

Vol. 25 No. 24

**December 19, 1986** 

**National Aeronautics and Space Administration** 

# Season's Greetings

Dear Colleagues,

With the holidays come reflection, and it is natural that we reflect on the difficult year now coming to a close and on the goals which lie ahead. A sense of sadness will stay with us from 1986, but it is important to remember that we pulled together as a family during our time of trouble, and we retained our professionalism and our determination to continue the guest for knowledge. It is important to remember that the desire for exploration, for pioneering the unknown, has always motivated the people of JSC. The vitality of that desire has not diminished; we can find some comfort in the hope that it has instead been strengthened by adversity. JSC represents, for the western world, the pinnacle of expertise in the field of manned space flight. Nothing has changed that. We owe it to ourselves, our Center and our lost friends to profit by reflection, to renew our determination and continue the quest for excellence. Remember that the dream is still alive; keeping it alive is what we do best. And we must keep that in mind as we continue in the goals of returning safely to flight, of developing the Space Station and preparing JSC for its role in future programs. The coming year holds new promise, and I look forward to sharing that with you as we move on and move ahead. My best wishes to you and your families for a most happy holiday season.



laron Cohen

Aaron Cohen

### Poll finds strong public support for space program

The American public strongly supports the U.S. space program and wants it to move ahead.

That was one of the findings in a survey of American attitudes towards the space program conducted by the Market Opinion Research Corporation, a leading public opinion survey organization. The firm did a nation wide telephone poll of 1,200 adults late last summer.

The survey found that the U.S. public views the Space Shuttle as a key element in achieving payoffs from the space program.

The survey showed that an overwhelming majority of Americans favor both resumption of manned flights and the building of a replacement for the Space Shuttle Challenger.

that the American public favors the Space Station as a long term U.S. space goal; that support for NASA's new Space Station program has increased since January; and that Americans support increased funding for NASA's civilian space program.

Survey results showed that 70 percent of Americans approve of the space program, 76 percent believe it should be continued and 57 percent say it should be expanded.

Other results disclosed that 89 percent want to resume manned flights, 85 percent believe there should be a replacement shuttle and 76 percent think astronauts

In addition, the study revealed travel on the shuttle. In addition, 79 percent agree that obtaining benefits for medicine. industry and science requires a

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replacement shuttle for the Challenger, and 73 percent believe that a replacement is needed to

in the space program to date. Sixty-three percent think that without the replacement shuttle, U.S. space capabilities would be crippled, and 58 percent believe that without a replacement. America will fall further behind the Soviet Union.

According to the survey, the American public supports a number of long term goals for the space that 52 percent of Americans disprogram. Fifty-six percent say a U.S. mission to Mars should be a goal for the civilian space program, and 58 percent approve of a future joint U.S.-Soviet Union manned mission to Mars.

An even stronger majority, 78 percent, support a manned earth and certain key civilians should avoid abandoning he benefits that orbiting space station and un-

are attainable from the investment manned exploration of planets as goals for America's space program. Americans favor NASA's new Space Station program by a margin of 69 percent to 15 percent, the recent survey found. Fifty-eight percent favored and 25 percent opposed the Space Station in a survey conducted before the Challenger accident.

The survey results also showed agreed with the statement that expenditures for the nation's civilian space program should be cut back. Sixty percent belived that the U.S. government should spend "whatever is necessary to maintain U.S. leadership in space."

The survey was commissioned by Rockwell International.



#### Brown is new AA for Management

Administrator James Fletcher has appointed June Gibbs Brown to become the new Associate Administrator for Management at NASA Headquarters. Brown succeeds C. Robert Nysmith, who has been reassigned to the position of Director of NASA Productivity Programs. Brown most recently served as Vice President and Chief Financial Officer of System Development Corp., now a part of UNISYS, the company formed from the merger of SDC, Sperry and Burroughs. From 1981 to 1985, Brown served as the NASA Inspector General. She holds a B.A. in business administration, summa cum laude, and a M.B.A. from Cleveland State University. She received a J.D. degree from the University of Denver School of Law and is a graduate of the Harvard Advanced Management Program.

#### Hermes preparatory work now underway

The preparatory program for the European Space Ágency's Hermes space shuttle began officially Nov. 27 when funding by member nations reached a specified level. Under an agreement adopted by the ESA Council in October, the research and development program was tentatively approved providing that 70% of the \$35 million necessary for its completion was pledged by member nations prior to program startup. the program is intended to refine the design of the Hermes orbiter and its systems. Nations now committed to the program are Austria, Belgium, Denmark, France, Ireland, Italy, Spain, Sweden, Switzerland and West Germany. Great Britain, Holland and Canada are also expected to take part. The Hermes, intended for first flight in the 1990s, was originally conceived by CNES, the French space agency, and was adopted by ESA as a formal program in October.

#### NASA and 3M sign joint agreement

NASA and the 3M Company signed a joint agreement Dec. 8 under which the St. Paul, Minn. firm will conduct 62 materials processing experiments aboard the Space Shuttle over an extended period. Signed by NASA's Assistant Administrator for Commercial Programs, Isaac T. Gillam, and Dr. Lester C. Krogh, 3M's Vice President for Research and Development, the joint endeavor agreement will provide 62 flight opportunities for the purpose of conducting materials processing in space experiments in organic and polymer science, areas in which 3M specializes and has major interests. NASA will schedule the 3M experiment flights on a space available basis. The assignment of specific flights will be contingent upon negotiation of individual task agreements which contemplate a particular 3M research project in a specific scientific area over a specified number of Shuttle flights. Under the agreement, NASA will have use of 3M's experiment apparatus for its own scientific investigations, subject to certain limitations. Although a major payload manifest has been established for the resumption of Shuttle flights, no flight dates as yet have been determined for secondary payloads - the category of the 3M experiments

### **Bulletin Board**

#### New Year's Eve dance scheduled

The Employee Activities Association will sponsor a New Year's Eve dance beginning at 7 p.m. at the Gilruth Recreation Center. Music will be by the Nick Navarro Combo and Sunshine Festival. The evening will begin with a social hour at 7 p.m., a cold cut buffet at 8 p.m., dancing from 9 p.m. to 1 a.m. and breakfast from 12:30 to 1:30 a.m. Tickets are \$12 per person and will go on sale at 8 a.m. Dec. 9 in the Bldg. 11 Exchange Store. The tickets will be on sale until 2 p.m. Dec. 23.

#### Space radiation/VLSI conference planned

Natural space radiation and VLSI technology will be the subjects of a conference to be held Jan. 20 and 21 at the Gilruth Center. The conference will provide a forum for the exchange of information between the physics and avionics communities, organizers hope, with an eye toward future spacecraft designs to cope with the ionizing radiation environment of low Earth orbit. The conference general chairman is JSC Director Dr. Aaron Cohen. The conference committee will clear JSC employees for attendance per JSC Form 1167. Registration is required by close of business Jan. 9. The conference is being sponsored by Prarie View A&M University, JSC, the American Institute of Aeronautics and Astronautics and the Institute of Electrical and Electronic Engineers. For more information, call Dr. R. P. Bennett at McDonnell Douglas, 280-1500, x3112.

#### Class planned for junior high students

Several JSC employees are planning to hold educational sessions on the Space Station for local junior high school students. The classes would begin after the first of the year, and an organizational meeting will be held at noon Jan. 15 in Room 135, Bldg. 2. Persons interested in providing ideas or expertise should call Andy Petro, x36622, Peggy Lathlaen, x38632, or Jim Poindexter, x38624, for more information.

### **MOD** donates to Houston Food Bank

Employees of JSC's Mission Operations Directorate (MOD) donated \$925 to the Houston Food Bank Dec. 10.

The money was raised Nov. 1 during the second annual MOD Olympics, a family event sponsored to promote unity among MOD's six divisions and contractors.

Dr. Barbara Adams, Food Bank Accountant, and Russ Levinton, director of marketing, accepted the check from Michael Darnell, chairman of the MOD Olympics for 1986 committee.

"We're making this donation to the Houston Food Bank in hopes that the action will promote the giving spirit during this holiday season," Darnell said. "It is hoped that this donation will contribute to the benefit of the hard-core poverty stricken communities of Houston."

The Houston Food Bank is a private non-profit organization that acts as a clearinghouse where food companies and individuals can donate wholesome food. The food is distributed to 275 local charities that help the poor, hungry and victims of crisis.



Michael Darnell, representing the Mission Operations Directorate, hands a check for \$925 to Dr. Barbara Adams, Accountant for the Houston Food Bank. The money was raised during the MOD Olympics Nov. 1.

### **Tracking operations extended**

NASA's Goddard Space Flight Center has announced plans to extend operations at five of its ground tracking stations until at least September 1988.

The ground tracking stations planned for extended operational status are at Ascension Island in the southeast Atlantic Ocean; Santiago, Chile; Guam; Hawaii; and the Yarragadee Shuttle air-toground voice station located in western Australia.

The five stations are part of a network which relays commands to and receives data from near Earth-orbiting spacecraft, including the Space Shuttle.

Goddard's plan to eventually close those stations is conditional on the February 1988 launch by the Space Shuttle of the second Tracking and Data Relay Satellite (TDRS) and subsequent placement of TDRS into geosynchronous Earth orbit. A third TDRS is scheduled for launch in September 1988 as a backup to either of the two operational satellites.

NASA changed its original network streamlining plans, calling for station closings to start on July 1, 1986, because of the loss of a TDRS in the 1986 Space Shuttle *Challenger* accident.

A sixth ground station at Dakar,

Senegal has been placed in caretaker status until resumption of Space Shuttle flights. Upon completion of the Tracking and Data Relay Satellite System constellation of three TDRS's planned for mid 1989, the Dakar station also will be closed.

The TDRSS, owned by the Spacecom of Contel and managed by the Goddard Space Flight Center, will be comprised of two operational and one spare TDRS on orbit, providing more than 85 percent coverage of a spacecraft's orbit, compared with 50 percent coverage now provided by existing ground stations and the first TDRS, launched in April 1983.

Sensor aids ocean studies

An airborne sensing device that could greatly enhance satellites' capability to monitor ocean weather patterns has been developed by researchers at NASA's Jet Propulsion Laboratory.

The new infrared radiometer, used to measure ocean surface temperatures, is 100 times more sensitive than typical radiometers. The new radiometer's ability to distinguish between the temperature of the ocean surface and that of the atmosphere immediately above is considered a major scientific advance. Earlier airborne sensors lacked this ability, making the task of assembling highly accurate

An airborne sensing device that climate maps more problematic.

The radiometer was tested in flights over waters between Los Angeles and Southern California's Santa Catalina Island, aboard the Goodyear blimp *Columbia*. The radiometer is a passive instrument—as opposed to active instruments such as radar devices that emit signals to monitor weather patterns. The radiometer gauges sea temperatures by analyzing infrared light given off naturally by the ocean surface.

of the atmosphere immediately above is considered a major scientific advance. Earlier airborne sensors lacked this ability, making the task of assembling highly accurate Researchers hope that temperature and wind maps generated by such instruments will help scientists develop better models of highly complex global weather interac-

tions—for example, how storm systems are generated in the tropics and spread to other latitudes.

Eventually, scientists believe oceanographic research may lead to a better understanding of such phenomena as El Nino, an unusual water warming in the eastern Pacific Ocean that previously has damaged fishing industries.

The scientific team which developed the infrared radiometer was led by oceanographer Denise Hagan and physicist Crofton Farmer of JPL's Atmospheric and Oceanographic Science Section. The research is funded by NASA's Office of Space Science and Applications.

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#### Armand Bayou star party planned

Star gazers will explore the winter night sky during a star party Jan. 10 at the Armand Bayou Nature Center. Telescopes will be available for viewing and a free program will be held in the Nature Center auditorium. Interested persons are advised to wear warm clothing and bring a pair of binoculars. The star party will be held from 7:30 to 10 p.m. at the Nature Center, located at 8600 Bay Area Blvd. For more information, call 474-2551, or Bill Williams at 333-1367.

#### JSCAS to meet Jan. 9

The next meeting of the JSC Astronomical Society will be held at 7:30 p.m. Jan. 9 at the Lunar and Planetary Institute. An invitation to attend the meeting and join the society is extended to anyone with an interest in astronomy. For more information, call Bill Williams at 333-1367.

#### BAPCO's next meeting is Jan. 20

BAPCO, the Bay Area PC Organization, will hold its next monthly meeting at 7:30 p.m. Tuesday, Jan. 20, at the Holiday Inn on NASA Road 1. The group has recently organized a special interest group for beginners, and will cover DOS, word processing, spreadsheets and databases. The local IBM PC users group is open to all persons with an interest in microcomputers and meets regularly the third Tuesday of each month. For more information, call Earl Rubenstein, x3501 or Jack Calvin, x2983.

#### Next issue will be Jan. 9, 1987

The next issue of the Space News Roundup, Volume 26, Number 1, will carry the dateline of Friday, Jan. 9, 1987. The deadline for submissions to that issue is Wednesday, Dec. 31.



Changes to the main entrance of Bldg. 1 began last week in an effort to maintain better climate control in the lobby. The new entrance, shown in this artist's concept, features an air barrier and automatic doors.

# Bioreactor has possibilities on Earth, too

#### **By Kelly Humphries**

In studying the effects of gravity on living cell processes, a team of JSC aerospace physicians, biologists and engineers has discovered that techniques useful in producing rare medicines in space may also be valuable on Earth.

Dr. David Wolf, project engineering manager, said the biosynthetic process has the potential to produce large quantities of living cells and proteins useful in fighting diseases such as cancer, in regenerating human cells, and in supporting life in space for long periods. Meanwhile, the team's attempts to simulate biosynthesis as it would occur in microgravity have produced new and better methods of maintaining cell cultures on Earth.

"The whole team is very excited, highly motivated and determined to successfully accomplish this project," said Wolf, who is both an aerospace physician and an electrical engineer. The team includes biologists, chemists, engineers, technicians and support from Technical Services Division.

"The key thing about this team is that the work requires the close knit interactions of a highly multidisciplinary team," he said. "I think this is an excellent example of the enhanced in-house productivity, motivation and team spirit NASA is trying to promote."

This particular biosynthetic process uses a device called a "bioreactor" to grow delicate living mammalian cells that naturally secrete proteins effective in fighting many diseases. Many such pharmaceutical products can be made right here on Earth, but gravity in many cases severely limits the process and results. Research on how well this type of bioreactor works in microgravity, will determine whether the products may be produced in large enough quantity and of sufficient quality to increase their availability and reduce their cost, Wolf said.

The basic process involves seeding the mammalian cells onto tiny beads (between 50 and 150 microns in diameter) that are coated with collagen, a structural protein. The cells, which attach themselves to the beads, then live and grow in a suspension solution containing oxygen and nutrients (including glucose and glutamine). As part of their life process, the cells secrete proteins that normally would be used by the body to fight diseases or would be used as hormones, but in this case are instead filtered out of the solution and purified for use as pharmaceuticals.

In standard 1-g reactor vessels,

the cells require agitation and mixing to distribute oxygen and nutrients, remove waste products and keep the beads suspended in the culture media. But mixing also can damage the cells, which reduces the quality, quantity and concentration of product. Using more beads to sustain more cells, which could in turn secrete more product, requires more mixing. But more mixing means more damage and less product in lower concentration. High concentration is important to the next processing step, purification.

Dr. Dennis Morrison developed early concepts for growing cells in microgravity where agitation is needed only to distribute nutrients, not to induce suspension, Wolf said. With less agitation, there is less cell damage and more production of pharmaceuticals. The first experiment in a microgravity environment, on STS-7, confirmed that cells would adhere to the beads in a weightless environment.

The JSC team is working with embryonic human and baby hamster kidney cells to determine exactly how much mixing is required just to distribute nutrients to the delicate cells in microgravity and improve their survival rate. These particular cells, when properly nourished and handled, secrete products that are useful in treating heart attacks by dissolving blood clots. More important, the proteins secreted by the cells work specifically on the blood clots as they form, rather than impairing the body's overall clotting ability. The fact that these particular cells have been used for biosynthesis on Earth will provide a basis for comparison with microgravity performance.

In order to analyze fundamental bioreactor performance and separate the many variables involved, the JSC team has built a bioreactor that uses clinostatic technology to approximate zero-g. The system already is docketed for three U.S. Patent Office examinations, and the technique of using simulated zerog in the process has become a spinoff technology for finding better ways to culture living cells on Earth.

Most equipment for the system was developed and integrated inhouse in the Bldg. 37 Biomedical Laboratories Branch. Technology Inc. employees instrumental in developing the system were C.D. "Andy" Anderson, Jay H. Cross, Ray Schwarz, Laura Pearson, Bill Bowie, Bill Hall, Tinh Trinh, Marian Lewis, Kevin Damron, Helen Huls, Kay Elton, Jean Turner and Paul Swank.

"I like to refer to the system as a combination of an artificial kidney,



Project Engineering Manager David Wolf inspects the bioreactor system with colleagues Tinh Trinh, Bill Bowie and Bill Hall of Technology Inc. The drawer contains the bioreactor chamber, where mammalian cells are cultured. Above the drawer are the status display panel and the system's computer control unit. The entire system will be designed to fit into two Shuttle mid-deck lockers or Spacelab.

an artificial heart, an artificial brainstem and an artificial lung," Wolf said.

The major components include an oxygenator that serves as a lung, maintaining oxygen and carbon dioxide at the proper levels; a pump that serves as a heart, circulating the culture media; a product extraction loop that acts as a kidney, filtering the secreted product from the media by its molecular weight; and a computer, process controller, sensors and effectors that serve as a brainstem and nervous system, automatically sensing the state of the system and making corrections to maintain a constantly ideal environment for

#### the cells.

Eventually, the bioreactor system may be teamed with the Continuous Flow Electrophoresis System (CFES) being developed by McDonnell Douglas, Wolf said. There is theoretical and experimental evidence that purification processes perform far better in space. The bioreactor would provide the feed stream that would be refined by CFES or other purification technologies, forming the basis of a space factory for pharmaceuticals.

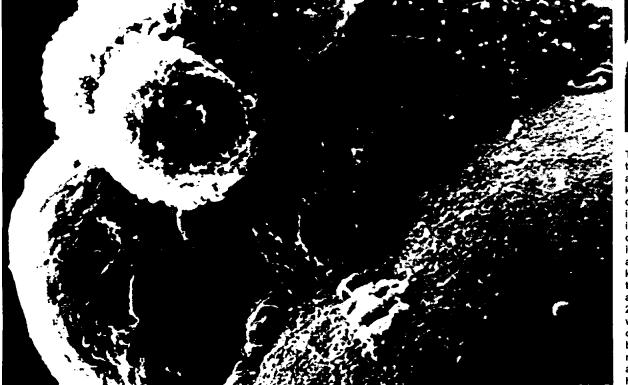
Such a factory could sustain cell of tumor infiltrating lymph lines more difficult to culture and which act as "killer" cells a maintain than those now being cancer, space food producti tested. Examples include cells that air and water regeneration.

secrete erythropoeitin, which modulate red blood cell formation in bone marrow and currently costs \$100,000 per milligram; interferon, an anti-viral treatment that is being tested for use against some cancers; lymphokines, which stimulate the immune system and may also be used in treating diseases.

The new processes also have the potential to regenerate human bone marrow and liver cells, which could be reimplanted in patients with associated diseases. Additional applications may include the culture of tumor infiltrating lymphocytes, which act as "killer" cells against cancer, space food production, and air and water regeneration.







These microscopic photos of the cell cultures prepared aboard STS-8 show human kidney cells attached to collagen-coated beads. Growing the cells in microgravity instead of Earth gravity reduces the amount of damage inflicted on the cells. In space, agitation is not needed to keep the cells suspended in their medium. At left, a cell is attached to one of the beads 2.5 hours after cells and beads were mixed. At center, numerous cells are anchored to one bead 24.5 hours after initial mixing. At right, several beads are shown suspended 24.5 hours after mixing.



### **Gilruth Center News**

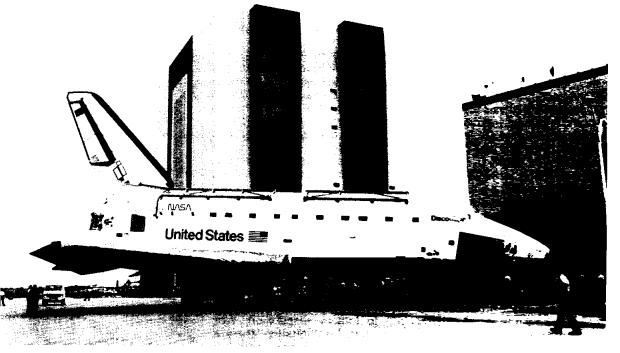
Call x3594 for more information

Defensive driving — Learn to drive safely and qualify for a 10% reduction in your auto insurance for the next three years. This all day Saturday class, taught by a representative from the Safety Council of Greater Houston, meets from 8 a.m. to 5 p.m. Jan. 17 or Feb. 21. Space is limited. Dancercise -- Part dance, part exercise and all fun, this class works on toning and will gradually get you into shape. This 4-week course begins Jan. 6 and meets Tuesdays and Thursdays. The cost is \$16 per person. Ballroom dance - This course offers professional instruction in beginning, intermediate and advanced ballroom dancing, with classes beginning Jan. 8. The advanced class will meet from 8:15 to 9:30 p.m. The cost is \$60 per couple.

Exercise class - Improve your cardiovascular fitness, flexibility and overall body tone by attending this class, which meets from 5:15 to 6:15 p.m. every Monday and Wednesday for 8 weeks beginning Jan. 5. The cost is \$21

Weight safety — This is a required course for JSC employees interested in using the Rec Center weight room. This class will be offered Jan. 15 from 8 to 9:30 p.m. or Jan. 28 from 8 to 9:30 p.m. The cost is \$4.

Karate - A continuous program of learning "Cha Yon," the Natural Way, consists of Taekondo, Kung Fu, Hapkido and Shido Ryu. This system was designed by the Grand Master Kim Soo. Class starts Jan. 26 and will meet from 7 to 8 p.m. every Monday and Wednesday for 4 weeks. The cost is \$25.



The Orbiter Discovery, scheduled to be used for the first flight when Shuttle operations resume in 1988, was rolled into the Orbiter Processing Facility recently at KSC as a first step in the preparations for launch.



#### 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**

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Sale: Baywind II 1-1 condo, FPL, mirrored walls, mini-blinds, fans, W/D connections, assumable loan. 471-6814. Sale: Package of seven mobile homes,

\$30,000 loan balance or take over payments, all need work. 486-4466. Lease: 3 BR townhouse near Hwy.

146 and Fairmont or 1 BR condo near NASA 1 and FM 270. 486-4466.

Rent: Ski condo in Heavenly Valley, Lake Tahoe, 2-1, sleeps 6, FPL, hot tub, 3 min. to lifts, 10 min. to gambling/ entertainment, available December 20-27 and March 14-21, 7 nights \$900 plus \$300 deposit. Quin Shepperd, 486-7770.

Lease: Seabrook 4-2-2, 2,000 sq. ft., cul de sac, drapes, FPL, formal LR, den, large kitchen, fenced, near schools/pool, \$500/mo., \$300 deposit. 333-6660 or 331-0733.

Sale/lease: Forest Bend townhouse, 2-2.5-2CP, mirrored, paneled, LR, DR, new carpet, new refrig., storage space, W/D hookups. Tom, x38317 or 482-2575

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

Lease: Condo on Clear Lake, 24-hr. security, pool, tennis, 2-1, \$365 plus utilities. 480-5583 or 482-7156.

Sale: Camino South, 3-2-2A, formal living, cov'd patio w/fan, low equity, \$69,900. Andy or Kevin, 280-1746 or 280-9861

Sale/lease: Forest Bend 3-2.5-2 townhouse, LR, den, corner, storage, pool, park, \$475/mo. or \$41,500. 333-2322.

Sale: League City/Dickinson house, 3-2-2, large deck w/gas grill, fenced, wet bar, vaulted ceilings. 337-6625.

Sale/lease: Heritage Park 4-2-2, new carpet, stove, DW, fresh paint, shady yard, \$510/mo. or \$57,500. Karl, x35067 or 333-3544.

Rent: Barringer Lane apartment, Webster area, 2 BR, W/D connections, \$330/mo., \$50 deposit. 996-8113.

Lease: Pipers Meadow, 3-2-2A, clean, comfortable, fan, central A/C, drapes, fenced, cathedral ceiling, \$525/mo. 486-0315

#### Beach truck, big tires, convertible,

Cars & Trucks

\$375. Bill Peters, x31528, 283-1528 or 486-9144

'77 Cadillac Coupe de Ville, white w/red trim, sunroof, \$2,900 OBO. 480-6431

'85.5 BMW, low miles, ex. cond., reasonable. Adolf, 333-3999.

'80 Pontiac Phoenix 4 DR, A/C, PS, PW, PB, stereo, \$1,750 retail, \$1,000 loan value, asking \$950. Erickson, x38119 or 488-5873.

'71 Corvette, 350, auto., T-top, good Boats & Planes cond., orig. owner, \$5,900. 333-3601.

'76 Buick Regal, 350, auto., air, good working cond., orig. owner, \$850, 333-3601.

'78 Plymouth Arrow, \$1,250. Everett, x36224

78 Mercury Grand Marquis, loaded, DR, BO. 474-4228.

'80 Toyota Corona, 4 DR, hatchback, A/C, AM/FM/cassette, 5-speed, ex. cond., one owner, service records. Dale, 481-0046 or x39039.

'78 Toyota Celica GT, 85K mi., 5speed, AM/FM/cassette, Pirelli tires, service records, non-smoker, \$2,300. 996-8541

'78 Jeep J-10 Truck, top of line, auto., A/C, PS, PB, 360

engine, 4x4, stereo, bucket seats, overloads, air shocks, 2 tanks, wired for camper, w/8.5-ft. Coachmen OTC Cadet Camper, sleeps 4, refrigerator, stove, heater, porta-potty, all for \$3,200. 474-2906

'83 Jeep Cherokee, 4x4, 4 DR, 5speed, A/C, mint cond., ex. gas mileage, \$8,500. 474-3063.

'77 Chevy Nova sedan, 3-speed, standard, 6-cyl., AM/FM, A/C needs work, 80K mi., passed inspection, \$700. 337-2165.

'82 Honda Civic, \$3,995. Mike Lake, 523-2137.

'72 Mercedes Benz, white, model 220, gasoline, ex. cond., good tires, AM/FM/ cassette, \$3,000 OBO, 641-4894.

'83 Ford Mustang GT, 5.0 liter, 5speed, \$5,500 OBO. Leonard, x38931 or 488-3916.

math, ext. function, \$300. Peter, 789-3249

Printer, TRS 210 daisy wheel, new, in box, \$300 OBO; SC typewriter, reconditioned, \$75; 12-ft. AL boat-motortrailer, ex. cond. \$500 OBO. 538-1579.

Apple IIE, 128K, disk drive, monitor, 80-column card. Haves micromodem (300 baud), flip file, table and joystick. Software: flight sim., games, Apple writer, \$900 OBO. 333-6246 or 859-1083

'83 16-ft. Hobie Cat, special edition, multicolor sails, galvanized trailer w/custom boat box, extras, stored indoors, \$2,990. Carla, x30181 or 538-1148.

'76 Seasprite, open-bow ski boat w/75hp. motor, trailer, \$2,600. Rusty, x31956 or 486-5581.

14.5-ft. Galastron ski boat, rebuilt 80hp. Mercury motor, new direct drive steering, new trailer, \$1,500. Alan, x31423 or 334-7814.

#### Cycles

'79 Suzuki GS1000L, good cond., new rear tire, brakes, big, fast, incl. inspection, license and battery, \$800. Craig, 453-4571.

Redline RL20 freestyle bicycle, fork lifter stem Potts-MOD, Tuff IIs wheels, \$200. 554-6242.

Raleigh and Iverson 27-in. boy's 10speed bicycles; Huffy 26-in. girl's 10speed bicycle, your choice, \$50. 480-4432

Mongoose BMX M1 bicycle, competition racing frame, ex. cond., approx 9mo.-old, \$150. John, 991-2121.

Benotto Italian-made 10-speed bicycle, orange, ex. cond., \$95. Valerie. x38385.

78 Honda CX500, running but may need work, \$500. Rusty, x31956 or 486-5581.

#### Household

Washing machine, almond color,

w/charger, card reader, optical wand, many accessories, \$300 OBO. Gordon, instruments available. Alan or Virgil, or 480-5410.

#### **Musical Instruments**

Remo 5-piece drum set, cymbal, black and chrome, \$450. Rusty, 485-3273 (day)

Fender Rhodes 73 stage piano, \$250; Yamaha RX11 drum computer, \$500.

#### Wanted

Want AKC Airedale stud for pick of litter. 538-3434.

Want Apple computer and peripherals under \$500; upright piano under \$400; encyclopedia set. 337-2165.

Want non-smoker roommate to share new 3 BR house at Heritage Park, private BR, bath, co-ops welcome, \$200/mo, Ken, x35463 or 996-0618.

Want JSC Porsche owners interested in forming club. J. Kosmo, x39235 or J.

Mays, x35052.

x37832.

Want two bowlers for Tuesday night (6-9 p.m.) mixed league. Two males or one male, one female. Mike Fohey, x31894 or 486-0193.

Want carpool from SW Houston to NASA, 8 a.m. to 4:30 p.m. shift. Jason, 622-3956

Want late model compact or mid size car, PS, PB, AT, AC, must be excel. cond. Boykin, 326-1267.

Want lawn work or light hauling for retired man. Joe Marks, 734-4058.

Want to buy 51-C coffee cup (from Rockwell gift shop) to complete set. Donna, x31614.

Want musicians for Alvin Community Band. Doesn't matter if you haven't

x34039

Want snow ski bindings, prefer step in w/brakes. Ray, 474-4885.

Pets

Half Labrador, half German shepherd pups, pure black, good hunting dogs. Bonnie, x34240, or Tina, 487-5455.

Half Irish setter, half Great Dane, two blacks, two blonds, born November 9. Dorothy Ritter, x34248.

Free border collie/hound mix puppies, 12 wks. old, 3 males, 2 females. Hazel, x37103 or 554-7087.

#### Miscellaneous

Infant car seat, \$25. Everett, x36224. Sears treadmill, \$50 OBO; alto saxaphone, \$125 OBO; genuine new wood wagon wheels, \$250 ea. 538-1579.

Exercise equip., Penney's finest home gym, all accessories, 300 lbs. weights, bars, \$225. Erickson, x38119 or 488-5873. 4-ton AC unit, used one season, \$400;

15-gal. hot waterheater, \$50; toilet, \$25; 15' formica bar top, \$50. Ray, 554-2908.

Lloyds stereo & spkrs., \$30; entertainment center, \$18; glassware for 6, \$15; stoneware for 6, \$20; exercise machine, \$7; weight set, \$20; tennis racquet, \$10,

other items. Kellie, 332-3280. Oak firewood, you haul, \$110/cord. Boykin, 326-1267

Complete set 1986 World Book, new in box, aristocrat binding, \$495. Max Kilbourn, x38127 or 482-7879.

Firewood, delivered and stacked, \$125/cord, will sell 1/2 and 1/4 cord. Joel, 482-7967.

Worried about osteoporosis? A free bone desnity measurement is being offered by the Bone and Muscle Lab of the Medical Sciences Division. Healthy women ages 25-45 interested in volunplayed in few weeks or 10 years. Loaner teering should call Jan Cook, x37171.

## Want to buy electric trains. Don,

Craig, x38675 or 665-1118. l year. Charlotte, 282-1982.

or Mark, 481-5498 (after 4 p.m.).

Gemeinhardt flute, used less than

Lease: Pipers Meadow, 2-2-2A, central A/C, like new inside, mini-blinds, \$475/mo. 486-0315

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

Sale/lease: Forest Bend townhouse, 2-2-2CP, mini-blinds, private courty'd, quiet area, \$395 or sell \$34,900 with \$1,000 down. Glen, x36541 or 486-0462.

Sale: Meadowbend brick 3-2-2. fenced, appliances, nothing down, assume FHA balance of \$47,000. Glen, x36541 or 486-0462.

Sale/lease: Pasadena-South Houston, 3-1.5-2, brick, cental A/C, all appliances, carpet, drapes, no pets, \$455/mo. or \$46,500 w/8.5-percent assumable VA Ioan at \$340/mo., owner equity \$16,500. 941-5908

Sale/lease: Pasadena 3-1-1, den, breakfast area, appliances, fresh paint, new carpet, drapes, fenced, no pets, \$400/mo. or \$35,500 w/8.5-percent assumable VA loan at \$227/mo., owner equity \$15,000. 941-5908.

Sale/lease: Nassau Bay, 2,200-sq. ft. townhouse, new carpet, paint, large garage, deck, atrium, 20-ft. FPL, \$890/ mo. or \$119,900. Jerry, x38922 or 474-4310.

75 Plymoi 3/8, 4-speed, no rust, AM/FM/cassette, rebuit A/C, engine needs work, \$800 OBO. Phyllis, x73423 or 538-3434.

#### **Audiovisual & Computers**

Apple IIE 64K computer, monochrome monitor, single external disk drive, thermal printer, joystick, Visicalc, word processor, flight simulator, game software, 480-4432.

DEC Rainbow 100A computer, 256K RAM, monochrome monitor, CP/M w/MBASIC, editor, commun, software, MS-DOS 2.05, freestyle word processing, more. Leonard, x38931 or 488-3916.

AT&T 6300 computer, 640K, 2 floppies, green monitor, printer, 70 disks, all software and hardware manuals, \$1,500 OBO. Jeff, x39365 or 538-1112. 35mm SLR Yashica TL Electo X,

50mm 1.7 lens, Vivitar auto flash model 252, 90-230 zoom lens, close-up lenses, 2X converter, hard plastic briefcasestyle case, \$235. 334-1934.

Atari 1040 ST computer (1Mb, DS drive), RGB monitor, external disk drive, Epson RX-80 printer, Pascal, Fortran 77, more software, \$1,500. Peter, 789-3249.

heavy duty, was \$450, asking \$200. 996-8541.

Office desk, large, five oak drawers, one file drawer, \$150. Jeff, x39365 or 538-1112.

Tweed emory toast sofa and loveseat, like new, \$400. 280-2618.

Wrought iron table & 4 chairs, \$125 OBO, TV or stereo stand, \$75 OBO. Sandi, x30086.

Alpaca rugs, wall hangings, throw pillows, fur coat and small brass llamas, all new, reasonable. George, 554-6317. Dinette set, 4 chairs, naughahyde and chrome, woodgrain table, formica top. 333-3673.

Whirlpool 16 cu. ft. frost free refrigerator, icemaker, gold, will deliver, \$300. 332-3852.

7' L-shaped couch/hide-a-bed, herculon, beige, 2 yrs. old, paid \$1,000, sell for \$650, Janet, x38650 or 554-5968.

3 ceiling fans, Amana side by side refrigerator/freezer (1 yr. old), Lawnboy mower, wet-dry vac and other items. Charlotte, 282-1982

Antique occassional table, \$50; Papasan chair, rust color cushion, \$50. Kellie, 332-3280.

Large 48 x 12 x 20 aquarium, 3/8" glass, heavy duty twin stand, light fixture HP 41CV calculator, NiCad pack & cover, Maxiflo filter, 2 other pumps,

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

Cookin' in the Cafeteria

Week of December 29 — January 2, 1986

Tuesday - Navy Bean Soup; Beef Stew, Liver & Onions, Shrimp Creole, Smothered Steak w/Dressing (Special); Corn, Rice, Cabbage, Peas. Wednesday - Seafood Gumbo; Roast Beef, Baked Perch, Chicken Pan Pie, Salmon Croquette (Special); Mustard Greens, Italian Green Beans, Sliced Beets.

Thursday - New Year's Holiday.

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

#### Week of January 5 — 9, 1986

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 Suev, 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.