

Space News Roundup

Vol. 21 No. 12

June 11, 1982

National Aeronautics and Space Administration

Workshops

Sessions will explore satellite servicing

As the age of routine space operations begins, new opportunities for the use of near-Earth space are being explored.

In keeping with preparations for these new opportunities, JSC will host a Satellite Services Workshop June 22-24.

The workshop will allow potential users of the Space Transportation System to exchange ideas and acquire information relating to on-orbit servicing of satellites.

The six sessions to be conducted during the workshop highlight servicing equipment, servicing operations, berthing/docking,

servicing economics, satellite design and fluid transfer.

The workshop is open to all interested persons and there are no preregistration requirements or fees. Registration begins at 8 a.m. June 22 in the lobby of the Bldg. 2 Visitor Center.

Those wishing to attend a social function the evening of June 22 should contact Joy Robertson at x2263. A \$5 fee will be charged to cover the cost of beverages and hors d'oeuvres at that activity.

Other questions about the workshop may be directed to Gordon Rysavy at x3805.

Education workshop set

The eighth annual aerospace workshop for educators will be held at the Johnson Space Center June 14 to 27 as part of NASA's continuing effort to broaden the horizons of science teachers.

Teachers from the elementary, secondary and college levels will take part in everything from a hot air balloon launch to observing NASA aircraft operations, and they may even get to see a Space Shuttle launch.

Sponsored jointly by JSC, the University of Houston and the Civil Air Patrol, the workshop is designed to make science and aerospace technology come alive for the teachers, with the hope they can in turn make it come alive for their students.

"You can't find this type of first hand experience in textbooks," said Jim Poindexter, JSC Education Specialist. "We fill in the blanks."

Topics during the workshop will include aerospace education, hot air balloons, NASA aircraft

operations, Civil Air Patrol activities, tracking and communications, physiological training for spaceflight, the STS-4 launch, crew systems, Earth resources, astronaut selection, lunar science, the Landsat program, the Space Operations Center and other future NASA programs.

The educators will also be briefed on the NASA-National Science Teachers Association Space Shuttle Student Involvement Project, which so far has seen one student experiment fly in space, and is expected to see two more go up on STS-4 in June.

Three semester hours undergraduate or graduate credit will be offered by the University of Houston to persons attending the workshop.

Directing the workshop will be Dr. Jacob Blankenship of the University of Houston. For more information, contact the Office of Curriculum and Instruction at UH, Houston, Texas, 77004.

With the Sun peeking through the stack, Columbia was captured by a Kennedy Space Center photographer during its fourth trip to Launch Pad 39A recently. Hypergolics were loaded aboard the Orbiter this week, and the Cargo Interface Test was conducted to ensure that STS-4 payloads are correctly linked to the spacecraft. Cargo installation was completed over the weekend. Launch date is now officially set for June 27 at 11 a.m. EDT, with landing July 4 at Edwards Air Force Base, California.



Lick Observatory technique resolves features of distant suns

Science in the 20th Century has gradually peeled away the mystery of our own Sun, revealing it as a roiling structure with a mottled, granulated face, and prominences, flares and sunspots which almost defy conception.

Now an astronomer at the University of California's Lick Observatory has developed an imaging technique which allows some of those same features to be discerned as never before on the discs of distant stars.

Dr. Steven Vogt of the University of California at Santa Cruz, an astronomer who has been working on the Doppler imaging technique for almost two years, said it is now possible to observe sunspot activity on stars light years from Earth, with about the same resolution as observing the Moon with 20/40 vision.

Not every star is suited to the technique. "The key is rotation," he said. "The faster the angular rotation, the easier we can synthesize spectral line profiles in our computer."

The technique involves reading those spectral lines and plotting them as one-dimensional representations of the surface, and then watching for interference or changes as the stars rotate. Those interferences, which Vogt describes as "little bumps and wiggles" on the spectral line patterns,

represent sunspots, and computer enhancement can then construct an image of the sunspots.

"We are trying to unscramble an egg, basically," Vogt said.

Terrestrial scientists since the days of Sir Issac Newton have known that sunlight can, through a prism, be divided into a rainbow of colors.

Over the centuries, scientists realized these spectrograms are almost infinitely detailed, with dark absorption, or Fraunhofer, lines crossing the visible colors. We now know that each absorption line is the signature of a specific chemical element at a distinct stage of ionization in the solar atmosphere.

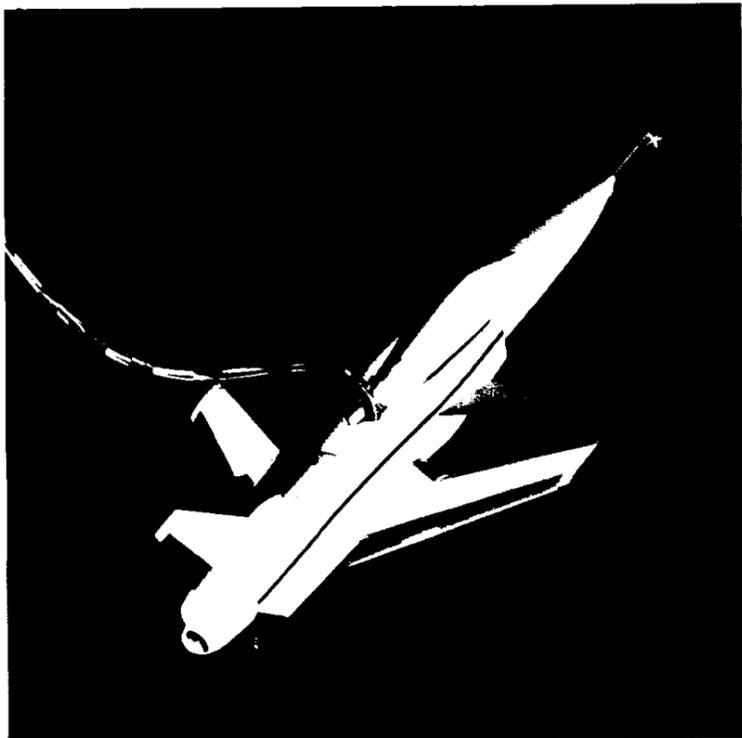
One key to making the technique work is observing stars with relatively swift rates of rotation. Vogt is currently studying subgiants in binary star systems, where two suns orbit one another in complex dances of orbital motion. One particular star rotates every two to six days. Our sun, Sol, by comparison, rotates about every 28 days.

"These stars have pronounced activity," Vogt said. "One had 35 to 40 percent of its visible hemisphere covered by sunspots. If something like this happened on Sol, it would be the end of civilization. It would cause an ice age you wouldn't believe."

Sunspots were observed by Chinese astronomers in the 2nd Century B.C. Not until the 20th Century, however, did an explanation of their curious presence account for all of their known properties, such as occurrence in pairs, long duration, arched penumbral filaments arranged along magnetic lines of force and cooler temperatures than the surrounding surface. George Hale of the Mount Wilson Observatory found they are basically huge magnetic upwellings, with such powerful strength that they dominate all material in their vicinity.

"Sunspots," he said, "tell you how efficient a star is at making a magnetic field. By comparison to this sub-giant, Sol is an inefficient producer of its magnetic field, and this is certainly fortunate for us."

He has hopes of further improving the enhancement technique, and eventually linking these studies to probes of Sol's structure, with an eye towards improving predictions of how our sun will behave in the future. Right now, his software is capable of analyzing each spectral line individually. He hopes to improve that considerably, to a rate of around 200 lines at once. One way he would do that, he says, is by attaching an array processor to the dedicated VAX 11780 computer used for his "number crunching."



Flying against the airstream in the Langley Research Center 30' x 60' wind tunnel, this one-sixth scale model of the experimental X-29A is shown going through its paces recently. Its forward-swept wing design is the subject of a research program managed by the Defense Advanced Research Projects Agency. The X-29A is actually being flown here by researchers studying its handling characteristics. Propulsion is supplied by compressed air coming through the umbilical. The tests are expected to lead to development of a full-scale prototype by the Grumman Aerospace Corp. with flight tests scheduled in early 1984.

Gal

Looking

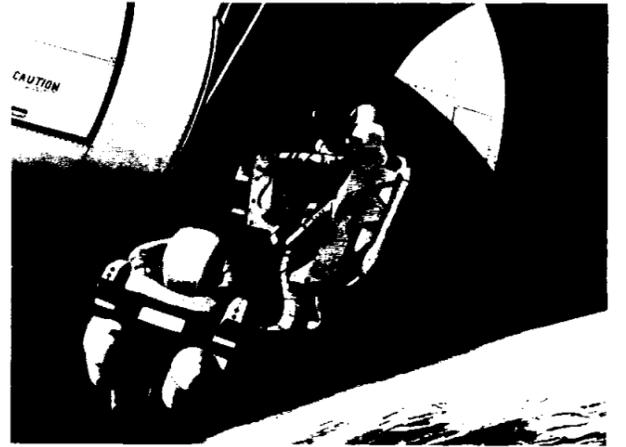
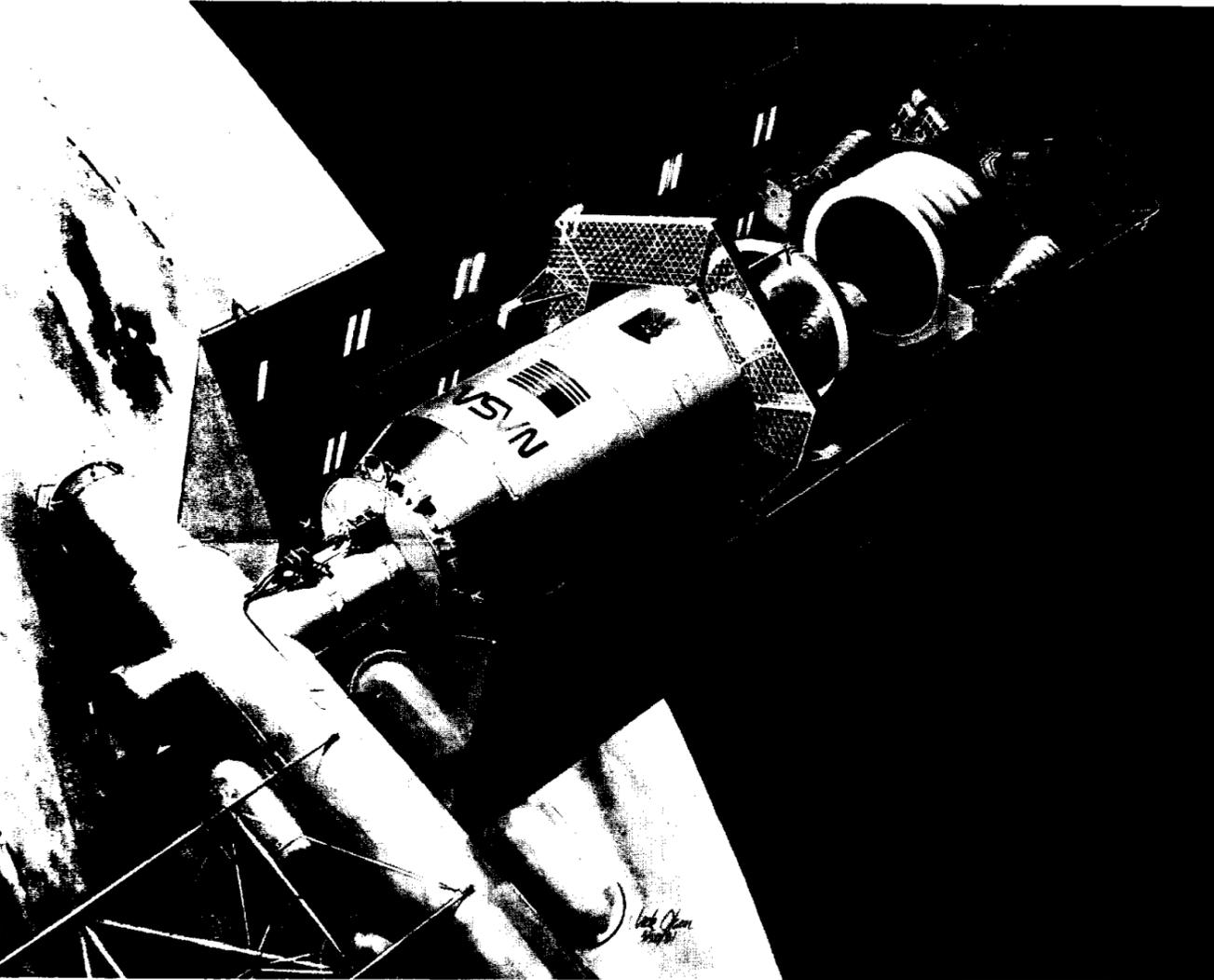
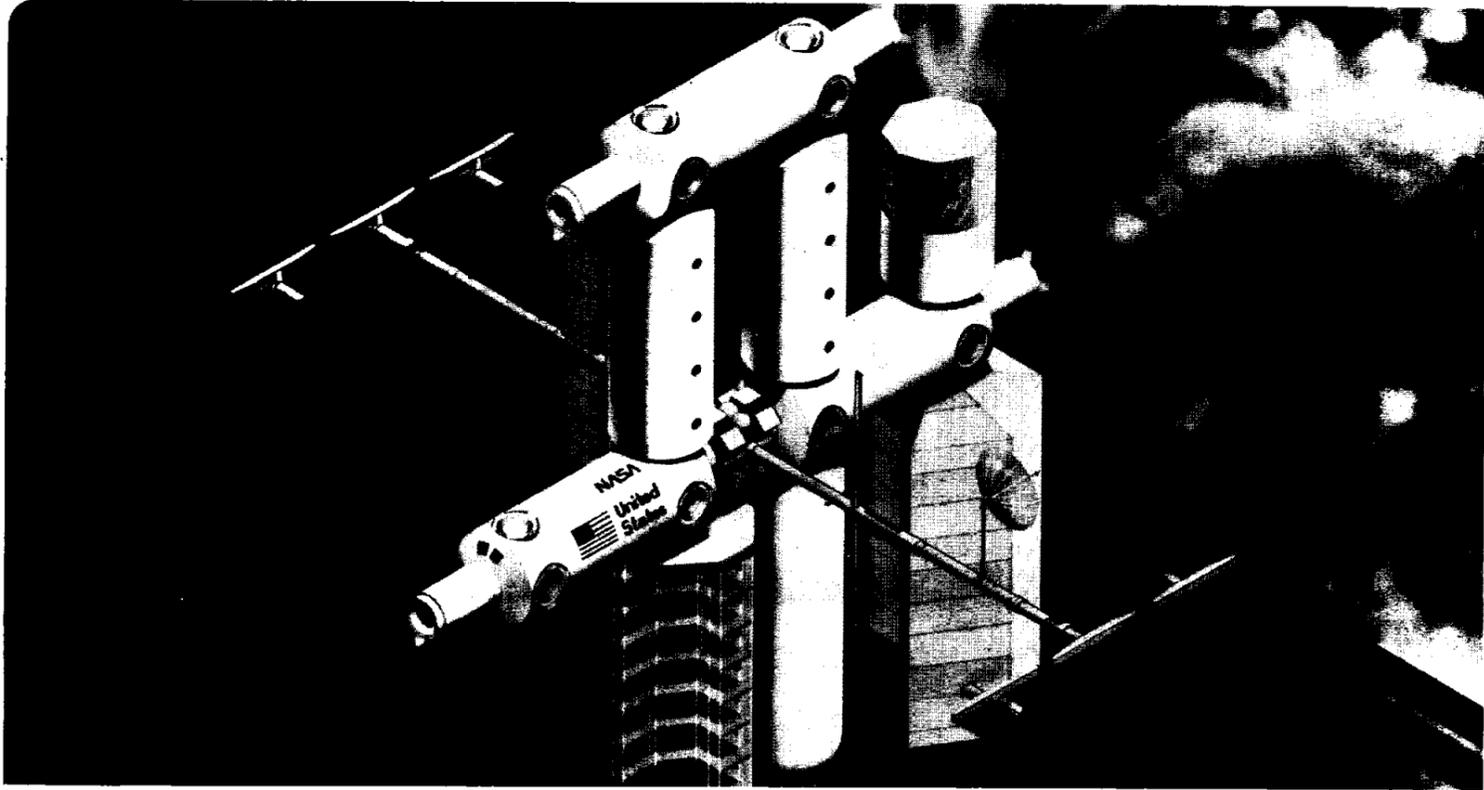
First in a series of features marking

Come October, Earth will have been in the Space Age for a quarter century. The period has been characterized by rapid technological advancement, and by explorations undreamed of in 1957.

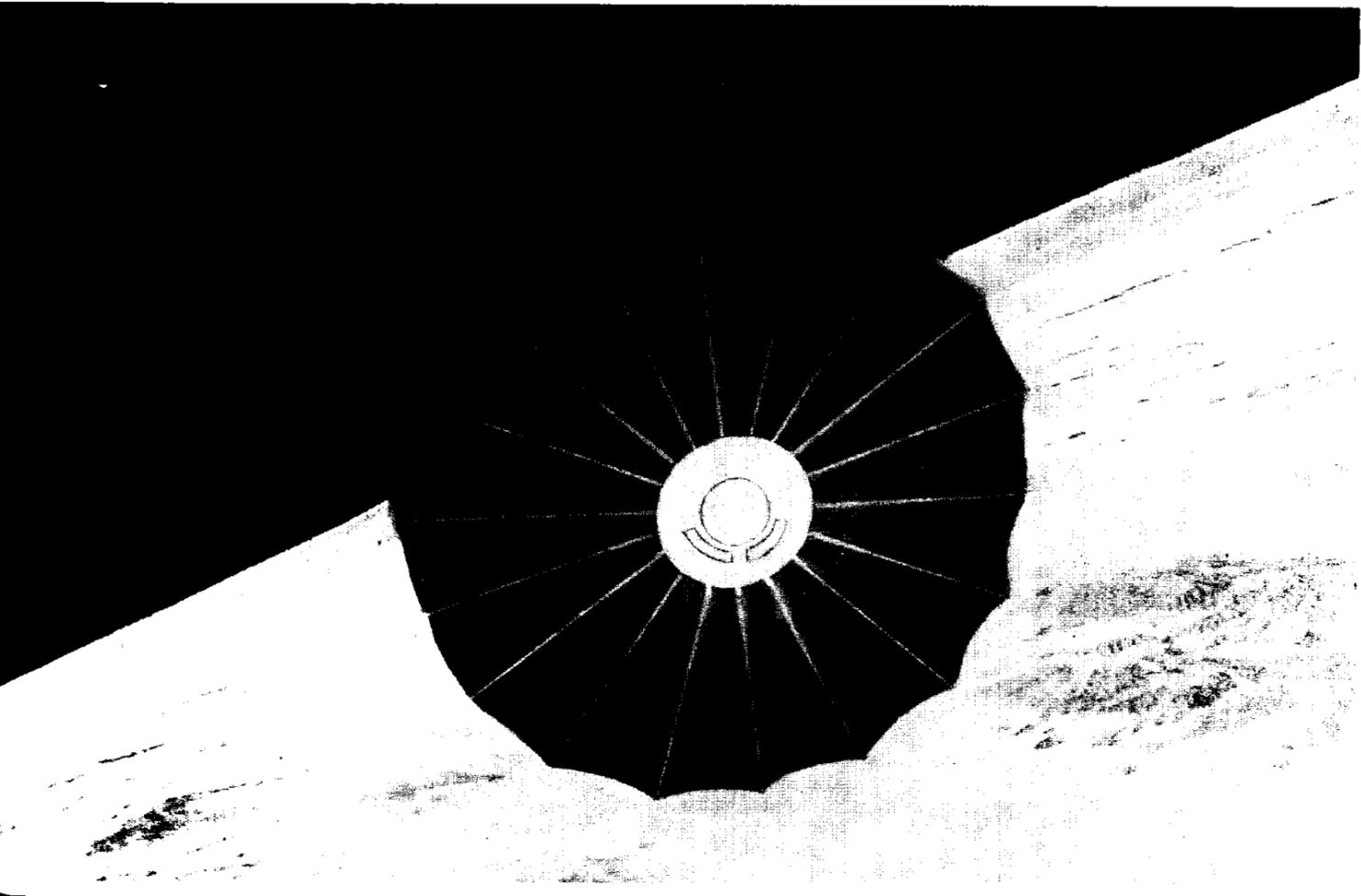
The next 25 years promise equal if not greater achievements, and some of the tools needed to accomplish those goals are already on the drawing board. Expanded operations in space will require different vehicles for different tasks. Those shown here are but some of the many different designs which are ready for the engineers whenever it becomes feasible to expand America's space capabilities.

Vehicles building on the base provided by the Space Shuttle are varied. Some, such as the next "spacecraft"—the Manned Maneuvering Unit and the standard Shuttle spacesuit (below)—already exist. Others, like the pressurized manned "cherry picker" shown at work on a solar power satellite, are years away.

Beyond making new designs available for future tasks, studies of vehicles like those illustrated here serve to push technology forward. "These studies have already served their purpose," said Program Planning Office Manager Dennis Fielder, "by identifying critical technology and the needs for



First step beyond the Shuttle, NASA planners believe. The design at upper left is a full-up vehicle-like structure left of center, a "surrogate" Orbiter. Others also envision unpressurized hangars for upper station from orbital debris. The high energy (liquid fueled) slow it down on the way back from geosynchronous Earth Shuttle tile gap filler, would be deployed as the aero surrogate shown at bottom center, for more ambitious deep space be built, and one design is the parallel-burn heavy lift launcher would drop off prior to orbital insertion and be remote. More promising is the serial-burn design at right center, and sand pounds to orbit. An elegant but much less feasible with two major drawbacks: technology to make it work or significant payload restrictions.



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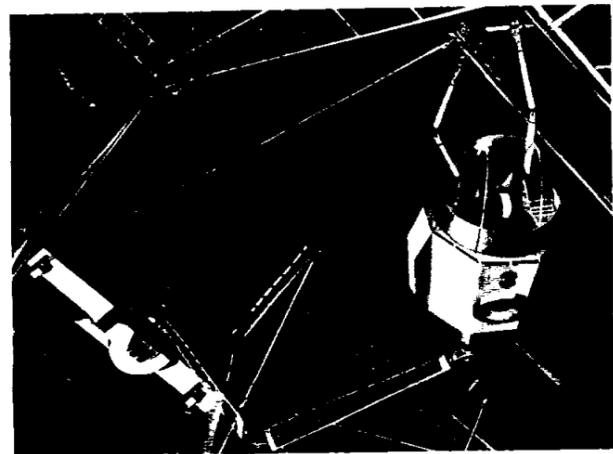
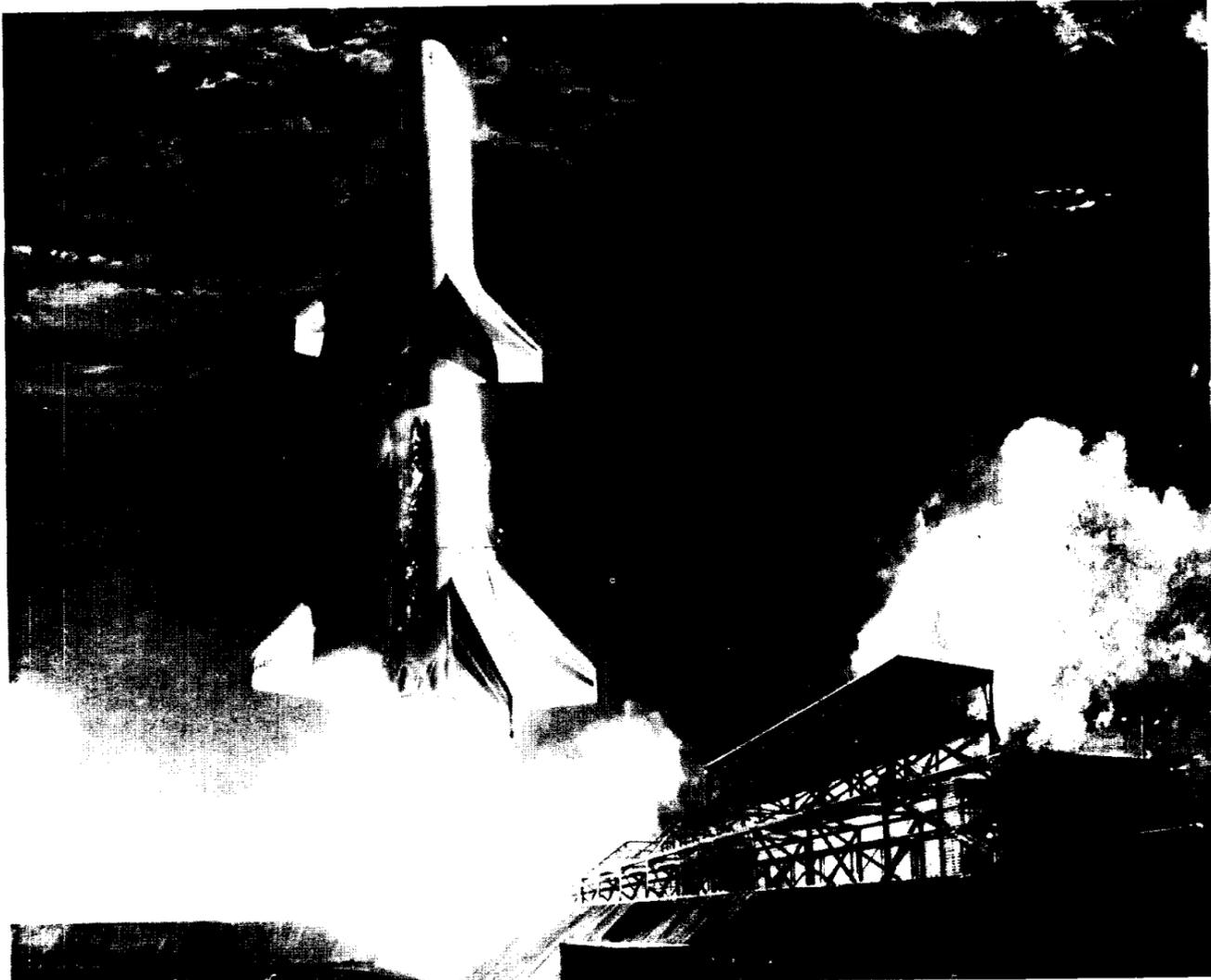
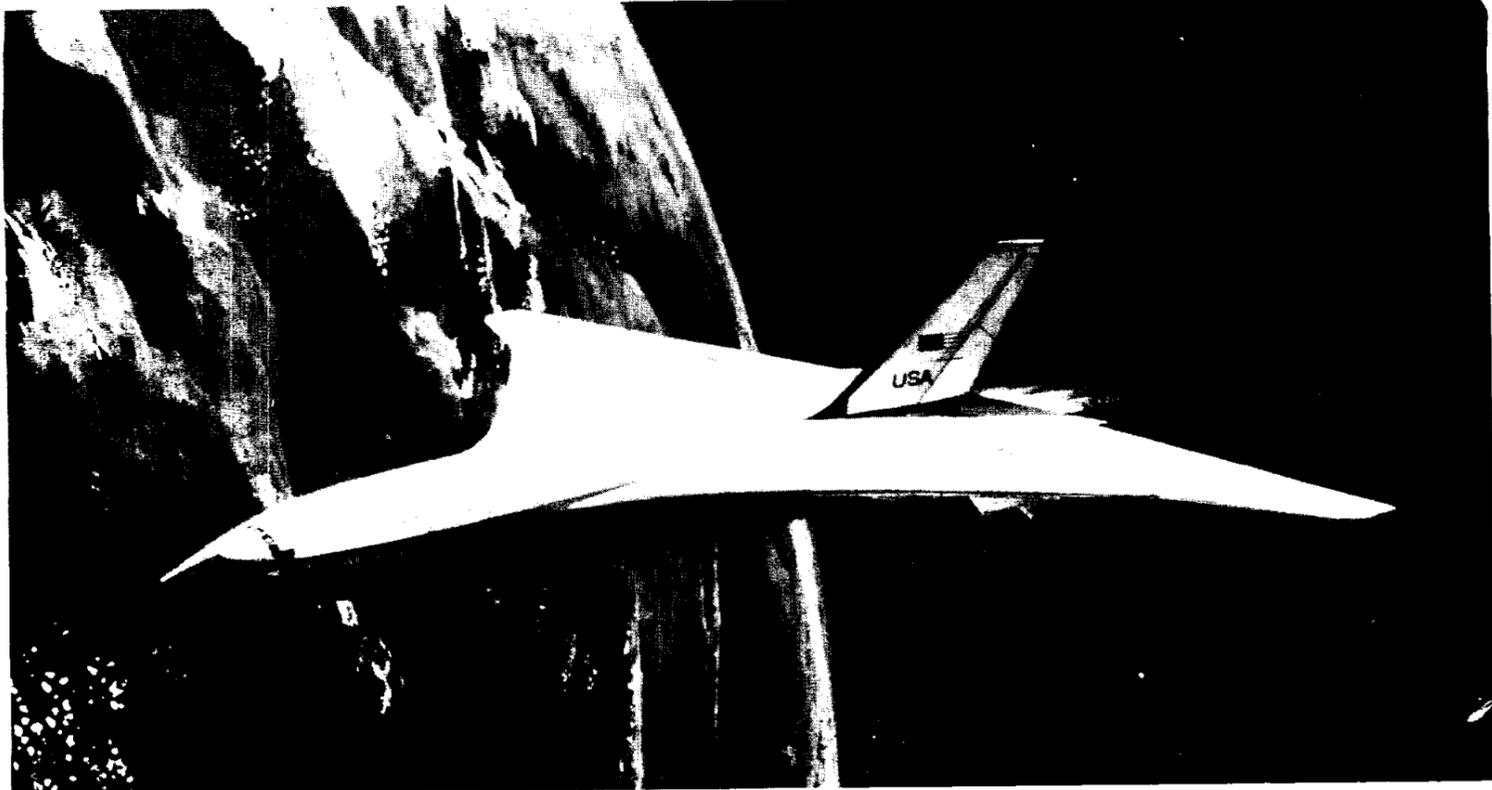
the 25th anniversary of space flight

future programs. The name of the game is to get a long lead time on the technical go or no go answer to the credibility of an idea."

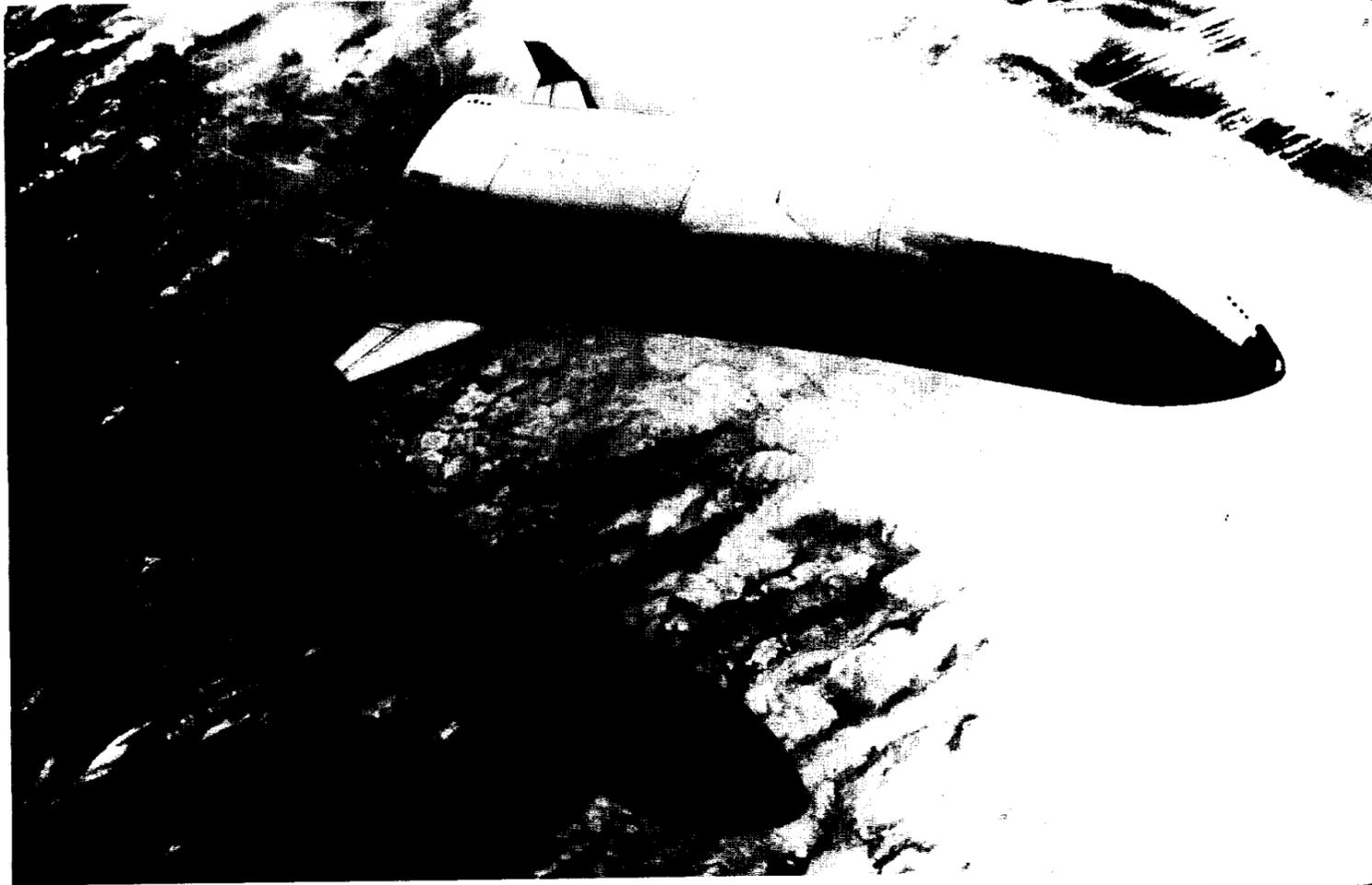
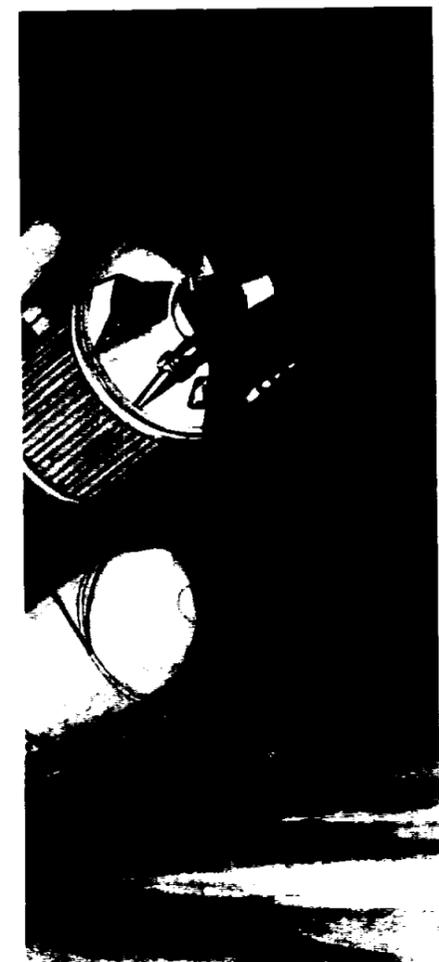
Identifying the utility of future launch vehicles is another important consideration. *Star Raker*, for example, a Rockwell spacecraft design shown at upper right, is a beautiful vehicle which would be capable of flying out of airports and into space. A "wet wing" design, it would carry liquid hydrogen in its wings and compress oxygen into liquid form on the way into orbit to fuel its rocket engines. But the technology to do that doesn't exist today and probably won't for years to come. And if a craft like *Star Raker* is ever built, it will have to overcome significant payload restrictions because there is no staging, no dropping off of dead weight, on the way to space.

It has, however, already made a contribution. "Sometimes," Fielder said, "the more innovative a design, in certain respects, the more technologically significant they can be."

Such considerations will drive the development of spacecraft in the future, as in the past. For now, however, enjoy this look at what could be some of the tools of tomorrow.



ve, should be a space station for expanded near-Earth mission which could be in orbit by the 1990s. Note the cage-payload bay which probably will become standard. Plans, such as at left center, for easier servicing and protection stage at bottom left would employ aerobraking to orbit. A nextel ceramic cloth, the same material used as a ce. Upper stages could eventually be man-rated, like the ce missions. At some point, follow-ons to the Shuttle will nch vehicle, bottom right. The liquid-fueled lower stage piloted back to Earth as part of a fully reusable system. cargo vehicle capable of carrying several hundred thousand is *Star Raker*, a type of single stage to orbit vehicle es not yet exist, and the lack of staging capability poses



Bulletin Board

History office seeks information, documents

The JSC History Office is attempting to collect samples of various patches, logos and emblems created over the years by JSC organizations, together with documentation on their origin. Historian Ed Ezell says substantial data on astronaut and mission-related patches is already in the files, but other official and unofficial emblems used in the past need more documentation. The History Office is also trying to locate copies of the following documents for its collection and the collection of the Headquarters History Office: Project Mercury post launch reports, Project Mercury mission documents (part of the Mercury Working Papers series), Gemini Program mission reports and Apollo post launch and mission reports. If you can help the History Office, call x2838 or write to Mail Code BE4.

Astronomy brown-bag seminars scheduled

Five astronomy brown-bag seminars are scheduled for June at JSC. The seminars meet each Wednesday from noon to 1 p.m. in Bldg. 31, Room 193. The June 2 meeting will be an open discussion. On June 9, Philip Rennert of the Mission Planning and Analysis Division will discuss "Effects of Higher-Order Geopotential Terms on Geosynchronous Libration Points." On June 16, Larry Nyquist of the Planetary and Earth Sciences Division will discuss "Fluid Dynamic Acceleration of Ejecta from Oblique Meteorite Impacts--the Origin of Martian Meteorites?" The June 23 meeting will be an open discussion, and the June 30 meeting will feature Charles Campbell of Lockheed, who will discuss remote sensing.

"Juneteenth" picnic and celebration set

The JSC Black History Committee will be sponsoring its annual "Juneteenth" Celebration Picnic at Clear Lake Park from 11 a.m. to 1 p.m. June 18. All JSC and contractor employees, as well as the public, are invited. Entertainment will include volleyball, basketball, music and other games, with a barbecue dinner, tea, punch and soft drinks also on tap. Tickets are \$6 and may be obtained from Bob Jones, x6364; Cheryl Harrison, x2921, Vergis Bourgeois Bush, x5888; Donald Pipkins, x2194 or Andrea Mosie, x6449.

Astronomical Society to meet

The JSC Astronomical Society will hold its regular monthly meeting at 7:30 p.m. June 11, gathering at the Lunar and Planetary Institute parking lot and then driving to a site near Alvin for stellar viewing and a business session. If weather obstructs viewing, the meeting will be rescheduled for June 18. Anyone interested is invited to attend. For more information about the Astronomical Society, call Mike Martin at 333-6405.

Exchange Store offering convention tickets

The Society of American Magicians cordially invites you to attend their shows during their convention at the Music Hall July 15, 16 and 17. Tickets are available in the Bldg. 11 Exchange Store for \$5 each (regular \$10 each).

Ex-Oiler quarterback to speak

Former Houston Oiler quarterback John Reaves will be the guest speaker when the Space Center Chapter of the Full Gospel Business Men's Fellowship International meets June 26 at the Nassau Bay Holiday Inn. Reservations for the 6:15 p.m. dinner are required by June 25. The program featuring Reaves begins at 7:15 p.m. Both men and women are invited. Call 488-8710 for more information or reservations.

Gilruth Center News

Call x3594 for more information

Ballroom dance—Learn the fine art of dance. Class will be held for intermediates from 7 to 8 p.m., and the introductory class from 8 to 9 p.m. beginning June 17. Class runs for 8 weeks and the cost is \$25 per person.

Defensive driving—Learn to drive safely and qualify for a 10% reduction in your insurance for the next three years. Class is held from 8 a.m. to 5 p.m. July 24 at a cost of \$18 per person.

Children's movie—The next movie will be "The Devil and Max Devlin," and will include cartoons. This movie will be shown from 10 a.m. to noon June 26. The cost of \$1 per person includes popcorn and soft drinks. Tickets are on sale at the Bldg. 11 Exchange Store.

June race—Entry blanks are available for our performance handicap 5 kilometer or 1 mile run to be held at 8 a.m. June 26. The cost is \$1.

Softball tourney—It's not too late to sign up for the 14th Annual Moon Walk Tourney. It will be held July 16, 17 and 18. Cost is \$65 per team and is limited to 24 male and female teams each.

Square dance—This class is now available on Thursdays for beginners at 7:15 to 8:15 p.m. and intermediates from 8:15 to 9:45 p.m. beginning June 17 for 12 weeks. Cost is \$25 per person.

Aerobic dance—Dance away those extra inches with Jacki Sorensen's dance class. Class will be held on Mondays and Wednesdays from 9 to 10 a.m. and Tuesdays and Thursdays from 4:15 to 5:15 p.m. Cost for this eight-week session is \$38.

Stained glass class—This will be held Tuesdays from 7 to 9 p.m. beginning June 14 and running for six weeks. The cost is \$30 per person.

Sunday basketball league—Registration is now being accepted for a Sunday afternoon basketball league. Space is limited to 11 teams on a first come, first serve basis. League begins play June 27 and the cost is determined by the number of participants on the team.

NASA
Lyndon B. Johnson Space Center

Space News Roundup

The Roundup is an official publication of the National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Texas, and is published every other Friday by the Public Affairs Office for all space center employees. Roundup headlines start the first Wednesday after publication.

Editor

Brian Welch



The latest JSC simulation facility was accepted recently during ceremonies in Bldg. 35. Shown with the keys to the new Guidance and Navigation Simulator is Flight Simulation Division Chief Robert E. Ernulf. Looking on, from left to right, are Pete Meyn, Singer-Link project engineer; Douglas Morris, FSD project engineer; and Claude Robertson, Singer-Link project manager. The facility will be important as Shuttle flight rates increase, and the need for specific mission simulation software increases also. The GNS will substantially increase the on-line development time in support of the training complex in Bldg. 5. It will also be an increasingly important point for developing hardware modifications and crew station panel changes for the trainers as new orbiters go into service.

Roundup Swap Shop

Property & Rentals

For rent: Lake house on LBJ, Kingsland, week/weekends, swim, fish, or ski, boathouse w/lift, sleeps 6-8. Call Steve Hawkins, x2001 or 482-1832.

Cars & Trucks

1973 Ford Pinto wagon, auto, 59,000 miles, runs great, \$600 or best offer. Call x4711 or 486-5020 after 5 p.m.

1981 Ford Grenada, auto, PB, PS, WSW, AC, AM/FM stereo, pewter w/wine interior, new condition, 11,400 miles, \$7,150. Call Phyllis Routson, x2831 or Bob Routson, x5362 or 337-7086.

1976 Ford sedan, PS, PB, AC, AM, 4dr., vinyl, 42,000 miles, \$2,000. Call 331-7231.

1947 Ford pickup, flat head eight cylinder, good running condition, best offer. Call 332-2990 after 5 p.m.

1973 Buick Regal, 2 dr., good condition, \$1,100. Call Betty, x3328.

1972 Datsun 240Z, orange, 83,000 miles, showroom condition in and out, \$3,950. Call 488-8537 evenings, weekends.

1976 Volvo 244 DL, AC, AM/FM stereo, auto, power, cruise, clean, \$3,250. Call x4404 or 488-0284.

1978 Chrysler LeBaron Town and Country wagon, loaded, very clean, good mechanical condition, \$4,150 (\$750 below book retail). Call 474-2906 after 6 p.m.

1976 wrecked Vega GT, excellent motor, 5 spd. trans., good tires and interior. Also, 1967 Cougar, good body, 289 engine and C4 trans. needs to be assembled. Call Charlie, x2353 or 338-1176.

1973 Mazda RX-3 wagon, auto, AC, very clean, good condition, one owner, \$1325. Call John Kaltenback, x3611 or 331-5751.

1976 Honda Civic, 3 dr. hatchback, 4 spd., rebuilt engine, 30 MPG, AC, 64,000 miles, good condition, \$2,100. Call C.W., x5169 or 331-3465.

1979 Mustang, PS, PB, AC, AM/FM/cassette stereo, WSW, wire wheel covers, V-6, interior/exterior trim package, 35000 miles, \$4,500. Call Walker, 479-7815 after 6 p.m.

Equal Opportunity Programs Office seeking ride for young blind woman who will be working at JSC this summer. She needs ride from 5525 Gasmer off Chimney Rock in SW Houston. Call x4918.

Boats & Planes

Aero Commander 520, 7 place, IFR loaded; new engines, props, tires, battery; new annual, \$30,000 firm. Call 475-1448 or 944-0598 after 5 p.m.

Catalina 27 ft. sail boat, 30 hp atomic four, gas engine, wheel, tiller, dinette interior, two jibs, etc., \$20,500. Call Bernhard, x4461 or 333-2968.

Cycles

1975 Honda XL-350, 1,500 actual miles, been in storage for several years

but in excellent condition, \$800. Call Rick Bell, x4891 or 486-1707.

Yama-Suki trail bike, needs work. Call Jerry, x2576 or 554-6093.

Household

Waterbed with wood bookcase, headboard and frame, \$100. Call 480-3356 after 4 p.m.

Trestle dining table and chairs, open to 8 feet, paid \$1,000 new, will sell for \$600 or reasonable offer. Call 486-1089.

Wanted

Want someone to tune up a running but tired 3.5 hp. Briggs & Stratton lawn mower engine at a reasonable rate. Call Phil, x3076 or 488-4453.

Video

RCA 25 inch color console, used, good condition, remote audio cut-off, \$250. Call Bob Rao, x4261 or 482-3697.

Pets

Labrador pups, AKC, yellow whelped 3-9-82, parents on premises, both good hunters, hips guaranteed, \$150. Call 534-2488 after 6 p.m. or weekends.

Free: two affectionate cats, 1 year old, neutered, all shots. Call Mike, x6226.

Computers

New Z80A 4m/c computer with 192K core, 2 MB discs, 3 terminal and 2 printer outputs. Call 338-1055.

North-Star Horizon computer, 32K, 1DD drive, \$1,700; also, Heath H-19 terminal, \$800. Call Phil Muhm, 488-5660 or 334-5892.

Miscellaneous

Riding lawn mower, attachments, front end loader, front blade and good mower deck. Call Jerry, x2576 or 554-6093.

Go cart 5 hp. engine, good working condition, \$200 firm. Call 332-8188 after 5:30 p.m.

For sale: Bay Area Racquet Club membership, \$650. Call T. Sherwin, x2531 or 333-2985.

Four chrome, wire spoke wheel covers, 14 inch, original GM customs from '78 Pontiac, all for \$90. Call J. Dornbach, 334-3459.

30 gallon mirrorback fish tank, includes cover, fluorescent light, wrought iron stand, diatom filter and cleaner and misc. accessories. Call Bea, 481-3877 after 6 p.m.

Older 7.5 hp. outboard motor, \$85. Call Jerry, x2576 or 554-6093.

Riding lawn mower, 5 hp., 24 inch cut, \$190. Call Sauer, x2759.

Security bars for front door and large 70" x 70" window, \$20 each or both for \$37.50. Call David, x5551 or 333-5130.

Golf pull cart, good shape, \$25. Call Brent Fontenot, 483-4981.

Willing to help with yard work anywhere in CLC, Brook Forest or Middlebrook, very reasonable. Call Robert, 488-0658.

Will the person in Bldg. 1 who purchased a yellow Chevy Citation 4 dr. hatchback from Ken Jones in January please contact Ken at x4905 or 488-1080. Very important.

Cookin' in the Cafeteria

Week of June 14 - 18, 1982

Monday: Chicken & Rice Soup; Texas Hots & Beans, BBQ Ham Steak, Steak Parmesan, Beef & Macaroni (Special); Green Beans, Carrots, Au Gratin Potatoes. Standard Daily Items: Roast Beef, Baked Ham, Fried Chicken, Fried Fish, Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

Tuesday: Tomato Soup; Potato Baked Chicken, BBQ Spare Ribs, Mexican Dinner (Special); Squash, Ranch Beans, Spanish Rice, Broccoli.

Wednesday: Seafood Gumbo; Baked Turbot, Liver & Onions, BBQ Ham Steak, Baked Meatloaf w/Creole sauce (Special); Beets, Brussels Sprouts, Green Beans, Whipped Potatoes.

Thursday: Beef & Barley Soup; Chicken & Dumplings, Corned Beef w/Cabbage, Smothered Steak w/Cornbread Dressing (Special); Spinach, Cabbage, Cauliflower Au Gratin, Parsley Potatoes.

Friday: Seafood Gumbo; Pork Chop w/Yam Rosette, Creole Baked Cod, Tuna & Salmon Croquette (Special); Brussels Sprouts, Green Beans, Buttered Corn, Whipped Potatoes.

Week of June 21 - 25, 1982

Monday: Cream of Celery Soup; Braised Beef Ribs, Chicken a la King, Enchiladas w/Chili, Italian Cutlet (Special); Navy Beans, Brussels Sprouts, Whipped Potatoes. Standard Daily Items: Roast Beef, Baked Ham, Fried Chicken, Fried Fish, Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

Tuesday: Beef & Barley Soup; Turkey & Dressing, Country Style Steak, Beef Ravioli, Stuffed Cabbage (Special); Corn Cobbette, Okra & Tomatoes, French Beans.

Wednesday: Seafood Gumbo; Catfish w/Hush Puppies, Roast Pork w/Dressing, Chinese Pepper Steak (Special); Broccoli, Macaroni & Cheese, Stewed Tomatoes.

Thursday: Cream of Tomato Soup; Beef Tacos, BBQ Ham Slice, Hungarian Goulash, Chicken Fried Steak (Special); Spinach, Pinto Beans, Beets.

Friday: Seafood Gumbo; Liver & Onions, Deviled Crabs, Roast Beef w/Dressing, Tuna & Noodle Casserole (Special); Whipped Potatoes, Peas, Cauliflower.