NASA
Lyndon B. Johnson Space Center

Space News Roundup

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News Briefs

TDRS mods to begin

Modifications to the second Tracking and Data Relay Satellite, TDRS-B, will be performed at the Kennedy Space Center by TRW personnel. The modifications will involve installing new circuit boards to correct timing errors in the switching sequences of the satellite. The discovery of those switching sequence problems in late February caused TDRS-B to be pulled from the flight manifest. The current schedule calls for modifications to be completed by June. After that time, the spacecraft will be ready to reenter the launch flow at KSC, officials said, but no launch date has been scheduled as yet.

SII lets array contract

Space Industries, Inc., the Houston-based company led by Dr. Max Faget, former JSC Director of Research and Development, has signed a contract with Lockheed to develop a solar array for SII's Industrial Space Facility. The solar array will be an adaptation of the flight experiment array flown on STS 41-D last August. "This is a good example of the use of NASA sponsored technology to facilitate the emergence of commercial enterprises in the space arena," Faget said. "Access to NASA developed technology is one of the many facets of the Commercial Use of Space Policy that will encourage a number of new initiatives by the private sector." Plans call for the man-tended space facility to be operational by 1989.

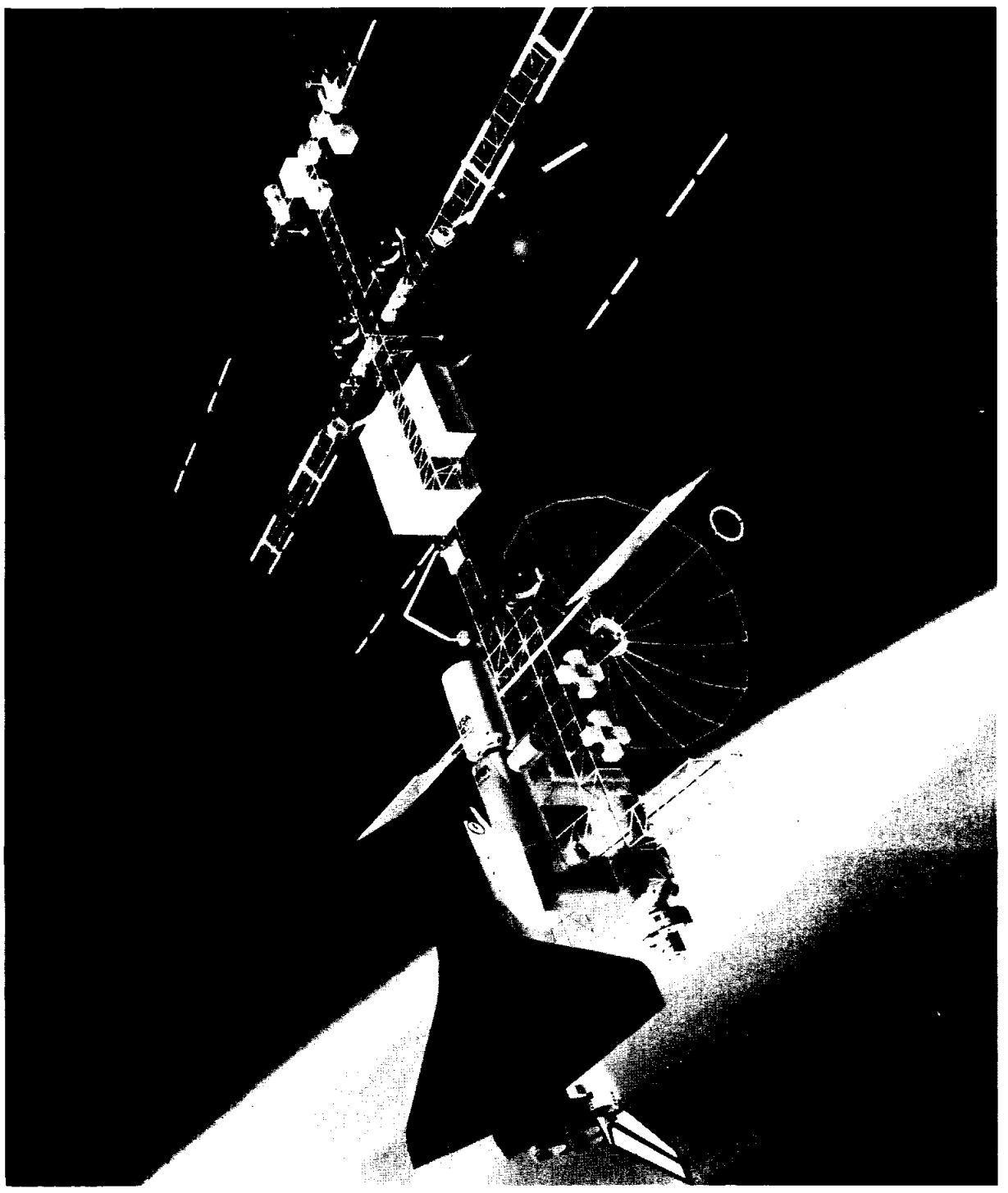
NAS ceremony held

The Ames Research Center held groundbreaking ceremonies March 14 for the Numerical Aerodynamic Simulation (NAS) Facility, a 90,500-square-foot building which will house the world's most powerful supercomputer system. The NAS processing system network will provide a national computational capability which will reduce both the time and cost of developing new aircraft. The high speed supercomputers will be used to solve complex aerodynamic equations which describe the fundamental fluid physics and large scale aerodynamic flows associated with flight. In essence, aircraft designs can be tested by "flying" them in the NAS computer system. A Cray 2 supercomputer, wtih an expected operation speed of 250 million calculations per second, will be the heart of the NAS system when it becomes operational next year. NAS intends to incorporate even faster supercomputers as they become available. The goals for NAS include operation of supercomputers capable of up to 1 billion calculations per second by 1988 and 10 billion calculations per second by the 1990s.

About submissions ...

Civil Service and contractor employees interested in advertising in the Roundup Swap Shop are reminded that submissions must be placed on a JSC Form 1452, available from the Forms Office, Distribution Operations. The one group excepted from this rule is NASA retirees, who may submit the ads as always, preferably on an 8 1/2 x 11 sheet of paper. For all other advertisers, a Form 1452 is necessary, and can be obtained through normal recquisition procedures. The cooperation of our advertisers in following these guidelines is greatly appreciated.

Station Phase B contracts advance



The familiar power tower reference configuration for the Space Station may now begin to evolve in design, perhaps significantly, with the beginning of Phase B work on the project.

After months of intensive in-house efforts, NASA's Space Station Program embarked on a second critical stage last week as contract negotiations began with six industry teams for Phase B.

The Phase B contracts are scheduled to begin April 15 and extend for 21 months. The six industry teams selected — led by Boeing, Martin Marietta, RCA, General Electric, Rockwell and TRW — will work on Space Station elements assigned to the Marshall, Goddard and Lewis centers.

Proposers for the JSC work package — Lockheed, McDonnell Douglas and Rockwell — are still negotiating with NASA. Following negotiations, a report will be presented to NASA Administrator James M. Beggs, who will then award one or more contracts within the next few weeks.

Although the value of each contract will be negotiated, the September 1984 Request for Proposal indicated that the approximate dollar value of each contract to be managed by JSC could be $27 million, by Marshall $24 million, by Goddard $10 million and by Lewis $6 million.

In addition to definition and preliminary design, the contractors will be required to study how those elements of the Station would change were the outpost originally man-tended rather than permanently manned. Contractors also have been asked to pay particular attention to the recommendations of the NASA Advanced Technology Advisory Committee, which is identifying automation and robotic technologies that could be used on the Station.

The Station Program structure calls for NASA to retain the responsibility for overall program definition, systems engineering and integration. The U.S. Government, in other words, will act as its own prime contractor due to

(Continued on page 3)

Repairs to *Discovery* go smoothly

Arnold Levine was driving down NASA Road One, running errands on a day of leave, when he heard on his car radio that *Discovery* had been damaged in an accident at the Cape.

As the Structural Subsystem Manager for the Mid-Fuselage, the news was of intimate professional concern and he quickly phoned the office. Although the news was not good, it could have been worse.

The access platform which struck *Discovery* had made two penetrations into the port side payload bay door. The penetrations were about three feet apart. The deepest was about five inches, the other about three inches. Neither beams, frames nor radiators had been damaged, but the panels themselves, part of the primary structure, would have to be replaced.

As with most elements of Shuttle vehicles, the doors are complex. They are the largest aerospace structures in use today which are fashioned from composite material. A typical payload bay door is made up of subassemblies consisting of graphite/epoxy honeycomb sandwich panels, solid graphite/epoxy laminate frames, expansion joint frames, torque box, seal depressor, centerline beam intercostals, gussetts, end fittings and clips. The doors also contain aluminum shear pins, titanium fittings and Inconel 718 floating and shear hinges. Lightning strike protection is provided by bonding aluminum mesh wire to the outer skin, and thermal protection is provided by blankets of Advanced Flexible Reuseable Surface Insulation (AFRSI). Each door weighs about 2,000 pounds, and the radiators within add another 800 pounds. The doors can be operated automatically or manually through the use of such devices as the data processing system, midmotor control assemblies and electro-mechanical actuator assembly electrical motors.

The graphite/epoxy honeycomb panels which were damaged are part of a series of panels which stretch across the structural framework of the doors, adding rigidity and strength. There are structural frames every 22 inches, and the panels help hold it all together.

After assessing the damages, NASA convened a mishap investigation board and also began work to repair the door. Work began at Rockwell International's Tulsa Division, where the doors were made, to fabricate new honeycomb panels and doublers for the repair. At the same time, work began at the Cape to remove the damaged material.

Workers at the Cape, using carbide drills and hacksaws with diamond tips, removed the honeycomb structure. As they cut out the damaged material, checks also had to be made for any delamination elsewhere in the structure, and the edges of the two holes had to be filed and smoothed for the patching job.

Five days after the accident, replacement panels were at the Cape, a quick effort which earned praise for the Tulsa Division from Levine and others.

From the outside in, a honeycomb panel consists of an outer primary face sheet, a central core of honeycomb material and an inner primary face sheet. For the repair job, doublers also had to be installed to overlap the new and original ,areas of the door, both inside and out. The doublers, essentially primary face sheets, are .016 of an inch thick.

A repair team sent from Tulsa used various epoxies and adhesives to bond the new panels in place. The bonding had to be done at heat and in a vacuum, so heat blankets were layed over the two bonding areas to warm the structure to 350 degrees. Vacuum bags were then layed over that to achieve the right bonding environment. By 4 a.m. March 17, a Sunday, the bonding was completed. An inspection followed at 8 a.m. that day to check the bonding ultrasonically. After that, new surface insulation was layed down, and by the 19th, NASA announced that the door was good as new.

The use of imprecise terminology rendered misleading an article in the March 15th issue of the Space News Roundup. The story, "*Discovery* sustains no structural damage," gave details of the accident March 8 in which a worker was injured and one of *Discovery's* payload bay doors was damaged. Although none of the structural framework of the door was harmed, the graphite/ epoxy panels which were damaged are, by definition, part of the structure, and in that sense the thrust of our story was misleading.

NASA flights begin with X-29 project

The first government flight tests began this week in the joint Defense Advanced Research Projects Agency/Air Force/NASA X-29 flight research program.

The X-29 is a high performance research aircraft that may point the way to the airplanes of tomorrow. A wide variety of advanced technologies have been incorporated into the aircraft, each aimed at producing a better fighter-type aircraft.

The X-29 is a technology demonstrator, and like many other of its X-series program flown by NASA and its predecessor, the National Advisory Committee for Aeronautics, its primary purpose is to provide engineering data for future design rather than to serve as a prototype for production.

The flight research program follows four recently completed contractor demonstration flights flown by Grumman Aerospace Corp., Bethpage, N.Y., builder of the experimental craft for DARPA. All flights are being conducted at NASA's Dryden Flight Research Facility, Edwards, Calif.

The first phase, the initial concept evaluation, of the government flight research program will be flown by NASA, Air Force and Grumman pilots, and will gradually increase the performance of the forward-swept wing aircraft to speeds of approximately Mach 0.6, almost 400 mph, at about 30,000 feet. This phase will include as many as 30 flights and is expected to conclude this summer.

The first three flights, to be flown by NASA test pilots Stephen D. Ishmael and Rogers E. Smith, and by Air Force test pilot Lt. Col. Theodore Wierzbanowski, will concentrate on handling qualities and stability and control aspects of the aircraft in its backup flight control mode, one of three different modes of computer-controlled flight on the X-29. These flights also will provide pilot familiarization and allow smooth program team transition from the contractor to the government. Ishmael will pilot the first flight.

Following the first three government flights, the NASA Dryden control room will be reconfigured from its functional flight monitoring mode, which allows researchers to make sure that the plane's basic systems are functioning properly, to a research mode that will allow the team to expand the aircraft's flight envelope for the second flight research phase expected to begin in early fall, 1985.

Prior to start of the second phase or full envelope concept evaluation, the aircraft's flight control system will be modified to incorporate full envelope flight control system capabilities.

The second phase scheduling calls for as many as 100 research flights by NASA and Air Force pilots to be carried out through October 1986, according to Walter J. Sefic, NASA X-29 Flight Research Program manager. The second phase program is expected to extend the X-29's flight envelope to Mach 1.5, about 1,000 mph, and to 50,000 feet in altitude.

Phase B contracts

(Continued from page 1)

the scope and duration of the program. These efforts will be managed at JSC.

In preparing for Phase B, NASA selected a reference design for the Space Station called the "power tower," one of a family of configurations using similar elements and components. The power tower family is considered a starting point for the definition studies and is expected to undergo significant modifications as the studies progress. Contractors may offer modifications within the concept or other preliminary designs.

Phases C and D of the program will be combined. Those phases will encompass final design and development, manufacture of the components, hardware integration, launch and assembly in a low equatorial orbit about 300 miles above the Earth. Initial operating capability is scheduled for about 1994.

A major objective of the Space Station Program is to bring about participation of international partners as builders and users of the Station. The European Space Agency, Canada and Japan have indicated interest in participating, and negotiations are presently underway. Agreements are expected to be announced within the next several weeks. Funding for such international participation will be provided by the other governments, who will award their own definition and preliminary design contracts in phase with the NASA activity.

Work Package One

Marshall Space Flight Center

This package covers definition and preliminary design of pressurized common modules with appropriate systems for use as laboratories, living areas and logistics areas; environmental control and propulsive systems; and planning accommodations for orbital maneuvering and orbital transfer vehicles.

The contractor teams are:

Boeing Aerospace Co., Seattle — Teledyne Brown Engineering, General Electric, Vought, OAO, Thermacore, Garrett, Hamilton Standard, Life Systems, Lockheed, Umpqua, Perkin-Elmer, Fairchild, Aerojet, Rocketdyne, Rocket Research, Eaton, Sundstrand, Westinghouse, Rockwell Autonetics, TRW, Computer Tech Associates, Hughes, Telephonics and Camus.

Martin Marietta Aerospace, Denver — McDonnell Douglas Technical Services, Hamilton Standard, Honeywell, Hughes, Hercules and Wyle Labs.

Work Package Two

Johnson Space Center

This work package covers definition and preliminary design of the structural framework to which various elements of the Station will be attached; the interface between the Station and visiting Shuttles; mechanisms such as the Remote Manipulator System; attitude control, thermal control, communications and data management systems; a plan for equipping a module with sleeping quarters, a wardroom and a galley; and a plan for extravehicular activities.

The contractor team or teams for this work package are expected to be chosen in April. The teams negotiating for this work are:

Lockheed Missiles and Space Co., Sunnyvale — TRW, Bendix, Hughes.

McDonnell Douglas Astronautics Co., Huntington Beach — IBM, Honeywell, RCA, Ball Aerospace, Computer Sciences, Design West, Communications and Data Systems Associates, Eagle Engineering, Essex, Fluor, Ford Aerospace, Hamilton Standard, ILC Space Systems, SPAR Aerospace and LTV Aerospace.

Rockwell International Space Station Systems Division, Downey — Grumman, Harris, Sperry, Intermetrics, SRI International.

Work Package Three

Goddard Space Flight Center

This work package involves definition and preliminary design of the automated free-flying platforms and of provisions to service, maintain and repair the platforms and other free-flying spacecraft; provisions for instruments and payloads to be attached to the Space Station; and a plan for equipping a module as a laboratory.

The contractor teams are:

General Electric Co., Space Systems Division, Philadelphia — TRW, Essex, Integrated Systems Analysts, Perkin-Elmer, SPAR Aerospace, and Teledyne Brown Engineering.

RCA Astro Electronics, Princeton — Lockheed, Ball Aerospace and Computer Sciences.

Work Package Four

Lewis Research Center

This work package covers definition and preliminary design of the electrical power generation, conditioning and storage systems for the Space Station.

The contractor teams are:

Rockwell International, Rocketdyne Division, Canoga Park — Sundstrand, Ford Aerospace, Harris, Lockheed, Spectralab, Acurex and Georgia Tech.

TRW Federal Systems Division, Redondo Beach — General Electric, Grumman, General Dynamics, Perkin-Elmer, United Technology, Mechanical Technology and Life Systems.

Two small GAS satellites to be deployed on 51-B

NASA plans to deploy two small experimental satellites from Get Away Special (GAS) containers mounted in the cargo bay of the Shuttle orbiter *Challenger* during the STS 51-B mission scheduled for launch in late April 1985.

The spacecraft Global Low Orbiting Message Relay Satellite (GLOMR) and Northern Utah Satellite (NUSAT) will be deployed for $10,000 each under the GAS program, managed by the Goddard Space Flight Center. Officials hope to establish an inexpensive way to deploy small satellites during routine Shuttle operations.

This will be the first attempt at launching satellites from GAS containers.

The GAS containers have been upgraded with ejection systems for the 51-B mission, according to Clarke Prouty, technical liaison officer for the GAS program at Goddard.

"We also developed a motorized door for the can similar to the one first flown on STS-7, which allowed the GAS payload to be exposed to space. The new design is called the Full Diameter Motorized Door Assembly (FDMDA)."

Prouty said the FDMDA enables the GAS container to be insulated before and after the satellite is deployed and provides a means for retaining the satellite in the container in case of a malfunction. He said the spacecraft separation system used in the Delta rocket program had been adapted for these ejection systems. The GLOMR satellite is a data relay, communication spacecraft and is expected to remain in orbit for approximately one year. It was designed and built by Defense Systems Inc. (DSI), McLean, Va.

NUSAT is an air traffic control radar system calibrator. It will measure antenna patterns for ground-based radars operated in the United States and in member countries of the International Civil Aviation Organization. NUSAT has an expected lifetime of approximately six months and was designed, built and tested by Weber State College, Ogden, Utah, in coordination with the Federal Aviation Administration.

The two satellites will be launched at the end of the Spacelab 3 science activities on the sixth day of the seven-day 51-B mission. NUSAT is scheduled to be deployed first and GLOMR shortly thereafter. Satellite operations following deployment from the orbiter will be controlled from independent user ground stations.

The GAS program is available to anyone who wishes to fly a small experiment aboard the Space Shuttle. Space is made available in 2 ½-and 5-cubic-foot containers and experiments must be of a scientific research and development nature.

Twenty-nine GAS containers have flown on Shuttle missions to date. Most have been experiments involving materials processing, life sciences, biology, seed growth, crystal growth and cosmic radiation.

Science investigators chosen for Advanced X-Ray Facility

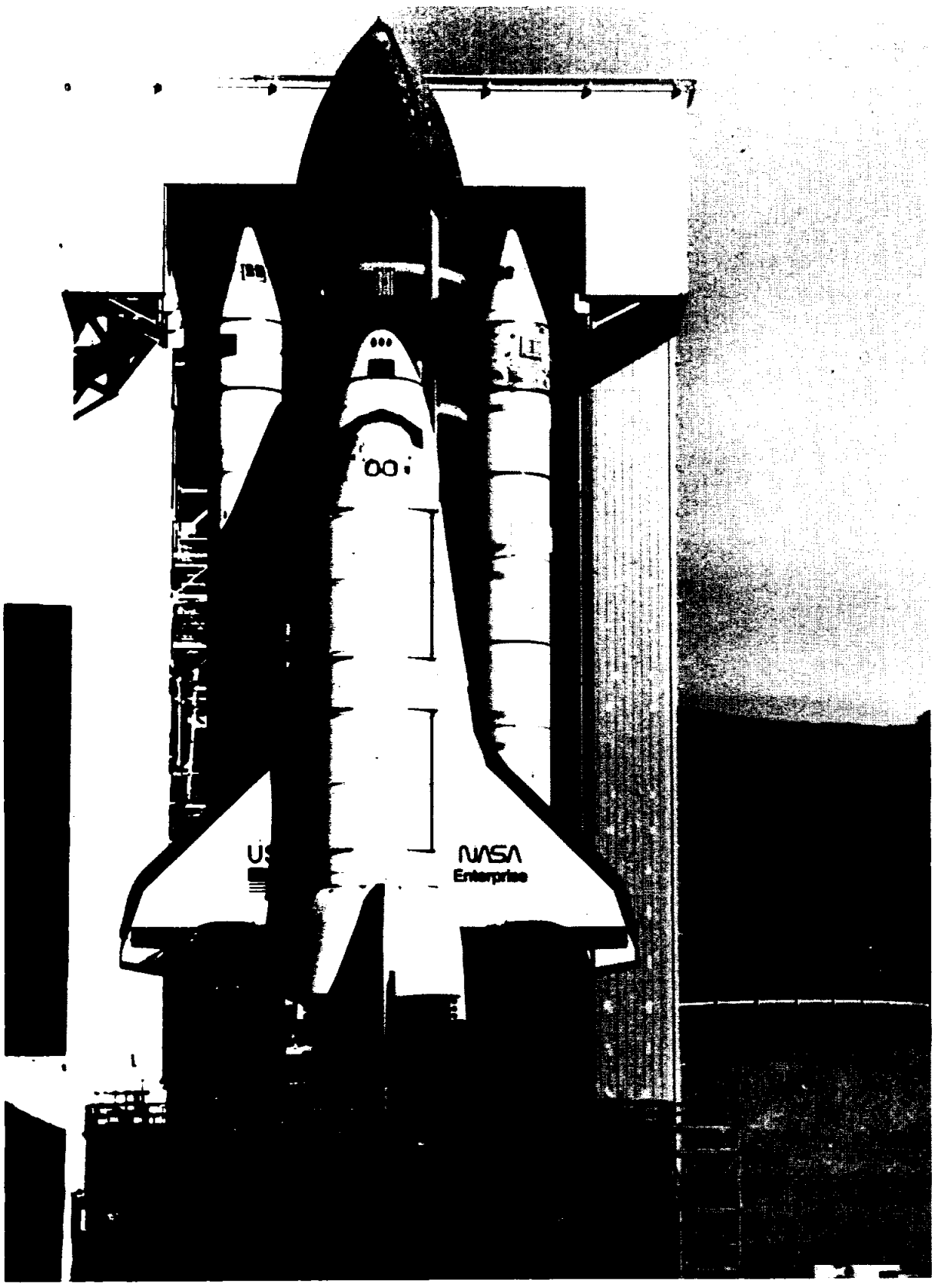
Scientific investigators have been selected for a proposed space observatory which, together with three other planned observatories, will allow the U.S. to scan space in five different wavelengths simultaneously by the mid-1990s.

The proposed Advanced X-ray Astrophysics Facility (AXAF), which could be ready for launch around 1993, would join the Hubble Space Telescope and the Gamma Ray Observatory. With the addition of a fourth planned telescope, the Space Infrared Telescope Facility, the U.S. would be able to scan cosmic sources over infrared, visable, ultraviolet, X-ray and gamma ray wavelengths.

The X-ray facility is planned as a long-lived observatory that would operate in low-Earth orbit for at least 15 years. The basic observatory design consists of a 1.2 meter diameter, 10 meter focal length X-ray telescope housed within a spacecraft carrying an array of instruments.

The facility would be capable of precise pointing and data transmission. Its targets would be X-ray emissions from cosmic sources ranging from nearby stars to distant quasars. Construction of AXAF could begin as early as 1987 or 1988, with launch approximately five years later.

NASA named Dr. Leon Van Speybroeck of the Smithsonian Astrophysical Observatory as the Telescope Scientist. The Agency also selected five instrument principal investigators and five interdisciplinary scientists. The selected investigators will be appointed members of the AXAF Science Working Group which will provide scientific and technical guidance to the project through all stages from initial design to on-orbit operation. Each will receive a specific amount of time to use the telescope during the first 30 months after the AXAF is declared operational.



***Enterprise*, the venerable pathfinder for the Orbiter fleet, stands on the launch pad at Vandenberg Air Force Base in California during form and fit check tests recently. The Shuttle launch complex there is nearing completion for the first anticipated polar Shuttle flight early next year.**

Local section voted AIAA's best

The American Institute of Aeronautics and Astronautics has voted the Houston Section as the outstanding chapter for 1984.

This honor comes at a time when the Houston Section is encouraging interested professionals to join the organization.

The AIAA is divided into six regions nationally, with 66 chapters or sections across the country. The Houston Section, with 900 members, competed with such chapters as the Los Angeles and Orange County sections, with a combined membership of 4,000, to win the outstanding section award.

The AIAA designated the Houston chapter as the section which "most actively advanced the arts, sciences and technology of aeronautics and astronautics and best served the needs and interests of AIAA professional members" during 1984.

Highlights from 1984 which contributed to the award included the largest technical symposium ever sponsored by the section, the subject matter and speakers at the frequent dinner meetings, and a locally sponsored workshop, in conjunction with IEEE, which was held at the request of the Space Shuttle Program Office and which drew participation from all over the nation.

Membership benefits in the AIAA include informational programs designed to provide the latest information in subject areas, technical tutorial programs which allow members to stay current in their professional interests, access to motivational and tutorial tapes and lectures, and annual symposiums which allow research results to be presented to colleagues at JSC.

The yearly membership fee for the AIAA is $51. Interested persons should contact Richard Hermling, Code DH, x4521, or Scott Baird, Code EP, x5495.

The OIG takes complaints

The NASA Office of Inspector General at JSC wants employees to know it takes complaints.

"NASA has an enviable record of efficiency and success, combining the best of private industry and government to accomplish its mission," said Karl Beisel of the NASA Office of Inspector General here.

"Although misuse of government funds or authority has proven to be insignificant in relation to NASA's total budget, such activity does occur," he said. To meet the problem, the NASA Office of Inspector General was established in 1978 to conduct and supervise audits and investigations with an eye to promoting economy, efficiency and effectiveness.

Like all agency OIG chiefs, Beisel said, NASA's is appointed directly by the President to help create an independent unit within the agency. The OIG is a NASA Headquarters operation, and individuals assigned to the field centers report directly to Washington.

Audits and investigations, Beisel said, cover both criminal and non-criminal offenses such as fraud against the government, violations of drug statutes, bribes, waste, abuse, mismanagement, unethical conduct, prohibited personnel actions and others. In practice, investigations often begin with information volunteered by concerned individuals.

The OIG at Johnson encourages legitimate leads from all sources and does take volunteered information by phone, written correspondence and interview. Individuals can remain anonymous and telephone conversations are not recorded, Beisel said. The OIG can be reached at x4773 at JSC, or at (202) 755-3402 (FTS 453-1230) at Headquarters. The Headquarters number is a 24-hour hotline.

Bulletin Board

BAPCO meeting is April 16

The next meeting of the Bay Area PC Organization (BAPCO) will be held at 7:30 p.m. April 16 at the Sheraton Kings Inn on NASA Road One. The topic will be problems and approaches to the design and marketing of games for microcomputers. BAPCO meets regularly on the third Tuesday of each month. For more information, call Earl Rubenstein, x3501, or Hattie Thurlow, x2213.

Spaceweek kickoff meeting set

Spaceweek National Headquarters, a Clear Lake-based group which sponsors Spaceweek activities all over the country each July, will kick off organizational efforts for Spaceweek '85 in a meeting to be held April 10. The meeting will begin at 5 p.m. at the Lunar and Planetary Institute on NASA Road One. Group leaders will explain the concept of the annual event, as well as the goals of the organization. Admission is free and refreshments will be served. For more information, call Bob Runnalls at 333-0838.

ABWA to hold garage sale

The Clear Lake Chapter of the American Business Women's Association will hold its annual garage sale from 9 a.m. to 5 p.m. April 13 at the Clear Lake Elks Lodge in Kemah. Proceeds from the sale will be used as part of the chapter's fundraising efforts in establishing scholarships for young women. For more information, call Marge Holmes at x5505.

Gilruth Center News

Call x3594 for more information

Hayride — Come join the fun at the Rec Center's 2nd annual hayride, which begins at 6:30 p.m. April 5. Refreshments, hot chocolate, hot dogs, chips and music will be provided. Tickets are on sale at Bldg. 11 for $4 per person. The deadline to register is April 4. Call Helen, x3594, for more information.

Beginning jitterbug/swing — This popular course teaches beginners to dance to many types of music, from swing to country and western, honky-tonk and rock. This four week course meets from 7:30 to 9:30 p.m. beginning April 5. The cost is $30 per person.

Tennis — Beginning and intermediate classes in tennis will be offered in April. The first beginner's class will meet from 5:15 to 6:45 p.m. April 9. The first intermediate class meets from 5:15 to 6:45 p.m. April 10. Both classes run for eight weeks.

Biathalon — A new twist on the popular races held at the Rec Center will take place beginning at 8 a.m. April 13 when the first biathalon is held. The contest consists of a 5 kilometer run and a 7 mile bicycle race. The cost is $2 per person.

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

Almost Anything Goes — Teams are now eligible to start the long road of competition that leads to finals at the JSC Picnic May 4. The rules of events in this contest are known only by the Rec Center staff. Teams should consist of four males and four females. The cost is $10 per team and T-shirts will be given. Trophies will go to the winners. Dates for the competition will be determined by the number of entries. The deadline for entries is April 25. Call Helen, x3594, for more information.

Garage sale — Shop the annual Rec Center garage sale from 9 a.m. to 3 p.m. April 27. Tables are $2 per person, first come, first serve. Advanced registration for vendors is required.

Defensive driving — Learn to drive safely and qualify for a 10 percent reduction in your insurance rates for the next three years. The class will be held from 8 a.m. to 5 p.m. May 18. The cost is $20 per person.

Inter-Center race — The next Inter-Center race will be held every Monday through Thursday night, beginning at 5:15 p.m., from April 8 to April 25. One Saturday race will be held April 20 at 8 a.m. Runners can choose between a 10 kilometer or a 2 mile race, or both.

Ladies weight training — This popular course meets Mondays and Wednesdays from 7 to 8 p.m. for four weeks beginning April 15. The cost is $20 per person and enrollment is limited.

Cookin' in the Cafeteria

Week of April 1 — 5, 1985

Monnday — 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 — Seafood Gumbo; Fried Catfish w/Hush Puppies, Braised Beef Rib, BBQ Plate, Wieners & Beans, Shrimp Salad, Stuffed Bell Pepper (Special); Corn O'Brian, Rice, Italian Green Beans.

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 April 8 — 12, 1985

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, Chinese 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.

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

For rent: Galveston/Tiki Island, 3 BR, master bath spa, dock your boat, fish, swim, TV, week-end, weekly, monthly rates. Call 486-9335.

For sale/lease: CLC townhouse, 4-2-2D, FPL, two ceiling fans, fenced, covered patio, VA, 10.5%. Call Dave, x2558 or 480-4208.

For lease: University Green townhouse, 3-2-2A w/loft, courtyard, across from credit union, security system, no pets, prefer adults. Call 488-2392.

For sale: Brookforest, 4-2-2, 2,200 sq. ft., cathedral ceilings, atrium, large MBR w/garden bath, many energy saving extras, $125,000. Call 480-5394 after 5 p.m.

For sale/lease: Lake Shore condo, 2-2-2, water view, W/D, refrig., split BR, pier, pool, clubhouse, $495/mo. plus deposit or $57,700. Call Regelbrugge, 280-3655 or 484-3318.

For sale/lease: League City, two and three BR townhomes, pool, tennis, ceiling fans, marble jacuzzi, garage, move in April 1. Call 333-1508 or 333-4048 after 5 p.m.

Marlin area, 101 acre ranch, lg. old house, utilities, road frontage, tractor, equipment, fruit, nut, oak trees, $825/AC. Call 488-8105 after 5 p.m.

For sale: Hyatt Lake, 17 miles east of Ashland, OR, 6.3 acres, 3K down, 27K assumable, 10% at $306.27/mo. Call (503) 479-0218 or write L. Albert, 4306 Azalea Drive, Grants Pass, OR 97526.

For sale: Dickinson, 2-1, 1983 mobile home, 14' x 64' in adult section of park w/pool, extras, energy efficient, $750 and assume $297/mo. Call Garner, x5827 or 534-3499 evenings.

For sale: East Texas resort timeshare, 2 BR, sleeps 6, whirlpool, take over pymts., less than $5,000 on loan. Call Angela, 944-5786 after 6 p.m.

For sale/lease: CLC townhouse, 3-2.5-2 (carport), completely renovated, new paint, carpet, tile, $65,000 or $650/mo. Call Ed White, x5489 or 480-0273.

For lease: Friendswood, 3-2-2, 1,750 sq. ft., large, open, FPL, ceiling fans, drapes, mini-blinds. Call 482-7181 after 6 p.m.

For sale: 14' x 70' 1981 mobile home on large, fenced corner lot, nice neighborhood, extras. Call 534-2626 after 5 p.m.

For sale: Forest Bend, 4 or 3-2.5-2, pool, six ceiling fans, wet bar, gameroom, trees, formals, no flooding, will pay all closing costs, $76,500. Call 482-4145.

For sale/lease: El Lago, Pebblebrook condo, 2-2, FPL, appliances include W/D, new carpet, ceiling fan, $400/mo. Call 996-0158 after 5 p.m.

For sale: Southern Colorado, lot located in Colorado City, will sell at half value, $4,500 if sold by August 1. Call Cal, x2495 or 470-9938.

For lease: Forest Bend, 3-2.5-2 CP townhouse, living room, den, lot of storage, option to buy, $435/mo. plus deposit. Call 333-2322.

For sale: Fairmont Park, 3-2-2, formal dining, FPL, C/A, 8% VA assum., fenced back yard, cathedral ceiling, ceiling fans. Call Hendrickson, x4053 or 470-2293.

For sale: University Green, 2-2-2 patio home, split BR design, detached garage, utility room, cathedral ceiling, FPL, microwave, pool access. Call 488-0500 or 480-6516 after 5 p.m.

For lease: Pipers Meadow, 3-2-2, dining, FPL, cathedral ceiling, $575. Call 488-0500 or 480-6516 after 5 p.m.

For lease: Egret Bay condo, 2-2-2 CP, W/D, FPL, fan, new carpet, clean, $400/mo. plus $200 deposit and references. Call 486-8551 or 333-5260.

For lease: Baywind I, 2-2-2, split plan, FPL, W/D connections, ceiling fan, built-in bookshelves, $400/mo. plus deposit. Call Roberta, x5441 or 486-9673 after 6 p.m.

Walnut Hill, 1 BR condo for rent, FPL, W/D, extras, $325/mo., deposit required, off Fairmont. Call Charlie, 280-2818 or 488-4578 evenings.

For rent or lease: Deer Park, 3-2-2, fenced yard, near schools, shopping center, available April 1, $500/mo. Call 479-5089 after 5 p.m.

For sale: El Lago/Taylorcrest, 4-2.5-2D, both formals, oversized garden master bath, 2,760 sq. ft., no equity, assumable, balance approx., $126,500. Call Darlene Moore, x2591 or 326-7336.

For rent: Galveston Gulf Front condo, treat yourself to a 2 day to 1 month vacation completely furnished, low rates. Call Nussman, 488-7762.

For rent: Condo for rent, Hawaii, Lake Tahoe, Las Vegas, others, sleeps six to eight, one or two weeks, $450/wk. Call Janice, x5867 or 482-6888.

For sale/lease: Pasadena, 4-3 townhouse, lease $600, sell $54,000; also for sale/lease 10 acres, close in, fenced. Call Damewood, 482-5572.

Lifetime vacation condo on Lake Conroe with exchange privileges to international condos. Call Don, 280-6307 or 554-6205.

For sale: Waterfront lot on 244 acre lake with access to excellent bass fishing in Brazoria County. Call Don, 280-6307 or 554-6205.

For sale: Brookforest, 4-2-2, open home with cathedral ceilings, atrium, ash cabinetry, lg. MBR with garden bath, $125,000. Call 480-5394.

For sale: Friendswood/Regency Estates, 4-2-2, 90 x 130 lot, gas heat, hot water, high efficiency AC, FPL, 1989 sq. ft., $98K. Call Steve Williams, x3421 or 482-3696.

For sale/lease: Nassau Bay, 4-2-2 townhouse, 2,200 sq. ft., new carpet, paint, roof, large sundeck, garage, kitchen, 20' FPL, atrium, reduced to $114,900. Call Jerry, x3561.

For sale/lease: League City, 3-2-2, brick home, 3.5 yrs. old, fenced, $49,500 or $450/mo. Call 481-6453.

For sale: 1982 mobile home, 2-1, 14 x 64, all appliances, W/D connect., no down, assume $286/mo. Call 333-0698 or 480-7278.

For sale: Freeway Manor, 3-1.5-2 (double carport); 5' ceiling fans, den, FPL, equity and assume payments. Call Jim, x3911 or 941-0130.

Cars & Trucks

1981 Ford F250 3/4 ton pickup, 5 passenger, supercab, long bed, 4 spd., 6 cyl., double gas tanks, $4,995 or trade. Call 280-0454.

1980 Cadillac Coupe de Ville d'Elegance, loaded, 56K miles, excellent condition, $8,100. Call 326-3370.

1981 Datsun 200SX, AC, tilt-up, removable skyroof, PS, alloy wheels, $5,500. Call 482-6660.

1980 Chevette, 2 dr., 4 spd., AC, AM/FM/cass., clean, runs well, $1,950. Call Bob, x6327 or 333-4269.

1982 Escort wagon, auto, AC, PS, rear wiper, 40K miles, excellent condition, $4,200. Call Joe, 280-7827 or 946-8825 after 5:30 p.m.

1982 Silverado, diesel, PU, good condition; 1929 Model A Ford, runs well, new tires. Call Cotton Wright, x2211 or 471-5964.

1981 Cadillac Coupe de Ville, all options, perfect; 1984 Chrysler & class., 4 dr., air, auto, wire wheels, stereo. Call Haines, 338-2682 days.

1972 International Travel-all, good work transportation, needs some work, reasonable price. Call Glenn, 334-3132 after 5 p.m.

1980 Citation, 6 cyl., great shape, $2,400. Call Bill, x5378 or 486-0581.

1981 Goldwing Interstate, garage kept, new tires, battery, extras, 10K miles, good condition, $3,500. Call Kenneth Wilson, x4271 or 486-8325 after 5 p.m.

1978 Datsun B210, excellent condition, 98K miles, $1,450. Call Rita Sommer, x4031 or 649-1493 evenings.

1975 Cadillac deVille, $1,600. Call Dean, x5381 or 488-7032.

1977 Chevy Monza, nice body, needs overhaul, 4 cyl., current tags, $345; 1977 Chevy Vega, needs engine, $165; 1973 Toyota Corolla station wagon, needs engine (18R-C), $150. Call Kilbourn, x4544 or 482-7879.

1983 Porsche 944, dark gray, cloth seats, 5 speed, extras, great mileage, 25K miles, $19,800. Call Jim, 333-6706 or 333-5368 (home).

1981 Toyota Celica GT liftback, excellent condition, 5 spd., air, AM/FM, cruise, light blue, 45,000 miles, $6,500. Call 481-6453.

1978 Honda Accord, air, 5 spd., low mileage, runs great, $1,750. Call Craig, x3977 or 420-2936.

1971 Toyota Corolla, 57K miles, AC, runs well, $750. Call Paul, x5435.

1982 Chevy van, Travel Quest conversion, loaded, grey/grey interior, auto, cruise, 40K miles, $13,500. Call 280-8221 after 5 p.m.

1981 Mercury Lynx, air/AM/FM, station wagon version, needs body work, $1,500. Call Dave Kissinger, x2771 or 482-6702 evenings.

1975 Malibu Classic, 2 dr., AC/PS/auto, V-8, 104K miles, good engine, body, inside, warranty, $895. Call Jerry, x3561 or 474-4310.

1975 Malibu, 4 dr., auto, air, PS, PB, radio, good transportation, $900. Call Murray, x2261 or 473-8400.

1980 Mercedes 300 SD, manganese brown metallic, bamboo int., alloy wheels, stereo/radio, mint condition, low 20's. Call 486-1989.

1978 Pontiac Gran LeMans, 305-V8, 107K miles, no problems, $2,200. Call Steve Williams, x3421 or 482-3696.

1971 Toyota Corolla, not running, two 2TC engines that are apart, will sell parts. Call Ray, x6327 or 996-1966.

1971 Pinto, good engine, TX and tires, $200 OBO. Call 479-5089.

1972 Pinto, body in good condition, new radial tires, engine needs work, $300. Call Frank, x4907.

1968 GTO Pontiac, mint condition, 400/400 HP, 4 BBL, 4 spd hurst, make offer. Call 666-5510 or 333-2335.

1974 VW Superbeetle, yellow, excellent condition, cold AC, recent valve job, new battery, good tires, $1,500 OBO. Call 486-4420 or 480-9248.

1984 VW Jetta GLI, excellent, $10,500; 1975 Plymouth window van, V-8, 3 spd., $1,250. Call John, x5301 or 482-8457.

1976 Ford Elite, $1,000. Call Mary Ramirez, x2078 or 538-3672.

Boats & Planes

Airplane rental C-150 $32/hr. wet or 10 hour block $300, Clover Field. Call Paul or Kate, 333-6857 or 482-4430.

1983 Hobie 16', super condition, sailed one season, garaged, racing equipped, harken block, double trapeze, shaped rudders, more, $2,985 w/trailer. Call 280-0330.

19' MFG center console fishing or pleasure boat and sportsman trailer, excellent condition, $3,000 OBO. Call Marilyn Blevins, x6571 or 538-2172.

14' Laser sailboat and trailer, 2 rudders, 2 daggerboards, 2 lifejackets, sail, excellent shape, equipped with boom vang and Cunningham, hull has graphite racing finish, $1,000. Call 474-5601 after 6 p.m.

17' Lowe Line aluminum canoe, excellent condition, in still water 5 times, $250 cash. Call Bill, 326-1600 after 5 p.m.

12' semi-V aluminum Jon boat, $85. Call Ted Guillory, 480-2367.

Piper Lance aircraft, 6-place club seating, $85/hr. wet. Call Damewood, 482-5572.

Cycles

1968 Honda CL 175, needs work, $75. Call Jerry, x4971.

1981 Honda CM400T motorcycle, excellent condition, less than 9,000 miles, $875. Call 482-1821.

1981 Honda CB900F, excellent condition, extras, $1,500 OBO. Call 486-4420 or 480-9248.

1975 Honda 750F Supersport MC, low mileage, excellent cond., $1,000. Call Bullock, 326-4949.

1978 Kawasaki KZ1000 LTD, low mileage, $500 OBO. Call JJ, 334-6821 after 5 p.m.

1978 Honda Hawk, 14K miles, recently rebuilt engine, runs fine. Call Hendrickson, x4053 or 470-2293.

Three-speed bicycle, good condition, $15. Call Janet, x5111 or 554-5968.

1971 Honda CB450, mint condition, Wixom fairing, crash bars, luggage rack, 4,300 actual miles, $1,000. Call 486-9335.

1973 Honda CB350, 4 cyl., fairing, luggage rack, good condition, always garaged, $350. Call Dean, x5381 or 488-7032.

Audiovisual & Computers

RCA color TV, 25 inch, mahogany console, excellent cond., $250. Call 333-2335 after 5 p.m.

19 inch Magnavox color TV w/ Odyssey games, $150 OBO. Call 482-3742 after 5 p.m.

Stereo, small console includes record changer and total six speakers, good cond., reasonable. Call 488-4487.

Commodore CPU and owners manual, cassette drive, choplifter cartridge, special users manual, Atari joystick, monitor and cable, three blank tapes. Call 486-5296 after 5 p.m.

Sears video arcade in perfect condition (needs adaptor) w/10 cartridges and case, $20; Sears stereo, $25. Call 332-8188 after 5 p.m.

Magnavox console stereo AM/FM, 8-track turntable, reel-to-reel, two mikes, oak finish, $250 OBO. Call 482-3742 after 5 p.m.

Pioneer HPM-100 4 way speakers with 12" woofer, 4" midrange, 1.75" tweeter and high dome tweeter, input 100 w/ch, excellent condition, $195/pair. Call 748-5044 after 6 p.m.

Teac A-510 MK II cassette deck, metal tape recording and Dolby NR, fluorescent meter display, like new with packing material and owners manual, $150. Call 748-5044 after 6 p.m.

TRS-80 model 4 computer with 2 disk drives, modem, printer, stand, 35 blank disks, holders, Super Scripsit with training program, some software. Call Ray x6327 or 996-1966.

Apple IIe computer, 128K memory, 2 disc drives, monitor, printer, $1,500 firm. Call Lou, x4266 after 3 p.m.

Household

Girls canopy bed w/mattress, dresser w/mirror, night stand, chair, maple, $350. Call Kandy, x7256 or 482-2750.

Chair-bed, opens into twin-size bed, good cond., $50; pedestal chair, contemporary, fiberglass, $25; rocker-recliner, vinyl, $35. Call 486-8266.

Stuffed sofa, (double hide-a-bed), matching stuffed chair, ottoman, plus six chintz pillows, $250. Call Sue, 486-8016.

Two super-single waterbeds w/headboards, 14 yr. guarantee, mattress, liner, heater, excellent condition, $100/each. Call Janice, x5867 or 482-6888.

Modern walnut bedroom set, dresser, mirror, chest, night stand, bed, excellent cond., $300. Call Joe, 280-7827 or 946-8825 after 5 p.m.

Pets

Kishound pups, 4 wks. old, 1 poodle, $50/each. Call Jim, x3911 or 941-0130.

Golden Cocker spaniel, male, under 2 yrs. old, military move, $25. Call Dianne, x2557 or 480-4208.

Wanted

Visiting scientist wishes to rent home from May 1, 1985 to August 1, 1986, minimum 3 BR, two children, Clear Lake area. Call Mike Greenisen, (414) 962-5943 — Wisconsin, collect calls O.K.

Used 16" bicycle. Call 471-1488 after 6 p.m.

Female roommate for room with private bath, kitchen privileges, non-smoker preferred, $200 plus half utilities. Call 280-9377.

Scuba divers for Caribbean trip, unlimited diving, airfare, room, food, tanks, $850. Call Charlie, 480-3260 or Earl 326-1953.

Riders for vanpool, Meyerland Plaza to NASA, share expenses. Call Richard Heetderks, x3583.

Female housemate for 3-2-2 in Baycliff, $200/mo., must like pets. Call 559-2763 or 474-4687.

Electric trains. Call Don Jeffers, x2449.

Carpool from Galveston to NASA, Monday and Friday, 7:30 to 4 p.m. Call Rick, x5341 or 480-8223.

Carpool from Northeast-Kingwood, Humble, Atascosita area, 8 a.m. to 4:45 p.m. shift but flexible. Call Afshin, 333-6104.

Built-in dishwasher, cheap, must work. Call Cal, x2495 or 470-9938.

Single, non-smokers to share social good times. Call SNS, 333-4739.

Roommate to share 3-2 in Friendswood, fully furnished, waterbed, microwave, W/D, cable TV, $170/mo. plus 1/3 utilities. Call Joey, x6193 or 996-9162.

New partner for Pearson Wanderer sailboat, 30 ft., a minimum cost way to sail, financing available. Call 474-3319 after 4 p.m.

Pickup truck up to 3/4 ton, can have bad engine. Call Dennis, x5437 or 554-4233.

Miscellaneous

350 V8, 4 bolt mains, VW engine, parts; 20 cu. ft. freezer still in warranty, make offer. Call Dennis, x5437 or 554-4233.

Water ski, Jobe's open class, 67 inch with carry case, excellent condition, $300. Call Walter Jr., 532-4766.

Nickel-plated Gemeinhardt flute, good condition, $125. Call Bianca, 480-4256 after 3:30.

Astronomical telescope, 8 inch Newtonian on mount with clock drive, tubel sealed w/optical window, perfect condition, $1,700. Call 747-3977.

Alpaca fur rug, two 4 x 6' and one 5' round, new, $250 each. call John, x5301 or 482-8457.

Shop Smith w/bandsaw & joint, accessories, $1,500 OBO; Sears 10" radial saw $275. Call Mary Ramirez, x2078 or 538-3672.

Guy Coheleach collector prints, koala bear, raccoon family, tiger head. Call Linda, 333-9234 evenings.

Richard Timm wildlife collector prints, set of 40, will sell individually, 22 x 28". Call Linda, 333-9234 evenings.

Seven foot solid slate pool table, sticks, balls, excellent condition, $300 OBO. Call 488-2678.

Ariens riding lawnmower, repaired, but not running, $200; Harley Davidson golf cart in good running condition, $500. Call John, 326-2402.

2,500 lb. class II trailer hitch fits 1983-85 Ford LTD/Mercury Marquis, $25. Call Bob, 554-4175 after 5 p.m.

Official 5' x 9' tennis table, .75 inch particle board top, folds for storage and playback, $50. Call 488-5422.

Lowry Genius organ, computerized keyboard, style, rhythm cartridges, can play many different voices, $1,700. Call Ron Arthur, x5271 or 332-1289.

Teakwood desk, $700; lamps, $60/pair; Head 210 cm skis, $50; Wards 19.6 CF refrig., $400; moped, $300; couch/loveseat, $310; hi-output kerosene heater, $110. Call Jim, 333-6706 or 333-5368.

1890 antique trunk, Lord & Taylor, large w/lift-out tray, $150 or trade. Call 280-0454.

1984 World Book encyclopedia, new (still in box), $375; Childcraft, full set, new; $150; Goodyear Viva fiberglass radial, FR78X15, not used, $35. Call Kilbourn, x4544 or 482-7879.

Sears 17 cu. ft. upright freezer, frost-free, coppertone fine, excellent condition, $195. Call 488-4487.

Rent my motor home by day or week, self-contained with onboard generator, roof air, the comforts of home on wheels. Call Dave, x5111 or 480-0202 after 6 p.m.

Commodore II electric typewriter with case, several features including memory correction, $275 firm. Call Donzelle, x3336 before 4 p.m.

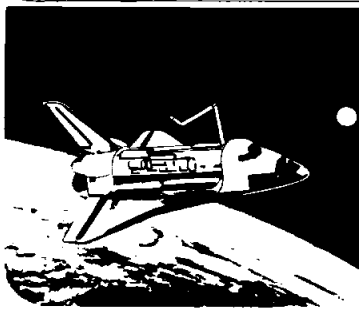
Three prom dresses, size 7 - 1, one violet, one blue & white, one lavender, worn once each, $10 to $30. Call 474-5601 after 6 p.m.

Bulletin Board

JSC Picnic tickets to go on sale

"Pursue a Non-trivial Picnic" is the theme for this year's JSC annual picnic event set for May 4 at the Gilruth Recreation Center. The day's festivities will include clowns, face painting, a palmist, belly dancer, bingo, and a dunk tank. Also featured are two square dance groups, country-western and rock bands for the adults and teenagers and rides and games for the kids. A Borden ice cream truck will be serving from 11 a.m. to 5 p.m. and a Texas style barbecue with all the trimmings will be served from noon to 3 p.m. Because parking lots near the Rec Center are likely to be full early on, a shuttle bus will run from parking lots near the JSC fire station to the picnic grounds. Tickets for the picnic will go on sale the second week in April at the Bldg. 11 Exchange Store. Those interested in participating in the "Almost Anything Goes" team competition must attend pre-picnic preliminaries. For more information on that event, call Helen Munk at x3594.

NASA
Lyndon B. Johnson Space Center
Space News Roundup



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NASA-JSC