NASA
Lyndon B. Johnson Space Center

Space News Roundup

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Nozzle gimbal likely culprit on IUS failure

Collapse of the nozzle gimbal mechanism on the first Inertial Upper Stage is the most likely cause of the poor thruster firing which sent the first Tracking and Data Relay Satellite into a low elliptical orbit during STS-6 in April.

Those are the findings released by the joint Air Force/NASA Anomaly Investigation Board after three months of study. "Failure of the gimbal system used on the IUS solid rocket motor caused the nozzle to be mechanically jammed in an offset position," the report said. "The actuators were unable to overcome the high mechanical forces caused by the jammed nozzle while the motor was thrusting."

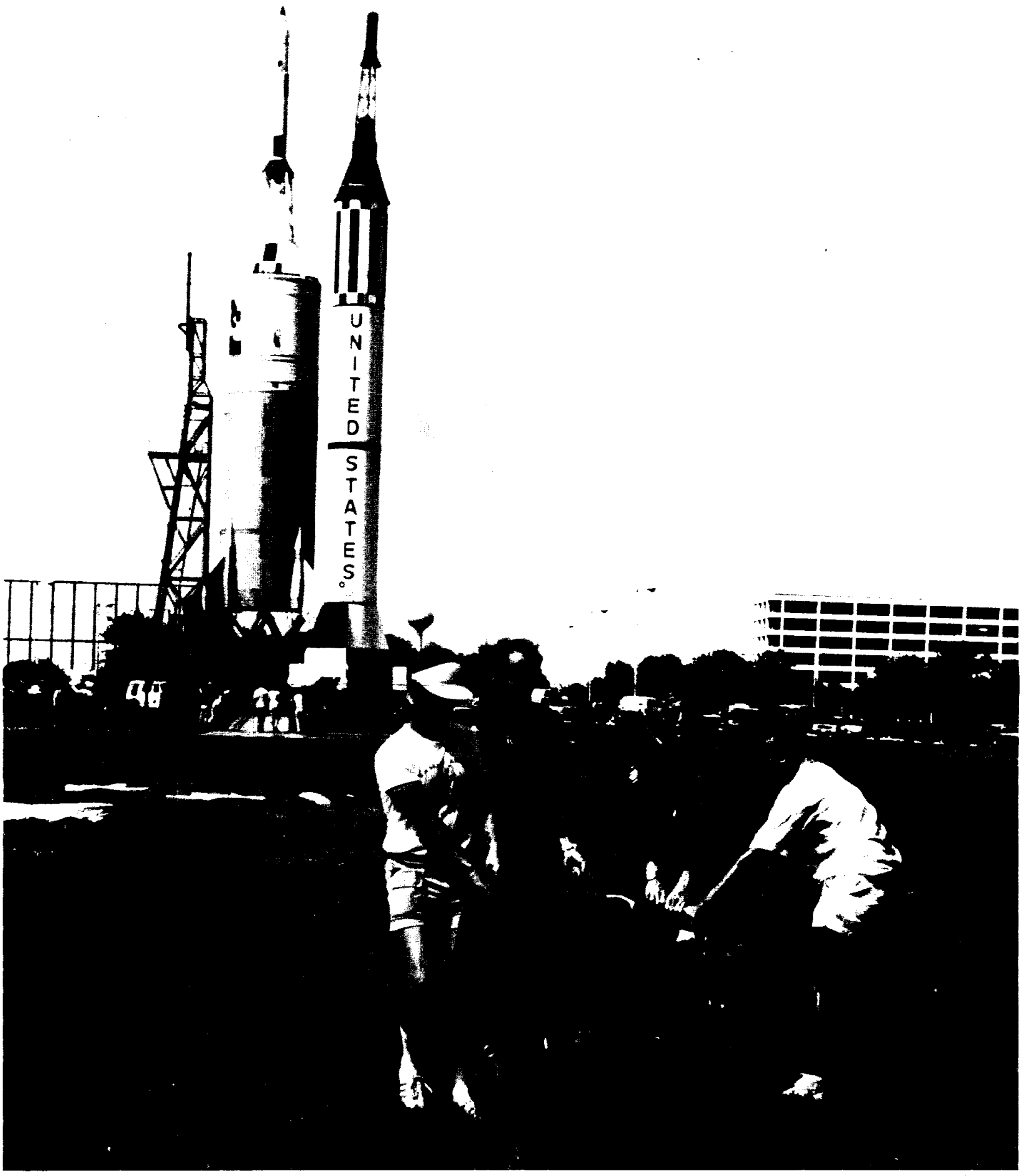
The failure occurred at approximately 83 seconds into the SRM-2 burn. At that point, the motor, which had operated nominally, had an uncommanded rocket motor nozzle position change in both pitch and yaw. This uncommanded deflection resulted in the uncontrolled tumble of the IUS/TDRS stack at a rate of approximatley 30 RPM. "No net increase in orbital velocity occurred after tumbling started," the report said, "even though SRM-2 continued to burn for the planned nominal time of approximately 105 seconds."

The pitch and yaw actuators, which had responded to commands before the gimbal mechanism apparently collapsed at 83 seconds, did not respond to commands from that point until after the burn was completed.

The Investigation Board identified four potential sources of the nozzle gimbal mechanical failure: a breakdown of thermal protection in the flexible seal around the nozzle; long term seal leakage; quality or manufacturing problems; or environments to which the assembly was exposed.

The Air Force said a firm decision about the near term launch schedule of the IUS is expected this fall. NASA is tentatively planning the next IUS/Shuttle launch for STS-12 in March 1984.

The Air Force's IUS Program Office has identified three means to resolving the problem, the Air Force said. They include nozzle component testing, nondestructive testing of motor nozzles leading up to ground test firings, and a rebuild of the nozzle using stringent quality control.



Pulling the silk

Astronauts James Van Hoften and Dave Walker help balloon pilots deploy the demonstration hot air balloon during the Flying Fantasies event at the Rocket Park during Spaceweek. More than 60 balloons are expected here Aug. 13 and 14 for a balloon meet honoring NASA's silver anniversary and the 200th anniversary of the first balloon flight. (Photo by Otis Imboden)

STS-8, STS-9 delayed for TDRS checkout

Launch dates for STS-8 and STS-9 have been pushed back to Aug. 30 and Oct. 28, respectively, to allow extra time for ground verification testing of the Tracking and Data Relay Satellite (TDRS-A).

Although the satellite itself so far has performed nominally, important ground tests of the system are as much as 20 days behind schedule, and both Shuttle flights require that most of the tests be completed.

The decision to delay the first Spacelab flight on STS-9 by about one month was reached jointly by NASA and the European Space Agency. The joint NASA-ESA mission was originally scheduled for Sept. 30.

Proper checkout and operation of the TDRS satellite is essential for the Spacelab mission due to the enormous amount of scientific data that is to be transmitted through the satellite to ground stations. Some of the experiments aboard require specific alignments of the Sun, Earth and Moon, and the next acceptable alignments beyond Sept. 30 occur in late October.

During STS-8, the Indian National Satellite, INSAT 1-B, will be deployed from *Challenger's* cargo bay on the second day of the mission. Flight days three and four involve operations with the Payload Flight Test Article, and tests with the TDRS will be interspersed throughout the mission. Program officials said the scheduled five-day flight may be extended an additional day, if necessary, to allow for a more complete checkout of the TDRS satellite.

Plans call for regular air-to-ground communication through the TDRS on STS-8 as soon as *Challenger* passes Dakar on the first orbit. A series of four detailed test objectives and flight test objectives are planned to be run during three days of the flight. Nominal TDRS-A coverage begins at about the mid-Pacific Ocean and ends near where the Indian Ocean Station coverage begins on the east coast of Africa.

The planned launch time Aug. 30 is now 1:15 a.m. CDT, rather than the 1:21 a.m. launch time scheduled for an earlier launch date.

Problems with ground checkout of the TDRS began in July when a software anomaly occurred in ground computers. Two additional days were lost later in the month when a power failure caused two emergency generators at the NASA-Spacecom White Sands ground station to come on line and one caught fire.

A major element of the checkout still to be completed is the tracking test of the Ku-band antennas on the TDRS. The antennas must track other satellites, as well as Shuttle orbiters, for nominal operations.

At the Kennedy Space Center last week, the *Challenger* was moved from the Orbiter Processing Facility to the Vehicle Assembly Bldg. and mated with the external tank and solid rocket boosters. *Challenger's* stay in the OPF was the shortest for any orbiter to date. The vehicle spent 27 days in the OPF, with crews working around the clock shifts every day during that time except the Fourth of July holiday.

Work is still progressing satisfactorily on the *Columbia*, which will return to service for the Spacelab mission. Plans now call for installation of the Spacelab components in mid-August and rollover to the Vehicle Assembly Bldg. in late August. The *Columbia* is scheduled to go to Launch Pad 39A in late September.

JSC honors its own at ceremony

Although NASA had conducted two major awards ceremonies at JSC recently, it has been some time since the Center recognized its own civil service and contractor employees. The time came July 19, when Center Director Gerald D. Griffin presented a variety of awards to individuals, groups and organizations.

Some 63 Certificates of Commendation, 53 Superior Achievement Awards, four Equal Opportunity Awards, 72 Certificates of Appreciation, 35 Group Achievement Awards and two Special Awards were presented during the ceremony.

Following is a list of those groups and individuals honored:

Certificates of Commendation: Pleddie M. Baker, Philip N. Barnes, Bartus H. Batson, Jack C. Boykin, Glen E. Brace, Hubert J. Brasseaux, Lt. Col. Roy D. Bridges Jr., Donald C. Brown, Jervy J. Conwell, Douglas R. Cooke, Lt. Col. Richard O. Covey, John M. Crockett, Carroll T. Dawson, Merle J. Denny, Louis DeWolf, James L. Dragg, Duane L. Duston, Max Engert, Ronald C. Epps, Lt. Col. Ronald J. Grabe, Robert F. Hall, Lt. Col. Carl M. Hatelid, Gregory W. Hayes, Lovick O. Hayman Jr., Jeffrey A. Hoffman, Donald E. Holkan, Richard H. Holzapfel, Charles T. Hyle, Paul S. Jaschke, Mansour A. Jowid Jr., Martin B. Keough, John J. Knochel, Lt. Col. Thomas Y. Kumashiro, Lt. Col. James C. Liller, Ray C. Malone, Kenneth I. Mansfield, Frank J. Marlow, Bobby G. Martin, Cmdr. Jon A. McBride, Bill J. McCarty, William G. McMullen, Larry J. Moon, William J. Moon, Dale E. Moore, Robert T. Neal, Charles W. Pace, Jose R. Perez, Paul T. Pixley, J. Gary Renick, Thomas O. Ross, James R. Roundtree, Iva L. Scott, Edwin W. Sievers Jr., Roy J. Smith, Richard D. Snyder, Glenn W. Spencer, Darrell E. Stamper, Horace E. Whitacre, Robert D. White, Harold Wayne Whittington, Milton L. Windler, James A. Wood, and Fred H. Wrinkle Jr.

Superior Achievement Awards: Gerald E. Anderson, Richard W. Armstrong, Gautam D. Badhwar, Richard F. Baillie, Frank J. Benz, James L. Blumentritt, William A. Chandler, Nitza M. Cintron-Trevino, Richard E. Coblentz, Humberto J. Davila, Jesse M. Deming, M. Dane Dixon, Dennis E. Fielder, Dwayne L. Forsythe, Claudette A. Gage, Charles Dale Haines, Arthur W. Hambleton, Kenneth J. Hancock, Gerald D. Harding, Larry D. Hartley, James Richard Homer, Jerry L. Homick, James G. Hondros, Samuel G. House, Donald F. Hughes, Clarence E. Humphries, Lindsey D. Irby, Rigdon E. Joosten, Sharon A. LaFuse, Renee J. Lance, Robert D. Langley, Charles K. LaPinta, Stanley M. Luczkowski, Ross L. McHenry, Joseph A. McKeon, D. Herman Mobley, Ernest D. Murrah Jr., Clair D. Nelson, John L. Nelson, Michael L. Peterson, Robert T. Savely, William W. Seibert, Paul E. Shack, Richard E. Simms, Robert H. St. John, Robert H. Steel, Charles J. Walsh, Ernest L. Weeks Jr., William R. Weimer, Gerard E. Weingartner, Donald J. White, Rowland B. Williams and Peggy A. Zahler.

Equal Opportunity Awards: William W. Grimes Jr., Evelyn J. Williams, William B. Wilson, Robert Wayne Young.

Certificates of Appreciation to Individuals: Robert J. Coskren and Ernest R. Kaswell of Albany International Research Co.; James H. Morris of Alpha Building Corp.; Eva Moore Payne of Media Services Corp.; Bob K. Culpepper of Barrios Technology Inc.; Hiram G. Baxter, Eugene B. Chmielewski, Charles A. Coindreau, Frank DiGenova, Wayne H. Jolley, William B.D. Jones, Donald E. Smith and William E. Sturm of Ford Aerospace and Communications Corp.; James C. Hundley of IBM Corp., Julius A. Pustejovsky of Kentron International; Christopher D. Barnet and Edward P. Shales of Lockheed Engineering and Management Services Co., Inc; Robert L. Benbow, George W. Bull and Walter W. Haufler of McDonnell Douglas Technical Services Co., Inc; Lois W. Morgan of MITRE Corp.; and Irwin J. Altneu, Bohdan I. Bejmuk, Charles R. Bishop, Edward M. Blood Jr., Lamar D. Bowles, Richard T. Brown, Kay Burns, Sterling L. Burt, Gaius H. Cadwell, Charles D. Caughren, Louis F. Cecchi, Ted Clauss, Donald D. Dillehunt, Henry J. Dinenno, Wendall D. Emde, Harold E. Emigh, Richard C. Fowler, George F. Fraser, William H. Frohoff, Ralph E. Gatto, Patrick J. Hanifin, Elmo S. Holt, Joseph B. Humber, Melvin E. Ingles, Douglas A. Johnson, Thomas H. Kennedy, Samuel Kreidel, William R. Lake, Robert C. Lashbrook, Raymond G. Leeth Jr., David Llorente, Paul C. Merhoff, John F. Mesmer, Wayne L. Norton, Will L. Owens, George A. Phelps, Donald G. Saindon, Donald L. Samsal, Charles A. Scottoline, Charles L. Statham, Billy L. Stine, Lloyd K. Stockwell, Fredrick C. Svenson, Richard E. Thomas, Christian T. Thomasen, James A. Wolfelt and Shoji Yahata of Rockwell International; and Janet M. Rauschmeier of the Singer Company, Link Flight Simulation Division.

Certificates of Appreciation to Organizations: Applied Solar Energy Corp.; Pan American World Airways, Aerospace Services Division, Engineering Support Services and Maintenance and Operations Support Services.

Group Achievement Awards: Acoustic and Modal Test Team; Advanced Life Support Systems Development Team; Aft Reaction Contol System Special Test Team, White Sands Test Facility; Construction Branch, Plant Engineering Division; Controlled Mode Facilities Project Team; Controlled Mode Implementation Team; External Tank Thermal Protection System, Inspection Camera Development Team; Flight Crew Equipment Packaging Facility Team; Gaseous Oxygen Test System Activation Team; Get Away Special Unique Adapter Beam Team; Graphics Analysis Team; Institutional Services Support Team; Logistics Management Support Team; Middeck Payload Integration Support Team; Northrup Strip Activation and Operations Team, White Sands Test Facility; Operations Branch, Plant Engineering Division; Orbital Maneuvering System Qualification II Test Team, White Sands Test Facility; Orbiter Crew Station Team; Orbiter Materials Team; Orbiter Structural Certification Team; Orbiter Wheel/Tire Development Team, Landing Gear Test Facility, Wright Patterson Air Force Base; Program Office Mission Administrative Support Team; Shuttle Avionics Integration Laboratory Team; Shuttle Orbiter Tape Recorder Subsystem Development Team; Space Shuttle Flight Operations Support Team; Space Shuttle Interface Working Group; Space Shuttle Medical Operations Team; Space Transportation System Mission Planning and Analysis Team; Still Photo Library, Public Affairs Office; STS-1 Mission Evaluation Team; STS-6 Mission Astronaut Office Support Team; Technical Services Division; Television and Photography Mission Support Team; Thermal Protection System Flow Test Program Team; Thermal Protection System Structural Integrity Team.

Special Awards: The Navy Distinguished Flying Cross to Col. Robert F. Overmyer, USMC; and the Diplome d'Honneur to the Johnson Space Center from the Federation Aeronautique Internationale, Paris, France.

Awards await A long stack of awards lay ready for presentation to winners during the JSC Honor Awards Ceremony recently. Freda Lowe of the Personnel Office is shown ready to hand them out.

Space News Briefs

STS-8 to carry 260,000 postal covers

The cargo for STS-8 will include some 260,000 special cacheted postal covers which will go on sale from the U.S. Postal Service after the flight. Each of the covers will be placed in a specially designed folder and sold for $15.35 each from the USPS Philatelic Sales Division. The covers will bear the recently announced $9.35 postage stamp, intended primarily for express mail. The cachet design on the front of each cover will be a full color replica of the STS-8 crew patch, and on the back will be NASA's 25th anniversary logo. The cancellation on the front of each cover will carry the originally scheduled STS-8 launch date of Aug. 14, which is also the issue date of the stamp. After the flight, the actual launch date will be noted on the cover, and another cancellation will indicate the landing date. Proceeds from the sale of the Shuttle Flight Folder will be divided equally between NASA and the Postal Service. Mail orders only for the item (designated Item Number C572) will be accepted no earlier than the date of the landing. Orders and remittance should be sent to: Shuttle Flight Folder, Philatelic Sales Division, Washington, DC 20265-9997.

Bulletin Board

U.S. Model Rocket Championship set for JSC

For the third time in 25 years, the National Association of Rocketry will hold the U.S. Model Rocket Championships at JSC. The events will take place during the week of Aug. 7 to 12. The competition is open to public viewing, and will be held in the field west of the Rocket Park. Like the previous championships held at JSC, annual meets 12 and 21, the 25th competition will be comprised of several different daily events, including flight competition, tours, lectures and a closing banquet. Only NAR members may compete in the championship, although a non-contestant category is available for non-NAR participants. For more information, contact Contest Director Ron Goforth at 481-7318 or 484-2085.

Summer employees banquet to be held

Dr. Leonard Spearman, President of Texas Southern Univerisity, will be the guest speaker at this year's Summer Employees Awards Banquet to be held beginning at 11:30 a.m. Aug. 10 at the Gilruth Center. All summer aids, OE students, supervisors, friends and parents are invited to attend. Some of the summer employees will be receiving special performance awards for their efforts at JSC. For more information, call Freda Lowe at x5266.

Blood drive scheduled in August

The second JSC blood drive for 1983 is scheduled to run from 8:30 a.m. to 3 p.m. August 16 and August 18 at the Gilruth Recreation Center. For appointments to give blood, please call Bob Jones, x6251; Jim McBride, x6226; or Helon Crawford, x5238

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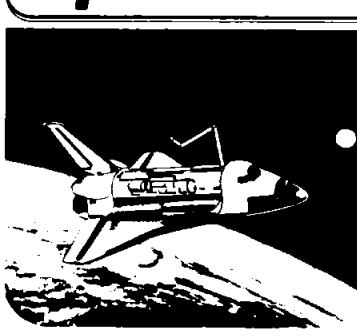


The *Roundup* is an official publication of the National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Texas, and is published every other Friday by the Public Affairs Office for all space center employees. *Roundup* deadline is the first Wednesday after publication.

Editor Brian Welch

Cookin' in the Cafeteria

Week of August 8-12, 1983

Monday: French Onion Soup; BBQ Sliced Beef, Parmesan Steak, Spare Rib w/Kraut, Chili & Macaroni (Special); Ranch Style Beans, English Peas, Mustard Greens. Standard Daily Items: Roast Beef, Baked Ham, Fried Chicken, Fried Fish, Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

Tuesday: Split Pea Soup; Meatballs & Spaghetti, Liver & Onions, Baked Ham w/Sauce, Corned Beef Hash (Special); Buttered Cabbage, Cream Style Corn, Whipped Potatoes.

Wednesday: Seafood Gumbo; Cheese Enchiladas, Roast Pork w/Dressing, BBQ Link (Special); Pinto Beans, Spanish Rice, Turnip Greens.

Thursday: Beef & Barley Soup; Roast Beef w/Dressing, Fried Perch, Chopped Sirloin, Chicken Fried Steak (Special); Whipped Potatoes, Peas & Carrots, Buttered Squash.

Friday: Seafood Gumbo; Fried Shrimp, Baked Fish, Beef Stroganoff, Fried Chicken (Special); Okra & Tomatoes, Buttered Broccoli, Carrots in Cream Sauce.

Week of August 15-19, 1983

Monday: Cream of Potato Soup; Franks & Sauerkraut, Stuffed Pork Chop, Potato Baked Chicken, Meat Sauce & Spaghetti (Special); French Beans, Buttered Squash, Buttered Beans. Standard Daily Items: Roast Beef, Baked Ham, Fried Chicken, Fried Fish, Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

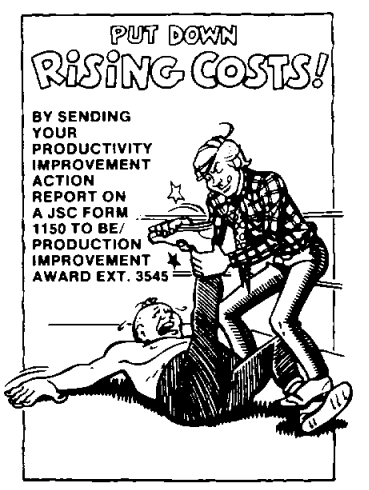
Tuesday: Navy Bean Soup; Beef Stew, Liver & Onions, Shrimp Creole, Smothered Steak w/Dressing (Special); Corn, Rice, Cabbage, Peas.

Wednesday: Seafood Gumbo; Roast Beef, Baked Perch, Chicken Pan Pie, Salmon Croquette (Special); Mustard Greens, Italian Green Beans, Sliced Beets.

Thursday; Beef & Barley Soup; Beef Tacos, Diced Ham w/Lima Beans, Stuffed Cabbage (Special); Ranch Style Beans, Brussels Sprouts, Cream Style Corn.

Friday: Seafood Gumbo; Fried Shrimp, Deviled Crabs, Ham Steak, Salisbury Steak (Special); Buttered Carrots, Green Beans, June Peas.

25
National Aeronautics and Space Administration
Twenty-fifth Anniversary
1958-1983



'A WET-F run in space'

STS-11 EVA is dress rehearsal for STS-13 and Solar Max

The most demanding and far-ranging EVA ever attempted in space is now scheduled for STS-11, in a visual and technological tour de force leading up to the Solar Max revisit on STS-13.

Not since the lunar surface EVAs of the Apollo era has JSC prepared for such complex extravehicular activity, and the training necessary for this exercise has involved new approaches for the crew trainers, EVA planners and the crew members themselves.

"The training has been as much development as pure training," said STS-11 EVA planner Barry Boswell of the EVA and Crew Systems Section, Training Division. "We are still somewhat in the developmental stages, with some hardware still being defined, rather than refined."

Usually, crews are brought into the picture only after various procedures for working with different pieces of hardware have already been worked out. But the ventures on STS-11 and STS-13 involve demonstrations of several integral tasks for future work in space — even beyond STS-13 — and the complexity of both the training and the jobs to be performed next spring is considerable.

The result, Boswell said, is that one new wrinkle to training for these two flights is "the crews themselves have been 'down in the mud' with us for some time, and they are very much involved in the development and buyoff of the equipment and procedures."

The STS-11 EVAs are essentially dress rehearsals for the challenging work to be done on STS-13, where it is planned to rendezvous with, stabilize, grapple, fix and redeploy the ailing Solar Maximum Mission satellite. But there is more to the STS-11 EVA periods and training than just that.

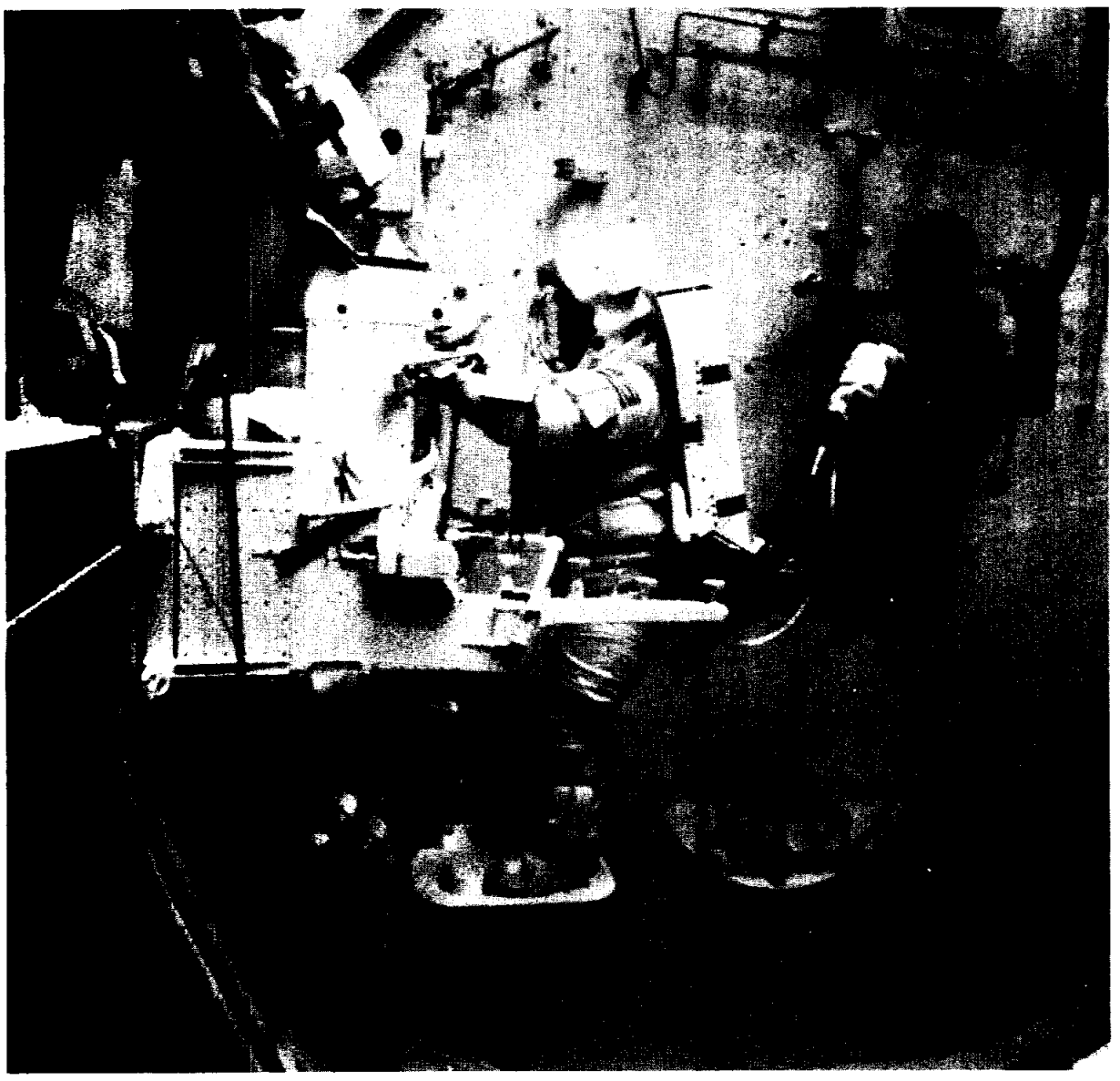
Crewmembers Bruce McCandless and Robert Stewart (the first representative of the U.S. Army scheduled to fly in space) will not only demonstrate the procedures necessary for the Solar Max repair, but they will also perform the first in-space checkout of the Manned Maneuvering Unit (MMU) and the Manipuator Foot Restraint, (MFR),demonstrate curved path tracking, simulate the changeout of a Solar Max main electronics box and demonstrate orbital refueling of a satellite — all of that in addition to training for such contingencies as problems with the payload bay doors, balky sun shields on the PALAPA B-2 and WESTAR-V1 satellites, a malfunctioning robot arm or difficulties with the SPAS Shuttle pallet satellite.

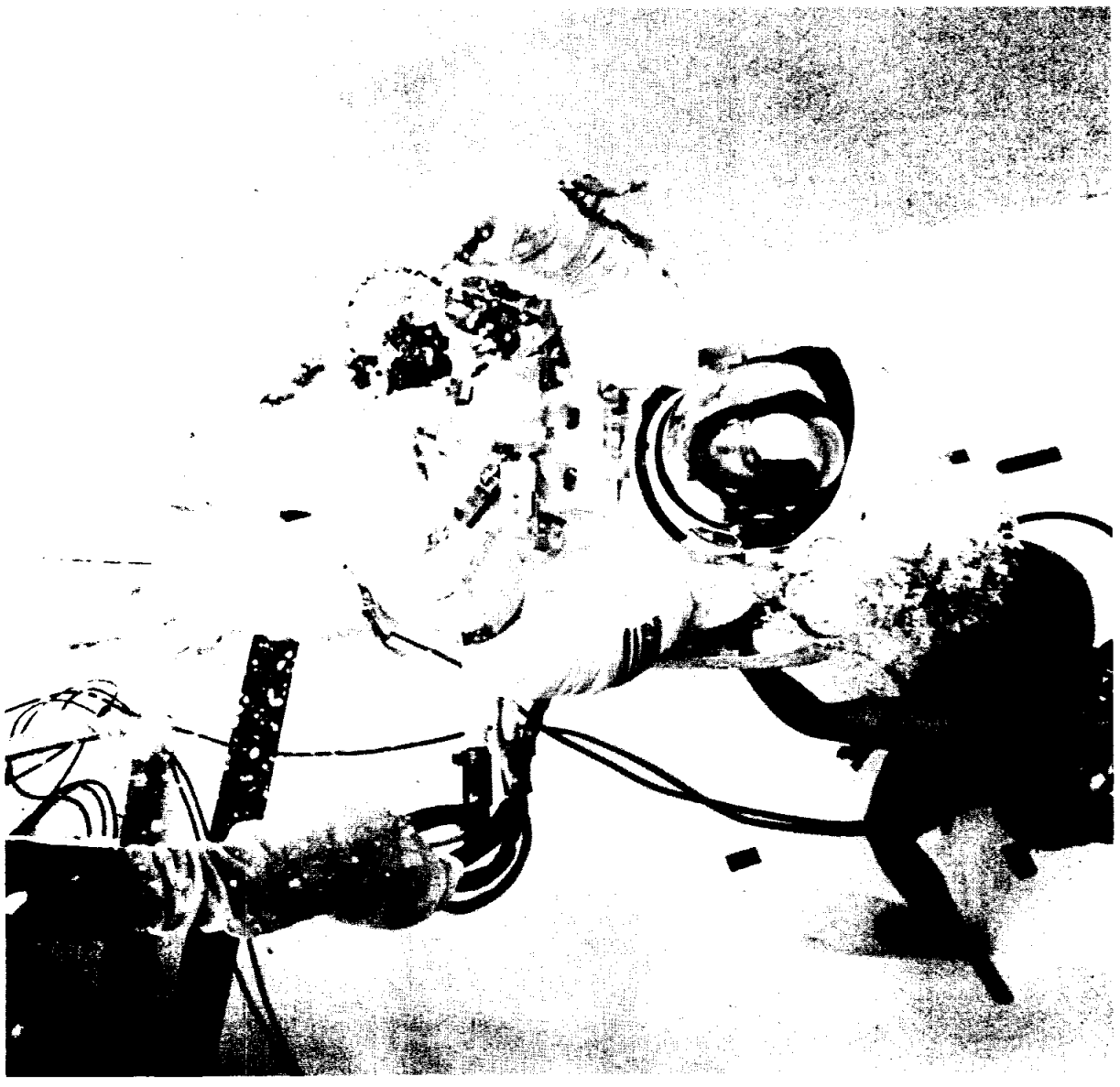
"We are in a sense space qualifying the STS-13 equipment and procedures on STS-11," Boswell said. "It is something of a WET-F (Weightless Environment Training Facility) run in space."

A summary of the STS-11 timeline for two different EVAs illustrates the complexity of the planned tasks:

EVA-1: McCandless and Stewart will egress from the Orbiter *Challenger's* airlock for a five-hour extravehicular period. Two MMUs will be positioned in Flight Support Structures (FSS) on the forward bulkhead of the payload bay. The second Shuttle Pallet Satellite, SPAS-1A, will be the forwardmost payload, and will provide television coverage of the egress along with the two regular closed circuit television cameras mounted on the aft bulkhead.

McCandless will be the first to don an MMU. For approximately 10 minutes, he will perform a checkout of the system in the payload bay, making sure that all 26 thrusters on the unit are working properly. He will then use the MMU to dock with a trunion pin attach device (TPAD) mounted on an equipment stowage box located on the starboard side of the payload bay near the MMUs. The TPAD is the same attachment device astronaut George Nelson will grapple with to stabilize Solar Max during the STS-13 EVA. A second TPAD will be mounted on the SPAS-1A for STS-11, and will come into play during both EVAs.





STS-11 astronauts Bruce McCandless and Robert Stewart run through an Earthbound version of what will be the most ambitious spacewalk ever attempted. In training sessions in JSC's Weightless Environment Training Facility, McCandless (above) checks out the Manned Maneuvering Unit which he will pilot to a maximum distance of 300 feet from the *Challenger*. Stewart (below) has his weights adjusted prior to rehearsing his EVA procedures.

After docking with the TPAD, McCandless will do both a 150-foot and a 300-foot translation away from *Challenger*. He will be carrying an MMU-mounted 35mm camera and a small closed-circuit television. He will then translate back to the orbiter and begin a recharge of the MMU.

While that is underway, Stewart will be performing the first tryout of the manipulator foot restraint, a device which secures an astronaut's feet against the end of the remote manipulator arm. In effect, Stewart will be "grappled" by the arm in much the same way as previous payloads on earlier missions.

While in that foot restraint, Stewart will first perform a checkout of the unit, doing force measurements with the RMS in an effort to duplicate ground-based math models of the dynamics and feedbacks in the arm. Stewart will then egress from the MFR and move back to the forward bulkhead to don the port MMU McCandless flew. He will repeat the initial MMU checkout procedure and then venture first 150 feet and then 300 feet away from *Challenger*. Repetition of this task is designed to give crew systems analysts two subjective accounts of the MMU's performance after the flight.

Once Stewart has returned to the orbiter and doffed the MMU, McCandless will position himself in the manipulator foot restraint and begin a simulation of the main electronics box replacement which will be performed on STS-13 for Solar Max.

McCandless will then stow the MFR and both astronauts will enter the airlock some five hours after venturing out into the vacuum of space.

EVA-2: During this EVA, the starboard, or second, MMU will be used. McCandless will don it first while Stewart assists. He will then attach a TPAD and translate down the length of the payload bay to the vertical stabilizer. By this time, the SPAS-1A satellite will have been grappled by the robot arm, and the arm will have raised it almost directly over the center of the payload bay, straight up from the "shoulder" joint of the arm. The SPAS will then be rotated at approximately the same speed as the Solar Max satellite is now turning about its axis — about one degree per second. From his position near the vertical stabilizer, McCandless will approach the rotating SPAS-1A and demonstrate the circular tracking technique of the MMU, which is essential for the STS-13 Solar Max repair. McCandless will match rates with the SPAS and dock with the TPAD, and then repeat the procedure as often as time allows.

When the timeline calls for it, he will return to the flight support structure and doff the MMU, and Stewart will begin a servicing of the unit. McCandless will then move on to a demonstration of orbital refueling. The procedure under evaluation here is equivilant to what may someday be used to refuel the Landsat satellites and others now in orbit. While McCandless performs the first such refueling demonstration (essentially, he will connect two pressurized lines using special tools and check to see that there are no leaks — a simulation of a hydrazine transfer on later missions), Stewart will don the starboard MMU and repeat the SPAS tracking and docking procedure.

If time permits, McCandless will then don the first MMU — the port MMU used during the first EVA — and conduct a series of flight evaluations to provide data on the unit's handling characteristics.

"More significant than the distance reached from the 'mother ship,' as it were," Boswell said, "is the complexity, the number of different systems being exercised during the STS-11 EVAs."

"We've been planning this for several years, and we've made a special effort not to have the STS-11 EVA become even more demanding than the one planned for STS-13," Boswell continued. "In itself, the Solar Max mission is pretty incredible. We will service systems that were, and some that were not, designed for orbital servicing. The entire thing, both the STS-11 and STS-13 EVAs, are opening an entire new effort in working in space."

Gilruth Center News

Call x3594 for more information

Flower arrangement — Learn how to make floral arrangements in this eight-week course which begins Aug. 11. The class covers basic design, selection of materials and finalization of the product. This course runs from 7 to 9 p.m. and costs $100. Registration deadline is Aug. 9.

Coin collecting — Learn to play the "poor man's stock market" in this course designed for fun and profit. The class meets Aug. 31 and Sept. 7 from 7:30 to 10 p.m. The cost is $12 and the deadline is Aug. 12.

Understanding traffic tickets — In freeway-rich Houston, this class can be valuable in preparing you, should you receive a ticket, and it can teach you how to avoid them. Reckless drivers need not apply. Class meets Aug. 17 and 24 from 7:30 to 10 p.m. The deadline is Aug. 12 and space is limited.

Guitar lessons — This beginning guitar class will focus on simple songs, chords, hand strums and melodies. Intermediate classes will cover music theory and finger picking. Beginners meet Mondays from 7 to 8 p.m. starting Aug. 8. Intermediates meet from 8 to 9 p.m. The cost for both of these six-week courses is $25. Registration deadline is Aug. 5.

Dancercise — Part dance, part exercise, all fun, this class will gradually get you into shape. The eight-week course begins Aug. 16 and meets Tuesdays and Thursdays from 5:15 to 6:15 p.m. The cost is $25 per person.

Speedreading — This course covers the techniques needed to gain greater reading speed and comprehension. The class meets for seven weeks beginning Aug. 23 from 6 to 8 p.m. The cost is $60 and the registration deadline is Aug. 19.

Buying a house — Find out how much home you can afford in today's market, and learn the ins and outs of mortgages, equity, assumables and the like. The class meets for two weeks beginning Aug. 31 from 7:30 to 9:30 p.m. at a cost of $10 per person. Registration deadline is Aug. 29.

Bookkeeping — This class shows you how to set up your books for small businesses and services in the home. It will show you how to keep your personal and business books separated. Bring to class your last statement and a calculator. The class begins Aug. 24 and runs from 6 to 8 p.m. The cost is $20 per person.

Race — The Rec Center's next race will be a 6x5 km or 1 mile relay. You will need four persons per team to compete. The cost is $2 and the race begins at 8 a.m. Aug. 27.

A Japanese Zero model was one of the radio-controlled airplanes demonstrated during Flying Fantasies, a Spaceweek event sponsored by the Houston Section of the AIAA and Spaceweek-Houston. (Photo by Otis Imboden)

Roundup Swap Shop

Ads must be under 20 words total per person, double spaced, and typed or printed. Deadline for submitting or cancelling ads is 5 p.m. the first Wednesday after publication. Send ads to AP 3 *Roundup*, or deliver them to the Newsroom, Building 2 annex. No phone-in ads will be taken. Swap Shop is open to JSC federal and on-site contractor employees for non-commercial personal ads.

Property & Rentals

For Rent: Week at Lake Tahoe vacation condo. Studio Unit. Have asked for Thanksgiving week - may be able to change. Call Faber, 482-7877.

For Sale: Wedgewood, 3/2/2, over 2,000 sq. ft. w/30 x 16 gameroom, landscaped, quiet. Reduced to 70,900. Must see. Call 482-5393.

For Sale/Rent: Newport/League City, 3-1.75-2, fenced, finely finished, low utilities, 60's or rents for $575/mo., located at 2303 Kingsway. Call 554-6200.

For Sale: Hertiage Park, 3-2-2, 1370 sq. ft., dining & breakfast, fireplace, fans, drapes, shades, fence, $67K ($34 eq., $33 G.I., 8% $390/mo.). Call Bernie, 482-5573 after 5 p.m.

For Rent: Galveston Gulf Front Condo. Treat yourself to a relaxing 2 day to 1 month vacation in our completely furnished condo. Low rates. Call Nussman, 488-7762.

For Lease: Alvin area, 10 acres, fenced, on paved road (horses, cattle). Call Damewood, 482-5572.

For Sale: Seabrook area, 1 acre unimproved land, residential, restricted area, nice division off Red Bluff Rd, Red Oak Acres $15,000. Call x5081.

For Rent: Galveston Jamaica Beach, 4 BR, 1.5 BA, Furn., C/A, city utilities, $370/wk. (full & mid-week reservations). Call x2003, or 713/337-3970.

For Sale: Baywind II Condo., 2-2-2, split plan, 2 full baths, fireplace, large living room, walkin closets, W/D conn., patio, low 40's. Call Hiram, x2651 or 488-1683.

For Lease: Kemah, new 2-2.5-1, bayfront house, great view, boatramp, sundeck, ceiling fans, $550/mo. plus deposit. Call Bob, x5451 or 538-1822.

For Lease: Camino South/CLC, 3-2-2 split bedroom plan, fenced yard w/ trees. Available mid-August. Call 488-8440.

For Lease: Sunmeadow, 3 BR, formals, den w/wet bar, screened in patio, fireplace, $650/mo. Call 482-5321 or 486-8153, x105.

For Lease: Pipers Meadow, 4-2-2, mini-blinds, fenced, area pool & tennis. Available immediately, $675/mo. Call Jim x2891 or 486-4083.

For Lease: Tranquility Lake, 1 BR condo., private lake w/lighted jogging path, electronic security gates, covered parking, W/D, no-frost refrig. w/ice maker, microwave oven, fireplace, TV cable option, large trees. Call L. Webster, x3611 or 554-6892.

For Sale: University Trace Condo., 2-2-2, fireplace, wet bar, fenced patio, mini-blinds, security system, W/D, refrig., well kept & assumable. Call 482-1228 after 6 p.m.

For Lease: Baywind II Condo. 2 BR/2 BA, earthtones, fireplace, ceiling fans, utility room, split BR's each w/own BA, 500/mo. Call 480-5329 after 4 p.m.

For Rent: UH area, off I45s. 2 BR, clean, quiet neighborhood. Call Rick, 784-6775.

For Lease: Galveston area, 1 acre wooded estate, 3 BR/3 BA., unfurnished. $695/first & last month, plus deposit. Call 471-4387.

For Lease: Baywind II Condo., 1 BR/1 BA, FP, W/D conn., pool, tennis, exercise & game rm. Call Jim, 944-0451 (evenings).

For Lease: Forest Bend, 2-2-2CP townhouse, extra clean, $375/mo. Call 486-0462.

For Sale/Lease: Nassau Bay townhome, 2-2.5-2, 1400 sq. ft., 2 patios, all electric w/appl., fireplace, ceiling fans, available August. Call x3995, or 333-4379.

Cycles

1983 Honda V-65, 3 mos. old, 1300 miles, superb condition Call Everett, x4414 or 486-1183 after 4 p.m.

Yamaha Enduro 250 trail bike, excellent condition, $375. Call Bill, x3068 or 482-7081 after 5 p.m.

1980 Honda CX-500 Custom, black fairing, rack, garaged, immaculate, $1,450/ offer. Call Stan, x2457 or 488-6822 after 5 p.m.

1976 Honda XL175 M/C, good condition, low miles, helmet, $250. Call Tony, x3987.

1981 Suziki GS550XL, $1,775. Call 482-0789 after 5 p.m.

1979 Honda XL250, good condition, rebuilt engine, new tires, $550 or best offer. Call 538-1382 after 5 p.m.

REWARD $300 for information leading to the recovery of (in usable condition) or conviction of person who stole black'81 Suzuki GS 1100E, license no. 4HR962, black silverstreak fairing w/ "built-in" radio, luggage rack & back rest. Was stolen from motorcycle parking area on south side of Bldg. 4, 7/13/83, during normal working hrs. Contact local police w/info. (Harris County phone: 221-6000, case no. 83-085-109) or Larry Minter, x6327 or 488-7899.

Boats & Planes

For Rent: Piper Lance - 6 place, 160 knots, full IFR, club seating, $85/hr. wet. Call Damewood, 471-1675.

1974 Catalina 27' sloop w/large inventory. Equity & assume 1/2 interest. Call Rudy, x4696 or 482-5181 after 5 p.m.

1983 Glastron, 90 HP, V-4, drive-on trailer, sleek ski boat, like new, need quick sale. Call 488-4069.

Private Pilot Ground School starts July 18, written guarantee C-150 $25 solo, $38 dual. Call Epperson, 337-1713 or 409/925-8288.

Musical Instruments

Epiphone classical guitar, w/case, like new, $220. Call Jerry, x2341.

KLM 2 meter amplifier, 25 watts in, 140 watts out, $100. Call B. Terrell, x2437 or 481-1808.

Conn Constellation Coronet, excel. cond., no dents, 1st & 3rd valve triggers, leather hand grip, 2 mutes; new $375, asking $190. Call Mike, x5592.

Household

Stereo console, can be converted to liquor/storage cabinet, Spanish decor, $55. Corner BR unit, 2 twin beds w/table, $125. Corner table w/built-in stereo, $40. Call x5565, or 333-3425 after 5 p.m.

Modren 40" round coffee table, $35. call 488-1326 after 5 p.m.

Zenith stereo in cabinet w/8 track, AM/FM radio, $250. Rocking chair, maple, $20. Call Dianne, x2558.

Queen size sofa/hide-a-bed, $35. Call Chuck Larsen, x2068 or 538-1477.

Sturdy bunkbed, excel. cond., no matresses, $75. Shopsmith w/accessories, excel. cond., $1,000. Call Judy, 331-1230.

72" dresser w/mirror & 9 drawers, $65; walnut 40" round coffee table, $35; swimming pool "leaf vaccum catcher," $20. Call 488-1326 after 4:30.

Kimball piano, studio model, $300. Call 474-2200.

Sears Gas Dryer, $75; 15 x 7 Ford chrome spoke wheels, $100; dinette/4 chairs, $100; lamps. Call Kochner, x6364 or 488-2390.

Sears 20.3 cu. ft. frostless upright freezer, excel. cond., kept inside home, $100. Call 487-5935 after 5 p.m.

Sears Washer & Dryer, 5 yrs old, white, w/hoses, etc., special settings, excel. cond., $300 pair. Call Shannon, x4831 or Bill x3866 or 331-6260.

Black & White TV, 13", $25. Call Greg, 280-7090.

Electric stove/oven, old but works good, $25; old set of Encyclopedia Britannica books, $15. Call 554-4133 after 5 p.m.

Moving Sale: couch, full bed, dresser, desk, bookcase, lamps, coffee & dining tables. Call x4261 or 488-5592 after 5 p.m.

Sears Kenmore 30" electric range, oven/four burners, almond color, $225 or best offer. Call Tom, x3458 or 554-4178.

Upright freezer, Wards "Signature" deluxe, 16.1 cu. ft., excel. cond., $325. Call Tim, x3105 or 488-6389 after 4:30 p.m.

Custom drapes, wall to ceiling, 12'6" x 8', antique satin, pale green, fully lined, rod and pins, $50. Call Lenett, x2555

Audiovisual & Computers

HP-41CV w/card reader, extended function & two extended memory modules (6K total), extra cards, batteries, manuals, $300. Call Tom Clark, 483-7445.

Dot Matrix printer, RS232 interface, excel. cond., $250. Call Don 280-4267 or 554-6733.

Cars & Trucks

Complete set of 75/76 Ford/Merc/Linc manuals. Also usable on 77 models. Original cost $40 plus, asking $20. Call Faber, 482-7877.

1979 Honda Civic, new tires, runs good, $1,500. Call 554-6733.

1979 Ford Futura Fairmont, 6 cylinder, auto., sports package, A/C, 8 track tape deck w/AM-FM radio. Call Dianne, x2558.

1971 Cadillac Coupe de Ville, excel. shape, no air, $750. Call Dr. Lambert, x2781.

1979 Capri RS Turbo, AC/PB/PS, new TRX Michelin tires, car cover, showroom, 54 K miles, $4,000 firm. Call Dr. Lambert, x2781.

1981 Olds Cutlass, 6 cyl diesel, 37,000 miles, AM/FM tape, $500, take over payment $330. Call Rick, x5341 or 480-8223.

1970 Chevy Impala, 4 door hardtop, '74 engine & transmission, AM/FM cassette, good transportation. Call Walter, x5881 or 947-0128.

1981 Monte Carlo, PS/PB, AM/FM, AC tilt/cruise, trailer package, 32K miles, excep. clean. Call Ray, x5350 or 554-2908 after 6 p.m.

1977 Maverick, fully loaded, needs work, make offer. Call 534-6252 after 5 p.m.

1973 Camaro, Holley carburetor, black jack headers, Micky Thompson valve covers, street dominator manifold, new Kelly tires, slot mags, needs paint. Call 331-4716.

1971 Mercury Cougar XR7, 351 C, runs great, front end body damage (have all new parts), Cragar super sport mags, $600. Call James, x4414.

1980 Gran Prix, silver w/burgundy interior, AM/FM cassette, wirewheel covers, new Michelin tires, perfect cond., $5,500. Call 480-7413 after 5 p.m.

1980 Cutlass Calais, extra clean, mechanically perfect, loaded, 56K miles, sell or trade for clean van. Call Thompson, 332-2229 after 5 p.m.

1980 Datsun B210 station wagon, AC, auto., AM/FM, $3,795, Call Jerry, x6101 or 488-4359 after 6 p.m.

1973 Datsun 240Z, excel. cond., runs perfect, good tires, AM/FM stereo, louvers, 4-speed, $3,950. Call Joe, 488-0658 between 9 a.m. & 3 p.m.

1981 Audi 4000, 4 DR, manual, AC, stereo, 34K miles, metallic blue, $7,500. Call Roberta, x3421 or 480-7207.

1977 Dodge Aspen SE station wagon, V-8, AC/PS/PB, cruise, AM radio, auto., low mileage, Sears steel-belted radials, recent brake overhaul, some body damage, $1,600. Call Stagg x6204 or 481-3086.

New 3 HP minicar, blue fiberglass truck body, very unique (collector's item), $685 (well below wholesale cost). Call Gene, 486-8153 x405.

Wanted

Used textbooks & instruments for first year dental student. Call 480-3658 or 486-8153, x372.

Female non-smoker needed to share w/same, 2 BR/2 BA Egret Bay condo., $200 + 1/2 util. Call Michelle, 474-2501, x316.

Need car pool partners between NASA & Quail Valley/Sugarland area. Call Jack Dunaway, x3771 or 438-1308 after 5 p.m.

Looking for a Tennis partner for practice. Call Stan, x5917 or 944-2752.

Investors in condo. for students at College Station. Call Ed Rainey, x2651 or 474-2988 (evenings).

Wanted 1/2 to 2 acre lot in nice or restricted area, within 15 mile radius of NASA. Call Laurie, x2426.

Want female roommate to share house in JSC ares. Looking to rent house starting in August. Call Marika at x4231 or 480-2760 after 5:30 p.m. (leave message if no answer).

Miscellaneous

"Cooking Cajun" electric Bar-B-Q water smoker, used four times, retails $105, asking $70. Call 280-0860 after 5 p.m.

Overeaters Anonymous - (every Wed. at 11:30 a.m., rm 215) for further info. contact Gil at x3701 or Gilruth Rec. Center.

Five still-life oil paintings, various prices. Call Donna, x4193.

22" Sears self propelled 4 hp lawnmower, $50. Call Chuck Larsen, x2067 or 538-1477.

Seiko wrist watch (man's), quartz alarm, chronograph, never worn, received as gift, $80. Call Tim, x3105 or 488-6389 after 4:30 p.m.

Playground quality, heavy guage galvanized, five place swing set, excel. cond., cost over $350 new, $125. Call 334-3370.

5-ton gaffers/sattler AC condenser unit, compressor, fan motor work, coil needs leak repair $75. Call 334-3370.

Authentic ship hatch covers, $60 & $75. Square baled coastal Bermuda hay. Call 488-8682 after 5 p.m.

Canon FD 80-200 mm S.S.C. f4 zoom lens w/case & Halliburton #103 aluminum case for $300 firm. Call Paul Vincent, x3801 or 538-1281 after 6 p.m.

Swimming pool "leaf vaccum catcher", $20; 6-gal. fiberglass gas tank for boat $25. Call 488-1326 after 5 p.m.

10 x 12 wall tent, wide windows all sides, fly, rear zip-up plastic window, neoprene impregnated nylon floor, carrying cases, excellent cond., $75. Call Jack Dunaway, x3771 or 438-1308 after 5 p.m.

Wood door, 36" x 80"/21 panels, would make good tabletop f/patio or pool area. Call 554-2908 after 6 p.m.

Double wood carved entry doors, 72" x 80", will sell singly ($50) or as set ($100). Call Beth, x5581 or 554-2908 after 6 p.m.

Diamonds, investment quality, registered & documented. Selling .27, .26, .23, .10, & .07 wholesale, the lot $800. Beautiful. Call 486-1089.

LOST: pair foldup sunglasses, left on newstand (Post) in lobby Bldg. 1. Call Drue Stubbs, x3885.

International 1847 Rogers Bros. Silverplate Centennial pattern service for 8 plus 8 serving pieces (48 pieces), brand new, lifetime guarntee, $250. Call 333-2395.