NASA
Lyndon B. Johnson Space Center

Space News Roundup

Vol. 26 No. 22 November 6, 1987 National Aeronautics and Space Administration

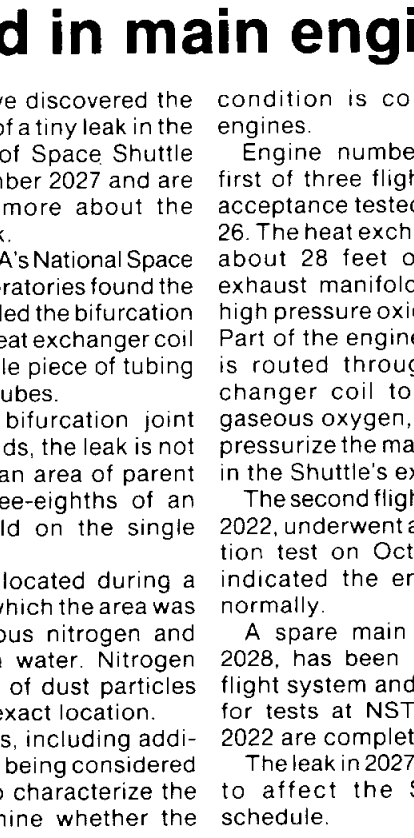
JSC Photo by Benny Benavides

NASA Deputy Administrator Dale Myers shakes hands with Glynn Lunney, executive vice president of Rockwell International's Space Station Systems Division, during the recent NASA/Contractors Conference on Quality and Productivity. Clockwise from left are Myers, JSC Director Aaron Cohen, George Rodney, associate administrator for the Office of Safety, Reliability, Maintainability and Quality Assurance, and Lunney.

Focus on five goals

Strategic planning establishes course to JSC's future

Director Aaron Cohen has approved JSC's new "Strategic Game Plan: Charting a Course to the Year 2000 and Beyond," and asked employees to react to the enunciated goals with energy and feedback.



The 35-page report, the culmination of a year of effort by more than 200 employees guided by senior staff, is designed to focus the center's efforts on five goals:

- Provide, maintain, and operate a safe, reliable, and effective National Space Transportation System (NSTS);
- Define, develop, and operate the Space Station system and capabilities necessary to achieve a permanent manned presence in space;
- Develop the critical technologies and capabilities necessary for the conception, design, development, and operation of systems for space transportation and exploration;
- Ensure the highest quality of personnel and support systems so that JSC can accomplish its responsibilities with excellence. Provide an environment that (1) promotes technical excellence, leadership, initiative, and creativity and (2) facilitates development and retention of a high-quality, conscientious, and dedicated work force; and
- Enhance relationships with external constituents so that JSC can effectively carry out its mission responsibilities.

Each goal, established within the context of the overall NASA strategic

(Continued on page 2)

Team performance key to success

'We have to do it right,' Myers tells contractors

The American space program's success ultimately will depend on the performance of the NASA/contractor team, Deputy Administrator Dale Myers told more than 450 people gathered at JSC on Oct. 27 and 28 for the fourth annual NASA/Contractors Conference.

"That means specifically grasping and retaining the vital competitive edge," Myers said in his keynote address. "It means excellence across the board in contractor operations, the enhancement of product and service quality, and steady improvement in productivity to assure that the nation gets the most for every tax dollar allocated to the space program and aeronautics."

"Manned space flight to me is the crucible, the ultimate test of all the things that bring out the best in excellence and productivity," he continued. "We have to do it right. The lives of the astronauts depend on it. And we have to improve productivity because the public depends on it."

JSC Director Aaron Cohen welcomed participants from across the country to the NASA-wide conference hosted by JSC with the help of the JSC Contractor Team Excellence Forum.

Cohen said the space program cannot rely on technical breakthroughs, but should work diligently to improve its management to meet quality and productivity challenges. The reason, he said, is that new projects envision sustained operations that are building blocks for a space infrastructure that must span decades.

"If we are to continue our achievements in space at the same rate as we have in the past we must significantly improve the way we design, develop and operate new programs," Cohen said.

(Continued on page 2)

JSC Photo by Bob Walck & Mark Sowa

Tiny heat exchanger leak located in main engine

Test crews have discovered the precise location of a tiny leak in the heat exchanger of Space Shuttle main engine number 2027 and are trying to learn more about the nature of the leak.

Officials at NASA's National Space Technology Laboratories found the leak in an area called the bifurcation joint, where the heat exchanger coil splits from a single piece of tubing into two smaller tubes.

Although the bifurcation joint contains four welds, the leak is not in a weld but in an area of parent metal about three-eighths of an inch from a weld on the single piece of tubing.

The leak was located during a "bubble test" in which the area was filled with gaseous nitrogen and surrounded with water. Nitrogen bubbles the size of dust particles pointed out the exact location.

Several options, including additional testing, are being considered as officials try to characterize the leak and determine whether the condition is common to other engines.

Engine number 2027 was the first of three flight engines being acceptance tested for use on STS-26. The heat exchanger consists of about 28 feet of tubing in the exhaust manifold of the engine's high pressure oxidizer turbopump. Part of the engine's liquid oxygen is routed through the heat exchanger coil to convert it into gaseous oxygen, which is used to pressurize the main oxygen supply in the Shuttle's external tank.

The second flight engine, number 2022, underwent a 1.5-second ignition test on Oct. 29. Initial data indicated the engine performed normally.

A spare main engine, number 2028, has been brought into the flight system and is being readied for tests at NSTL once tests on 2022 are complete.

The leak in 2027 was not expected to affect the STS-26 launch schedule.

Start-training date big milestone on recovery road

The week of Oct. 26 marked the official start-training date for the crew of STS-26 as it continued working toward a June 1988 return to flight.

Commander Rick Hauck, Pilot Dick Covey and Mission Specialists Dave Hilmers, Mike Lounge and Pinky Nelson celebrated with increased time in the Shuttle Mission Simulator (SMS) and a party hosted by their SMS training team.

STS-26 Training Manager Mark Adams said the start-training date means there are only 18 weeks of flight-specific lessons to go. Adams is responsible for planning and integrating the many Mission Operations Directorate Training Division requirements and activities for STS-26. He coordinates those with the crew, section chiefs and training supervisors.

"I'm an optimist and you see the launch coming up and you don't want it to slip," said Adams, who worked the SMS navigation (NAV) console on STS 51-I and 51-L. "We haven't got much time to go before the launch and every week it seems to get closer and closer and go by faster and faster. The start-training date is quite a milestone."

Among other upcoming milestones are the next software load for SMS training due Nov. 12, and the flight-specific SMS software load due March 1, 1988.

Time in the SMS already has been increased from four to eight hours a week, Adams said, and that will be augmented by integrated simulations. STS-26 dedicated integrated sims begin the week of March 21, and a 40-hour joint integrated sim is scheduled for May 9, three weeks before launch.

The crew will steadily increase its number of Shuttle Training Aircraft (STA) flights as the launch date nears, eventually flying at least one a week.

Add to that additional briefings on the primary payload and more training on secondary payloads, and the crew's time gets "pretty full," Adams said.

Space News Briefs

Aircraft, balloons study supernova

NASA's C-141 Kuiper Airborne Observatory left Oct. 31 for Christchurch, New Zealand, for a month-long mission to study the brilliant supernova, SN1987a. It is 170,000 light years away, and is the closest supernova to Earth discovered since the invention of the telescope nearly 400 years ago. Four teams of scientists aboard the Kuiper will make eight flights to study the supernova between Nov. 4 and 24. The first of four balloon-borne investigations was launched from Alice Springs, Australia. The balloon carries a 1,500-pound instrument package that may detect the first gamma ray line emissions from the supernova.

Comet penetrator prototype tests successful

The prototype of a comet penetrator probe, an integral part of NASA's Comet Rendezvous Asteroid Flyby (CRAF) mission, has been tested successfully at the Sandia National Laboratory, Albuquerque, N.M. The penetrator-lander is a full-scale aluminum prototype of the planned 5-foot-long titanium probe designed to penetrate rock-hard ice to a depth of three feet or more.

Castor-IVA rocket failure cause found

Scale model tests conducted by Morton Thiokol have successfully duplicated a Castor-IVA solid rocket motor failure that occurred Aug. 25, according to Goddard Space Flight Center officials. The motor is being developed to increase the lift capability of the Delta expendable launch vehicle. The failure was caused by staple holes left in a thin membrane of insulation known as a "stress relief flap" between the main propellant and the front end of the motor. Program engineers have developed new procedures that preclude the use of staples.

Small business research proposals selected

NASA has announced selection of 206 research proposals for immediate phase I award negotiations in the 1987 Small Business Innovation Research Program (SBIR). Included are 169 small, high technology firms in 29 states. SBIR objectives are to stimulate technological innovation in the private sector, strengthen the role of small business participation in federal research and development programs, and to contribute to the growth and strength of the U.S. private sector. The awards were selected competitively on the basis of scientific and technical merit and value to NASA.

Three firms chosen to work on aero-space plane

NASA and the Department of Defense have selected three firms to continue the vehicle technology development portion of the National Aero-Space Plane (NASP) program. Awarded 36-month, fixed-price contracts valued at $25.5 million each were General Dynamics Corp., Fort Worth Division; McDonnell Douglas Corp., McDonnell Aircraft Co., St. Louis; and Rockwell International Corp., North American Aircraft Operations, Los Angeles. The selection marks the end of the 18-month conceptual design portion of the NASP program, and the beginning of ground testing of large-scale engines and selected aircraft components.

Bulletin Board

Health insurance open season begins Nov. 9

The Office of Personnel Management has announced open season for the Federal Employees Health Benefits Program will be from Nov. 9 to Dec. 11. To assist employees in making open season changes, the Human Resources Office is sponsoring a Health Fair from 9 a.m. to 2 p.m. Wednesday, Nov. 18, at the Gilruth Recreation Center ballroom. For more information, contact the Administrative Support Group, x32681.

Employee Activity Association nominees sought

Nominations will be accepted for Employee Activity Association (EAA) district representatives and alternates until Nov. 16. Current terms expire at the end of the year. Completed nomination forms should be sent to Ginger Gibson, JJ4. Anyone submitting a nomination will be eligible for a $100 drawing to go toward a district party. The drawing will take place at the EAA General Assembly Meeting at 1:30 p.m. Nov. 17 in Rm. 206 of the Gilruth Recreation Center. For more information, call Susan Starkweather, x36608.

'SPACE' conference set for Nov. 17-20

"SPACE: Technology, Commerce & Communications," a major international business forum for aerospace, will be conducted at the George R. Brown Convention Center in Houston on Nov. 17 through 20. Registration rates vary from $450 for the full four-day conference to $25 for exhibits admission only. For more information, call T.F. Associates, Boston, 617-292-6480.

Flight crews sponsor Fajita Fiesta on Nov. 13

The fifth annual Fajita Fiesta sponsored by the Flight Crew Operations Directorate will be from 4 p.m. to midnight, Friday, Nov. 13, at Ellington Field's Hangar 990. Music will be provided by Max-Q featuring Brewster Shaw, Pinky Nelson, Hoot Gibson and Jim Wetherbee. Food and beverages will be provided, and tickets are $5. Children under 18 will not be admitted.

Lighthearted aviation history review slated

"Wrights and Wrongs of Aviation History," a lighthearted review, will be presented by Dr. John J. Bertin of the University of Texas at Austin at 7:30 p.m. Wednesday, Nov. 18, at the Gilruth Recreation Center. Social hour begins at 5:30 p.m., dinner at 6:30 p.m. Dinner is $8 for members or $10 for others, but the program is free. Dinner reservations should be made by noon Nov. 13 by calling Judy at 282-4552 or Sandy at 845-0735.

Manned space program history discussed

"Manned Space Program History and the Planner" is the topic of the AIAA Houston Chapter Management Technical Committee's next Munch and Manage session. Dennis Webb of the Mission Operations Directorate will speak from 11:30 a.m. to 12:30 p.m. Nov. 17 in the Bldg. 3 cafeteria.

Officers Wives Club to meet Nov. 17

The Bay Area Military Officers Wives Club will meet at 11 a.m. Nov. 17 in the Gilruth Recreation Center. Gayles Boutique will present a fashion show. For more information, call Lucy Saum, 996-9340.

Macintosh Engineering Expo coming up

The NASA Area Macintosh Users (NAMU) is sponsoring a Macintosh Engineering Exposition on Nov. 10 and 11 at the Nassau Bay Hilton on NASA Road 1. The exposition will be open from 11 a.m. to 8 p.m.; admission is $2. For more information, call Rocky Forshey at 481-5600.

Next BAPCO meeting will be Nov. 17

The next meeting of the Bay Area PC Organization (BAPCO) will be at 7:30 p.m. Nov. 17 at the Holiday Inn on NASA Road 1. The group is open to anyone with an interest in microcomputers. For more information, call Earl Rubenstein, x34807, or Jack Calvin, 326-2983.

Houston RCA wins science payloads contract

JSC has signed a cost-plus-award fee contract with RCA Government Services of Houston, a subsidiary of General Electric, for science payloads development, engineering and operations.

The initial 3-year contract started November 1, and has an estimated value of $45,923,000. An optional 2-year extension (November 1, 1990 to October 31, 1992) has an estimated value of $33,784,000, for a combined 5-year value of $79,707,000.

Space Shuttle and Space Station scientific payloads engineering, integration, hardware acquisition and operations support are covered by the contract.

Other bidders were Boeing Aerospace Operations, Lockheed Engineering and Management Services Company, Inc., Northrop Services, Inc., and Systems Management and Engineering Corporation, all of Houston; and Grumman Technical Services, Inc., Titusville, Florida.

Auction generates friendly support, funds

JSC co-workers showed their support for flight controller Dave Herbek by raising about $5,000 at an Oct. 16 auction at the Gilruth Recreation Center.

Herbek, who was cleared earlier this year of bank robbery charges, incurred more than $40,000 in legal fees in the process. The auction was sponsored by the Dave Herbek Defense Fund Committee, a group of co-workers in the Environmental Systems Section.

The vest worn by Mission Operations Director Gene Kranz during the Apollo 11 mission drew the highest bid of $1,700. The vest was ceremoniously returned to Kranz immediately after it was sold.

The auction proceeds bring the total amount in the JSC Credit Union Herbek Fund to almost $9,500. The fund is expected to remain open through the holidays.

Members of the Defense Fund Committee expressed their thanks to all who participated in the auction and to the many others who have contributed to the fund.

JSC Photo

Graduates are, from left: Adrienne Powell, Bridgette Reed, Zena Perryman, Kaye Stevens, Shelia Guidry, Lisa Guidry, Kay McDaniel, Richard Guillot, Carolyn Johnson and Merrell McDaniel.

Worker-trainees graduate with high marks

Ten graduates of the 14th Worker-Trainee Opportunity (WTO) Program were recognized at a recent ceremony marking the end of a year-long course of study.

The graduates included Adrienne Powell, Bridgette Reed, Zena Perryman, Kaye Stevens, Shelia Guidry, Lisa Guidry, Kay McDaniel, Richard Guillot, Carolyn Johnson and Merrell McDaniel.

The program is designed to give low-skilled clerical employees the opportunity to become productive clerk typists through classroom and on-the-job training.

Instruction is divided into two areas, work station and classroom.

On-the-job work station training includes all facets of secretarial development, including telephone answering, time and attendance procedures, travel procedures, typing and records management.

Classroom instruction helps the trainees add and enhance other skills needed to compete in today's clerical workforce.

Strategic plan charts course to JSC future

(Continued from page 1)

planning process, is accompanied by a group of specific objectives designed to help achieve that goal.

Separate sections examine JSC's potential roles in developing technologies and systems associated with exploration programs, orbital vehicles, and launch vehicles; enhancing JSC's technologies and capabilities; and the responsibilities of project offices, directorates, center staff offices, divisions and individual employees.

"This plan is a living document that is designed to help us focus on the future as we see it today," Cohen states in his Director's Message. "As this plan evolves, we want it to be more valuable to the Center and more meaningful to you, the Center's greatest resource."

Cohen states that the planning process made him aware that it is critically important for JSC to begin now to influence its future in a complex, changing environment by shaping alternative programs and carefully choosing the technical capabilities that will be at the heart of NASA's manned space efforts.

JSC must succeed in achieving multiple goals at the same time, and to do that its employees must discover new work methods that will improve the center's effectiveness and harness their own individual energy, commitment and involvement, he explains.

In preparing the plan, the JSC Strategic Planning Team sought to answer questions such as: "What is the current state of JSC?" "Where will the space business be by the year 2000?" "What should JSC be doing in the year 2000?" and "What critical factors must be considered so that our vision of the future can be realized?"

The plan ends with a scenario of how a JSC employee's day might begin on Thursday, June 1, 2000.

All civil servants should have received a personal copy of the plan, and copies will be distributed to contractors within the next two weeks. Employees who have not received a copy but would like to should call the Management Analysis Office, x34221.

Employees who have feedback on the strategic plan should discuss items involving their area of responsibility with their supervisors, and employees with other comments should address them in writing to Les Sullivan, BY.

Beggs encourages management quality

(Continued from page 1)

Former NASA Administrator James Beggs said in his conference banquet speech that the space program is not alone in its need to improve quality and productivity. America as a whole has let the quality of its work and products decline over the past decade until those products are no longer considered the best in the world.

He said American managers have put the responsibility for quality in the hands of inspectors instead of in the hands of the workers and managers who should be concerned.

"We still do not have our hands around this problem," he said. "I would ask all of you now, do you really know the cost in your company, your division or your organization of poor quality? I would suggest that none of us do."

Beggs said Americans cannot wish themselves back into space.

"As we all know, it takes very hard work and dedication to do the job that needs to be done," he said. "We can do it. We will fly again next June. And then I predict that we will fly increasingly often. The projections we have made I think are very conservative and we will better them."

Myers had ended his remarks on a similar note of optimism that encompassed the entire space program.

"Don't let anybody tell you that we don't know where we're going in space," Myers concluded. "We have a very clear vision of what we can do and how to do it. We've been on a course for a long time that will put us in a position to shoot for any one of a number of major new goals.

"When the national policy and the national budget say 'Go,' we'll be ready."

HIGH ALTITUDE HYGIENE

Shower test subject Paige Lucas, a JSC co-op, uses a vacuum hose to remove water from her skin as Rafael Garcia and Bob Williams (foreground) monitor her progress in the zero-g simulating KC-135 airplane.

JSC Photo by Jack Jacob

Space Station shower gets most from every drop

By Billie Deason

Something most of us take for granted—a daily shower—will be readily available to Space Station astronauts as a result of engineering research completed recently at JSC.

Rafael Garcia of JSC's Man-Systems Division has been developing hardware for a Space Station zero-g shower since 1985. Garcia spent three months collecting early shower technology data from Langley Research Center and Marshall Space Flight Center. Most of the Skylab shower hardware from the mid-1970s was retrieved from the Smithsonian Institution and returned to JSC for study.

Skylab missions were the first real opportunity for engineers and astronauts to try out personal hygiene hardware and procedures more like those used on Earth. The Skylab shower worked well, but sponge baths were the mainstay for personal hygiene on those missions. Skylab IV commander Jerry Carr said, "We could have a shower once every 10 days limited to 3 liters of water. Even though the entire procedure took about 45 minutes, it was worth it. It was really nice to get all sloshed up with water." Space Shuttle crews must make do with sponge baths for their short-duration missions. Space Station crew members may take a shower every other day.

Space Station planners are working to provide the most comfortable, home-like accommodations possible for the crew. Yet all the creature comforts must operate simply and use a minimum of consumable resources. The prototype shower design stressed anthropometric measurements, limited space on the Station, and the need to recycle water as primary considerations.

The first tests of the prototype shower hardware were conducted in 1986. Laboratory testing was accomplished in an opaque fiberglass shower enclosure. Technical Services Division built the plexiglas model of the shower for use in KC-135 tests. The plexiglas version allowed photographers to document both the hardware in use and the test subjects as they showered. Garcia developed procedures and a testing program, test subjects were recruited, then data and comments were accumulated.

"The best comments I received were from female, non-technical test subjects," Garcia said. The first vacuum nozzle that Garcia himself designed worked poorly during early tests. One of the female test subjects offered a suggestion "that sounded like it couldn't possibly work from an engineering viewpoint," said Garcia. Co-op student Cheryl Jakub, then a third-year mechanical engineering student at Purdue, designed the nozzle exactly as suggested. "It worked great and we're still using that design," Garcia said.

Once inside the shower enclosure, the test subject adjusts circulating air temperature and water temperature. The subject washes one part of the body at a time. A spray nozzle with a squeeze lever on the side directs water onto a wash cloth or directly onto the body. After lathering, the subject vacuums both soap and water from the skin, then uses the wet wash cloth to rinse. Shampooing the hair follows the same basic steps. When the shower is complete, the subject vacuums the sides and bottom of the shower enclosure, then dries the interior with a towel.

The mixture of water and air vacuumed from the body and from the shower enclosure is moved in a circular motion into the cylinder of a vortex separator. The circular motion creates centrifugal force that pushes water to the outside of the cylinder, leaving air in the middle. Water is drawn down into the cone of the separator by static pressure and a pump. Air is removed from the cylinder through the top using suction from a blower and is circulated back into the shower enclosure.

Soap used on Shuttle flights was found to produce too little lather. During early shower tests, subjects used several times the amount of soap needed for cleaning. Excess soap was difficult to rinse from the body, left skin sticky and overloaded the shower separator system. Paste and liquid soap products evolved as the final candidates of a development contract with Economics Laboratory of Minneapolis-St. Paul and were evaluated during another seven-week test. Products being considered for use contain only three or four ingredients compared with 17 or 18 in most commercial bath soaps and shampoos. Candidate products rinse from the skin and hair more easily and clean more efficiently. Since water in the Space Station will be recycled, fewer chemicals put into it will simplify the recycling process.

Subjects who participated in the test program were briefed on the use of equipment and showering procedures. All subjects shampooed their hair and females also shaved their legs and underarms as part of the test. From data on more than 500 showers, the average water usage is .83 gallons per shower.

Data consistently reveal the same results in all tests: females use less water, more soap and less time in the shower; males use more water, less soap and more time.

JSC's Crew and Thermal Systems Division personnel are working on water reclamation technology for Space Station, and assisted Garcia's project by recycling used shower water. In 10-week tests using water recycled up to four times, shower test subjects could not detect any difference in the water.

"It was a real learning process for me about how water reclamation works," Garcia said. Five different systems of reclamation are being evaluated for Space Station. Reverse osmosis and multifiltration processes were used for the shower water tests.

Microbiologist Duane Pierson and Dick Sauer of the Medical Sciences Division developed disinfection techniques for the shower. Biomedical Laboratories Branch personnel also collected data on microbial and biofilm contamination in the shower enclosure and plumbing.

"The entire project depended on the support of other divisions and centers. Cooperation was excellent. Everyone worked well together to meet the test schedule," Garcia said.

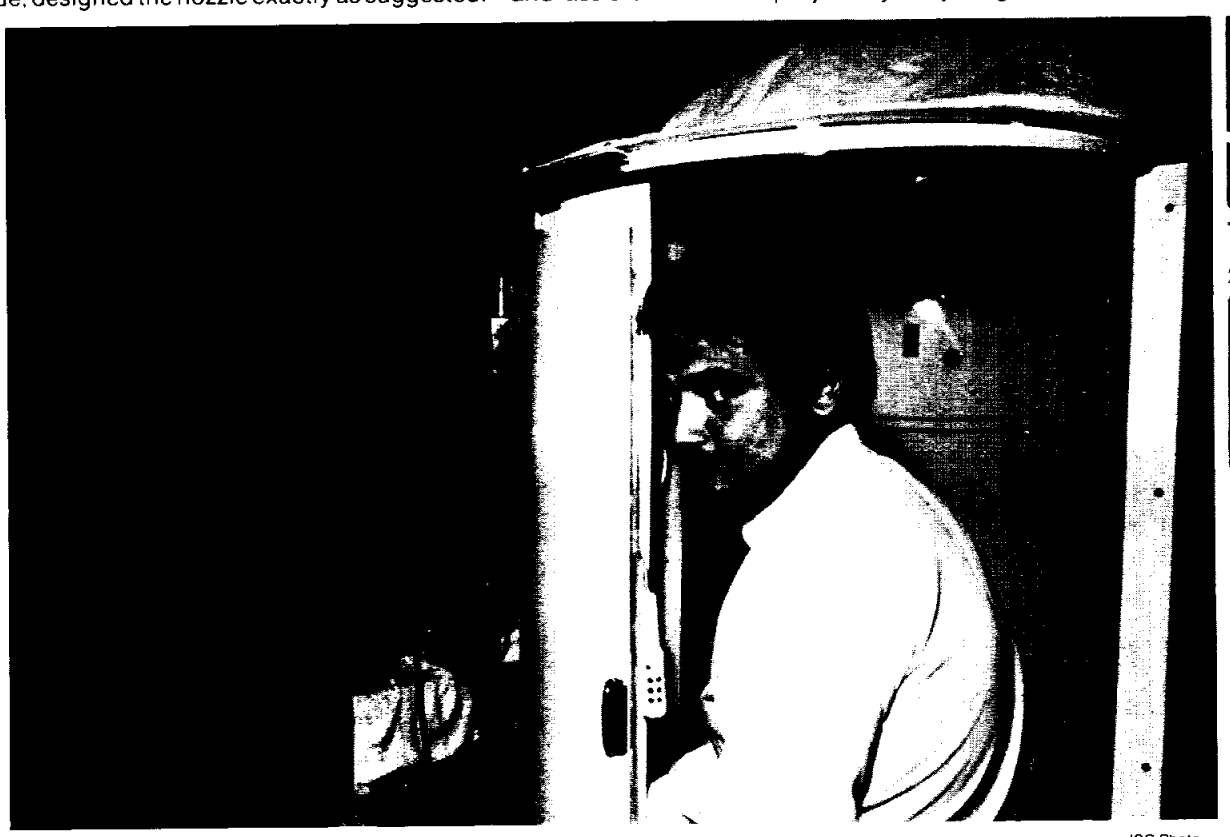
The most difficult yardstick for both hardware and test subjects was on the KC-135 zero-g aircraft. During three days of parabolic flights, the entire shower system was evaluated. In fewer than 10 parabolas, all mechanical equipment checked out. Two test subjects then took complete showers, and one subject shampooed her hair. Both reported that the shower worked very well, but more work is required to clean the shower in zero-g than in the JSC lab.

"All the human interfaces worked as designed. We need to do some fine tuning on the separator, but the KC-135 tests proved that the hardware will operate in zero-g conditions," Garcia said.

To control contamination of the closed loop life support system, further development work remains to be done on problems of microbial and biofilm growth and cleaning procedures. Biofilm is caused by growing microbes that attach themselves to drain pipe surfaces. Microbes create polymers which provide places for more microbial growth and a film that actually protects them from biocides and disinfectants. Biofilm can cause numerous problems ranging from plumbing corrosion to potential health hazards.

Tests of the zero-g whole body shower system officially ended in October. A final report is scheduled for release in February 1988 for use by the Space Station environmental control system prime contractor. All data collected during the project and all hardware developed for the tests will be available to the contractor.

"Of course, the final design may be modified or improved. All candidate designs that work will be considered for the actual Space Station whole body shower," Garcia said.



JSC Photo

JSC Photo by Jack Jacob

Above: Sue Eley, a Clear Lake housewife who used the shower exclusively for several weeks, washes her hair during a zero-g test aboard the KC-135. Left: Garcia (right) and Lockheed employee Bob Nicholson, who helped develop the shower, work on components of the laboratory test article in Bldg. 15.

Roundup Swap Shop

All Swap Shop ads must be submitted on a JSC Form 1452. The forms may be obtained from the Forms Office. Deadline for submitting ads is 5 p.m. the first Wednesday after the date of publication. Send ads to Roundup, AP3, or deliver them to the Newsroom, Bldg. 2 Annex, Room 147. No phone in ads will be taken.

Property & Rentals

Sale: '77 mobile home, 14' x 65', 2-2, central AC-heat, new carpet, near Texas A&M. Doug, x30964 or 480-2929.

Lease: University Place, 3-2.5-1 townhouse, refrig., microwave, W/D, miniblinds, fans. 1 mile to NASA. David, x32791 or 488-9768.

Lease: Baywind II townhouse, large 2 story, FPL, W/D, fans, pool, tennis, $480/mo. Jeff, x30715 or 280-8608.

Sale: 2 acres in League City, city water, sewer available, walking distance to Montessori, elementary, high schools, 10 min. to NASA, $26,000. 554-6695.

Sale: Beach house, Crystal Beach, TX, 2 lots, private BR, 2 bath, FPL, large deck, large screened porch, enclosed downstairs w/utility room, storage, new carpet, remodeled. Edwards, 282-4017 or 488-2681.

Lease: Beach house, Crystal Beach, TX, sleeps 6-8, 2 bath, furnished, $225 weekend, $400 weekly. Edwards, 282-4017 or 488-2681.

Lease: Seafarer townhouse, 2-2.5, fans, FPL, W/D, refrig., miniblinds, $700/mo. Malise, x31952 or 280-0229.

Lease: Lake Livingston waterfront house, on Indian Hills peninsula, 85' fishing pier. Jerry Kalk, x39287 or 554-6093.

Lease: Lake Livingston waterfront 3-2 house, sleeps 8, furnished, pier, ex. fishing, skiing, swimming, weekend and weekly rates. 482-1582.

Sale: Meadow Bend/League City, 3-2-2, fans, landscaped, 6' fence, 1,406 sq. ft., near schools, 8% assumable loan. Tom, x34166 or 538-2918.

Sale: Friendswood, wooded lot, cul-de-sac, utilities, near shopping, schools, $17,550 or $290/mo. 488-3224.

Sale/lease: '80 14' x 56' mobile home, 2-1, 7 min. to TX A&M, AC, ex. cond., equity plus assume $122/mo. or rent for $235/mo. Scott, x37115 or 485-4364.

Lease: Baywind 2-2-2 condo, W/D, $425/mo., discount available to JSC or contractor employee. Musso, 282-5211.

Sale: Seabrook, Seascape subdivision, 3-2-2, new carpet/oven, vinyl siding, fenced, $52,000. 280-8006.

Lease: Heritage Park 3-2-2, new paint/carpet, near pool and school, $475/mo. and deposit. Sue, x32630 or 486-9469.

Sale: Seabrook, 3-2-2, fresh paint, immediate occupancy, $4,000 down, assume $500/mo. or $49,500. Chuck, x32163.

Sale: Meadow Bend, 3-2-2, formal dining/living rooms, kitchens built-ins, fans, drapes, FPL, security system, landscape w/sprinklers, $69,500. Jessie, x32739 or 538-1038.

Lease: University Trace condo, W/D, refrig., fans, alarm system, all electric, 10 min. to JSC, $385/mo. 488-1454.

Sale: 14' x 80' mobile home, Lake Livingston area, double insulation, plywood floors, metal exterior, A/H, refrig. w/ice maker, $13,900. Chuck, x32923.

Lease: Middlebrook, 3-2-2, new paint, formal living/dining room, FPL, drapes, separate laundry room, fenced, near school. Walter, 332-1609.

Lease: Piper's Meadow, 3-2-2, large living room and kitchen, FPL, blinds/drapes, fenced, $590/mo. Walter, 332-1609.

Sale or Lease: Baywind I, 2-1.5-2, W/D, sell for appraised value or $325/mo., elec. plus 1 mo. deposit. 333-3992.

Sale: Woodlands 3-2-2, yard, deck, assume mortgage, FHA fixed. 783-7744 or 367-5122.

Lease: League City, 4-plex, 2 BDR, W/D, appliances, alarm, storage, covered parking, $415/mo., deposit. Gordon, x33269 or 481-3787.

Lease: Baywind II condo, 1 BR, upstairs, drapes, new carpet, FPL, appliances, W/D, tennis, pool, $295/mo. Chuck, x35402 or 488-5019 eve.

Sale: 13.5 acres, gently rolling wooded east TX land, fronts county blacktop, near Tyler and Henderson, assumable low cost TX Vet loan. McLeaish, 480-7445.

Cars & Trucks

'84 Honda LX 5 spd., 4 dr., PW, cruise, AM/FM, dr. locks, $6,950. Chuck, x30092 or 481-3637.

'79 Dodge window van, green, V8, PS, AC, good cond., $2,350. Susan, 479-7812.

'80 Chevrolet Citation, 2-toned, 4 dr., AC, 84K mi., good cond., ex. body. Loan Le, x36186.

'83 Ford LTD station wagon, AM/FM, cruise, rear defroster, PL, tilt, new brakes, 65K mi., $4,400. Ed, x37446 or 481-2956.

'82 Mercury Capri, 6 cyl., auto., AC, AM/FM/tape, cloth interior, ex. cond., 44K mi., $3,600. Bob, x39079 or 488-5881.

'78 Mercury Monarch, 4 dr., vinyl top, AM/FM/tape, new paint, undercoating, rebuilt trans., interior ex. cond., 66K mi. Brenda, x37747 or (409) 948-1672.

'80 Olds Toronado, power moonroof, PL, PS, PW, 67K mi., $2,995. Jerry, x38922 or 333-4003.

'83 Porsche 944, champagne color, PW, leather and cloth interior, 62K mi., ex. cond., $12,000. Wheeler, 480-6541.

'79 Toyota Celica GT, AC, new tires, good cond., BO. Frank, 280-4380 or 480-2314.

'87 Hyundai Excel GLS, 3-dr. hatchback, AC, AM/FM/tape, power sunroof, 7,600 mi., $6,895. 282-4109 or 554-5148.

'85 Ford F-150 Supercab, 6 cyl., 4 spd., AC, cruise, AM/FM/tape, Brahma top, bedliner, 47K mi., ex. cond., $9,300 OBO. Jim, 333-0968 or 481-2170.

'85 Pontiac Fiero 2M4, sunroof, alarm, custom paint, extras, 50K mi., $6,900. 474-2153 or 282-5337.

'80 Oldsmobile Cutlass, 2-dr. Supreme, new tires, 67K mi., $4,000. Rick, x36156 or 480-1218.

'87 Nissan 300ZX, 5-spd., loaded, 1,100 mi., ex. cond. Carol, 333-6500 or 333-5516.

'86 Ford Bronco II XLT, 20K mi., ex. cond., $12,200. Mike, x34427 or 482-0626.

Enclosed 8' x 6' x 5' single-axle trailer, dr. drops for loading ramp, wired, new tires, $1,000. Myron, x32694 or 482-4778.

'80 Olds Toronado, PL, PS, PW, V-8, power moonroof, 67K mi., $2,995. Jerry, x38922 or 333-9003.

'85 35' Mallard motor home, low miles, loaded, ex. cond., $10,000 plus assume note or $45,000. Long, x32493.

Boats & Planes

'77 27' Columbia Sailboat, 110, 150, SPNKR, VHF, KMTR, Atomic 4 INBD, FM, ex. cond, $21,000. 480-3613.

33' Hunter sailboat Bimini, Loran, 15 HP, Yanmar diesel, extras, $30,000. 282-3123 or 326-1179.

'86 Searay Seville, 17', 140 HP, Mercury I/O, AM/FM, walk-thru windshield, ice chest, swim deck, drive-on trailer, red and white, ex. cond, $8,250. 554-4239.

'80 16.5' Glasstron HPV 165 bass/ski, 115 HP Evinrude, troll, galv. trailer, $5,500. Garland, 488-0217.

10' Jon boat, good cond., $200. Musso, 282-5211.

16' Ski boat, 75-HP Johnson, tow bar, new paint/seats/instruments/carpet, AM/FM, skis included, trailer, $2,800. Ben, x31588 or 488-1326.

'78 MacGregor 25, sleeps 4, jib/genoa/main, 7.5-HP Honda OB, extras, BO over $4,500. Sally, 480-8190 or 326-1608.

Cycles

Boy's 10-spd. bicycle, $25; boys 18" bicycle, $20; girl's 18" Schwinn bicycle, $15. Whitcomb, 944-6457.

'83 Honda CB1100F, case bars, luggage rack, helmet, lock, cover, extras, 23K mi., $2,300 OBO. Jack, x38213 or 980-9750.

'80 Honda 750, mags, low miles, $1,350. Chuck, x30092 or 481-3637.

'85 Suzuki FA-50 moped, 350 mi., ex. cond., great for college student, $300 OBO. Greg, 280-7341 or 488-5015.

'82 Suzuki motorcycle RM80, ex. cond., $425; '85 Suzuki motorcycle JR50, matching helmet, was $700, now $350. 554-2476.

3-spd. English-type bicycle, new tires, good cond., $50. Bob, 488-0397.

Ladies 10-spd. Peugeot bicycle, 5 yrs. old, heavy-duty lock, toe clips, water bottle, sheep-skin seat cover, owner's manual included, $50 OBO. Marie 333-2783.

'80 Harley Davidson 1200FLH, 8K mi, black and red w/yellow pinstripes, windshield, saddle bags, railing, solo and king/queen seats, mint cond., $4,000. Jim, 863-1506.

Ladies 3-spd. bicycle, $25; men's bicycle, $10. Joane, x30674 or 474-3517.

'85 Suzuki GS 700E, 2375 mi., red/white, recent tune-up by Stubbs, ex. cond., $2,450. John, x36484 or 486-1186.

Audiovisual & Computers

Alpha Micro Multi User, micro mainframe, 3 terminals, 1 printer, $3,150. 493-9058.

Software for Commodore 64 computer; 300 baud modem. Steve, x35272.

Amiga Computer A1000, 512K RAM CPU, keyboard, mouse cable, manual, enhanced Amiga Dos 1.2 4096 colors, ex. graphics, ex. cond., $525. Khan, 488-9080 or 480-1318.

Professional 1/2" VHS editing system, 2 JVC 8600U recorder/editors w/86RM edit controller, was $7,085, now $5,500. Darold, x39640.

Household

Scoop chair, tan, ex. cond., $30. 944-6457.

2 wooden desks, $80 ea.; sofa and love seat, ex. cond., $450. Ski, x38013 or 332-4666.

Sturdy oak bunk beds, ex. cond., $325; king-sized water bed mattress, accessories, $125. Billie, x38334 or 482-4365.

King-sized bed w/bookcase, headboard, good cond., $250. Billie, 996-1730.

Living room suite, matching sofa, love seat and chair, contemporary, earth tones, herculon, coffee table, end table, oak finish w/glass inlays, ex. cond., $950. Pierre, x32773 or 532-3515.

Frostless refrig./freezer, almond, 16.4', hook-up for auto. ice maker, reversible drs., 2 yrs. old, under warranty, ex. cond. $400 OBO. Ken or Marie, 333-2783.

Carpet, 6' X 9', copper brown, good cond., $10. Chuck, x31701.

2 Oriental antique nightstands inlaid leather $25; 2 mattresses, box spring and frame $50; solid wood dresser, $50; wooden desk, $35 OBO. Cyndi, x36534.

Sofa, brown tweed fabric, $60; queen-sized headboard, frame, $50. Joanne, x30674 or 474-3517.

G.E. gas dryer, heavy duty, ex. cond., $150. Beth Ann, 333-6191.

Stacked W/D, almond, 4 yrs. old, ex. cond., $250; canvas tent 8' x 10', 10 yrs. old, $10; girls headboard/footboard, $15; twin headboard, $5; 4 pc. FPL tools, $5; new light fixtures, 1 hanging, $10, 2 ceiling, $5 ea. Marie, x33875 or 480-4507.

Wanted

Want folding golf cart, good cond. David, x30298.

Want outdoor furniture, round table, metal frame w/hole in middle, 4 chairs, for pool side, good cond. Harold, 488-1044.

Want camera equipment for Yaschica FXD, or Tamron zoom lenses 60-300 or T6 500 200mm, need backgrounds, light umbrellas, infrared filters, film belts, flash arms. 488-1044.

Want Cannon FT-b camera body. Michael, 333-0990.

Want roomate(s) to share 3-2 in Friendswood, W/D, cable, microwave, household privileges, non smokers, $245/mo., all bills paid. Michael, x38169 or 482-8496.

Want photographic studio equipment, lights, stands, umbrellas, backgrounds, tripods, props. x38169 or 482-8496.

Want to use or borrow Siamese sealpoint male for pet quality stud service for reasonable fee. Ken, 487-9179.

Want to buy electric trains. Don, x37832 or 996-1425.

Want to buy '80-'83 Buick Skylark or '82-'83 Buick Century, under 65K mi., good cond. Jerry, x38922 or 333-9003.

Want Macintosh users interested in support group, will provide mutual assistance, software evaluations, loaner equipment, advice on maintenance, etc. Campbell x30617.

Musical Instruments

Ludwig snare drum, case, stand; xylophone, case, school approved. $150. 554-2476.

Guitar C.F. Martin bicentennial commemorative limited edition, factory cond., hard-shell case, lifetime warranty, $1,776. Darold, 39640.

Pets & Livestock

Free 1.5 Lab-1.5 Husky, female, 1 yr. old, white, 30 lbs., must have fenced yard. 559-1452.

Lost & Found

Lost gold and diamond wedding band Oct. 20, near large softball field at Gilruth Center, band has approx. 10 diamonds inlayed in silver w/gold, reward offered. Sharlene, x33938 or 474-3865.

Found box of 36 color slides of a picnic, between Gilruth Center and Avenue B, can be picked up at Bldg. 45, Rm. 419.

6-spd. Raleigh bike missing, feared stolen from MCC. Jon Axford, x37671 or 332-1473.

Miscellaneous

New designer wedding dress, satin, size 16, $300 OBO. Terry, 486-2166 or 474-5305.

2 Pink Floyd tickets, good seats, Nov. 18. Chris, 280-7417.

8'6" x 8' round porch columns. Garland, 488-0217.

TEAC reel-to-reel, 4 or 2-channel, auto reverse, was $985, now $200. 332-4666.

Italian Provincial BR set, $150; 2 bar stools, $25 ea or 2 for $40; 4 Bridgestone 14" tires, $60. Pat, x32900 or 925-6405.

DP Shape Master 1000 rowing machine, new, $70; exercycle, new, $70; trampoline, $30; Canon TX 35mm camera, flash, assorted lenses. 333-3234.

Encyclopedia Brittanica, '84 edition, still in boxes, $400. Ann, 280-2084 or 554-4551.

Stearns life preserver, small adult size, $15; stationary exercise bike, $35; Sears lawn mower, good cond., $125; 5-drawer chest, 3-drawer night stand, $98. 481-0468.

Ping pong table, $100; typewriter portable-manual, $50. Terry, 333-2985.

'86 World Book encyclopedia, 22 volumes, plus 2 volume dictionary, classical binding, bonded leather, $500. Paula, 337-2703.

School clothes for sale, OP, Polo, Catchit, Gotcha, Izod, shirts and jeans, new; antique typewriter, needs minor adjustment, $10; antique dolls, good cond., no clothes, $5-$10 ea.; misc. antique glassware, 1920-40 pieces. Pat, x33277 or 480-7194.

Northwestern golf clubs, 11-club set, 3-9 irons and PW, 1-3-5 metal woods, wood covers, golf bag and cart, $150. Bobby, x39491 or 991-2396.

10" Rockwell radial arm saw, accessories, $300. James, x32488.

Fresh honey, golden color from corn and milo, $10 per gallon, smaller quantities available. Clarence Blume, x38820 or 554-2911.

Chev. 283 engine, 3-spd. manual transmission, engine is partially disassembled, needs rings and valve work, was in a '66 Chevelle, $150. Bob, x39079 or 488-5881.

Chest waders, suspenders, size 8; converse hip boots, size 7, good cond.; auto service and repair manuals, '58, '59, '60 Chevrolet, '57 Ford, T-Bird, '71 (5 volumes) Ford Maverick, T-Bird, Mercury, Mustang, Lincoln, originals, good cond. John, x30018 or 488-4487.

Pink Floyd tickets, 30th row, BO. 280-2658.

Postage stamps below post office prices, 5% discount, mostly mint commemoratives, $10 minimum. Jeff, x38312 or 482-5393.

2 BF Goodrich All-Terrain tires, size 30 x 9.50-15, ex cond., $25; Toyota short bed pickup snap-on bedcover, durable, good cond., beige, $10. 554-2267.

7' Grecian Spa, 250 BTU gas heater, 2 pumps, spa cover, $2,995. Whitnah, 481-2854.

Solid ivory chess set, over 100 years old, highest piece six inches, carved by master artist of India. 326-2282.

DP Gympac 2500 home fitness system, bench, accessories, free standing, extra weight pack, $250. 480-4692.

Spanish style 8' sofa, $85; lined drape for patio door, matching 63" double drape, $30; traverse rod, $15; Thermostat-Honeywell set back for AC, gas furnace, $30; men's new jogging suits, $25 ea. Roy, 941-7994.

2 formals for sale, one black tea-length size 7/8, $50; strapless full length size 9/10, $75. 532-1794.

Lined shuttle spacelab team member jackets, new, adult sizes, 1 XXL, navy blue, 1 XS or L youth, TX orange, 1 XS or L youth, yellow/gold, $31.75 ea.; AKAI model GX-280DSS, 4 channel, quad, reel-to-reel record player, was $800, now $300 OBO. James, 482-6744.

Remington deer rifle, 243 Win caliber 3-9X scope, accessories, ammo., mint cond., $240. Howard, 282-2873.

Colt Python, 6" blue, RR, WO, spring kit, Pachmayr Presentation grip, ex. cond., $475; 6" bench grinder, $25. John, x36484 or 486-1186.

Recorder/player, 3-spd., SOS, microphones, mixer, pillow speaker, tapes, $250; small Lear-Striedel amplifier, $25; 2-pedestal office desk, table, cover, $200; navigational sextant in wooden case, $35. Art, 282-4922.

STS-26 jackets, T-shirts, sweats available. 488-1454.

3 or 4 golf balls, $1. Steve, x35272.

New Stacy Adams men's dress shoes, 8 1/2, $25 OBO. Malcolm, x38278.

Cookin' in the Cafeteria

Week of November 9 — 13, 1987

Monday — French Onion Soup; Beef Chop Suey, Polish Sausage w/German Potato Salad, Breaded Veal Cutlet (Special); Okra & Tomatoes, Green Peas. Standard Daily Items: Roast Beef, Baked Ham, Fried Chicken, Fried Fish, Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

Tuesday — Split Pea Soup; Salisbury Steak, Shrimp Creole, Fried Chicken (Special); Mixed Vegetables, Beets, Whipped Potatoes.

Wednesday — Holiday - Veteran's Day.

Thursday — Chicken Noodle Soup; Beef Stroganoff, Turkey & Dressing, BBQ Smoked Link (Special); Lima Beans, Buttered Squash, Spanish Rice.

Friday — Seafood Gumbo; Broiled Turbot, Liver & Onions, Fried Shrimp, Meat Sauce & Spaghetti (Special) Green Beans, Buttered Broccoli, Whipped Potatoes.

Week of November 16 — 20, 1987

Monday — Beef & Barley Soup; Beef Chop Suey, Breaded Veal Cutlet w/Cream Gravy, Grilled Ham Steak, Wieners w/Baked Beans (Special); Buttered Rice, Brussels Sprouts, Whipped Potatoes. Standard Daily Items: Roast Beef, Baked Ham, Fried Chicken, Fried Fish, Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

Tuesday — Celery Soup; Fried Shrimp, Pork Chop w/Applesauce, Turkey a la King, Pepper Steak (Special); Au Gratin Potatoes, Breaded Squash, Buttered Spinach.

Wednesday — Seafood Gumbo; Fried Catfish w/Hush Puppies, Braised Beef Ribs, Mexican Dinner (Special); Spanish Rice, Ranch Beans, Buttered Peas.

Thursday — Green Split Pea Soup; Corned Beef w/Cabbage & New Potatoes, Chicken & Dumplings, Tamales w/Chili, Hamburger Steak w/Onion Gravy (Special); Navy Beans, Buttered Cabbage, Green Beans.

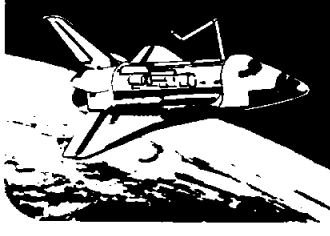
Friday — Seafood Gumbo; Deviled Crabs, Broiled Halibut, Liver & Onions, BBQ Link (Special); Buttered Corn, Green Beans, New Potatoes.

SANDWICHES

On Wednesday we feature The Reuben: Corned Brisket, Swiss Cheese on a bed of Sauerkraut, Poupon Mustard on Rye and 1/4 Pickle. Delicious!

Monday and Thursday check out our French Dip Sandwich.

NASA
Lyndon B. Johnson Space Center
Space News Roundup



The **Roundup** is an official publication of the National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Texas, and is published every other Friday by the Public Affairs Office for all space center employees. **Roundup** deadline is the first Wednesday after publication.

Editor . . . . . Kelly Humphries
Staff Writer . . . . . Beverly Green

NASA-JSC