N/S/ yndon B. Johnson Space Center *pace News Roundup*

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National Aeronautics and Space Administration

President requests new station study

President Reagan last week requested the Senior Interagency Group (SIG) for Space to conduct a high level study to establish the basis for an Administration decision on whether to proceed with NASA development of a permanently based, manned space station.

The interagency group, chaired by National Security Advisor Judge William P. Clark, will consider four scenarios for possible paths the nation's space program might take following completion of the development of the Space Shuttle program. The scenarios include: the Shuttle and unmanned satellites. the Shuttle and unmanned platforms, the Shuttle and an evolutionary space station, or the Shuttle and a fully functional space station.

The issues addressed by the study will include how a manned space station would contribute to U.S. leadership in space and how an international program could best fulfill national requirements versus other means of satisfying them. Foreign policy and national security implications, as well as overall economic and social impacts, will also be considered.

A working group, chaired by NASA and including Department of State, Department of Defense and other representatives of the SIG for Space, has been established to conduct the study. Results will be presented to the SIG this fall prior to their submittal to the President.

(Continued on page 2)



Regal passage

NASA 905 carried a special cargo a week ago during the second leg of a ferry flight from California to the Kennedy Space Center. Challenger, NASA's second Shuttle Orbiter, flew over JSC on that trip for the second time. The Orbiter is now in High Bay 1 of the Orbiter Processing Facility at the Cape undergoing preparations for STS-7, now set for June.

Program stresses lower costs **Committee releases solar system report**

A high level NASA advisory com- report said. "The primary goal mittee report says investigation of among the four fundamental goals of U.S. solar system exploration through the year 2000.

After a two-year study, the NASA Solar System Exploration Committee (SSEC) recommended that a core program of low to moderately expensive planetary missions should be flown for the remainder

continues to be the determination near-Earth resources should be of the origin, evolution and present state of the solar system," said the SSEC report, titled Planetary Exploration Through Year 2000: A Core Program. A second goal is understanding Earth through comparative planetary studies, while a third is understanding the chemical and physical evolution of the solar system and the appearance of life new. secondary line of study for solar system is the entire extended the U.S. planetary exploration program, an attempt to develop a scientific basis for the eventual utilization of the resources available in abundance relatively near Earth.

Planetary science uses theory. experiment and observation to turn knowledge of natural laws into understanding of the world. A major goal of this inquiry is an environment of Earth's inhabitants. There is no conceptual barrier to extending the sphere of major human activity ultimately to fill this environmental niche."

To achieve lower costs for these missions, the SSEC proposed using two classes of spacecraft, the first comprised of derivatives of commercial, Earth-orbital vehicles understanding of the origin and for inner planet missions. This type, known generically as the primary onboard systems. "Efficiencies accrue because it is possible to take advantage of the aerospace industry's spacecraft production capability (facilities, test equipment, etc.), the systems concept and engineering team that each company has brought together, and the capable subsystems that have already been developed for other missions," the report said. The other type of spacecraft, a deep space probe developed by the Jet Propulsion Laboratory and known as the Mariner Mark II, would be modular and could be reconfigured for a variety of missions using essentially the same hardware. The Mariner Mark II program would require funding levels of about \$100 million per year, with a first mission in the early 1990s, now forseen as a comet rendezvous flight.

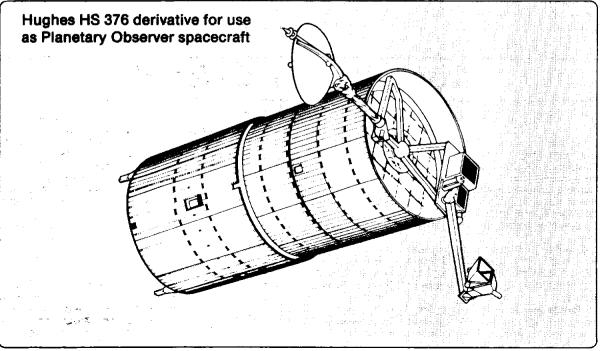
Geoscience/Climatology Orbiter mission

The SSEC report also identified an initial sequence of missions. The first, already included in the FY 1984 budget, is the Venus Radar Mapper, which would be launched in 1988 and would return data through 1989. The mission would complete the global characterization already conducted on Mars and begun on Venus. The next mission would be the Mars Geoscience/Climatology Orbiter, the first of the Planetary Observer class spacecraft. The mission would have two fundamental objectives: determination of the global surface composition of Mars and an understanding of the role water has played in the Martian climate. It would be launched in 1990 and would return data until 1992. The third mission would be a Comet Rendezvous/Asteroid Flyby using the first of the Mariner Mark Il spacecraft. It would be launched in the 1990-1992 time frame and could return data for as long as six years.

of this century.

on this planet. The fourth doal, a cosmic prevalance of life, the

Those missions should be mount- survey of the resources available SSEC said. "The second motiva- Planetary Observer, would use ed to achieve four basic goals, the in near-Earth space, represents a tion is the recognition that the basic off the shelf hardware for



The Planetary Observer would require about \$60 million per year and would be initiated by a Mars

The fourth core mission would be a Titan Probe/Radar Mapper, to be launched on a modified Galileoclass probe in the 1988-1992 time frame. Data return would be from 1995 to 1997.

The SSEC plans a second report later this year, which will present options for adding to the various core concepts.



May 7 JSC Picnic set

JSC to purchase third STA

The Johnson Space Center has signed a firm fixed-price contract to lease, with an option to buy, a used Grumman Gulfstream II for eventual conversion into a third Shuttle Training Aircraft (STA). Full inspection and systems analysis will be performed on the aircraft during the lease period, after which NASA intends to exercise the purchase option and begin modifications. The proposed lease-purchase price of the aircraft is \$6.9 million. The twin turbojet aircraft will join two other STAs purchased from the Grumman Aerospace Corporation in January 1974. STA Gulfstreams are extensively modified to exhibit the same handling characteristics as Shuttle Orbiters during the steep descent and final approach regimes of Shuttle flights. The contract was signed with U.S. Aircraft Sales, Inc. of McLean, Virginia.

Lewis awards OTV propulsion contract

The Lewis Research Center has awarded the first of three parallel contracts to the Aerojet Liquid Rocket Co. for research on advanced propulsion systems which could be used on future orbital transfer vehicles (OTVs). The first contract is worth \$3,475,000. The contract calls for exploration of advanced engine concepts and propulsion technologies for OTVs, both manned and unmanned, operating between low Earth orbit, geosynchronous Earth orbit and beyond. The program stresses innovative uses of technology which could produce engines capable of reuse and servicing in space. Two similar study contracts are expected to be awarded shortly.

Last Shuttle wing nears completion

The Grumman Aerospace Corp. plans to ship the final Shuttle wing to Rockwell International's Palmdale, California plant in mid-May, ending a long project which has produced five shipsets for NASA's Orbiter fleet. The last wing, for the Orbiter *Atlantis*, was lowered from its vertical tooling fixture at the Bethpage, New York plant in a "laydown" procedure which took just nine minutes, a record. The first three wing shipsets were built for the development craft: the *Enterprise*, the *Challenger* and the *Columbia*. The two production wing shipsets, for the Orbiters *Discovery* and *Atlantis*, benefit from an improved internal structure and weigh about 800 pounds less than earlier versions. As the work nears completion, the 25-man Shuttle Wings team gradually will be disbanded.

NASA signs agreement for SRBS

NASA has entered into a \$393.9 million supplemental agreement with Morton Thiokol, Inc., to produce Space Shuttle solid rocket motors for future Space Shuttle flights. This contract agreement covers the production and delivery of solid rocket motors for Space Shuttle flights STS-7 through STS-15, the refurbishment of motors flown on STS-1 through STS-10, and reuseable metal parts to support the required deliveries and future requirements. The agreement also includes the additional tooling and incremental tool releases necessary to support future solid motor production requirements for 24 Shuttle flights per year. The supplemental agreement is an add-on to NASA's basic contract with Morton Thiokol for the development and production of Shuttle solid rocket motors.

Bulletin Board

League City Jaycees sponsor fun run

Beginning at 9:45 a.m. on Saturday, May 7, at Clear Creek High School parking lot, a 3-mile fun run will kick off the Village Fair parade. The race's finish line is Galveston County Park. Registration opens at 9 a.m. on race day and is open to everyone. Entry fee is \$5 per person. T-shirts or caps will be given to the first 100 entrants. Eighteen firstplace awards will be given in various age and sex categories. For further information, contact Jeff Hegemier at x4143.

Noncommissioned officers forming group

Detachment 2, Space Division Manned Space Flight Support Group and Air Force Elements noncommissioned officers at JSC are starting an NCO Cail for all active and retired NCO's. All active/retired personnel from the Army, Navy, Air Force and Coast Guard assigned to JSC who would like to participate in this monthly meeting are welcome. "This is a good way for today's active duty and retired NCO's to meet and talk about the 'good old days' (if they ever really existed) or any subjects that you may want to talk about," said TSgt J. T. Hester. Interested personnel should contact Hester or Sgt. Ken Phelps at x2716 for further details.

It might be Derby Day in Kentucky, but on May 7 it will be Picnic Day here.

Sports, music, food, bingo, rides, a palm reader and even Elsie to Cow will be among the many attractions at the JSC Picnic, to be held from 11 a.m. to 5 p.m. at the Gilruth Center May 7.

The picnic will feature a midway with booths and concessions in the parking lot south of the Rec Center, bingo and bands for the teenagers in the Rec Center itself, and assorted dances, special events, and a dunk tank scattered around the grounds.

Parking will be in the lot adjacent to Bldg. 25 on Ave. C and Second Street. There will be a dropoff point in front of the Rec Center, and a shuttle bus will carry drivers back to the picnic grounds after they park their cars.

Activities for the adults include a tennis tournament from 2 to 4 p.m. (registration from noon to 1 p.m.), a dunk tank from 12:30 to 4:30 p.m., an Anything Goes contest from 2 to 3 p.m., an obstacle course from 3:30 to 4:30 p.m. and bingo from 3:45 to 4:30 p.m. Activities for the children include a clown from noon to 5 p.m., a threelegged race from 2 to 2:30 p.m., a balloon race and bust from 2:30 to 3 p.m., a water balloon run from 3 to 3:30 p.m., rides from 11 a.m. to 5 p.m. and booths from noon to 4 p.m.

Free sports during the day will include horseshoes, volleyball, softball, football and a playground.

Special events include country western music by Bob Asbridge and "Dixie" from 11:15 a.m. to 12:45 p.m., the "Clogg Hoppers" from 1 to 1:30 p.m., a palm reader from 1 to 4 p.m. and the "Insiders", a barbershop quartet, at 3 and 4 p.m.

Beverages, popcorn, sno-cones and ice cream will be served from 11 a.m. to 5 p.m., and barbeque



dinner with all the trimmings will be served from noon to 3 p.m.

A country and western dance is to run from 2 to 5 p.m., and a rock 'n roll battle of the bands will run from 2 to 4 p.m.

Proceeds from the 25¢ per throw dunk tank will go to the Clear Lake Meals on Wheels program. Dunkers will be those who want to pay two bits for a throw, and the dunkees will include the following intrepid teams: Don Puddy and Glenda Lancon, Ginny McKissack and Dan Brandenstein, Mary Lee Meider and Bob Crippen, Candy Hosea and A. J. Roy, Charlotte Hines and Gordon Fullerton, Barbara Middlebrook and Mark Hawes, Terry Standford and John Creighton, Mary Wylie and Bill Kelly, Ann Walker-Voss and Larry Griffin, Betty Sue Fedderson and Gerald Griffin, Sandy Richardson and Jerry Bostick and Mary Margret Lobb and Roger Zwieg.

Tickets are on sale through May 3 at the Bldg. 11 Exchange Store. Prices are \$2.50 for children 12 and under, and \$3.50 for adults. All JSC civil service and contractor employees are welcome.

Viking problems persist

Officials have concluded that communications probably cannot be reestablished with NASA's Viking Lander 1 on Mars, after several months of unsuccessful efforts to regain contact at the Jet Propulsion Laboratory, but there is one last hope remaining.

Communications with Viking Lander 1, which touched down on Mars on July 20, 1976, were lost in late November 1982, and engineers at JPL have been trying since then to contact the station, without success.

They have repeatedly commanded the spacecraft in attempts to reestablish contact with command sequences based on detailed studies of possible failure modes.

The lack of success has led to the conclusion that communications with the lander probably cannot be achieved, but the lander does have an internal program that will initiate transmissions to Earth without commands from JPL. In the event that the lander is still operating, engineers at JPL will listen on May 5, the first time such automatic transmission would occur. One week later, in case the lander is operating but could not initiate communications on its own, engineers will command the lander to switch to different components of its transmitter, in the event some of those components have failed.

Mars will reach superior conjunction — where the red planet will be directly opposite the Sun from Earth — in late May and early June. During superior conjunction Earth-based antennas will be unable to communicate with the lander.

Viking Lander 1 was launched to Mars in August 1975. It landed on the Martian surface at Chryse Planitia, on July 20, 1976, and was joined by Lander 2 on Sept. 3, 1976. Both landers conducted the Team leader, and former Associate Administrator of NASA's Space Science Division. Dr. Mutch disappeared during an attempt to climb Nun Kun, a peak in the Himalayas, in September 1980.

President requests

(Continued from page 1)

Although the Department of Defense will participate in the study, the Space Station project is seen as principally a civil space program. NASA said President Reagan's recent proposal for an advanced technology defense system is an independent initiative and is not related to the Space Station proposals.

No weapons would be placed on the Space Station, NASA said.

Meeting set for asteroid watch

Volunteers who plan to take part in the observations of the asteroid Pallas as it passes in front of the star 1 Vulpeculae in May are reminded of the last organizational meeting to be held prior to the event. The briefing will begin at 7:30 p.m. May 13 at the Lunar and Planetary Institute on NASA Road One. Organizers hope the widespread observations of the occultation will add information to knowledge of Pallas, the third largest asteroid in the solar system. The observation effort is being sponsored by the JSC Astronomical Society. For more information, contact Paul Maley at 488-6871.

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NASA

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Brian Welich

Ed for

most thorough examination of another planet ever undertaken.

Viking Lander 1 was renamed the Mutch Memorial Station in memory of Dr. Thomas A. Mutch, former Viking Lander Imaging the opuce station, in tori said.

NASA believes the Space Station could be in orbit by the early 1990s. Preliminary analyses have shown a modest Space Station Program could be constructed for from \$4 to \$6 billion.

Cookin' in the Cafeteria

Week of May 2-6, 1983

Monday: Cream of Chicken Soup; Beef Burgundy over Noodles, Fried Chicken, BBQ Sausage Link, Hamburger Steak (Special); Buttered Corn, Carrots, Green Beans. Standard Daily Items: Roast Beef, Baked Ham, Fried Chicken, Fried Fish, Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

Tuesday: Beef Noodle Soup; Baked Meatloaf, Liver & Onions, BBQ Spare Ribs, Turkey & Dressing (Special); Spanish Rice, Broccoli Buttered Squash.

Wednesday: Seafood Gumbo; Broiled Fish, Tamales w/Chili, Spanish Macaroni (Special); Ranch Beans,

Beets, Parsley Potatoes.

Thursday: Navy Bean Soup; Beef Pot Roast, Shrimp Chop Suey, Pork Chops, Chicken Fried Steak (Special); Carrots, Cabbage, Green Beans.

Friday: Seafood Gumbo; Broiled Halibut, Fried Shrimp, Baked Ham Tuna & Noodle Casserole (Special); Corn, Turnip Greens, Stewed Tomatoes.

Week of May 9-13, 1983

Monday: French Onion Soup; Weiners & Beans, Round Steak w/Hash Browns, Meatballs & Spaghetti (Special); Okra & Tomatoes, Carrots, Whipped Potatoes. Standard Daily Items: Roast Beef, Baked Ham, Fried Chicken Fried Fish, Chopped Sirioin. Selection of Salads, Sandwiches and Pies.

Tuesday: Beef and Barley Soup; Beef Stew, Shrimp Creole, Fried Chicken (Special); Stewed Tomatoes, Mixed Vegetables, Broccoli.

Wednesday: Seafood Gumbo; Fried Perch, New England Dinner, Swiss Steak (Special); Italian Green Beans, Cabbage, Carrots.

Thursday: Cream of Chicken Soup; Turkey & Dressing, Enchiladas w/Chili, Weiners & Macaroni, Stuffed Bell Pepper (Special); Zucchini Squash, English Peas, Rice.

Friday: Seafood Gumbo; Baked Turbot, 1/4 Broiled Chicken w/Peach Half, Salisbury Steak (Special), Cauliflower au Gratin, Mixed Vegetables, Buttered Cabbage, Whipped Potatoes.

Space News Roundup

Going underground Yes Virginia, there is a tunnel system, and it's a big one too

Beneath the beautiful landscape of JSC's central mall area flow the main arteries of life for the Center's buildings, in a vast network stretching more than two miles.

Large pipes carrying steam and chilled water to and from heating and cooling systems stretch below triple decked cable travs holding miles of cables and wires - electrical, telephone, data, television, and fire detection.

After approval from security and facilities personnel, one enters the utility tunnel system by climbing straight down a 15-foot ladder. Lights evenly spaced along the ceiling provide limited visibility. An average inside height of 7.5 feet allows adequate clearance in most areas, but in some locations a person of average height must stoop down to avoid bumping his head. Abrupt temperature changes are noticeable from one location to another. A continuous flow of ambient air is maintained in the tunnel to keep the environment reasonably comfortable, but in the summers the tunnels can become some of the warmest places onsite

Through the 20+ years of JSC's existence, the tunnel system has been expanded and now boasts a lineal length of 14,750 feet, linking all buildings in the central mall area of JSC. Large duct banks of concrete conduit carry cables and pipes to buildings in the 200, 300, and 400 areas.

Evidence of a growing and changing workplace is everywhere in the tunnel. New data carrying cables and wires are constantly being added. The next large project scheduled for addition to the tunnel is the updated telephone system. Since JSC requires the new system to be operational before the old system is removed, installation of new telephone cables (some of which may be fiber optics) will be choreographed as carefully as a premiere ballet performance



This 1965 photo shows part of the tunnel system under construction in what would eventually become the mail area of the central part of JSC.

For safety, a sophisticated heatsink cable runs atop the cable trays to detect any excessive temperatures before a cable could begin to burn. The main site power 15-kV feeders encased in shielded cable run in a dedicated cable tray along the opposite side of the tunnel supplying each building with two 15-kV feeders for redundant power.

Drainage in the tunnel system is managed by a continuous flatbottomed gutter along the length of the tunnel. The gutter drains into strategically located sumps which are provided with permanently installed sump pumps.

While no telephone system exists in the tunnel to communicate with someone above ground, personnel entering the tunnel must notify both security and work control officials before entering and upon exiting the system.

The basic design of the tunnel is a rigid monolithic box-type structure in an excavated trench. The walls and roof were poured as a unit and bonded to the prepoured floor slab. After the top and sides of the tunnel had cured, the bottom 5-ply waterproof membranes were

turned up and joined to the top and side waterproofing, which consist of two-ply bituminous membrane. Waterproofing material on the top and sides exposed to backfill were additionally protected by 1/2-inch treated fiberboard pressed firmly into asphalt. The backfill was then compacted to the density of the surrounding terrain.

–Billie Deason.

Test firings planned for TDRS-A

Officials plan to conduct two test firings of the thrusters on the Tracking and Data Relay Satellite (TDRS-A) before starting maneuvers designed to boost the satellite into its proper orbit.

Deployed from the Orbiter Challenger during STS-6, TDRS-A failed to achieve its planned orbit of 22,300 miles due to an unidentified problem with its Inertial Upper Stage booster. Some damage was done to two of the four roll thrusters on the satellite, and both have been shut down as a precaution against possible fuel firing can be conducted the first week in May and the second four or five days later.

The test firings will be made to check out the mathematical models which are being developed for changing the TDRS-A orbit. Basically, Browning said, the firings will check out the spacecraft's attitude control system, with special attention being paid to thermal characteristics and fuel utilization.

The spacecraft has been using about one-half pound of hydrazine fuel each day in its orbit of 22,000 by 13,600 statute miles. The warm in those areas but the maneuvers to correct the orbit are expected to take several weeks. During the test firings, the first maneuver will last for about 20 minutes and the second slightly longer. Telemetry from the first firing will be reviewed by NASA

one. He said it is hoped the first ations before a go-ahead is given for the second firing, Browning said.

The number of thrusters to be used during the test firings has not been determined as yet, he said. Several different modes are under consideration.

Engineers are also trying to assess damage to the spacecraft. Besides the roll thruster damage. they are also examining the temperature profile at the base of the satellite, including both the roll and pitch thrusters. Browning said temperatures have been running



leakage.

No date for either of the test firings has been set, said Ronald Browing, TDRSS Project Manager at the Goddard Space Flight Center. Browning said NASA and TRW officials are still working out the details for maneuvers designed to change the TDRS-A elliptical orbit to a circular

problem is seen as manageable. There is some speculation that some of the thermal insulation has been degraded in some way, but because of limited data no solid conclusions have been drawn on what might be causing the temperature fluctuations, Browning

Before its deployment from the Space Shuttle during STS-6, the TDRS-A satellite and its Inertial Upper Stage booster filled most of the payload bay of the Orbiter Challenger. NASA and TRW officials are now formulating plans to put the errant communications satellite in its proper orbit.

crosses orbit of Pluto Pioneer 10

Pioneer 10, a planetary probe with so many firsts to its record, became the first object from Earth to cross the orbit of the planet Pluto last week.

Pioneer has traveled nearly 3.5 billion miles on its curving path across the solar system. Radio signals, moving at the speed of light, require more than four and a quarter hours to cross the vast distance between Earth and the spacecraft. NASA scientists typically send Pioneer 10 a message when they arrive at work in the morning and don't receive a reply until quitting time.

and TRW officals to see if the

results are consistent with expec-

Only the planet Neptune is still farther out than Pioneer 10. Normally Pluto is the outermost planet, but for the next 17 years its highly elliptical orbit will place it nearer the Sun than Neptune. When Pioneer 10 crosses the orbit of Neptune in June, it will effectively have left the solar system.

When the spacecraft crossed Pluto's orbit April 25, it was traveling at over 30,000 miles per hour, almost 5,000 miles per hour faster than solar system escape velocity. For the Space Shuttle Challenger to cover an equal distance it would have to orbit Earth 107 690 times At Challenger's orbital speed of about 17,000 miles per hour, this would take over 20 years of continuous travel.

The spacecraft communicates

with Earth through an eight-watt radio transmitter, equivalent in power to a Christmas tree light. Despite broadcasting a narrow, conical beam, by the time the signal reaches Earth, it has spread over an area more than 11 million miles across. When the signal is received by the 210-foot radio antennas of the Deep Space Network, the original eight-watt signal has weakened to twenty thousand trillionths of a watt. If the total energy of that signal could be

collected for 67 million years, it would not be enough to power a seven-and-a-half watt light bulb for even one-thousandth of a second.

Among its discoveries, Pioneer 10 is credited with finding that Jupiter is a liquid planet, with providing the first accurate measurements of the masses and densities of Jupiter's planet-sized moons, and with returning the first close-up pictures of Jupiter's Great Red Spot.

Roundup Swap Shop

Property & Rentals

Page 4

Galveston oceanfront condo, reasonable, 1 BR completely equipped, pool & tennis, reserve now for spring and summer vacation. Call Nussman, 721-2459.

For lease: Eldorado Way 2-2.5-2 condo, papered, fans, W/D, ref., \$545/mo. plus deposit. Call 488-2804 after 5 p.m. and weekends.

For lease: Eldorado Way 2-2-2 condo, storm windows, decked patio, W/D, ref., \$526/mo. plus deposit. Call 488-2804 after 5 p.m. and weekends.

For sale: Lake Livingston lot, across from water w/immediate access, wooded, \$5,000. Call 482-1582.

For lease: Egret Bay 1 BR condo, fireplace, W/D, covered parking, water view, less than 2 years old. Call Actkinson, x4761 or 482-7061.

For sale: Lago Vista lot, Austin Lake, Travis Country Club golf course, great for retirement/investment, priced right. Call Shorpshire, x2836 or 482-7715 evenings.

For Sale: New 3-2-2 brick home in Pipers Meadow, professionally landscaped, all drapes, low equity, owner being transferred. Call Tim, x6208 or 488-4707.

For lease: Webster duplex, 3-2-2, 1,700 sq ft., fireplace, CF, DW, TC, MW, on cul-de-sac, inside utility room, garage door openers, \$575/mo. plus deposit. Call 333-1466.

For rent: 10-acre horse pasture, stalls, water, electricity, etc., \$40/mo. Call 482-7079

For lease: 10 acres, Alvin area, fenced, paved road, horses, cattle. Call Damewood, 482-5572.

For sale: Large wooded lot, Rayburn Country, number six hole middle course, utilities, cul-de-sac, 10% interest. Call Poindexter, x4241 or 474-7769.

For lease: Camino South 3-2-2, two story, fully fenced, trees, fireplace, large kitchen, patio, \$625/mo. Call Blacknall, x5378 or 480-2896.

For sale: Galveston By-the-Sea condo, 2 BR, beautifully furnished, private balcony overlooking Gulf, 9 3/8% assumption, rental association available. Call 944-3640.

Co-op special: furnished bedroom in private home, \$155/mo. plus options, utilities paid, available now. Call Jim, x5071 or 480-5097 after 5 p.m

For sale: College Station 3-2 mobile home, 14' x 78', 2 miles from campus, fenced, landscapped, ceiling fan stays, available June 15, \$14,900 firm. Call 474-3839 after 5 p.m.

For rent: Friendswood/Heritage Park 3-2-2, large kitchen with breakfast, formal dining, fireplace, new paint, wood fence, no pets, \$625/mo. Call F. Wong, x5303 or 482-6609 after 5 p.m.

For rent: Galveston-by-the-Sea 2bedroom condo, fully furnished, fully equipped, reservations for spring & summer, month, week, 2-day minimum. Call Clements, 474-2622.

For rent: Heritage Park (new section), 3-2-2, draperies, microwave, cable hookups in Ir & br, near Landolt Elem., clean house, friendly neighborhood, available June 10. Call Gail, x4986.

Cars & Trucks

1965 Mustang, 289 V-8, auto, good condition, \$1,850. Call Ray, x5844 or 488-2316 after 5 p.m.

1978 Datsun 280Z 2 + 2, sunroof, shade kit, AM/FM/cassette, excellent condition. Call Beverly, x2676 or 997~

1973 Toyota Celica, excellent condition in and out, 4-spd. manual, mag wheels, stereo, \$3,000. Call Paula, 554-2249 from noon to 6 p.m., or 486-0154 mornings.

1975 Olds Cutlass Supreme 9-passenger wagon, AC, PS, PB, 76K miles, very good condition throughout, \$1,250. Call J. Homick, x5457 or 471-2276 after 5 p.m.

1978 Jeep Eagle CJ5, 302 V-8, tan denim and bikini tops, stereo, runs and looks good, make offer. Call 482-7858. 1983 Chevy Blazer 150, 8,500 miles,

full warranty, loaded, \$11,000. Call George, x3987 or 474-5267. 1977 Chevy Monza 2 × 2, loaded, immaculate, 60K miles. Call 486-4666

after 5 p.m. 1982 Chevy Celebrity, 4 cyl., 8K miles,

auto, air, power, \$6,700. Call 488-3966, 668-3242, or Musgrove, x5528. 1980 Citation, blue, 4-dr., hatchback,

4-spd., 4-cyl., A/C, loaded, 39K miles, \$3,500. Call Jerry, 534-4603 or x4626. 1977 Fiat X19, black w/gold pin stripping, mag wheels, A/C, \$2,800. Call Earl, 334-2294.

1972 Corvette, 350, Auto, recently reconditioned and repainted, \$8,000 or best offer. Call 471-5161 after 7 p.m.

1982 Datsun 210, 4-door, yellow, air, auto, mint condition, \$5,000. Call 488-2854 after 5 p.m.

1977 Fiat X-1/9 convertible, air, AM-FM cassette, excellent condition, \$3,100. Call 486-8266 or 480-8325.

1977 Pontiac Grand Prix, 66K miles, green w/white vinyl top, excellent condition, service record available. Call Pawlowski, x4647 or 488-3353.

1982 Firebird SE, t-top, AM-FM cassette, full power, cruise, tilt, more, \$9,900 or best offer. Call Mark, x6226 or 332-2686 after 5 p.m.

1980 Chevrolet Caprice Classic, diesel station wagon, A/C, fully loaded, 40K miles, \$5,500. Call Dan, x3021 or 331-3719 after 6 p.m.

Cycles

1979 KIM 250 dirt bike, helmet, 2bike trailer, gear, extras, clean, \$1,200 or best offer. Call John, 334-2194 evenings.

1976 Honda 175 cc, excellent condition, helmet, low miles, \$400. Call 488-3238 after 5:30 p.m.

1981 Kawasaki KZ305CSR, low miles, some extras, \$650 or best offer. Call J. Johnson x3916 or 334-6821 evenings. 1979 Kawasaki LTD 1000, good cond.,

new paint, \$1,900. Call Bill at x6313 or Mitch at 479-1375

1978 Honda CX500, fairing, luggage rack, trunk, new battery & rear tire. Call Mark, x4395 or 487-4249.

10-speed bike, good condition, \$50. Call 487-1883 after 5 p.m.

Schwinn bicycle, Sting Ray Pixie, 16", blue, convert. to boy or girl, \$38. Call McCartney, 488-2735.

New M/C parts: plex fairing II windshield, \$85; jardine mufflers for Suzuki GS550, \$80; sz. 7 1/8 Bell Magnum III \$50. Call 488-7899 after 5 p.m.

1978 Honda XL 250 S, excellent condition, dual purpose street/trail bike, \$595. Call Jim, x6386 or 482-2941. 1980 Kawasaki KZ 750, 4-cyl., Kerker

header, excellent condition, \$1,800. Call Jody, x6386 or (409) 945-6963.

1972 Honda 350-4, one owner, new battery & mufflers, fairing, luggage rack w/backrest, 19K miles, excellent condition, \$700. Call Dan, x5528.

1982 Yamaha 1100 Maxim, \$2,900. Call Earl, 334-2294.

Audiovisual & Computers

Text Editor program for TRS-80 Model III, w/48K, 1 disk. Call Lee at 480-7239 after 5 p.m

Atari cartridges, all brand new, Video Pinball, Centipede, Laser Blast, Combat, Pac-Man, Night Driver, \$90. Call Dennis, x6393 or 482-5021.

HP 34C with new batteries, \$70, HP25 with software book, \$30. Both w/manual & wall outlet adapter. Call Mike at 481-4196 after 6 p.m.

Car AM-FM stereo 8-track unit for in-dash mount, new. Call 334-1267. 14-foot satellite dish, no electronics,

\$800. Call Judy, x6167 or 332-2207. Heathkit TV's, 25" GR900, one in

cabinet in working cond., other in parts as spares (circuit boards, picture tube, tuner, etc.), all for \$150. Call Stan, x2901 or 482-1425.

Colecovision cartridges, Zaxxon \$30, Venture \$20, Cosmic Avenger \$20, used very little. Call Stan, x2901 or 482-1425.

Motorola 6800 computer, all documentation, many extras, \$300. Call Scott Thompson, 488-8111 or 488-6134

evenings. PUT DOWN RISING COSTS! BY SENDING YOUR COST REDUCTION REPORT ON AJSC FORM 1150 TO BE/ 80 COST RE-¥ DUCTION PROGRAM! ٦¢

Radio Shack PC-2 pocket computer, 8K module, Basic, built-in scientific, used 2 months, \$338 value for \$235. Call C. W., x3101 or 643-8944.

Clear Lake Osborne and CP/M Group meeting, May 14, 9 a.m., second floor, Gilruth Center. Come learn about computers, guests welcome. Call Mark, x5348.

Interested in joining Rocket Computer Club at JSC? Share programs, buy new programs. Call C. W., x3101 or 643-8944

Delco AM-FM car stereo w/balance and fader controls. from '82 Firebird. best offer. Call Mark, x6226 or 332-2686 after 5 p.m.

Atari 2600 video computer w/combat cartridge, works great, joysticks and paddles, \$65. Call Dennis, x6393 or 482-5021

Sony Walkman cassette plus headphones, excellent condition, \$50, Call Dennis, x6393 or 482-5021.

Household

Hide-a-bed, \$75; Patio doors, 2 pr. w/screens, \$250; 3.5 HP lawn mower. \$65; fireplace screen, \$5. Call 488-2616.

Chandelier, victorian style, excellent condition, 25 years old, \$250. Antique radio, table model, 1927 Radiola-18. limited guarantee, \$255. Call 488-0104. acuum nump suitable for

Couch and chair, \$80. Call 480-7200. Sofa, 96" Stratford, Herculon velvet, antique gold, trad. styling, like new, \$295. Call 482-1429.

Ads must be under 20 words total per person, double spaced, and typed or printed. Deadline for

submitting or cancelling ads is 5 p.m. the first Wednesday after publication. Send ads to AP 3 Roundup, or deliver them to the Newsroom, Building 2 annex. No phone-in ads will be taken - Swap Shop is open to JSC federal and on-site contractor employees for non-commercial personal ads

> Refrigerator, Montgomery Ward, 20 cu. ft., \$150. Call x3188 or 480-6109 after 5 p.m.

> Sofa & love seat, 2 months old, excellent condition, \$800 or best offer, may sell separately. Call 332-1391.

> Dinette set w/6 chairs, butcher block formica top, chrome legs, cream color padded chairs, \$150. Child's tricycle, \$10. Van seat, \$5. Call Steve at x5111 or 554-2435.

> Pool table and overhead light, excellent condition, all accessories, \$475. Call 334-3227.

> Bedroom furniture set, girl's, 8 piece, white, includes canopy bed, excellent condition, \$350. Call 474-3127.

> Bedroom set, child's, twin bed, new box springs & mattress, dresser, mirror, chest of drawers, off white, \$125. Call 333-2395.

Photography

Kodak Colorburst Instant camera w/electronic flash, case included, used twice. \$20. Call 334-6128 evenings.

Polaroid SX-70 SLR instant camera with electronic flash and case, \$125. Call Steve, x2447.

Canon 35mm camera, quick load, 1.8 lens, auto exposure control, aperture needs work, \$20. Call 486-8266 or 480-8325.

Nikon 43-86mm f/3.5 zoom lens, used only once, \$175. Call Redmond, x2848 or 333-4534 after 5 p.m.

Musical

Flute, Gemeinhardt, like-new condition, used only 8 months, \$200. Call x2221 or 481-0924 after 6 p.m.

Guitar, Fender, small acoustic, with case, \$100 or best offer. Call Todd, 486-0481 or 488-9005.

Clarinet, Bundy, with case and stand, excellent condition, used 4 months, \$275. Call Marie, x3606 or 488-2870 after 5 p.m.

Pets

Mini-Dachshund pups, AKC, red, pedigree, \$200 each. Call Kandy, x7256 or 482-2750 after 6:30 p.m.

Wanted

limited.

Boat trailer (sailboat or other type), 4,000 lbs capacity or greater. Call Jon, x4006 or 334-1087 after 4:30 p.m.

Formal dining room suite, trad. w/walnut or fruitwood finish, with 6 or more chairs and china cabinet, excellent condition. Call Evelyn, x6311 or 488-4387.

Need car pool partners for pool between Quail Valley, Missouri City, and NASA. Call Jack Dunaway, x3771, x4351, or 774-2367 after 5 p.m.

Join or form no smoking car pool from SW Houston, Richmond/Gessner area, work hours flexible. Call Tom, x2653.

Non-smoker to share furnished condo, all amenities, \$400/mo, includes utilities & phone. Call Maj. Herb Jansen, x3751

F attachment trigger trombone in good condition. Call Croom, 944-5624. Baby crib, with mattress, any style, prefer pine finish. Call Keith Fontaine, x 6484 or 996-9938 after 5:30 p.m.

Sagemont Eagle carpool is in great need of a fifth rider, we work 8:10 - 5 p.m., loads of fun. Call Jeanette, x3725.

Need ride from League City to NASA, will help pay gas. Call Sharon, x5516 or 996-0764 after 6 p.m.

Miscellaneous

482-5021

10-inch radial arm saw, Craftsman, perfect condition, \$245. Call Croom, 944-5624. Air-conditioner for van/motor home.

Coleman Mach I, Model 6734B917, 115V

AC, 60 cycles, phase 1, roof mounted,

Ping-pong table, paddles & net, good

Tires, (2) H-78-15, polyglas (WSW),

Camper, Starcraft, Starflight 6, pop-

less than 4K miles, \$50 for both. Call

Dean, x6467 or 482-7138 after 6 p.m.

up, canopy, AC, screened porch,

curtains, many extras, like new. Call

Lawn mower, electric, Craftsman 2.5

Cake decorating pans, separator plates, etc., like new, priced to sell. Call

Oak floor tiles, 25 sq, ft., unused,

glue & primer, originally at \$70+, sell

for \$40. Scott postage stamp catalog

from 1976 on, pick a year. Call Jeff at

Heat/Sun lamp, excellent condition,

Pickup cover for Toyota regular

Motorcycle battery, used only one

week in science fair. Call 334-1267

length bed, all aluminum, all windows

open, \$250. Call 480-2367.

\$60. Call Weldon, x2313 or 482-1416

HP, twin blade, 18", used one season,

Doug, x3561 or 334-2179.

\$100. Call 482-3742.

334-6128 evenings.

x7429

after 5 p.m.

after 5 p.m.

Gilruth Center News

Defensive driving — Learn to drive safely and qualify for a 10% reduction

in your auto insurance over the next three years. The class meets from 8

a.m. to 5 p.m. Saturday, May 21. The cost is \$20 per person and space is

Race - Start getting into shape for our next race, to be held beginning at

8 a.m. May 21. The entry fee is \$1 per person and medals will be awarded

Dancercise - This class meets from 5:30 to 6:30 p.m. Tuesdays and

Thursdays beginning May 3 for six weeks. The cost is \$20 per person.

Country western dance - This popular class is again available begin-

to the top men and women in each age bracket.

Call x3594 for more information

condition, \$60. Call Dennis, x6393 or

practically new, \$150. Call 488-0104.

1966 Mustang, good condition, 289, 3 spd. std., new tires, brakes, ball joints, \$2,195. Call Lee, x2271 or 488-5908 after 5 p.m.

1978 Camero, auto. AC, PS, PB. like new condition, \$3,595. Call 774-3030 after 5 p.m.

1979 GMC Custom van, icebox, water supply, captain's chairs, cruise, AM/FM/8-track, CB, 67K miles, \$6,000. Call 332-8188 after 5:30 p.m.

1970 Cadillac, good body, motor, tires, needs transmission repair, \$500. Call 333-5869.

1981 Chrysler Imperial, all options, low miles, electronic fuel injection, it's beautiful. Call 333-2974.

1975 Olds Cutlass, 4 new steel belted radials, AC, AM/FM, good condition, \$1.750. Call 334-2318

1971 Dodge Polaris, four door, AC. AM, auto, good condition, \$750. Call 334-2318.

1978 Dodge Colt, good condition, will sell at wholesale, 54K miles. Call Jay, x6151 or 481-2335 after 5 p.m.

1972 Chevy window van, auto, cruise, stereo, hitch, runs well, \$650, Call 334-1406 after 5 p.m. weekdays.

1974 VW bus, one owner, 80K miles, excellent running condition, body ugly but solid, interior very clean, \$1,750. Call Kimball, x6316.

Girl's 26" bicycle, 5 speed, very good condition, \$50. Call Stan, x2901 or 482-1425

1973 Suzuki TS250, low miles, garage kept, good condition, \$400 or best offer. Call 471-5165 after 7 p.m.

1978 Honda CB550K4, 16K miles, windshield, backrest. Call 482-7042 after 5 p.m.

Boats & Planes

1978 Cessna 152, \$24,85/hr. wet; G.A. Tiger, \$41.85/hr. wet; \$8/mo. dues, \$50 membership; Gulf Coast Aero. Call Mark, x4436 or 554-2538 after 5 p.m.

24' Buccaneer cabin sailer, completely outfitted, all extras incl., sleeps 6, galley, head, main cabin, \$7,500. Call 996-9070 after 5 p.m.

15' Chrysler Mutineer sailboat w/trailer, \$475. Call J. Johnson, x3916 or 334-6821 evenings.

"Victoria Eighteen" sailboat, '81, good condition, extras. Call Tracy at 482-8425 after 6 p.m.

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

Piper Warrior PA-28-151 for rent \$33/hr. wet. Cessna 150, \$25/hr. wet, based at Houston Gulf, avail. weekends, instructors avail. Call 946-1750.

auto air-conditioning work, \$75. Call 482-9116.

GE washer and electricall dryer, white, 3 yrs. old, used 1 year by bachelor, \$250. Call 482-9116.

Silex coffee maker, two-burner commercial type, two pots, \$30. Call Avis or Claudia at x4488.

Gas stove, 30" Sears, continuous cleaning, gold \$100; Sears 15.2 cu. ft. refrigerator/freezer, gold. \$100. Call 554-6006 after 6 p.m.

Dinette w/4 chairs, good cond., \$65. Black vinyl bar w/accessories, excellent cond., \$100 or best offer. Call Jim, x3911 or 941-8763.

Living room suite, Spanish, two end tables, coffee table, good condition, \$225. Call 488-5610.

Living room rocker, new, heavy wood frame w/removable cushions. Call 486-8153 x149 or 331-4026 evenings.

Trundle beds, 39 × 77, 6-inch innerspring mattresses, steel frames, mint cond., \$320 new, asking \$200. Call Linda x5595.

Bunk beds, good condition, bedding incl., \$95. Call D. Mangieri, x5107 or 488-5471.

Antiques - oak corner cabinet, \$200; oak jelly cupboard, \$150; walnut pie safe, \$250; child's oak rocker, \$55. Call 334-4483.

ning May 2. Two beginners classes will be held from 7:15 to 8:45 p.m. and from 8:45 to 10:15 p.m. Cost is \$20 per couple. The limit is 15 couples per class.

Ballroom dance --- This class will be held for intermediates from 7 to 8:15 p.m. and for beginners from 8:15 to 9:30 p.m. beginning May 5 for eight weeks. The cost is \$50 per couple.

Garage sale — Come swap and shop with us at our annual garage sale. It's a good opportunity to find good buys, with all types of homemade items on sale also. The sale runs from 9 a.m. to 3 p.m. May 21. A concession stand will be open, and a limited number of tables are available. Reservations for tables must be made in advance.

Volleyball leagues — Limited space still exists in our spring volleyball leagues, with openings on Mondays in mixed recreational leagues, Tuesdays in competitive men's and women's, Thursdays in mixed recreational and Fridays in mixed recreational. Registration deadline is May 5, and play begins May 9.

Summer basketball - Registration is being accepted for two basketball leagues, with openings on Wednesday nights and Saturday afternoons. Deadline for entries is May 5, and play begins May 11.

Softball tourney - Registration is now underway for the men's and women's B League tourney. Dates are May 20, 21 and 22. the cost is \$65 per team and space is limited to 24 male and female teams.

Children's movie - The next movie will be a Road Runner cartoon festival and will include popcorn and soft drinks. The cost is \$1 per person. Tickets are on sale at the Bldg. 11 Exchange Store.

Club data — The Rec Center would like to compile data on all the clubs which are available to JSC employees. Please call Helen Munk at the Rec Center so information on your club can be made available to all employees.