass top, 1 dwr, $35; sm mahogany end table, 2 dwr, 15"x21", $20. 488-5564.

Mauve swivel rocker, ex cond, $75. x31057.

Double sz BDR set, metal frame/hdbd, chest, dresser & nite-stand, ex cond, $250; baby crib w/matt, good cond, $50. C. Lam, x37223 or 280-9880.

Wanted

Want personnel to join VPSI vanpool departing Meyerland Park & Ride lot at 7:05 a.m. for JSC, consisting of on-site personnel working 8 a.m. - 4:30 p.m. shift, have 15 members looking for 2-3 more. Pipkins x35346.

Want roommate needed, 4-2.5, house in South Shore. Bill, 716-0644.

Want personnel to join friendly vanpool, departing Southwest Park & Ride lot at 6:50 a.m. for JSC & offsite locations, 7:30 a.m. - 4:30 shift. Susan Gaynor 282-5447 or Ed Rangel, x36124.

Want roommate, non-smoker, to share 4-2 home in Friendswood, cable, W/D, all household privileges, all bills pd, avail mid August, $250/mo. Michael, x38169 or 482-8496.

Want 1 slide projector w/magazines. 482-8045.

Want baby grand piano, prefer Kawai, Yamaha or of equal category. 488-6798.

Want to rent house or townhouse, not over $485/mo, prefer Fuqua Rd. area or Almeda Mall area. 440-7963.

Want good used outboard motor, 10 hp or smaller, good cond. Robert, x36402 or 286-0434.

Miscellaneous

Birdcage, black & gold, 13" x 11" x 23"", rounded top w/rectangular base, removable tray, extras, new $80 sell $30. Bob, x33149.

Ruger M-77, 338 Win mag, 2 boxes of shells, $460 or trade for Sako rifle. Charles, x37678 or 661-4789.

Country music CDs over 100, latest hits, ex cond, $6 ea; gas BBQ grill, $45; Canon T80 SLR camera w/35-70mm lens, $150. Bobby, 244-2444 or 488-4382.

Tropical plants, in permanent pots, lg to sm, various kinds, $5 & up obo; 14' Pony Tail Palm tree, 50 gal pot, unique lg plant, $700 obo. Bob, x33149.

Butcher block table, 70"x34" w/6 chairs, $100; pine coffee table, 44"x20" w/drawer, $35; 5" portable TV/radio, $40; pull golf cart, $10; 18' alum flag pole, sectionalized, $85. 480-6763.

Fisher Price child's table w/4 matching chairs, ex cond, $45. 480-2244.

Sylvania 40" superscreen projection TV, needs repair, $40; 2 Sanyo hi-fi Superbeta CVR's, $40/both; butcher block table, oak, 40"x30", $40; Cannon gun safe, 450lb, $400. Mike, x30993 or 333-1856.

Dog kennel, portable, 10x20, 6' height, galvanized, $295. x30737.

Aquarium, 10 gal w/stand & complete setup, $18; 40 issues of "Muscle" magazines, $3; 50 issues of "Guitar" magazines, $4. 488-0664.

350 Chevy 4 bolt main .030 overbore, std crank, short-long block or running stock cam or mild performance; back glass for '75-'81 Firebird or Camaro; 350 Chevy block .080 over .010-.010 crank; TH400 for Chevy. Bobby, x38823 or 337-4134.

Leers Snug Top for Toyota short bed PU, ex cond, $325. Gil, x31274 or Gene, 481-2599.

Bauer XF4 in-line skates, sz 9, wrist/knee & elbow pads, skate carrier, $115; ladies 26" Saintropez, 5 spd bicycle, side mirror/carrier, wide seat w/gel pad, ex cond, $135. x48821.

Houston Post special color insert, Monday, July 21, '69, first edition after moon landing, good cond, $30. 798-7431 or 667-3438.

Large Igloo dog house, $40; lg dog Pet Porter kennel, $30; Nokia 100 port. telephone, $100. 488-5962.

Sears childs wagon, $17.50; several frames, $6 ea; baby bed, Nod-Away, matt/bumper, $80; baby stroller, $40; Signature briefcase, hard molded, $25; 4 story doll house, completely furn, car in garage, & patio furniture, 26"Wx31.5"H, $100. 488-5564.

Aquarium, 20 gal, $10; 3 person dome tent w/vestibule, $35; 6 person frame tent, $25 obo. 332-9094.

600 plus lbs wts, dumbbells, bench, access, $350; Marvel comics, over street value, $24k sell $4k. 482-6650.

5hp tiller B&S eng, ex cond, $175; Montgomery Ward gas dryer, good cond, $150; 21" ariens self propelled mower, 35hp, B&S eng, elect ignition, $150; Temmsmith metal shear, 16 ga, 3' W, $900 obo; hvy duty 5" swivel vise, $70. 921-7212.

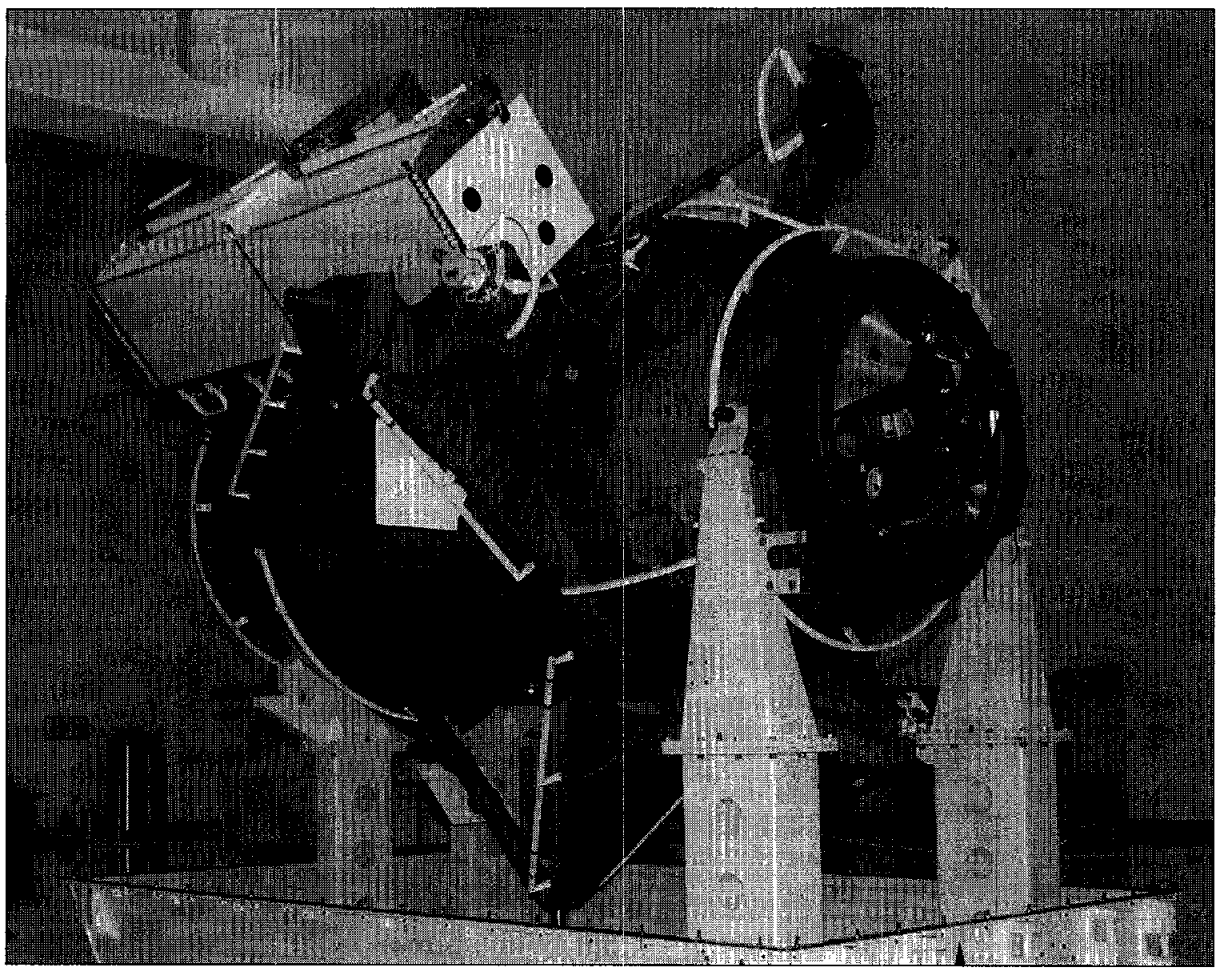
Men's & women's 10 spd bikes, new tires, $75; barstool, $10; Blue Noritake china, 8 settings, $50; lg metal office desk wood grain formica on top, $15. Susan, x30660 or 488-2543.

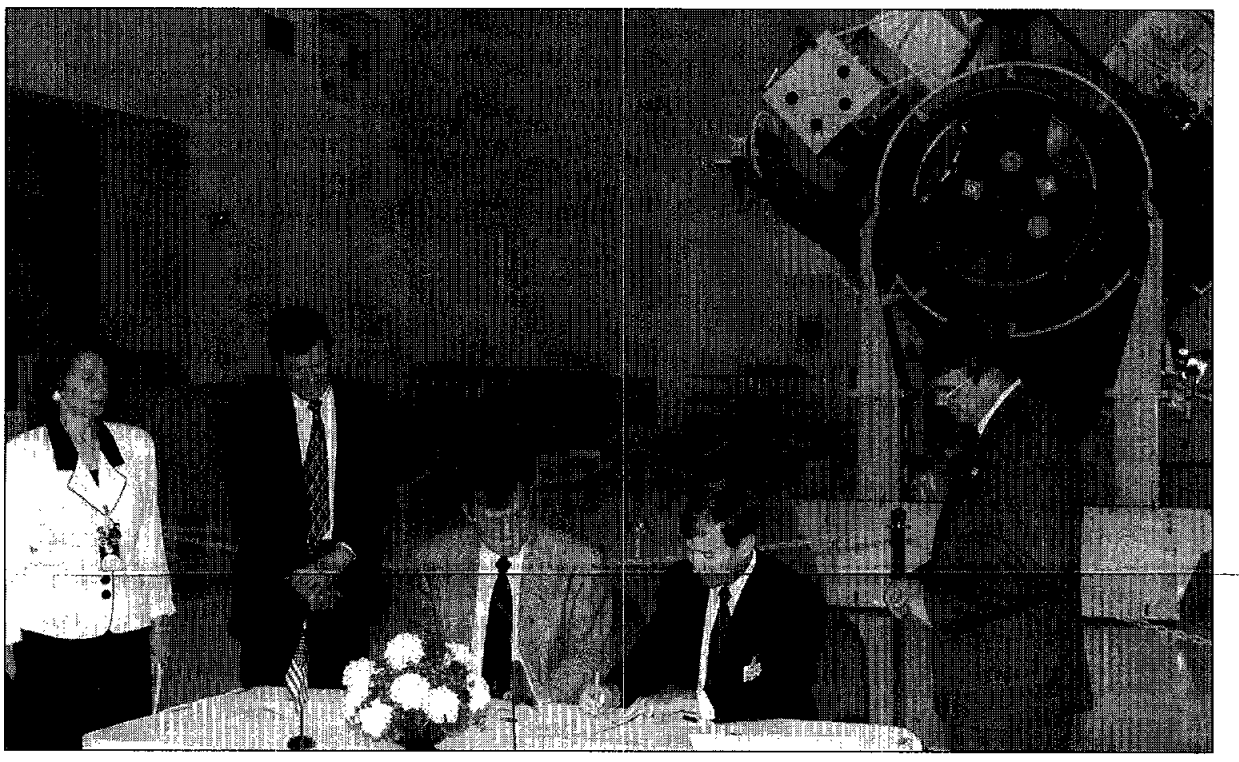
Spalding Proflite golf clubs, 3-PW & 1-3-5 oversized metal woods, $80; Home Gym Image 516, 200 lbs, 4 stations, $450 obo. 474-5221.

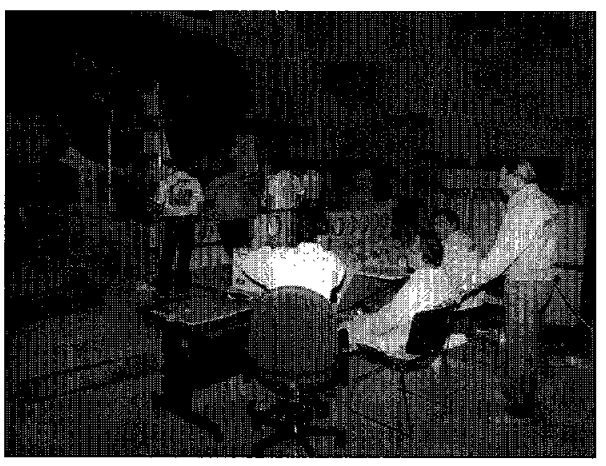
Rowing machine, $25; 2400 modem w/cable & S/W for Mac or PC, $10; fertilizer spreader, $5. 280-9461.

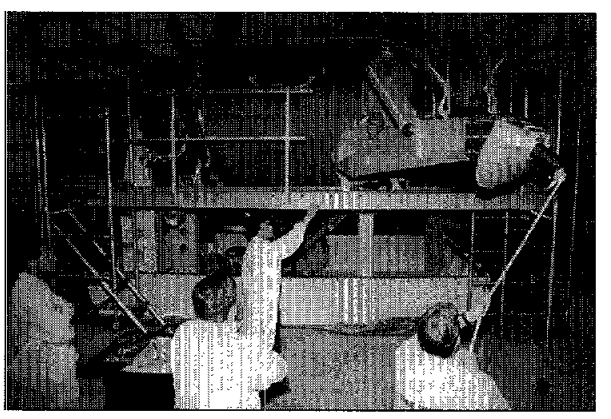
Ping-Pong table & access, $50. Marlynn, 488-5509.

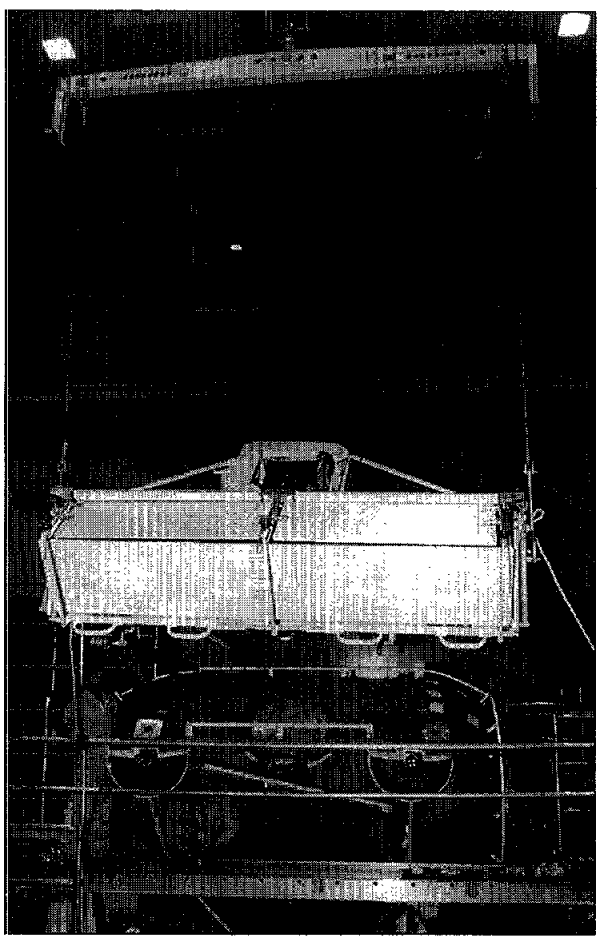
Sears rowing mach, $50; Spirit Stair climber, $300. 328-3840.











Top to Bottom, left to right: The new Russian built docking module rests on a support structure in the Space Station Processing Facility at Kennedy Space Center. From left, a Russian interpreter and John Conway, director of payload operations at KSC look on as Viatcheslav Gavrilov, manager of ground operations for RSC Energia and Frank Culbertson, acting director of the Phase 1 Program sign transfer papers for the docking module with the help of Valeri Grigoriev, right, department manager of the Russian Space Agency. Employees of RSC Energia conduct tests on the module. RSC Energia employees attach trunnions to the docking module so that it can be mounted in the payload bay. The Russians also built the trunnions that will be attached to the docking module. RSC Energia employees attach the solar arrays to the docking module.

Hand-Delivered Hardware

International teamwork delivers hardware to Mir

By Karen Schmidt

Not only are NASA employees working cheaper and faster, they are working with international teams to produce hardware that will take the space station program to new levels.

The STS-74 mission scheduled for launch in October will be the second shuttle docking with the Russian Mir Space Station. *Atlantis*' payload will be a docking module that will be used for the next six shuttle dockings and American-made photovoltaic cells installed in a new solar array that will increase Mir's electrical power capacity and test actual station array configurations.

In 19 months, engineers from both JSC and Russia designed, integrated and built the first pieces of hardware that will allow the U. S. to better utilize Mir and serve as a bridge to building the station itself. While it will only be used during Phase 1, it is an essential piece to bring the station to completion.

"There was a lot of good engineer-to-engineer interaction in this joint effort," said Jim Nise, manager of the Russian Program Office-Phase 1.

Of the two new solar arrays, one has American-made photovoltaic cells designed for the station. The arrays will piggy-back on the docking module and produce additional power to Mir.

"We are bringing a lot of research equipment up to the Mir that will require additional power," Nise said. "Plus we get a long-term view on orbit of how the arrays work. There is only so much information you can get from analysis. This flight testing will give us a chance to fix things before they go into orbit for use on the station."

Tri Nguyen of the Vehicle Office and Mike Skor of Lewis Research Center worked together to develop the photovoltaic cells that generate power. They were required to develop a cell that would fit into Russian hardware and complete vibration, illumination and deployment testing.

The arrays will be attached to the Kvant-1 module in space walks set to begin after STS-74.

The cooperation didn't end with solar arrays. A new docking module will accompany the arrays to become part of Mir.

During initial negotiations, designers recognized the need for a docking module that would allow shuttles room to maneuver among Mir's expansive solar arrays. Prior to STS-71, Russian cosmonauts performed several space walks to move the Krystall module to another position so the orbiter could dock. This required use of a robotic arm that has a limited service life. To continue docking missions, a new docking module was developed to provide the shuttle with a conflict-free area to dock.

Talks began in October of 1993. Within a month, a contract was agreed upon for the Russians to build the docking module.

In February 1994, RSC Energia's Igor Efremov, program manager for the docking module, and his colleagues met with project engineer Don Noah, other JSC engineers and Sue Sheffield of Rockwell. By June 1994 an agreement was signed. Cargo Engineering Manager Larry Bell and George Sandars, co-chairman of the joint operations and integration working group were key players in the development of requirements for the module.

Noah said shuttle integration teams had their work cut out for them. They had to develop requirements for the mechanical and electrical interfaces between the orbiter and the module. Jimmie Gibbons along with Larry Lee and Bill Speier of Rockwell worked with their Russian counterparts to develop the interfaces that would provide power, control and monitoring from *Atlantis*.

NASA also took the opportunity to place new equipment on the docking module that can be used for future missions. The new space vision system consists of targets mounted on the module and solar arrays, and a software program designed by Iain Christie of the Canadian Space Agency that can pinpoint a location using those targets.

"A lot of negotiations went into where the panels would be located. The cooperation was exceptional," Noah said.

Throughout the process, Contracting Officer Frank Goldston of the Business Management Office and Contracting Officer Technical Representative Tom Cremins of the Russian Program Office kept contract requirements in-line and produced modifications.

"I don't think anyone worked harder than Gary Johnson's safety, reliability and quality assurance team," Noah said. "They were there every step of the way verifying each component of the docking module was safe to fly."

Noah attributes the success of the preparations to the cooperation within his own office as well as within other directorates. Within the space shuttle program, Noah received assistance from Greg Lange who is the project manager for docking targets; Rick Miller the thermal testing lead; Ray Nieder for structural verification review process, and Roy Hatch for the space vision system.

A host of Engineering Directorate experts contributed to the project as well. John McManamen and Tim Briscoe performed analysis on installing the docking module to the orbiter docking system; Glen Ecord laid out a fracture control plan; John Kennedy assisted in the design and production of the docking targets; Karen Edelstien certified the hatch window; Bill Renegar reviewed stress analysis; Ray Serna designed the thermal blankets; Nancy Tengler working with Structural Dynamics Research Corp. and Steve Yahata of Rockwell developed a math model for structural loads; Hank Rotter worked with Mike Fullerton of Rockwell to produce requirements for the cooling system and atmosphere control; Joseph Prather and Irv Emanuel determined the location for the Trajectory Control System reflectors and Bernie Embrey and Wendall Rowan developed the requirements for the color television cameras.

Just shipping the hardware to the U.S. required a team from JSC and the technical liaison office in Russia. Bill Clark and John Chessler of the Support Operations Division arranged entry for the hardware through customs. Dave Lengyel of the Russian program office facilitated the shipment, and Rita Svarcas, Jim Schornick and Joe Christen of the technical liaison office in Moscow inspected the hardware prior to shipment.

"This international teamwork made it possible to produce products in a very short time frame," Nise said. "They did an outstanding job, working cheaper, faster and better." ❑

NASA scientific balloons carry first student payloads

College students from Virginia and Pennsylvania last week, realized their dream of flying scientific experiments to the edge of space on scientific balloons.

The first of two NASA scientific balloon missions carrying payloads designed and built by college students through the NASA Student Launch Program were conducted Aug. 23 from the Goddard Space Flight Center's Wallops Flight Facility.

The first balloon, launched at 1:26 p.m. JSC time, Aug. 23, carried an upper atmospheric research payload for three participating universities in the Virginia Space Grant Consortium—Old Dominion University, Norfolk, Hampton University, Hampton and the College of William and Mary, Williamsburg. The 95-pound payload included a water-vapor density surveyor and an atmospheric sampling experiment.

The astronomy payload from the University of Pennsylvania, Philadelphia, was launched at 6:05 p.m. The 150-pound payload was developed to image star fields.

Both payloads flew on a 197,000 cubic-foot balloon. The Virginia payload reached an altitude of 96,500 feet and the Pennsylvania payload flew to an altitude of 90,800 feet.

At launch, the flight system, which includes a helium-filled balloon, the payload and a parachute, was approximately 200-feet long for the Virginia mission and 300-feet long for the Pennsylvania. After their ascent and flight, the payload and balloon began their descent for recovery.

The Virginia payload was recovered in good condition on Virginia's eastern shore about 10 miles southwest of the Wallops Flight Facility. The Pennsylvania payload landed in eastern Virginia near the Rappahannock River, east of Adler.

The purpose of the NASA Student Launch Program, initiated in December 1993, is to provide undergraduate students with an opportunity to gain experience in all aspects of suborbital missions including planning, management, design, fabrication, payload testing, qualification and field operations associated with experiments for spaceflight.

The program provides students with the opportunity to participate in carrying out spaceflight experiments, increasing their awareness of the complex nature of such activities and stimulating continued interest in pursuing careers in engineering and science.

Through the Wallops Flight Facility, NASA provides the balloons, technical consultation and launch services. The participating institutions are responsible for funding the payload hardware and related activities. In addition, the universities receive technical assistance from industry and other NASA centers.

The suborbital program offers students an opportunity to see projects through from inception to launch in a relatively short time. Two sounding rocket missions under this program are scheduled for 1996. They will carry experiments for the Colorado Space Grant Consortium and the University of Cincinnati.

The Student Launch Program is sponsored by the Office of Space Science, the Office of Human Resources and Education, and the Office of Equal Opportunity Programs at NASA Headquarters.

JSCV Photo by Benny Benevides

A LOT OF HOT AIR—Competitors prepare in the early morning hours to fly their balloons during competition. Points were earned during the weekend to determine a winner. In other competition balloonists floated across a target to pluck a key. The balloonist with the correct key drove home with the brand-new pickup.

Columbia rolls out to launch pad

(Continued from Page 1)

improvements made to their spacesuits and will test tools and techniques which may be used in the construction of the International Space Station.

One of the major activities will involve the evaluation of small tools and connectors on a task board mounted on the starboard side of the payload bay. Two similar, but even more intricate space walks, will be conducted on the STS-72 mission at the end of the year.

Meanwhile, *Columbia* rolled out to Launch Pad 39B on Tuesday and work on the solid rocket motor nozzle joints began Wednesday. *Columbia* is scheduled to launch on STS-73 Sept. 26. The USML-2 mission, a 16-day dual-shift flight, will feature around-the-clock work by the astronauts conducting a score of microgravity experiments.

Atlantis is undergoing routine maintenance in the Orbiter Processing Facility. The docking module that will be used during STS-74 will be installed in *Atlantis*' payload bay next week. Launch is scheduled for late October or early November.

Discovery in is its final preparations for its ferry flight to Palmdale, Calif. The orbiter will undergo nine months of modifications including installation of an external airlock that will be used in the assembly of the space station. *Discovery* will receive a fifth tank for holding liquid hydrogen and oxygen to enable the orbiter to extend its mission duration.

Transition to be carefully planned, controlled

(Continued from Page 1)

detailed assessment of the required transition to move tasks and activities to the contract."

Littles gave an estimated time frame for action to convert the operations over to the prime contractor. Currently under way are redesigns that have canceled and added some requirements to the program. This is expected to take about one year during which NASA will begin to establish tasks and a transition plan. This will lead to contract requirements and selection. Once a contractor is selected it will take about three years to transfer all activities. By the end of five years, the contractor will have full responsibility for sapce shuttle operations.

September is cholesterol month

September is blood cholesterol month at the JSC clinic.

Employees can have their cholesterol level checked during the weeks of Sept. 11 and 18. Individuals who have increased risk factors may want to take this opportunity to have their cholesterol checked. High risk factors include people who have high blood pressure, smoke cigarettes, a family history of heart disease, vascular disease and obesity.

total health

The clinic invites anyone who has not had their cholesterol level checked within the last year to come in during these two weeks. Employees may call the clinic to schedule a time for testing at 34111.

Open house videos to air

Beginning Sept. 11 and running through the week, employees may view a "Brown Bag Lunch Video" at 11:30 a. m. every day.

The videos will air on channel 23 on the JSC Television Distribution System and feature presentations from the JSC Open House that were videotaped in Teague Auditorium.

Monday's topic will be "Hubble Telescope Repair Mission" with astronaut Story Musgrave. Tuesday will feature former astronauts Gene Cernan and Walt Cunningham discussing "Space History Lesson." On Wednesday "Space Shuttle-Mir Rendezvous" with astronauts Robert "Hoot" Gibson and Norm Thagard will be aired. Space Station Program Manager Randy Brinkley and John Connolly of the Earth Science and Solar System Exploration will discuss "Space Station and The Future" on Thursday. On Friday an "Apollo 13 Retrospective-The Real Stuff" with former flight controllers Eugene Kranz, Gerry Griffin, Jerry Bostick and John Aaron will be shown.

Potatoes, wheat to generate oxygen for next experiment

(Continued from Page 1)

"We have been supplying this kind of information since we first began growing crops at KSC in 1987," Knott said. "Some of our data was used in preparing a recent JSC experiment where a British chemist was supplied with all of his oxygen and carbon dioxide removal requirements in a sealed chamber for 15 days by a crop of 30,000 wheat plants."

Because of the success KSC has had with potatoes, this crop will make up 75 percent of the food for the next bioregenerative life support system experiment, Stutte said. Wheat will make up the remaining 25 percent of the crop during the two-year study that will begin in January 1996.

"We feel that a mixed crop is needed to optimize system production," Stutte said. "Potatoes provide the highest yield, but wheat is more tolerant to longer light cycles that might be used in the chamber."

The planned longer studies also will provide more data on the ability of the bioregenerative life support systems to operate over an expected three-year mission to Mars.

"We feel that we can keep this system going indefinitely," Knott summed up. "There is no reason to believe we can't."

Ames dedicates newly refurbished wind tunnel

Ames Research Center dedicated the newly renovated 12-foot Pressure Wind Tunnel last Wednesday.

Built in 1946, the wind tunnel has tested models of most U.S. commercial aircraft in service over the past half century, including the Boeing 737, 757 and 767; Lockheed L-1011; and McDonnell Douglas DC-9 and DC-10. The new wind tunnel was restored at a cost of $115 million to replace the original which gradually suffered deterioration of its pressure shell due to extensive use. By 1986, cracks in the tunnel walls had eliminated its pressurization capability.

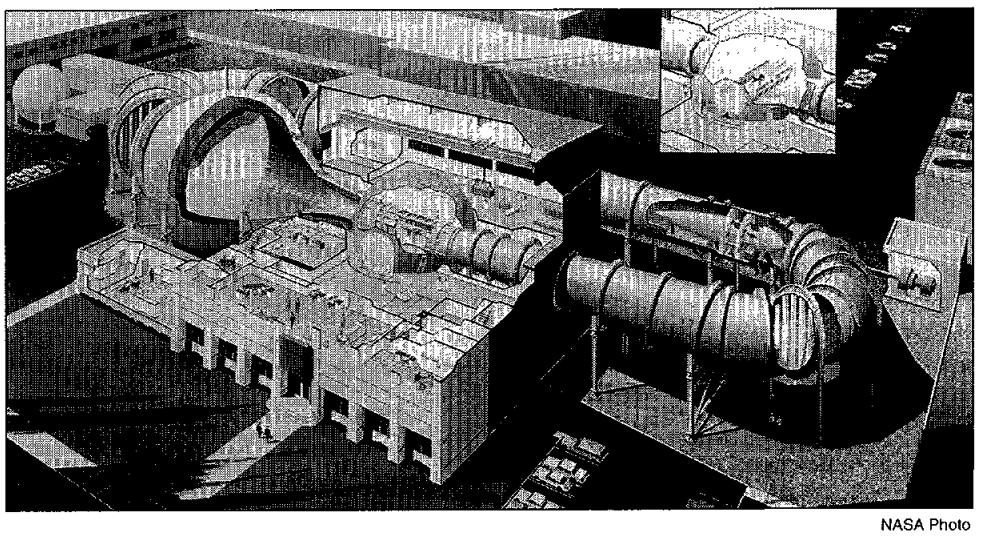
"The shell's structural steel began to exhibit serious fatigue after 41 years of service," said project manager Harry Gobler. "Essentially, it just wore out."

Restoration began in 1990 and was completed in November 1994. The project included the complete rebuilding of the closed-loop pressure vessel and installation of an innovative air lock system around the test section. The new air lock system allows access to the test section without depressurizing the entire tunnel, thereby significantly increasing its productivity.

"This has been one of Ames' workhorse wind tunnels," Gobler said. "There's no other facility in the country that duplicates the testing it does. No other tunnel has such excellent air flow quality."

The new tunnel measures about 300 feet long and about 100 feet wide, with the diameter ranging from the 12-foot test section to a maximum of 68 feet in the settling chamber.

Powered by a 15,000-horsepower synchronous electric motor, the tunnel is designed to test aircraft models at airspeeds up to Mach 0.61 (Mach 1 equals 760 mph, the speed of sound at sea level).



NASA Photo

Cutaway shows the test section of the newly-refurbished 12-Foot Pressure Wind Tunnel located at NASA Ames Research Center in Mountain View, Calif. The $115 million restoration was completed in the fall of 1994. The refurbished tunnel replaces the original 12-foot tunnel built in 1946 which gradually suffered a deterioration of its pressure shell due to its extensive use. The original wind tunnel had tested models of virtually every commercial aircraft in service over the past half century. Following a year of tests of its mechanical, automated controls and data acquisition systems, the refurbished wind tunnel began normal operations in September.