

Space News Roundup

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National Aeronautics and Space Administration

News Briefs

Lockheed gets contract

NASA has selected Lockheed Engineering and Management Services Co. of Houston for negotiations leading to the award of a contract for engineering support services at JSC. The new contract will consolidate work currently being performed by Lockheed, McDonnell Douglas Astronautics Co. and Northrop Services, Inc., under three separate contracts. The work will include research and development support services to all elements of the Engineering Directorate and to specified elements of the Space and Life Sciences Directorate. The cost-plus-award-fee contract will have a basic performance period of two years beginning in May 1987. The contract also contains three two-year options. The total estimated cost proposed by Lockheed for the eight-year period is approximately \$655 million.

ETM mods planned

NASA and Morton Thiokol have decided the solid rocket engine test motor (ETM) needs to be reworked before firing. The test was scheduled for late March but is now expected to take place in early to mid-May. The change is not expected to delay other test motor firings or the STS-26 target launch date. A Feb. 23 firing of the Joint Environment Simulator provided data that indicated potential insulation bonding deficiencies in the "U" seal of the ETM case joints. The rescheduled ETM test will use 51-L type seals, and allow evaluation of an improved exhaust nozzle and case-girdling bands that limit case joint rotation.

Barrios gets repair contract

Barrios Technology of Houston has been selected by JSC for negotiations leading to a cost-reimbursement contract for instrument calibration and repair services. Estimated cost of the five-year program is \$8.6 million. The contract will cover maintenance and calibration of reference, transfer and working standards instruments, and maintenance of National Bureau of Standards Measurement Assurance Programs. The contract also covers work on the Meteorological Information Management System.

Pioneer 12 studies comet

NASA's Pioneer 12 spacecraft, now in orbit about Venus, has begun six weeks of measurements of the newly discovered Comet Wilson as it streaks by Venus and arcs past the Sun. Controllers at Ames Research Center used Pioneer 12 to track Wilson from March 14 until March 21, when the comet dipped beneath the plane of the Solar System and Pioneer's field of view. Observations resumed March 31 and will continue through April 30. This period will include the comet's closest approach to the Sun on April 20. The comet will be tracked 20 hours a day during observation periods. Comet Wilson, discovered in August 1986 by Christine Wilson, a Ph.D. candidate at the California Institute of Technology, is thought to be a fresh comet embarking on its first visit to the Solar System.

How to see the supernova

In response to a local newspaper's suggestion that viewing the recent supernova in the Large Magellanic Cloud is possible from Brownsville comes this sage advice from "StarSCAN," the newsletter of the JSC Astronomical Society. "Go outside around 1930 CST and face south," advises writer Matt Delevoyas. "On the other side of the 1,400 miles of Earth at which you are looking, you will find the supernova. From Brownsville, the view is improved by 550 or so miles of solid rock, but over 800 miles remain."



The Orbiter Atlantis, back from Launch Pad 39A following last fall's tests at the pad, hangs suspended in the Vehicle Assembly Bldg. during demating recently at the Kennedy Space Center.

Reagan approves revised Station baseline design

President Reagan last week approved a plan for a revised Space Station baseline configuration that will establish a permanent U.S. presence in space by 1996.

As currently envisioned, the first phase of the Space Station, the revised baseline configuration, would provide an initial, permanently manned research capability in 1996 with capabilities for scientific activities, particularly in microgravity and life sciences.

The new configuration also would provide for the conduct of scientific experiments in Earth observations and astronomy and enable future growth for Earth orbit capabilities and for missions into outer space. This phase will accommodate international involvement.

NASA will now seek Congressional approval to release requests for proposals to industry for a phased development of the Space Station, including estimates for an enhanced-capability Space Station configuration.

The revised baseline Space Station configuration approved by the President would include the U.S. laboratory and habitation modules, four resource nodes, the U.S. polar orbiting platform and experiment provisions outside of the pressurized modules.

The initial configuration also would include elements to be provided by the European Space

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JSC adopts stricter smoking policy

Citing smoking as "Public Health Enemy Number One," JSC Director Aaron Cohen has set forth a policy of stricter guidelines for smoking on-site, coupled with a series of JSC-sponsored workshops to help smokers kick the habit.

"Because JSC is a responsible employer genuinely concerned about employees health, I have concluded that action must be taken now to minimize involuntary exposure to passive tobacco smoke

in our workplace," Cohen said in an announcement to all employees.

The new policy becomes effective April 6.

Under the new guidelines, smoking will not be allowed in offices shared by more than one person, where one of those employees prefers a smoke-free environment. "I anticipate that people in shared work areas will usually be able to reach an agreement among themselves concerning

smoking. If an agreement is not reached, however, then an individual who prefers no smoking must notify his or her supervisor," Cohen said.

The supervisor will be expected to make an attempt to accommodate both the smoker and nonsmoker, Cohen said, by such actions as moving furniture or putting smokers and nonsmokers in separate offices.

"If such accommodation is not practical or is ineffective," Cohen

said, "then the supervisor will not permit smoking in the area."

All conference rooms, classrooms, auditoriums, elevators, stairways, restrooms and libraries on-site will be designated non-smoking areas. Other areas where smoking is prohibited will include the JSC Clinic and facilities such as clean rooms or flammable materials areas where smoking must be banned due to operational or safety

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Atlas failure investigated

An investigation board began looking into the launch failure of Atlas Centaur 67 last week as debris salvage operations continued off the coast of the Kennedy Space Center.

Board Chairman Jon R. Busse, Director of Flight Assurance at the Goddard Space Flight Center, said initial evidence pointed to some sort of electromagnetic phenomenon as a possible cause of the loss of the \$78 million rocket and \$83 million payload.

"There certainly are a lot of strong indications electromagnetic phenomena are associated with the failure of Atlas Centaur 67," Busse said, but he said it would be premature to identify lightning as the specific cause, as has been widely speculated.

Busse said four lightning strikes, occurring at 40-millisecond intervals, were recorded near Launch Complex 36B at Cape Canaveral Air Force Station. The strikes were recorded at an azimuth of 11 degrees and 1.9 miles from the pad, he said.

Busse also said that large current and voltage transients were recorded on the AC batteries prior to loss of the vehicle.

The sixty-seventh Atlas Centaur mission, carrying the Fleet Satellite Communications-6 payload (FLTSATCOM-6), was launched at 3:22 p.m. CST March 26.

According to program officials, countdown and liftoff proceeded without difficulty. But at about 51 seconds into the flight, the vehicle executed a hard pitchover, and multiple pieces were being tracked on radar when a destruct command was sent by the Range Safety Officer. The vehicle was then at an altitude of 14,250 feet and approximately one-half mile down range from the launch complex.

The investigation board, chartered by Associate Administrator for Space Flight Rear Admiral Richard H. Truly on March 27, is to report its findings no later than May 25. The board's charter includes investigating the accident and recommending corrective actions.

Other members of the board are: Kenneth J. Cox, Chief of the Avionics Systems Division at JSC; William C. Bradford, Director of the Information and Electronic Systems Lab at the Marshall Space Flight Center; Creighton A. Terhune of Integration Office, Kennedy

Space Center; Norman C. Wenger, Chief of the Instrumentation and Control Technology Office at the Lewis Research Center; Robert C. Baumann, Deputy Director of the Flight Projects Directorate at Goddard; USAF Lt. Col. John Kim, Commander of the Weather Detachment at Eglin AFB, FL; USAF Col. John W. Allsbrook, FLTSATCOM System Program Director; and Bruce D. Fisher of the Flight Applications Branch at the Langley Research Center.

Affiliates to the board are: Robert C. Weaver, Associate Chief of the Special Payloads Division at Goddard, who will act as Executive Secretary; Richard H. Mundy, KSC Deputy Chief Counsel, who will act as Legal Counsel for the board; Hugh W. Harris, KSC Public Affairs Deputy Director, who will handle public affairs matters; Wayne R. Frazier of NASA Headquarters and Charles R. Billings of KSC, who will offer safety, reliability and quality assurance expertise to the board; John P. Castellano, representing the Headquarters Office of Space Flight; and Philip J. LaTulippe, representing the Naval Space Command.

Huntoon will head Space & Life Sciences

Carolyn Leach Huntoon, Ph.D., has been named to succeed Joseph P. Kerwin, M.D., as Director of Space and Life Sciences at JSC. The appointment was effective upon Kerwin's retirement April 1.

Dr. Huntoon, an endocrinologist, joined JSC in 1970 as a senior physiologist. She became chief of the Biomedical Laboratories Branch in 1976 and since 1984 has served as Associate Director of JSC. She has also served as a member of astronaut selection boards since 1978.

During her 17 years with NASA, Huntoon has been the recipient of numerous awards, including both the NASA Exceptional Service Medal and the Exceptional Scientific Achievement Medal, the highest honor that NASA gives to a scientist.

The University of Texas Health Science Center selected Huntoon as the Distinguished Professional Woman of the Year for 1985.

Bulletin Board

Clinic to offer mammography screening

The JSC Clinic will begin offering mammography screening to employees in May. The tests will be offered to employees above the age of 50 during their regular annual physical examinations. "Mammography is the most reliable method of detecting breast cancer," said Dr. Charles Bergtholdt. "Early detection of breast cancer offers the highest cure rate, and mammography can detect a problem even before it can be felt." Two thirds of the more than 100,000 women who will be diagnosed with breast cancer in 1987 will be 50 years of age or older. The clinic plans to begin offering mammography screenings to other age groups in Fiscal Year 1988.

Thrift plan open season ends April 30

Civil Service employees are reminded that the first open season for the Thrift Savings Plan retirement system ends April 30. Employees who are covered under the Civil Service Retirement System as of March 31, 1987 are eligible to participate in the open season. Employees who have been covered under the new Federal Employees Retirement System since Jan. 1, 1987 and covered under the Interim Plan prior to the first of the year are also eligible to participate in the Thrift Savings Plan. The next open season election periods will be held in July 1987 and January 1988, according to the Personnel Office.

JSC Picnic tickets on sale in Bldg. 11

Tickets are on sale through April 29 for the 1987 JSC Picnic, to be held from 11 a.m. to 6 p.m. May 2 at the Gilruth Recreation Center. The tickets, available at the JSC Exchange Store in Bldg. 11, are \$3.50 for adults and \$2.50 for children (12 and under). All Civil Service and contractor employees and their families are welcome.

Hispanic professional engineers to organize

Organizers are establishing a Clear Lake Chapter of the Society of Hispanic Professional Engineers to develop programs which benefit Hispanic students and to promote the advancement of Hispanic engineers and scientists. An open house and organizational meeting was held April 10, and a second meeting will be held from 6 to 8 p.m. May 15 at the Village Green Clubhouse at Space Center and Bay Area Blvds. Membership in the society includes engineers, technicians, computer operators, educators and others with related careers in engineering and science. For more information, call Elias Sanchez-Perez at 282-7196 or 332-9026 evenings.

STS architecture is topic at lunch and learn

Charles Mallini of the Advanced Programs Office will discuss the NASA/U.S. Air Force Space Transportation Architecture Studies at the next Lunch and Learn session sponsored by the Space Systems Technical Committee. The meeting will be held at 11:30 a.m. April 23 at the Bldg. 3 Cafeteria. For more information, call Andre' Sylvester at x31537.

AIAA session offers Space Telescope overview

Burtram R. Bulkin, Space Telescope Program Manager for the Lockheed Missiles and Space Co., will be the featured speaker at the next AIAA dinner meeting April 23 at the Gilruth Center. Bulkin's overview of the Hubble Space Telescope program will include current status, launch and assembly plans and future operations. The activities will begin with a social hour at 5:30 p.m., dinner at 6:30 p.m. and the program at 7:30 p.m. The menu features a Chicken Imperial dinner. Tickets are \$8 for members and spouses, \$10 for non-members and \$7 for students. Dinner reservations are required except for those who wish to attend the program only. For reservations, call Pat at 333-4150, Susan at x30401, Joni at 280-1500, x3499, Dee Dee at 333-6492 or Judy at 282-4552.

BAPCO to meet April 21

The next meeting of BAPCO, the Bay Area PC Organization, will be held at 7:30 p.m. April 21 at the Holiday Inn on NASA Road One. The group is open to all persons with an interest in microcomputers. BAPCO meets regularly on the third Tuesday of each month. For more information, call Earl Rubenstein, x33124 or Jack Calvin, 326-2983.

Lotus upgrades available from DPSD

Lotus 1-2-3 upgrades from version 1a to 2.0 are now available from the Data Processing Systems Division (DPSD). The upgrades are \$140 per package. Users are required to submit a service request to DPSD asking for the upgrade. The forms can be mailed to the SR Office, Code FD3, or taken to Bldg. 12, Rm. 294. The original Lotus manuals and system disks will be collected when the upgrades are delivered. A maintenance upgrade from 2.0 to 2.01 is also available at no cost. A service request form is required, but no manuals or diskettes will be collected when the upgrade kits are distributed. For more information on the upgrades, call the DPSD Help Desk at 280-4800.

Symphony League spring concert set

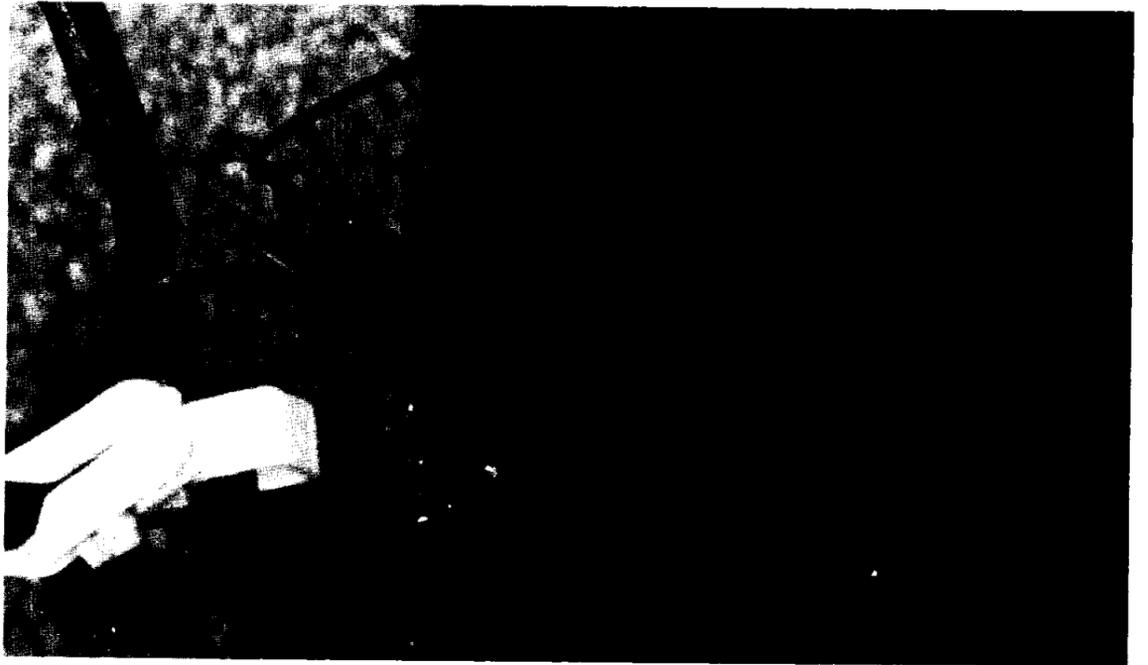
The Bay Area Symphony League will present a Spring Pops Concert at 8 p.m. April 25 in the Atrium Bldg. at the University of Houston-Clear Lake. The program, a tribute to the late Boston Pops conductor Arthur Fiedler, will include Verdi's "Overture to La Forza del Destino," De Falla's "Ritual Fire Dance," Ives' variations on "America" and Grofe's "On the Trail" from "Grand Canyon Suite." Other selections include Mancini's "Pink Panther," Friedman's "Rock Around the Clock" and Tchaikovsky's "Capriccio Italien, Op. 45." General admission tickets are \$8 and are available at the UH-CL ticket office, the Clear Lake Area Chamber of Commerce at the Safeway Stores Bay Area Blvd. and Space Center Drive and Kirby and NASA Road One. For more information, call 282-6105 or 480-4512.

NASA
Lyndon B. Johnson Space Center

Space News Roundup

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Assistant Editor Kelly Humphries



Employees of Bldg. 15 were surprised recently to find two mourning doves nesting in the basket of a bicycle outside their windows. The doves were doing fine when last seen, but the bicycle will be stationary for the next several weeks.

MOD strives to communicate better

By Barbara Schwartz

A special committee established within the Mission Operations Directorate (MOD) is working to improve communication and solve problems in 11 other human resources management areas.

Vehicles being used to improve communication include expanded regular morning conference calls, more widely distributed notes on key meetings and Directorate log items, and a newsletter called "MOD Focus."

"Success in any large organization depends on good communication. When you have an organization as large as MOD, if you want productivity, you've got to have good communication," said Ray Dell'Osso, chairman of the MOD Human Resources Committee (MHRC). "A super way to communicate is the MOD morning telecon."

The morning telecon is a conference-call system set up in meeting rooms throughout the Directorate. Section chiefs and above meet every morning for about 10 minutes beginning at 8 a.m. to go over major activities of the day.

MOD Director Eugene Kranz has said he is willing to expand the telecon, Dell'Osso said, making it open to all employees.

Lack of communication was one of the biggest areas of concern identified by an employee opinion survey conducted by Hay & Associates, a consulting firm hired in 1985 to help improve MOD's work environment. Hay consultants did an in-depth study of the organization and interviewed key members before developing the employee questionnaire. Names of the civil service employees surveyed were kept confidential.

After the results were given to Kranz, he asked the Training Division to form a committee to implement some of the recommendations. The Training Division was selected because they had worked with the Hay people to organize the study.

An ad hoc committee was formed in April 1986 to evaluate the Hay survey results. Representatives from each division and office studied

the report. Fourteen two-hour meetings were held to define action items and group them in five categories: technical, administrative, personnel, management and human resources.

Kranz supported the committee's recommendations and directed them to establish a permanent committee to try to implement the action items.

Career development and planning was another area of concern to MOD employees. The MHRC has defined and developed some non-supervisory GS-14 positions in MOD. The jobs, which will include technical management but not employee supervision, will be announced through the competitive process.

Jack Kochner, who developed Personnel's Career Planning Workshop, also will be working with each MOD division to help employees understand the options available to them. Kranz sent information to employees on career planning and briefed his staff on their supervisory responsibilities. Employees have been encouraged to fill out career development plans and to review their goals, interests, and accomplishments with their supervisors.

Dell'Osso said the MHRC also is trying to develop opportunities for cross training.

"We tried it with someone from my branch and Jim Saultz' branch. We had one of their flight controllers come see how the Training Division operates because we do the training for flight controllers in the integrated sims. We also had one of our senior instructors go work in flight control for six months. They both had fantastic raves about it," Dell'Osso said.

Representatives from each division (one supervisor and one non-supervisor) and office in MOD serve on the MHRC. Sue Leibert from Personnel and Raul Mejia from AFGE sit on the Committee in an advisory capacity. Meetings are held every two weeks to work the existing action items and to establish new ones.

Leibert, a non-voting advisor, said she provides information on Personnel guidelines, regarding pro-

motion policy, career ladders, and makes the Committee aware of other available resources such as training courses. She said all MOD supervisors soon will be taking the Sterling Institute supervisory training course offered by Personnel's Training Branch.

"Employees fill out questionnaires about their supervisors," she explained. "The results are computerized and printed out on a graph. As a supervisor, you can see how you rate in four different categories. There is a comparison of what you think the employees will say, what you think about yourself, and what the employees do say. Some supervisors have all three very different, others are fairly close," she said.

The Training Division and MOD staff were the first to take the Sterling Institute training course.

"I think everyone who took it has gone back to their employees and tried to improve the areas they are weak in—delegation of authority, feedback, or whatever it might be," Dell'Osso said.

Dell'Osso said MHRC is working on expanding MOD's personnel data base to include other things like personal interests, employees' participation in various professional and community organizations, and languages spoken by employees. One way it could be used is to locate the appropriate person to fill a speaking request.

Since work space is tight in most areas, the MHRC has sent out memoranda on office environment. Each Division is trying to clean up their work areas by moving large old documents into storage and improving furnishings as resources permit.

Leibert said she thinks the MHRC is effective because it has commitment from the Director and the employees.

There has been some discussion about having a followup climate survey done since it has been a year since work began on the tasks identified as a result of the Hay survey.

"The questions would see if we're hitting the mark or if we need to go in a different direction," Dell'Osso said.

New smoking policy

(Continued from page 1)

reasons. Government vehicles are also areas where smoking is prohibited when any passenger objects to smoking, Cohen said.

Areas where smoking is permitted include private offices, at the election of the occupant, shared offices and work areas where all occupants agree to permit smoking, corridors, lobbies, vending rooms, designated smoking areas of the cafeterias and outdoor areas, except in the proximity of hazardous or flam-

mable materials.

"Recognizing that it can be difficult to stop smoking and that many smokers would like to quit,"

Cohen said, "I wish to announce concurrently with the adoption of this policy that a series of smoking cessation workshops will be offered at JSC in the near future to assist those who want to quit." Cohen said details of the program will be announced soon, and that employees with questions on the new policy should call the Personnel Office at x32358.

Nebrig named to Cohen staff

Daniel A. Nebrig, Deputy Director of Administration, has been reassigned to JSC Director Aaron Cohen's staff as Executive Assistant. He will assume many of the duties previously held by the associate director.

Nebrig joined JSC in 1963 in the Apollo Spacecraft Program Office and was Senior Project Engineer for Apollo 7. He has served as Chief of Program Control for the Orbiter Project and was the Executive Assistant to the Associate Administrator for Space Flight at NASA Headquarters from 1976 to 1978.

President approves revised Station baseline plan

(Continued from page 1)

Agency through its Columbus laboratory module and polar platform, the Japanese through their experiment module and the first phase of Canada's mobile servicing system. The new Station design, like the Dual Keel version, will accommodate a crew of eight people.

The estimated cost of the revised baseline Space Station configuration is \$10.9 billion in 1984 dollars. In addition, NASA estimates that the basic engineering and technical support activities at the NASA field centers will need to be augmented by approximately \$1.3 billion (also in 1984 dollars) over the next eight years to support the Space Station.

NASA completed a Space Station cost review in January following more than three years of extensive definition studies, technology development and a significant commitment of resources prior to start of construction. Based on the extensive definition and technology development activities and substantial input from users, NASA developed the original baseline Space Station configuration consisting of U.S. laboratory and habitation modules, four resource nodes, two free-flying platforms, power supplied by solar cells and a solar dynamic system, a servicing facility and accommodations for external payloads attached to an extensive truss structure.

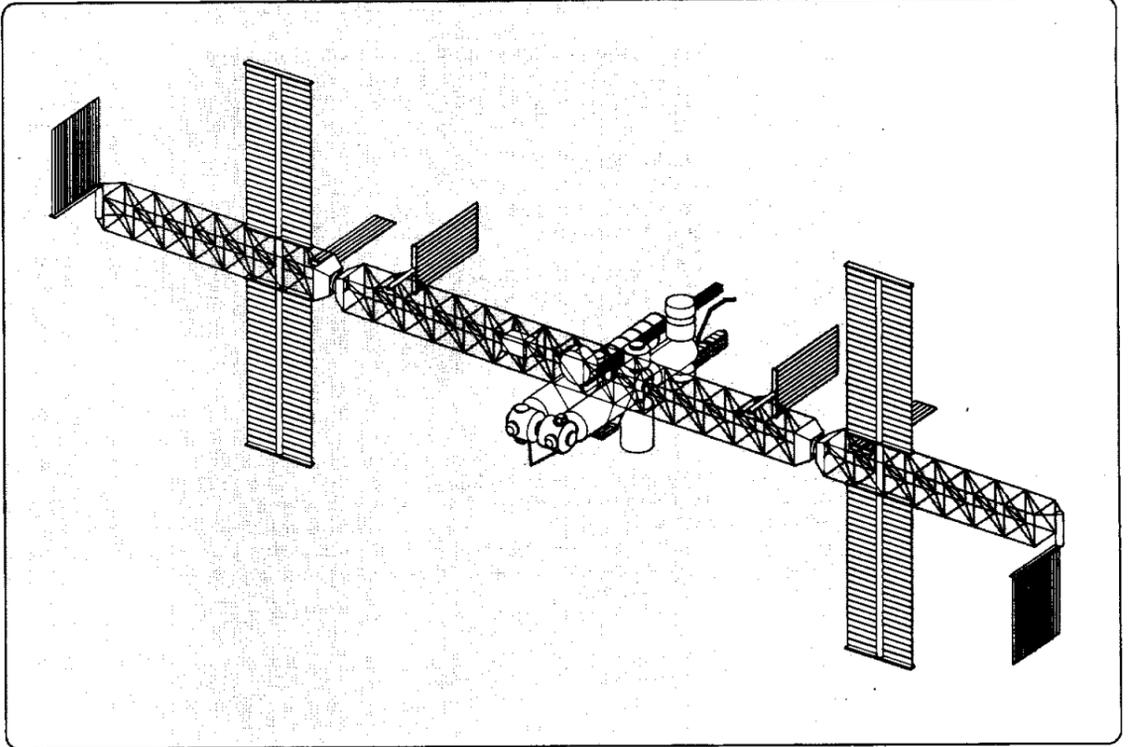
NASA estimated this original baseline configuration of the Space Station would cost approximately \$13 billion in 1984 dollars compared to the original estimate of \$8 billion. In addition, it estimated that the basic engineering and technical support activities at the NASA field centers would need to be augmented by approximately \$1.5 billion over the next eight years to support the Space Station.

As part of their proposals on the revised baseline configuration, NASA will ask aerospace contractors to submit estimates for the enhanced capability configuration. The enhanced Space Station would augment the revised baseline configuration in the areas of satellite servicing, materials processing, scientific payloads and power. In addition, NASA will ask the contractors to submit ideas for lowering the cost of their respective work packages.

In parallel with the development of the proposals by industry, an independent technical and cost review of the Space Station will be conducted. This review, together with the contractors' proposals, will provide an additional means of intensively examining lower cost alternatives for establishing a permanently manned Space Station in the mid 1990's. This review will be responsive to the concerns of the Administration, the Congress, potential international participants and users. The independent review team will report to the Office of Management and Budget, the Office of Science and Technology Policy, the National Security Council and NASA. The review will be completed by Sept. 1, 1987, and will not delay the program.

The industry proposals and the independent reviews will provide information for a decision on the overall Space Station configuration, cost and funding profile. This decision will be reflected in future year projections accompanying the President's Fiscal Year 1989 budget. In addition, the Administration plans to recommend specific legislation for a three-year rolling Congressional commitment and a total cost ceiling on the program.

The President's Fiscal Year 1988 budget request for Space Station will remain at \$767 million, and funding projections, through Fiscal



Year 1990, will not increase from the current budget projections for development. This funding profile is consistent with a schedule leading to permanent manned operations in space by 1996. Under the revised baseline, technical features of the Station will include a single traverse boom, to be augmented by outboard booms later. Under the plan, the augmented design, known as the enhanced Station, would be undertaken after 1996 and would ultimately closely resemble the dual keel configuration.

A habitable volume of 31,000 cubic feet in the revised baseline would be unchanged from the dual keel configuration. The U.S. would produce one habitation module and one laboratory module, as was planned for the dual keel configura-

tion. The atmosphere within the modules would be at 14.7 psi, supplied by a closed loop system.

Available power would be 50 kilowatts supplied by photovoltaic arrays. One feature of the dual keel dropped from the revised baseline plan is power derived from solar dynamics technology. Officials are studying whether to carry that advanced technology as a research and development budget item, or whether to initiate a development program in the 1990s.

Both the resource node and cupola designs featured in the dual keel configuration would be retained in the revised version. There would be two external airlocks and three logistics modules on the revised baseline Station.

Station propulsion would be

supplied by hydrogen/oxygen resistojets, as was planned for the dual keel design. The original 1985 baseline plan called for hydrazine reaction control thrusters.

EVA capabilities are envisioned for the revised design using the high pressure spacesuit now under development. Guidance, navigation and control would be implemented on the same scale as envisioned for the dual keel design, as would communications and tracking. Both the data management and thermal capabilities would be developed at a reduced scale from that intended for the dual keel design.

A satellite servicing facility would not be included on the initial Station, although it could be added later when work begins to enhance the Station's capabilities.

NASA seeks advanced solid rocket motor for Space Shuttle

NASA plans to initiate definition of an advanced solid rocket motor (ASRM) for the Space Shuttle, NASA Administrator Dr. James C. Fletcher has announced.

The ASRM program will begin with a "Phase B" engineering definition effort and other supporting studies in fiscal years 1987 and 1988. A decision to pursue a "Phase C/D" effort (design, development, test and production) could be based on the results of the Phase B activity, by proposing a "new start" in the fiscal year 1989 budget process.

In reaching the decision to initiate

Phase B studies for the ASRM, NASA considered three alternate courses of action: initiate a competition for a second source for the redesigned configuration of the current solid rocket motor (SRM) that will be flown on the first post-STS-51-L Shuttle flight; continue procuring SRMs from the present supplier (Morton Thiokol); and initiate an ASRM effort that could be followed by a competitive procurement for development and production of the ASRM. All of these approaches would have involved additional procurements

from Morton Thiokol.

NASA has concluded that the approach of pursuing the development of an ASRM offers two advantages not provided by other alternatives. The ASRM offers an opportunity for improved quality and safety through automation and advanced manufacturing methods, and potential improvements in performance to ensure that the Shuttle system will meet all its national lift requirements.

The decision reflects the completion of a "Phase A" activity in which five aerospace firms performed

conceptual studies of alternative SRM designs. The Phase A effort was initiated in September 1986 and managed by Marshall Space Flight Center.

NASA will initiate an open competition for a Phase B effort for ASRM definition, which also will be managed by Marshall. Proposals will be invited from all qualified sources including those participating in previous Phase A efforts: Aerojet Strategic Propulsion Co., Sacramento, Calif.; Atlantic Research Corp., Alexandria, Va.; Hercules Aerospace Co.'s Aero-

space Division, Salt Lake City; Morton Thiokol; and United Technologies' Chemical Systems Division, San Jose, Calif.

If a decision is made to proceed with a Phase C/D effort, it is anticipated that the ASRM could be available in fiscal year 1993.

Phase A conceptual studies of alternative liquid boost technology will be conducted at the same time, and provide data on which to base long-term decisions concerning appropriate future Shuttle propulsion systems. The effort also will be managed by MSFC.

Industry briefed on Mars sample return mission



The proposed Mars sample return mission would utilize both a lander and a surface rover. Above, a conceptual drawing shows the rover performing a rock coring operation on the Martian surface as the lander waits in the background.

Briefings for aerospace firms interested in the Mars Sample Return Mission were held at the Jet Propulsion Laboratory last week as teams at JPL and JSC began formal studies on the proposed project.

Both centers are studying concepts for designing and building a robot space vehicle that would travel from Earth to Mars, land and explore the martian surface and return an 11-pound sample of rock

and soil to Earth.

In coming weeks, JSC will award two \$350,000 martian atmospheric entry study contracts, and JPL will award two \$250,000 surface mobility and rover-lander rendezvous study

contracts.

Human exploration of Mars, preceded by robotic missions including the sample-return, is one of four space initiatives recently brought under study by NASA to help the nation determine its next major goal in space. Other initiatives include expanded studies of the Earth, enhanced Solar System exploration, and a permanent scientific base on the Moon.

If approved and funded, the sample-return mission would be launched in 1998 and return with martian soil, rock and atmosphere samples in 2001. NASA has allocated \$1.2 million for studies in Fiscal Years 1987-88.

The project has been recommended by the National Academy of Sciences and other space advisory groups. Unmanned Mars missions are seen as forerunners of manned Mars exploration in the 21st Century.

Task teams at JSC and JPL are outlining preliminary scenarios on how a Mars sample-return mission could be flown.

JPL would study a Mars orbiter spacecraft and an automated surface rover equipped with sample-gathering scoops and tongs. The orbiter and Mars surface craft would depend heavily on preprogrammed

computer software to manage tasks, since one-way transit time between the Earth and Mars for radio commands can vary between 8 and 22 minutes, depending on where Mars is in its orbit. Scientists believe the rover would therefore have to have some form of remote decision making capability, more advanced even than the reprogrammable control system used on Viking.

JPL will have overall project management. JPL managed mission control for the Viking Mars lander missions in 1975-76.

As now envisioned, JSC would study a spacecraft capable of entering and slowing down in the martian atmosphere—estimated at one percent the density of the Earth's atmosphere—to land gently on the planet's surface. JSC also would study the vehicle stage for lifting off Mars to rendezvous and dock with an orbiting spacecraft prior to return to Earth with the surface samples.

Returned martian soil, rock and atmosphere samples would undergo laboratory analysis, much like samples from the Moon during the Apollo lunar landing program. The Space Station probably will be used for initial study and analysis of the returned samples.

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: 420 acres, 1 mi. outside Center, TX, 300 timber, 120 pasture, half mineral rights. 482-4365.

Sale: Camino South 3-2-2, 1,850 sq. ft., DR, den w/FPL, cath. ceiling, rec. room w/bay window, wet bar, fans, walk-in closets, fenced, \$76,320 OBO, lease w/option to buy. Tom, x38162 or 280-0689.

Sale: Lake Livingston Memorial Point lakeview lot, utilities, security, restrictions, below assessed value, owner finance. 946-3945.

Lease: Condo, 2-2, W/D, FPL, \$400/mo., \$200 deposit, references. Rick, 480-1218 or x36156.

Lease: Pineloch Apts., Webster, 1-1, W/D, FPL, microwave, fan, 2 pools, 3 hot tubs, \$290/mo. plus electric until Oct. 31. Michelle, x31252 or 409-925-8714.

Lease: Sage Glen, 4-2-2, 2154 Perry, cath. ceiling, track lights, fans, garage opener, security system, fenced, \$600/mo. 481-4190.

Rent: Pasadena house, 1414 Wentwood, 3-2-2, brick, FPL, fenced, drapes, panelled den, \$525/mo. x31421 or 482-8730.

Sale: Friendswood Forest 1-acre lot, near FM518 and FM528, utilities, 8 mi. from JSC. Dale, x39039 or 481-0046.

Sale: Mobile home on lot behind Seawall, no damage last 3 hurricanes, 2-1, new carpet and A/C, all appliances, W/D, fenced, storage shed, carport, \$12,500 OBO. 409-744-7615.

Sale/lease: Friendswood 3-2-1, brick, A/C, all appliances, carpet, drapes, fan outlets, fenced, trees, \$450/mo. or \$50,000 w/8.75% VA loan at \$400/mo., owner equity \$15,000. 482-6816.

Rent: Gulf-front condo at the Victorian, fully furnished, sleeps 6, weekend or weekly rates. 280-8644.

Lease: League City 4/2/2 house, fence, FPL, new paint, ceiling fan, big storage room, almost new, \$550/mo. 333-6449.

Lease: Baywind 1-1 condo, all appliances, pool, game room, tennis, \$320/mo. plus 1 mo. deposit. Walt, x36353 or 532-4766.

Lease: West Galveston Island beach house, 3-2, furnished, day, week, month. Ed Shumilak, x37686 or 482-7723.

Lease: Baywind II condo, 1-1, FPL, all appliances, pool, game room, tennis. Jim Wiltz, x39009 or 944-0451.

Rent: New Orleans French Quarter condo, Jazz Festival week, April 24-May 1, Greek revival townhouse, private rooftop sundeck, fully furnished, kitchen, sleeps 4-plus. 280-3649 or 480-5656.

Sale: Alvin area, 8 acres state highway frontage, \$500 down, \$631/mo. 485-6074.

Rent: League City 2-1-1 frame near park, newly refurbished, \$300 deposit, \$280/mo. 333-6453 or 471-5161.

Lease: Condo on Clear Lake, 24-hr. security, pool, tennis, 2-2, \$400 plus utilities. 480-5583 or 482-7156.

Sale/lease: Baywind 2BR condo, all appliances, W/D connections, fans, storage room, pool, next to NASA, \$350 plus deposit. 488-0719.

Lease: Waterview condo at Landing, 2-1, marina, pool, adjacent to Clear Lake, boat slips avail., \$450/mo. plus utilities. L.J., x33005 or Patty, 554-7160.

Lease: Dickinson townhouse, 2-1-5-2, 1,200 sq. ft., end unit, 2 story, trees, fenced patio, FPL, \$400/mo. L.J., x33005 or Patty, 554-7160.

Sale: Conroe area, corner 5 acres, ex. elevation, county roads, some restrictions, \$2,950/acre. 488-2735.

Rent: Crystal Beach, TX, beach house, large deck, screened porch, sleeps 6-8, everything but linens furnished, weekend or weekly rates, families only. M. Edwards, 282-4017 or 409-684-5827.

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

Lease: Two BR, 1.5 bath, townhouse, garage, fenced, W/D connect., convenient location, includes water, sewer, some lawn care, \$450/mo. 486-4466.

Sale: Custom-built 3,100-sq.-ft. house across from water, large wooded lot, 4-2-5-2, all large rooms, 4 walk-in closets, floored attic, many decorator features, \$149,000. Jerry, x38922 or 474-4310.

Sale/lease: Nassau Bay, 2,200-sq.-ft. townhouse, 3-2-2 plus study, new carpet, paint, large garage, deck, atrium, 20-ft. FPL, \$890/mo. Jerry, x38922 or 474-4310.

Sale/lease: Forest Bend townhouse, large 2BR, private courtyard, quiet, spacious, miniblinds, \$425 down, \$425/mo. Glen, x36541 or 486-0462.

Sale/lease: Kemah/Bayview brick 3-2-2, large lot, built-ins, central A/H, CC schools, \$425 down, \$440/mo. Glen, x36541 or 486-0462.

Rent: Galveston by the Sea luxury two BR condo, fully furnished, two nights, weekly, monthly, yearly rates. Jay Clements, 474-2622.

Cars & Trucks

'78 Mazda GLC, 75k mi., AM/FM, A/C, 5 spd., \$750 OBO. Alan, x32554 or 334-5478.

'78 Chevy Malibu Classic station wagon, A/C, PS, PB, radio, family car, \$1,200 OBO. Walt, x36353 or 480-9280.

'77 VW Scirocco, 4-speaker stereo w/amp., A/C, sunroof, tinted windows, rebuilt head, ex. cond., \$2,700. 488-3554.

'81 Honda Civic 1500 GL, 5-spd., A/C, cassette, silver, ex. cond., \$2,800 OBO. Karen, x38850 or 520-8348.

'63 Chevy pickup, 327 engine, \$1,000. x37883 or 337-5482.

'76 Dodge truck, rebuilt 318, club cab, new paint, tires, battery, starter, \$1,050. 946-3408.

'80 Pontiac Bonneville, V6, 4-dr., blue, clean, \$3,000. 480-1218 or x36156.

'81 Camaro, sport coupe, V8, A/C, tilt wheel, new tires, paint. 332-1685.

'66 Mustang Pony, 289 auto., completely restored, \$6,500 firm. 333-9041.

'80 Subaru GL 4-dr. sedan, beige, 82.5K mi., 5 spd., A/C, AM/FM/cassette, cruise, clean, \$1,900. Jeff, x38312 or 482-5393.

'78 Chevy Impala, \$1,000. 485-2987 or 282-3926.

Free '74 Renault R17 Gordini, needs work, you haul it. Dave Pruetz, x35296.

'84 Z28, black, auto., T-tops, PW, PDL, tilt, cruise, tinted windows, Delco sound, 32k mi., one owner, ex. cond., \$9,500. x33617.

'82 Buick Riviera, black, moon roof, loaded, 59k mi., ex. cond., \$7,200 OBO. x33617.

'78 Ford Supercab pickup, camper top, 2K mi. on rebuilt Cleveland 351 engine, 77k mi. on body, no rust, good paint, \$3,000. Dave Walker, x32754 or 474-5315.

'82 Buick Riviera V8, loaded, clean, ex. cond., \$6,500 OBO. Dick, x30962 or 482-1535.

'76 Datsun 280Z 2-plus-2, 77k mi., good cond., \$2,500. Bob, 996-9172.

'79 VW Rabbit, 5 spd., A/C, sunroof, good cond., \$2,200. Sharon, x35452 or 480-2313.

'82 Ford Thunderbird Heritage, 62k mi., sunroof, power everything, V8, silver, BO. Mike, 282-4180 or 996-9440.

'78 Camaro, A/C, PS, PB, AT, tilt wheel, chrome custom wheels, clean, \$2,400 OBO. Bill Wood, x33838 or 554-2283.

'83 Chevy half-ton pickup, new engine, ex. cond., \$5,900. Cindy, x34165.

'84 Jetta, 3.5k mi., black, tinted windows, 5 spd., all gauges, \$5,500. Plaque, x39034 or 474-2660.

'85 Nissan 200 SX Coupe, metallic burgundy, cloth interior, 17k mi., extended warranty, dependable, \$8,500. 282-3972.

'78 Honda Accord LX, 2 dr., 5 spd., A/C, new engine, ex. cond., \$1,800 OBO. Celia, x38976 or 488-6431.

'78 Pontiac Bonneville, 4 dr., PS, PB, PW, AM/FM, auto., good cond., one owner, \$1,150. Jean, x36360 or 326-3019.

'80 Buick Skylark, 4 dr., A/C, auto., beige, ex. cond., 36k mi. Jim, x34382 or 486-0111.

'81 Chevy Caprice Classic, 4 dr., 3.8 liter V6, power, A/C, tilt, cruise, good tires, new brakes, timing belt, license sticker, safety sticker, 74k mi., \$3,650. Clay, x34568 or 481-1507.

'80 VW Rabbit, 4 dr., diesel, 4 spd., A/C, ex. cond., \$1,775 OBO. Kaltenbach, 333-6056 or 331-5751.

Boats & Planes

16-ft. Glasstron boat, 70 hp Evinrude, \$1,500. x37883 or 337-5482.

Egg Harbor 48-foot Sport Fisherman, twin diesel, extensive equip., ex. cond., teak cockpit, radar, loran, sell or trade. 282-3960 or 486-4466.

12-ft. Starcraft fiberglass boat w/ trailer, 9.3 hp Chrysler motor, ex. cond., \$750 OBO. Steve, x39327 or 485-0204.

'83 16-ft. Hobbie Cat Special Edition, multi-colored sails, galvanized trailer w/custom boat box, many extras, stored indoors, \$2,990. Carla, x30181 or 538-1148.

Zodiac boat, 10-ft., oars, carrying bag, \$400. Jerry, x31226.

Monark 14-ft. John boat, trailer, \$240 OBO. N. Martinez, x31794 after 3 p.m.

'74 Chrysler 16-ft. bass boat, 50 hp Johnson w/SS prop., 3 swivel chairs, depth finder, Motorguide troll, carpeted, bilge pump, two 6-gal. gas tanks, live well/pump, heavy duty trailer, \$1,250. Mike, 554-4766 or 332-3397.

Airplane project, Soneai 2LS Formula Vee racer, fuselage 90% complete, Cleveland hydraulics, 2,180 cc VW

engine w/forged 4340 chrome molly crank. Bill, x36311 or 473-7129.

16-ft. tri-hull walk-through w/90 hp Evinrude, incl. trailer plus 15 hp Evinrude, \$1,395. x33782 or 332-5725.

Cycles

Columbia 10-speed, still in carton, \$75; '85 Honda Elite 150, 2.3k mi., \$750; racing bike, \$600. Irene, 996-0219.

'73 Honda CB350, ex. cond., low miles, extras, Harold, x32004 or 438-0016.

'82 Kawasaki 440 LTD, 11k mi., \$700. 331-5013.

'80 Honda dirt bike, \$125. 488-3916.

'79 Suzuki GS1000L, new battery, rear tire, recent tune-up, full helmet, \$850 OBO. Craig, 280-0176.

Ladies 10-spd. Peugeot, 7 yrs. old, good cond., water bottle/holder, sheepskin seat cover, gear bag, foot clips, \$125. Ken, x32517.

Audiovisual & Computers

Commodore 64 personal computer, disk drive, printer, software, \$400. Harold, x32004 or 438-0016.

'83 GTE phone system, 4-line rotary, hold, intercom, 3 instruments incl., \$500 OBO. 480-4253.

Atari 1040-ST computer, color monitor, 2nd 800k disk drive, Epson printer, joystick, software, \$1,200. Peter, x31624 or 789-3249.

AT&T 6300 computer, monochrome monitor, 640k RAM, dual 360k floppies, Panasonic 1091 printer w/stand, 1200 baud Hayes compatible modem, \$1,500 OBO. 538-3295 or x33295 before 8 a.m.

Panasonic AM/FM stereo receiver and tape deck, 2 yrs. old, ex. cond., \$40. Valerie, x38385.

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Household

Light tan herculon couch, \$200 OBO. Sharon, x35452 or 480-2313.

Comforter w/matching bedroom curtains, pastel colors, flower-butterfly design, BO. Valerie, x38385.

Walnut desk, exec. chair, both 1 yr. old, ex. cond., \$75 ea. John McLeash, 480-7445.

7.5-ft. sofa, \$150; love seat, \$100, good cond., high quality material. 438-2951.

Small china cabinet, barley twist legs, dated 1870, \$275, buffet, barley twist legs, dated 1870, \$275, both for \$525; 4 matching chairs, \$60; office chair, \$30. 488-5564.

Quartz large cypress clock, \$35; 2 matching chairs, \$20. 488-5564.

Carpet w/foam pad, 9 x 12, cream color, \$75. Sharon, x30210 or 480-2646.

Two bar stools, beige w/wicker backs, \$75. Lynn, x31234 or 996-6834.

Two used bathroom vanities, tops, hardware, free for taking. 488-3128.

Amana RR1-Radar Range, needs repair, BO. Lori, x36600 or 486-4160.

Hoover vacuum, \$85; Magnovox TV, \$85; microwave, \$75; 6-ft. wood table w/extra leaves, 4 chairs, \$200 OBO. Sheryl, 333-9408.

Full-sized mattress, box springs, \$60; king-sized set, frame, headboard, 6-ft. dresser, highboy, nightstand, BO. Nancy, 280-1992 or 480-8067.

Dinette set, fireplace screen and access., lamps, washing machine, typewriter, etc., x30112 or 338-2074.

Wood dinette, 2 chairs, \$50; corner table, \$15; floor lamp, \$10; desk, \$35; all for \$75. Alan, x32554 or 334-5478.

Photographic

Minolta computerized Databank imprints date, time or sequential numbers, was \$120, now \$45. 332-2229.

Complete color darkroom, enlarger, analyzer, digital timer, processing reels, paper processing drums, slide copier, easels, paper safes, etc., was \$1,800 now \$850. Chip, x37705 or 554-6634.

Canon AE-1 w/f1.8 50 mm, f4.0 35-70 mm, f5.6 100-200 mm lenses, power winder, speedlite, tripod, access., \$450. Nering, x31382 or 481-0608.

Canon A1, 135 mm f2.5 lens and 35-70 mm zoom w/macro, \$165. 488-3941.

Nikon FM manual camera, wide-angle (28 mm f3.5) lens, \$120. 488-3941.

Yashica 8 mm auto. exposure movie camera w/light, \$25. 332-2229.

Wanted

Want pop-up camper, any condition, any price. Mary, x36518 or 486-1766.

Want ride for me and my seeing-eye dog from Queen's Court in Nassau Bay to Bldg. 32, your car or mine, may use my handicapped parking space, 8 a.m.-4:30 p.m. preferred. x37895.

Want outdoor motor in good cond., 45 to 65 hp, long shaft, 16-ft. cables and control box. Ralph or Joyce, 480-2817.

Want car-pool rider from Spring High

School to JSC, 7 a.m. to 3:30 p.m. work hours, non-smoker. Panna Amin, x32459, Roy Parker, x38233 or Patnesky, x38636.

Want female roommate to share 2/2 apt. w/same, W/D, cable, microwave, more, \$207.50 plus half utilities, references. Virginia, x36147 or 480-6792.

Want used microwaves. Cheryl, x34406.

Want carpool rider from Sugar Land area Highway 6 to JSC. Mike, x39288 or 947-8369.

Want child's car seat, to 40 lbs., stroller, high chair, in reasonable cond. Carla, x30181 or 538-1148.

Lost & Found

Lost: Man's wedding ring, March 19, Nassau Bay park, possibly north side of Field 2, reward. x36601 or 488-5533.

Pets & Livestock

AKC German shepherd pups, born Jan. 24, tan and silver. Billie, x38334 or 482-4365.

Mini lop-ear bunnies, born Feb. 19, just in time for Easter, \$25 ea. Tamela Oppelt, x36159 or 472-6323.

Free AKC black Lab, female, spayed, 5 yrs. old. Diane, x30566 or 532-2001.

Musical Instruments

Wurlitzer, double keyboard, console organ, ex. cond., synthesizer, keyboard computer, full-range instrumentation, \$7,350. Phyllis, x38383 or 488-7340.

Buffet clarinet, ex. cond., was \$1,500, now \$500; Signet clarinet, ex. cond., \$175. Barbara, 282-3318 or 331-5346.

Hammond organ, model CV, 2 manual, full pedals, suitable home or church, ex. cond., \$2,500. 944-1302.

Miscellaneous

Limited edition prints by Charles Frace, G. Harvey, Donald Vann, '84 federal duck stamp print, 332-1685.

Prom dress, pink, off the shoulder, full length, worn once, size 5, was \$125, now \$50. Norma, x30235, 554-4766 or 332-3397.

Aluminum camper top for long-wheelbase pickups. Bill, x36311 or 473-7129.

Black western hat, top quality, size 7 1/2, \$45. 332-2229.

Prom formals and evening dresses, sizes 8, 9, 10, prices \$75 to \$200. Barbara, 282-3318 or 331-5346.

Four first-class seats for van, good cond., cheap; four wheels, \$15 ea. or all for \$40. 333-3700.

Ladies Wilson golf clubs, bag, \$75; SoloFlex, \$600; Sears sewing machine, \$95; porch or yard swing, \$35. Irene, 996-0219.

Honda Accord LX 1980 service manual, \$10 OBO. Vincent, x30874 or 333-1316.

'79-81 Honda A/C compressor, 2 mo. use, was \$390, now \$250. Vincent, x30874 or 333-1316.

Blender, \$10; mixer, \$5; toaster, \$5; pressure cooker, \$10; Corning Ware canisters, 8 pieces, \$30; household fire extinguisher, \$10; 25-range multimeter, \$5. Lynda, x38296.

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