

# Space News Roundup

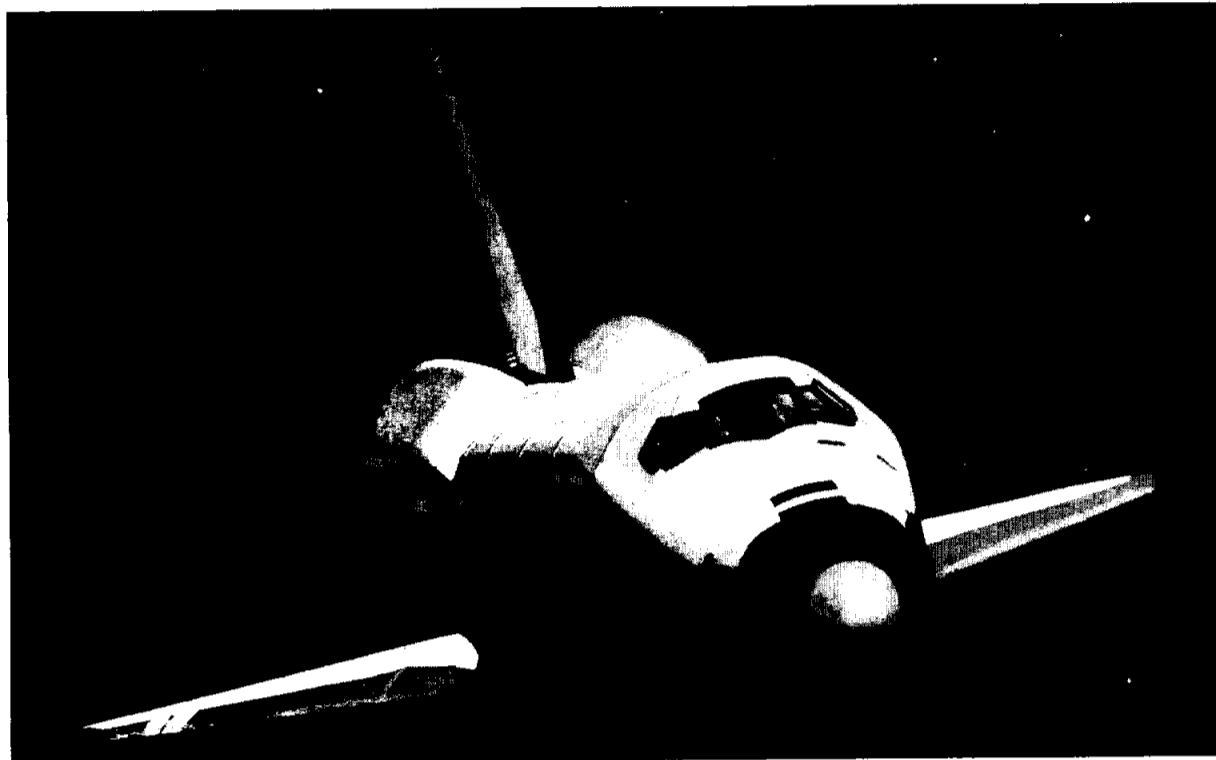
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National Aeronautics and Space Administration

## Space Truckin'

*Milestone payloads highlight the busy year ahead*



This artist's conception of an orbiter buttoned up for reentry illustrates an event which will probably occur three times in the coming year. And as NASA moves into the operational phase of the Space Transportation System, 24 flights are scheduled annually by 1988.

The first precursor of a commercial factory in space may go aloft aboard the Space Shuttle if schedules hold in 1982, as NASA moves from testing to operations during a busy launch year.

Three Shuttle missions, the latter of which will be the first operational flight, will include a series of milestone payloads. In addition, the space agency is planning 12 expendable rocket launches — seven Deltas, three Atlas Centaurs and two Scouts — and all but one will carry communications satellites (see related story, this page).

Also highlighting the scheduled events of 1982 is the planned delivery of Orbital Vehicle 099, the *Challenger*, which should be ready for orbital duties as *Columbia* is sent back to California for post-testing modifications late in the year.

### A factory in space

The first step toward a factory in space will come during STS-3 in March, when *Columbia* will carry an experimental space processing device built by McDonnell Douglas of St. Louis in conjunction

with Johnson & Johnson and its Ortho Pharmaceutical division. The device, known as the Continuous Flow Electrophoresis System (CFES), will be flown six times on a Shuttle middeck to investigate the potential for commercial processing of new drugs in zero g.

CFES is the first application of a recent NASA policy intended to foster commercial ventures in space, the result of early difficulties in sorting out the many financial and legal questions which arose when talk turned to making large private investments in space activities.

NASA wanted those investments from the private sector as part of its policy to encourage Materials Processing in Space (MPS), but one major obstacle blocked the way: technology developed with public funds by law had to become public domain, and this made substantial investment in a thus questionable market very chancy for private enterprise.

But in 1980, a Joint Endeavor Agreement (JEA), the first of its (Continued on page 2)

## NASA announces launch schedule for 1982

One of NASA's most ambitious launch schedules in years was recently announced, with three manned spaceflights and 12 expendable rockets slated for liftoff in the coming year.

Included on the payloads list is LANDSAT-D, the long-awaited Earth resources satellite which will decidedly improve remote sensing capabilities. The Delta rocket carrying LANDSAT in July will be launched from Kennedy Space Center facilities at Vandenberg Air Force Base, CA.

The launches will begin in the next two weeks when RCA-C' (C-prime) is launched from KSC aboard a Delta. In February, another Delta will take WESTAR-IV into orbit for Western Union.

March will see the launch of an Atlas Centaur with an INTELSAT V F-4 satellite aboard for the 106-nation International Telecommunications Organization early in the month. Later in March, Commander Jack Lousma and Pilot Gordon Fullerton will carry the Office of Space Science (OSS-1) astronomical investigations package into orbit on the seven-day flight of STS-3.

In April, a Delta will launch INSAT-1A for India, while in May an Atlas Centaur will hoist another INTELSAT, this one designated VF-5. In June, a Scout rocket will launch a Defense Department Transit satellite from Vandenberg.

July will see another Vandenberg launch when LANDSAT-D goes up aboard a Delta. Later in July, *Columbia* is scheduled for its fourth trip into space, a flight which should bring the spaceship's mileage to just over four million miles in orbit.

Another Delta will fly from Kennedy in early August carrying TELESAT-F, also called ANIK-D, a Canadian communications satellite.

In late September yet another Delta will be unlimbered to launch WESTAR-V. In November the

fourth Delta in a row will be launched, taking RCA-E into orbit. November will also be the month for STS-5, the first operational mission of the Space Shuttle. That flight is listed as carrying two communications satellites, SBS-C, for Satellite Business Systems, and TELESAT-E and their boost

stages. STS-5 is also scheduled to carry the OSTA-2 experiments pallet a year after the first OSTA package flew for the Office of Space and Terrestrial Applications.

Also in November, NASA's smallest orbital rocket, the Scout, with over 100 successful launches

on its record, will orbit San Marco-D/L, a joint NASA/Italy project designed to study the relationship of solar activity to meteorological phenomenon. The Scout will be launched from an ocean platform at Italy's San Marco launch site off the coast of Kenya.

The last launch of 1982 is

scheduled to an Atlas Centaur carrying INTELSAT VA F-1, the third Atlas Centaur and INTELSAT combination for the year.

The communications satellite missions are classified as reimbursables, with NASA being reimbursed for the cost of the launch vehicles and launch operations.

### 1981 Launch Record

| Date     | Payload                   | Launch Vehicle | Launch Site | Mission Remarks                                   |
|----------|---------------------------|----------------|-------------|---|
| Feb. 21  | COMSTAR-D                 | Atlas Centaur  | ESMC*       | Comsat General Corp communications                |
| April 12 | Space Shuttle             | STS-1          | KSC**       | First Shuttle flight                              |
| May 15   | Navy 20 (NOVA 1)          | Scout          | WSMC***     | DOD transit                                       |
| May 22   | GOES-E                    | Delta          | ESMC        | NOAA weather                                      |
| May 23   | Intelsat V-B              | Atlas Centaur  | ESMC        | Intelsat communications                           |
| June 23  | NOAA-C                    | Atlas-F        | WSMC        | NOAA weather                                      |
| Aug. 3   | Dynamics Explorer         | Delta          | WSMC        | NASA scientific                                   |
| Aug. 6   | FLTSATCOM-E               | Atlas Centaur  | ESMC        | DOD communications                                |
| Sept. 24 | SBS-B                     | Delta          | ESMC        | SBS communications                                |
| Oct. 6   | Solar Mesosphere Explorer | Delta          | WSMC        | NASA scientific                                   |
| Nov. 12  | Space Shuttle             | STS-2          | KSC         | Second Shuttle flight—first reuse of a spacecraft |
| Nov. 19  | RCA-D                     | Delta          | ESMC        | RCA communications                                |
| Dec. 15  | Intelsat V-C              | Atlas Centaur  | ESMC        | Intelsat communications                           |

\*ESMC—Eastern Space and Missile Center, Cape Canaveral, FL

\*\*KSC—Kennedy Space Center, FL

\*\*\*WSMC—Western Space and Missile Center, Vandenberg Air Force Base, CA

## Space News Briefs

### Oxidizer spill committee releases final report

An accumulation of iron nitrate lodged in the components of a quick disconnect fitting allowed an open path to the atmosphere and caused the Sept. 22, 1981 spill of nitrogen tetroxide oxidizer on the *Columbia*, according to a report released by the NASA committee which investigated the incident. The single failure point had not been previously recognized, and the committee recommended that other potentially damaging fluids and their access points around the orbiter should be examined to correct similar problems. Between 15 and 20 gallons of oxidizer spilled when the fitting failed, damaging a total of 370 tiles. A small but unknown quantity of oxidizer also entered the interior of the *Columbia's* forward Reaction Control System module, damaging thermal blankets and wiring. The committee recommended that possible entry paths into the orbiter be sealed during loading, or that internal compartments should be purged with inert gaseous nitrogen.

### External Tank mated to SRB's for STS-3

Work crews at the Kennedy Space Center returned from an 11-day holiday hiatus Monday and began the process of mating the apricot-colored External Tank to the Solid Rocket Boosters for the STS-3 mission. Mating of the tank and boosters with *Columbia* is scheduled for Feb. 5. *Columbia* was powered up during the week for the first time since the holiday break began. The three fuel cells removed for inspection following the second mission have been given a clean bill of health, and were returned to KSC during the week for installation on *Columbia*. As of press time, there were 177 tile cavities on *Columbia*. Work crews have removed 414 tiles and bonded 237 new ones into place.

### Ariane rocket qualified for operations

MARECS-A, the European maritime communications satellite, is now in orbit following a successful fourth flight test of the Ariane launcher Dec. 20. The European rocket was launched from the facility at Kourou, French Guiana. The flight concludes the Ariane launcher development program and qualifies the rocket for operations, the European Space Agency said.

## Four presented honor awards

Four JSC managers were recently presented NASA Honor Awards by JSC Director Christopher C. Kraft Jr. Those honored were Edwin J. Burke, who received the NASA Exceptional Service Medal; Larry G. Damewood, who was awarded the NASA Exceptional Service Medal; Harvey L. Hartman, also awarded the NASA Exceptional Service Medal; and D. Stuart Nachtwey, who was awarded the NASA Exceptional Scientific Achievement Medal.

Burke, Chief of the Quality Engineering Branch, Quality Assurance Division, was honored for his work in assuring the quality of products produced and procured. He was also cited for helping bring to bear a productive quality engineering concept and for his efforts in assuring safe operation of JSC's high pressure systems.

Damewood, Chief of the Central Budget Office, is responsible for planning and directing the Center's budget and resource planning activities, and was honored for his work in fulfilling these responsibilities. He is recognized as an authority on budget policy, and has been the focal point in coordinating the frequent and necessary budget reviews at JSC and NASA Headquarters. He also served as a member of a NASA committee

which was developed to establish a new budget concept for future funding of research and development activities.

Hartman, in association with JSC's Personnel Officer, shares the management of the Center's personnel program. Hartman was honored for meeting the demands of his job with efficiency and "sound and well-reasoned advice," and for working with the many personnel regulations, policies and laws which affect JSC employees.

Nachtwey, Chief of the Biomedical Applications, Branch, Medical Sciences Division, is responsible for managing JSC's biomedical technology utilization and research programs. He was honored for outstanding scientific contributions in the field of environmental photobiology. A world-recognized scientist in the field of ecological and human health consequences resulting from depletion of Earth's ozone layers, Nachtwey has been invited on numerous occasions to participate in government hearings and panels organized to study environmental issues.

## Twenty seven receive certificates

Twenty seven JSC employees received their 25, 30, 35 and 40-year length of service certificates during a ceremony Dec. 4 in Bldg. 1. JSC Director Christopher C. Kraft Jr. presented the certificates.

Those employees being honored, and their length of service were: Margaret F. Henry, 25 years; James E. Bone, Jr., 25 years; Ray D. Kaufmann, 30 years; Charles A. Biggs, Sr., 25 years; Edward S. Ashley, 40 years; Helmut A. Kuehnel, 30 years; Freeda F. Dunlap, 25 years; Max D. Holley, 25 years; Linus P. Murray, 30 years; Ralph H. Foster, Jr., 25 years; Judith S. Wyatt, 25 years; Alexie H. Benney, Jr., 25 years; John L. C. Mire, 25 years; Horace L. Bell, 30 years; Elsie M. Easley, 25 years; Richard G. Courtney, 25 years; William Y. Lee, 35 years; Eugene G. Edmonds, 25 years; Charles T. Hall, 25 years; John T. Roach, 25 years; Jack K. Coffelt, 30 years; Richard Rahilly, 25 years; William B. Goeckler, 25 years; Earl K. Smith, 40 years; William L. Tomkins, 35 years; Frank J. Herbert, 25 years; and Francis W. Ravet, 25 years.

# Space Truckin'

(Continued from page 1)

kind, was signed between NASA, McDonnell Douglas and Johnson & Johnson, in which no money would exchange hands. The two corporations agreed to proceed with plans to invest millions of dollars in the design and development of an orbital drug manufacturing process, as well as in testing and marketing the resulting space drugs. For its part, NASA agreed to provide room on the Space Shuttle and trained crews to operate the devices in space. Long-range plans for the six flights on the middeck, and the possible expansion to a free flying satellite or satellites which would be "harvested" of their high purity drugs about every four months late in the 1980s.

"These would be ultra-pure drugs," said Charles E. Chassay of the Payload Integrations and Operations Office. "You would have no side effects caused by impurities. In addition, the electrophoresis process is very slow on Earth. If on the ground your factor of output is 1, in space it can be 100 or so. Gravity absence is the big factor."

In its present configuration, the CFES will use the principles of electrophoretic separation (or electrophoresis) to direct the movement of charged particles under the influence of an electric field. These particles will be biological materials such as cells, enzymes and proteins which possess unique characteristics of charge, mass and shape. The resulting drugs could be produced much more bountifully than on Earth. Manufacturers could hope for what experts call a "100 throughput factor," or production at least 100 times faster in general throughout the electrophoretic process.

On STS-3, the idea will be to test the device itself in the Electrophoresis Equipment Verification Test (E EVT). The equipment is similar to devices flown aboard the Apollo-Soyuz Test Project in July, 1975, and will be used to separate eight samples of kidney cells. Because of storage and preservation complexities, the biological samples probably will not live through touchdown. During the July STS-4 mission, however, the goal will be to prove not only the separation process, but actually produce the first product, as yet unspecified, which will be submitted to the Food and Drug Administration for analysis. The CFES experiment is also scheduled to fly aboard STS-6, probably in early 1983.

Although the drug to be produced remains proprietary information, McDonnell Douglas has in earlier studies identified several drugs which might be acceptable for space manufacturing. These include a hormone which stimulates the production of red blood cells in animals, a cell which could produce insulin for diabetics, an enzyme which might help sufferers of emphysema, a material which could aid hemophiliacs, a chemical that may help speed the healing of wounds, and interferon, the much-heralded substance which could be of great value in the treatment of cancer.

Those kinds of developments depend on a number of unknowns, including process verification, success in the marketplace, government approval of the drugs and other factors. But for the moment and the foreseeable future, McDonnell Douglas and Johnson & Johnson are willing to take the risks, and NASA is willing to provide the means.

### Growing the better particle

NASA is willing to provide the space for another series of important payloads beginning in 1982 which also are geared toward materials processing in space. Now scheduled for flight on STS-3, 4, 5 and 6, the Monodisperse Latex Reactor

(MLR) will explore zero g production of very small, very precisely-sized particles with a variety of uses.

The MLR will allow scientists to see how the absence of gravity will improve the production of these large-diameter monodisperse (or, all exactly the same size) latexes. A latex is a suspension of very small micron-sized (approximately 0.00004 inches) plastic beads in liquid such as water. The human eye can discern particles no smaller than 50 microns.

On Earth, the latexes can be produced to a size of only about two microns before their dimensions begin to vary. The process for larger particles is cumbersome, and involves rapid mechanical agitation to keep the particles from floating or sinking within the suspension. Rapid agitation increases the chance of collision between the particles, which can result in beads of various sizes.

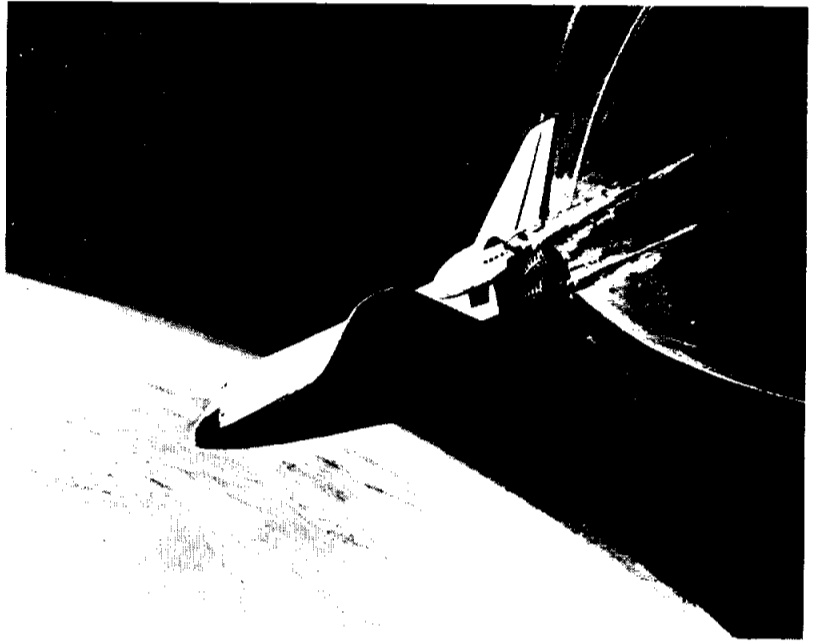
### Other Shuttle payloads

Space Shuttle flights in 1982 will also include Getaway Special (GAS) payloads, as well as several packages to more extensively monitor the orbiter environment.

Getaway Specials will consist of various small, self contained payloads for multidiscipline studies. There are two standard size GAS containers, each with its own internal payload support system. The GAS canisters have the capability of being operated from the flight deck by crew members if necessary.

In other experiments aboard Shuttle flights in 1982, scientists will seek to more closely examine the environment in and around the orbiter itself during space flight.

Flight 3 will carry Developmental Flight Instrumentation to monitor *Columbia's* performance through over 1,000 load cells, accelerometers, strain gauges and the like. The third flight will also



OMS burn on reentry

These problems can be alleviated in space, it is believed, because of zero g. With the absence of buoyancy and sedimentation, the large size particles will have no tendency to float or settle and could be kept in suspension with no agitation.

Keeping particles monodisperse is important due to their potential use as calibration devices for high fidelity instruments such as electron microscopes. But more importantly, the particles can be made for use in medical research with the promise of great potential.

One possible use would be as a carrier for drugs and radioactive isotopes inside tumors and other organs to closely control the amounts of drugs being released. The particles could be grown with precision to be used in specific areas of the body. In cancer research, for instance, they could be made to conform to the standard size pore opening for the stomach peritoneal cavity membrane or intestinal wall pores. Particles of the size of the human eye exit channel pore could likewise be used in glaucoma research.

As a calibration standard, the latex beads could function as internal standards for electron and optical microscopes, for filter calibration, for aerosol-counting equipment and for the calibration of blood cell counters.

The two components of the flight equipment will occupy the space of three standard middeck lockers on the Shuttle. The equipment consists of an Experiment Apparatus Container and a Support Electronics Package. Beads grown on STS-3 will be flown again on STS-4 to increase their size, and so on through STS-6.

The MLR will be removed from *Columbia* as soon as possible after touchdown and returned to the principal investigator, Dr. John W. Vanderhoff of Lehigh University in Bethlehem, PA.

carry the Induced Environment Contamination Monitor (IECM) to provide information on the particle and gaseous environment around the orbiter.

The IECM, which may be hoisted by the remote manipulator arm and moved to different position around the orbiter, is roughly the size of an office desk, and uses four quartz crystal microbalances to measure particle and gaseous concentrations around the spacecraft. The IECM will also employ a mass spectrometer to determine the types of particles which are present because of outgassing from payload bay and other orbiter materials. One result of the temperatures and vacuum of space is outgassing by non-metallic materials. Scientists hope to determine what significance, if any, these gases and particulates hold for payload operations.



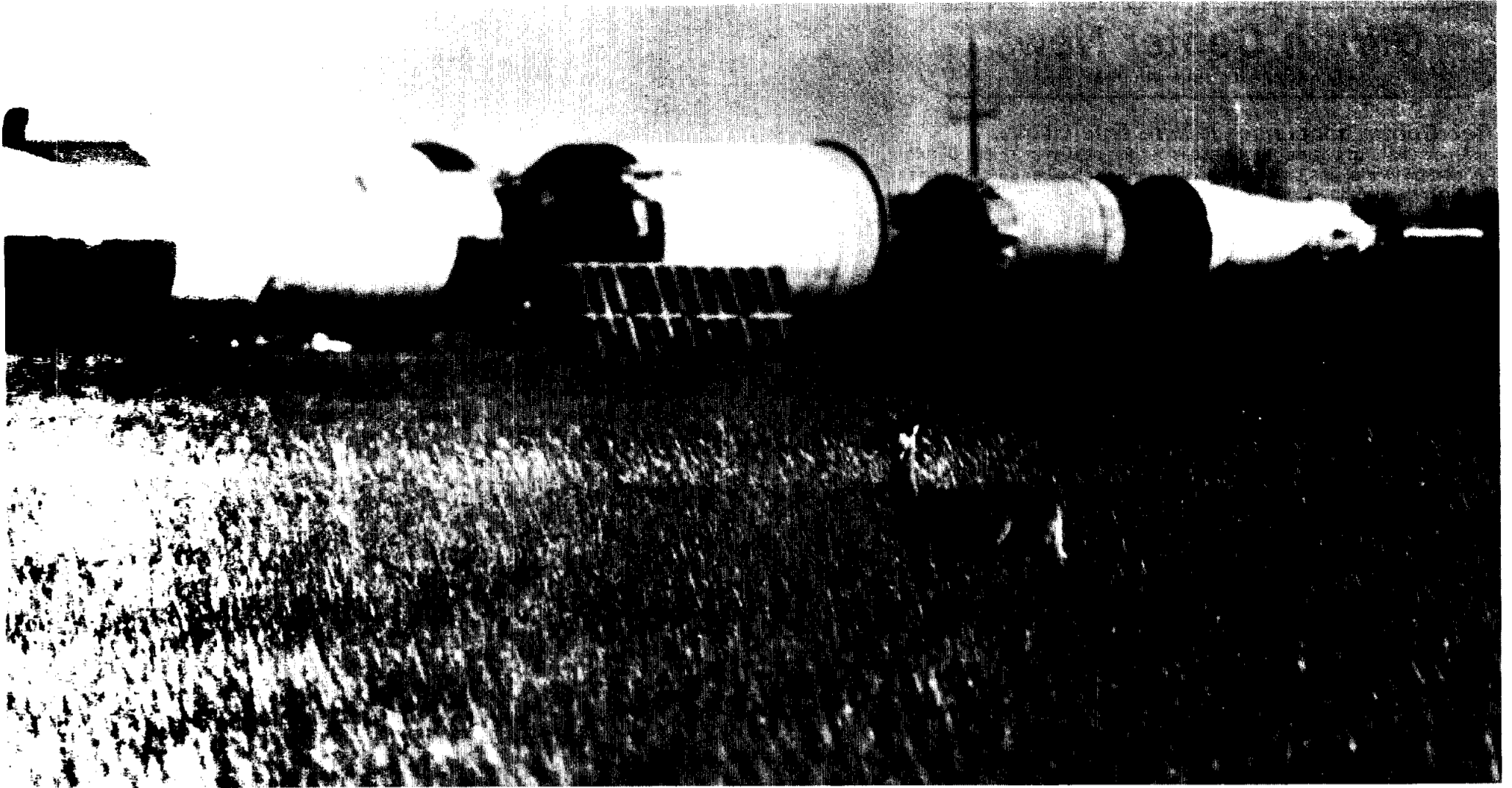
Atlas Centaur launch in 1981

## Space News Roundup



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Editor..... Brian Welch



A doe grazes in the grassland to the west of JSC's Saturn V display, and a mature buck with an impressive rack samples the scents in these photos taken by Terry Slezak, Photographic Technology Division. Below, the buck follows his harem back toward the woods on the northern border of the site where the deer generally spend the day. Groundskeepers at JSC report that deer tracks often have been found in the central mall of the Center, where the deer come to drink out of the ponds at night and in the early morning hours. It is estimated that from 15 to 30 deer live on site, but in doing so they are not altogether free of risk, despite the stringent game and firearm laws which protect them here. At least five or six and probably more deer were killed last year alone in the heavy morning traffic.



## Outstanding Secretaries named for October and December

Beverly A. Cox of the Scene Analysis Branch, Earth Resources Research Division, and Lillian M. Hudson of the Systems Integration Office have been selected as the JSC Outstanding Secretaries for December and October, respectively. Marilyn S. Hackett of the Electrical and Environmental Systems Branch was the November Outstanding Secretary (*Roundup*, Dec. 7, 1981).

Besides working as secretary to the branch chief and heads of the Pattern Recognition Section and Radiation Characterization Section, Cox was also cited for her outstanding work with an assemblage of 18 Scene Analysis Branch personnel, of which 90 percent are Ph. D's and all but two are GS-13's or higher.

"It should be emphasized from the outset that this report on superior quality performance of Ms. Beverly Cox comes from not one or a few Scene Analysis Branch personnel, it comes with

great enthusiasm collectively from this entire branch," Dr. F. G. Hall, Head of the Pattern Recognition Section, wrote.

Cox was honored for her work in helping branch personnel monitor several contracts each, and for dealing successfully with the many technical papers and difficult-to-type presentations of statisticians, mathematicians and physicists in the branch.

Cox was presented with a plaque and a \$150 award from the Awards Office.

Lillian M. Hudson of the Systems Integration Office also was recently honored when she was named the October Outstanding Secretary.

As secretary to the Manager of Systems Integration, Space Shuttle Program Office, Hudson was cited for her extraordinary secretarial support during the press of events surrounding two Shuttle launches in 1981. "Mrs. Hudson

worked many overtime hours, twice nearly around the clock, yet maintained her high proficiency and good humor," recalled her boss, Richard H. Kohrs. "Her direct support to me and to the Program Manager for STS-1 at the launch site was outstanding. The hectic pace and long hours did not diminish her efficiency nor affect her good nature. She was called upon daily during the last week before flight to coordinate meetings and/or teleconferences at a moment's notice, which she accomplished with no delays, managing to 'round up' the many management and engineering personnel required."

Hudson also was cited for her efficient assistance in setting up schedules of meetings, reviews, trips and the like, and for helping in research and preparing information for various administrative tasks. She was also awarded a \$150 check from the JSC Awards Office.

## Bulletin Board

### Duke will address Fellowship

Former astronaut Charles Duke, the tenth man on the moon, will discuss his experiences since retiring from NASA when he addresses the Space Center Chapter of the Full Gospel Business Men's Fellowship at 7:15 p.m. Jan. 30 at the Nassau Bay Holiday Inn. Those making dinner reservations should arrive by 6:15 p.m. Duke has traveled extensively since leaving NASA and is expected to share stores of his journeys and business life. More than twice the normal number of attendees showed up for Duke's last appearance before the chapter two years ago. For more information or reservations, call 488-8710 by Jan 29.

### TSPE plans program during Engineering Week

The Bayou Chapter of the Texas Society of Professional Engineers will sponsor an Engineering Week program on the subject of professional engineering registration beginning at noon Feb. 18 in the Gilruth Recreation Center. The speakers will be Wendell Beard, P.E., and President Joe Paul Jones of the TSPE, an affiliate of the National Society of Professional Engineers.

### NARFE meeting dates set for 1982

Chapter 1321 of the National Association of Retired Federal Employees will meet the first Tuesday of each month in 1982. Meetings will be held at 1 p.m. except for four evening meetings in March, June, September and December. Those meetings will be held at 6 p.m. The chapter meets in the Clear Lake Park Bldg. on NASA 1. The following officers will serve in 1982: president, Burney Goodwin; first vice president, Carl Russell; second vice president, Richard Crane; treasurer, Margaret Jackson; secretary, James Grimwood. For more information, call Burney Goodwin at 334-2494.

### "Cosmos" begins today at planetarium

"Cosmos: The Voyage to the Stars," the new show at the Burke Baker Planetarium, 1 Hermann Circle Drive in Houston, begins today and will run through March 14. The show can be seen Wednesdays and Fridays at 4 p.m., Friday evenings at 8 p.m., and Saturdays and Sundays at 2, 3 and 4 p.m. The admission is \$1.25 for adults and 50 cents for children under 12. No admissions are allowed after the show begins. The Planetarium is part of the Houston Museum of Natural Science, which is open from 9 a.m. to 5 p.m. Tuesday through Saturday, noon to 5 p.m. Sunday and Monday, and 7:30 p.m. to 9 p.m. Fridays.

### Explorers plan schedule, seek advisors

Explorer Post 1999 of the Boy Scouts of America, located at JSC, is planning activities during the spring which center on the recent Space Shuttle missions, future space development, model rocketry, model aircraft and working in space. Bi-monthly meetings are scheduled for the first and third Wednesdays of each month from 7 to 9 p.m. in the Gilruth Center, Room 215. The first meeting of 1982 is scheduled for Jan. 20. The Explorer Post is open to both young men and women in grades 10 through 12. Membership is open to students of JSC employees and contractors, as well as to students in the commuting area. The Post is seeking additional adult advisors to work with the students. For more information, call Wayne Boswell at x6254, Walt Jaderlund at x5107 or Mike Hawes at x5128.

### March election planned for credit union

Three directors will be elected to fill three year terms and one will be elected to fill an unexpired one year term during the JSC Federal Credit Union elections March 5. In addition, two credit committee members will be elected to fill three year terms. Persons interested in running for any of these offices should call Jim McBride at x6226 or 337-4643 before Jan. 29.

### NASA General Counsel to discuss space law

S. Neil Hosenball, NASA's General Counsel, will address the Houston Section of the American Institute of Aeronautics and Astronautics on the topic of space law. The dinner meeting will be held at the Gilruth Recreation Center with a social hour beginning at 6 p.m. Jan. 19. Dinner follows at 7 p.m. and the program at 8 p.m. The dinner reservation deadline is noon Jan. 15. The entree will be beef mandarin. For a list of costs and reservation information, call x3995 or 333-6161.

## Gilruth Center News

Call X3944 for more information

### Rec Center announces leisure time classes

A new slate of leisure time classes for the new year at the Gilruth Recreation Center has been announced, as well as other events during the next few months. For more information on the following listings, call the Rec Center at x3944.

**Ballroom dance** — Two classes will be offered for learning the fine art of ballroom dance beginning Jan. 15 and lasting for 8 weeks. The introductory class begins at 7 p.m. and the intermediate class begins at 8 p.m. The cost will be \$50 per couple.

**Aerobic dancing** — Dance away those extra holiday inches with Jacki Sorensen's aerobic dancing class. The 12 week session titled "One in a Million" began Jan. 4, but openings still exist. Classes meet Monday and Wednesday from 9 to 10 a.m. and on Tuesdays and Thursdays from 4:15 to 5:15 p.m. The cost is \$54.

**Dancercise** — Part dance, part exercise, all fun, this course is designed to get you in shape and keep you that way. Classes meet from 5:15 to 6:15 p.m. Tuesdays and Thursdays. The session begins Jan. 12 and lasts for six weeks. The cost is \$20.

**Ladies exercise class** — Designed to catch the ladies right after work, this class meets on a continuing basis Tuesdays and Thursdays from 5:15 to 6:15 p.m. The cost is \$12 per month.

**Country western dance** — This class is again available beginning Jan. 11 and continuing on Monday nights. The beginner's dance class will last from 8:45 to 10:15 p.m. The limit for the course is 15 couples at a cost of \$20 per couple.

**Square dance class** — By popular demand, this class is now available starting Jan. 21 on Thursday evenings. The 10 week class will meet from 7:30 to 9 p.m. The cost is \$25 per couple.

**Karate** — This class meets on a continuing basis on Mondays and Wednesdays from 5:30 to 7 p.m. The cost is \$18 per month.

**Defensive Driving** — Do Houston freeways adversely affect your nervous system and mental health? Add some confidence by learning to drive safely and qualifying for a 10 percent reduction in auto insurance for the next three years. The one class meets from 8 a.m. to 5 p.m. Jan. 9. The cost is \$15 per person and space is limited.

**January Race** — Get in shape for the Houston marathon by running in NASA's first race of 1982. A 20 kilometer and a one mile race will be held at 9 a.m. Jan. 16. Medals will go to the top finishers in each age group. The cost is \$2.50 per person. Call x3944 for entry blanks.

**Children's movie** — "Superman II" is the next children's movie at the Rec Center for two showings. The movie will be screened from 10 a.m. to noon Jan. 23 and from 2 to 4 p.m. Jan. 24. The cost of \$1 per person includes popcorn and soft drinks. Tickets are on sale at the Bldg. 11 exchange store.

**Second basketball season** — Register now for the second basketball season, which begins the week of Jan. 25. Teams will be formed in women's and men's A, B and C Leagues. The cost is \$100 for EAA teams and \$150 for non-EAA teams. The deadline is Jan. 20. The limit is 10 teams per league, first come, first serve.

**Volleyball** — The next volleyball season will begin the first week of February. Matches will be played on Friday evenings and Saturday afternoons. The cost is \$45 for EAA teams and \$90 for non-EAA teams, with 11 teams allowed per league. Teams will be accepted on a first come, first serve basis. Both leagues will play mixed volleyball.

**EAA Dinner Theatre** — Tickets go on sale Jan. 11 in the Bldg. 11 exchange store for the next edition of the EAA Dinner Theatre. The play "Little Mary Sunshine" will be preceded by a social hour from 7 to 8 p.m. and a roast beef dinner from 8 to 9 p.m. The cost is \$10 per person.

**1982 EAA cards** — Cards for membership at the Gilruth Recreation Center are now available. Cards will be mailed to all NASA employees. Contractor employees may pick up new cards by coming to the Rec Center and presenting their badges. Cards for spouses may be picked up at the same time. Forms may be obtained at the Rec Center for dependent's membership cards. Dependents must be 16 years of age or older to qualify.



**Venus, peaceful from space, but beneath its clouds a hellish world by Earthly standards, is shown here in one of the photos returned by NASA's Pioneer Venus Orbiter in January, 1979. The planet is expected to be among the topics discussed at the 13th Lunar and Planetary Science Conference, March 15 to 19 at JSC. Other topics expected on the agenda include early crustal evolution of the terrestrial planets, lunar petrology, planetary physics, meteorite chronology and satellites of the major planets.**

## Cookin' in the Cafeteria

### Week of January 11 - 15, 1982

**Monday:** French Onion Soup; Beef Chop Suey; Polish Sausage w/German Potato Salad; Breaded Veal Cutlet (Special); Okra & Tomatoes; Green Peas. Standard Daily Items: Roast Beef; Baked Ham; Fried Chicken; Fried Fish; Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

**Tuesday:** Split Pea Soup; Shrimp Creole; Salisbury Steak, Fried Chicken (Special); Mixed Vegetables; Beets; Whipped Potatoes.

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

**Thursday:** Chicken Noodle Soup; Beef Stroganoff; Turkey & Dressing;

BBQ Smoked Link (Special); Lima Beans; Buttered Squash; Spanish Rice.

**Friday:** Seafood Gumbo; Broiled Turbot; Liver w/Onions; Seafood Platter; Fried Shrimp; Meat Sauce & Spaghetti (Special); Green Beans; Buttered Broccoli; Whipped Potatoes.

### Week of January 18 - 22, 1982

**Monday:** Beef & Barley Soup; Beef Chop Suey; Breaded Veal Cutlet w/Cream Gravy; Grilled Ham Steak; Weiners w/Baked Beans (Special); Whipped Potatoes; Brussels Sprouts; Buttered Rice. Standard Daily Items: Roast Beef; Baked Ham; Fried Chicken; Fried Fish; Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

**Tuesday:** Celery Soup; Fried Shrimp; Turkey a la King; Pork Chop

w/Applesauce; Chinese Pepper Steak (Special); Au Gratin Potatoes; Breaded Squash; Buttered Spinach.

**Wednesday:** Seafood Gumbo; Fried Catfish w/Hush Puppies; Braised Beef Ribs; Mexican Dinner (Special); Spanish Rice; Ranch Beans; Buttered Peas.

**Thursday:** Green Split Pea Soup; Corned Beef w/Cabbage & New Potatoes; Chicken & Dumplings; Tamales w/Chili; Hamburger Steak w/Onion Gravy (Special); Navy Beans; Buttered Cabbage; Green Beans.

**Friday:** Seafood Gumbo; Deviled Crabs; Broiled Halibut; Liver & Onions; BBQ Link (Special); Buttered Corn; Green Beans; New Potatoes.

\*Notice. Menu subject to change without notice.

## Roundup Swap Shop

Ads must be under 20 words total per person, double spaced, and typed or printed. Deadline for submitting or cancelling ads is 5 p.m. the first Wednesday after publication. Send ads to AP3 Roundup, or deliver them to the Newsroom, Building 2 annex. No phone-in ads will be taken. Swap Shop is open to JSC federal and on-site contractor employees for non-commercial personal ads.

### Property & Rentals

For Sale: 3 BR house, like a double-wide, well insulated, very nice, all electric, 1 year old, \$33,500. Call 471-4387.

For Rent: La Porte, new 2 BR, available in April, \$385/mo. plus deposit. Call 471-4183 after 5 p.m.

For Rent: Heritage Park 3-2-2, large LR, formal DR, fireplace, fence, microwave, 1 year old, available immediately, \$600/mo. plus 1 month deposit. Call 488-4613 evenings.

For Lease: Camino South (CLC) 3-2, study, fireplace, \$525/mo. plus first and last month rent and \$250 deposit, available Jan. 1. Call x2425 or 333-2359.

For Lease: Condo near Clear Lake, 2-2, appliances, pool, tennis court, no pets, \$425/mo. Call 480-3771 evenings.

For Sale: Remodeled 2 BR house, fenced, near NASA, Bay, \$47,000. Low down payment, owner financed. Call Horton, x5350.

For Sale: 1,200 sq. ft. office building near NASA, \$49,500, owner financed. Call Horton, x6130.

For Rent: Galveston By-The-Sea condo, 2BR, furnished, for rent by day, week or month. Call Clements, 474-2622.

### Cars & Trucks

1977 Ford Pinto Wagon, 4 spd., 4 cyl., AC, luggage rack, 33K miles, excellent condition, \$2,550. Call Larsen, x3967 or 538-1477.

1978 Ford Fiesta Ghia, AC, radio, 30 MPG, \$3,000. Call Bob Voigt, x5540

or 488-1931 after 5 p.m.

1974 Mustang II, V6, good engine, tires, needs front end. Will buy replacement body or sell as is. Call 488-8080.

1973 Cadillac Sedan DeVille, white, loaded, runs well, asking \$1,050. Call 921-1715 after 5 p.m.

1976 Buick Electra Ltd., full power, 47K miles, \$3,300. Call Gary, 946-2499.

1968 VW Bug, auto, new radials and muffler, 61K miles, original owner, excellent condition. Call 488-3102.

1978 FWD Jeep for sale. Like new. Call 734-2286.

### Cycles

1980 Honda 400 Custom, like new, 4K miles. Call Frank, x3314 or 332-7383.

1973 Honda 75, good condition, \$200. Call Frank, x3314 or 332-7383.

1974 Yamaha 360A motocross, never raced or broken in, highly preserved, make offer. Call Roy, x3593 or 488-6326 after 5 p.m.

Suzuki T-125 for parts, needs carb, magneto cover, non street, no title, \$65. Call Kilbourn, x4402 or 482-7879.

### Boats & Planes

1977 27' Catalina, atomic 4 in-board, excellent shape. Call Robert, x6444 or 486-1766.

1965 Buick V6 21' I/O fiberglass. Runs, floats, excellent trailer, make offer. Call Frank, x3314 or 332-7383.

### Video & Audio

Heathkit GR-295 color TV, new 23" tube, extra vacuum tubes, solid maple

cabinet, works well, \$200. Call Joe, x3576 or 944-7042.

Movies for VCR TV recorder: Tora, Tora, The Wild Geese, Towering Inferno, Superman, Blazing Saddles, Carnal Knowledge, Silver Streak, \$350 for all. Call Meider, x4386.

Radio Shack 40C auto change turntable, needs retread on rubber drive wheel, good condition otherwise, only \$15. Call L. D. White, x6204.

Pair of Klipschorn speakers, unfinished cabinets, K77000 AM/FM Tuner, Dyna preamp. Call 488-3102.

Teac A210 stereo cassette deck, separate recording meters, \$50. Call 474-4531 after 6 p.m.

### Photography

Old 2-1/4 x 3-1/4 Federal enlarger, film tank, trays, printing easels, make offer. Call L. D. White, x6204.

Konica EE-Matic Delux F Rangefinder, needs repair, took beautiful pictures when it worked, \$10. Call Killingsworth, x2313 or 488-1689.

AF-100P flash unit for Pentax 110 system, brand new in box, never used, all papers, \$22. Call Ray, x3701.

### Computers

TRS-80 16K Level 2, expands to 48K, floppy controller, parallel printer port, serial port, real time clock, dual cassette controller, complete documentation. Call Jeff, x2836.

### Household Articles

Two skylights, 2 x 4 ft., self-flashing, double domed, everything you want in skylights, \$135 each. Call George,

x3849 or 488-4212/4236.

5-1/2 x 8 ft. braided rug, good condition, \$30. Call Mary, x4010 or 488-5127.

Medicine cabinet, light fixtures, drapery rods, make offer. Call 333-4669.

### Musical Instruments

Kay electric guitar and Peavy amp, excellent condition, \$175. Call 488-3965

Hammond M-100 Spinnet organ, drawbars, presets, pedals, reverb, \$900. Leslie 147 Tone cabinet, \$300. Call x2425 or 333-2359.

### Pets

Cute baby guinea pigs, ideal children's pet, \$7 each. Call x2296 or 488-5127.

Lhasa Apso, 1 male, 2 female, 6 wks, old, registered, \$150 each. Call 734-2286.

### Wanted

Four horse straight tongue trailer. Call Lausten, x5437 or 488-5192.

Want to buy WW II Japanese souvenirs — swords, daggers, armor, helmets, flags, OBI, etc. Call Howard Sloan, 337-2003 evenings.

NEED additional carpoolers from Gulf Freeway-Edgebrook Area to JSC on 7:30 to 4:15 shift. Call Ron, x3526.

Ride from Alvin to Bldg. 45, 8 to 4:30 Monday thru Thursday. Will pay. Call Candace, x3591.

Want 318 Chrysler, Dodge or Plymouth engine, 68-72 model, in good

or rebuildable condition. Call Boykin, 334-1267.

Want used sofa or love seat and bed for small apartment use. Call Jack, x6301.

### Miscellaneous

Ping pong table, regulation size (5' x 9'), heavy duty, painted green, \$25. Call Joe, x3576 or 944-7042.

Old IBM electric office model typewriter, works, \$75. Call 474-4531 after 6 p.m.

Fox super shop multi DC motor, 30-7,200 RPM, power driven carriage, heavy wood or light metal work. Call 488-3102.

Sears riding lawn mower, 6.5 hp, 30" blade, \$115. Call Ed Shumilak, 482-7723 after 5 p.m.

Two 14" General Motors wheels with raised letter Goodyear tires, \$40. Call Hector, 488-0217.

Anglo-Arab dressage and cross country trained 11 year old gelding, \$4,000. Call McCollum, 474-3839.

Used steel belted radial tire by Bridgestone, SR155 x 13, used for 20K miles, \$5. Call Jeff, x7429 or 482-5393.

Fly international Pan Am coupons Jan. 16-May 31, \$75 ea. or 2 for \$100. Call Doris Wood, 333-2373 evenings.

Extra copy of Yourdon's book, Techniques of Program Structure and Design. Call Jim, x4947.

1963 Corvette AM/FM radio, vertical style, \$20. Call Ray, x3701.

Firewood for sale, Arizona ash, almost a cord, \$75. Call 475-0541.