NASA
Lyndon B. Johnson Space Center
Space News Roundup
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Two down, an era to go

Second test flight, while shortened, accomplishes many objectives

At 400,000 feet, all sails crowding, *Columbia* tore into the atmosphere at a speed of Mach 26, feet enough to travel four and a half miles in a second, as fast as any winged craft was ever flown.

Columbia, named for an 1836 sailing frigate which was one of the first U.S. Navy ships to circumnavigate the globe, layed a ground track from the vicinity of Guam to the California desert in approximately 30 minutes.

With the vessel's reaction control thrusters firing, Commander Joe Engle and Pilot Richard Truly punched up the aerodynamic stick inputs and preprogrammed test inputs which maneuvered *Columbia* along three axes, and Engle radioed Houston, "This bird is really solid." The induced perturbations continued throughout the hypersonic, supersonic, transonic and subsonic speed regimes.

At 300,000 feet, the operational limit of the X-15s Engle flew 16 times in the 1960s, the Reaction Control System (RCS) roll thrusters were deactivated, and the spaceplane began to turn airplane. As *Columbia* penetrated deeper into the swiftly thickenin atmosphere, dynamic pressure began to build, and the rudder, elevons and body flap had something to push against, after 54 hours in orbit as useless appendages.

At Mach 19, Engle initiated the first roll reversal, and as *Columbia* exited the entry blackout, he initiated another. Fifty seconds later the speedbrake was deployed to 100 percent, and *Columbia* regained communications withugh the Buckhorn, California tracking station.

Three minutes later the third roll reversal in the ambitious entry flight dynamics test procedure was begun, followed one minute later by speedbrake retraction to 65 percent and the deployment of two streamlined probes near the nose cap to take air data. The computers began accepting that data later at Mach 2.5.

At Mach 3.5, the rudder was activated, but the RCS yaw thrusters remained active until Mach 1, giving *Columbia* two sources of directional stability.

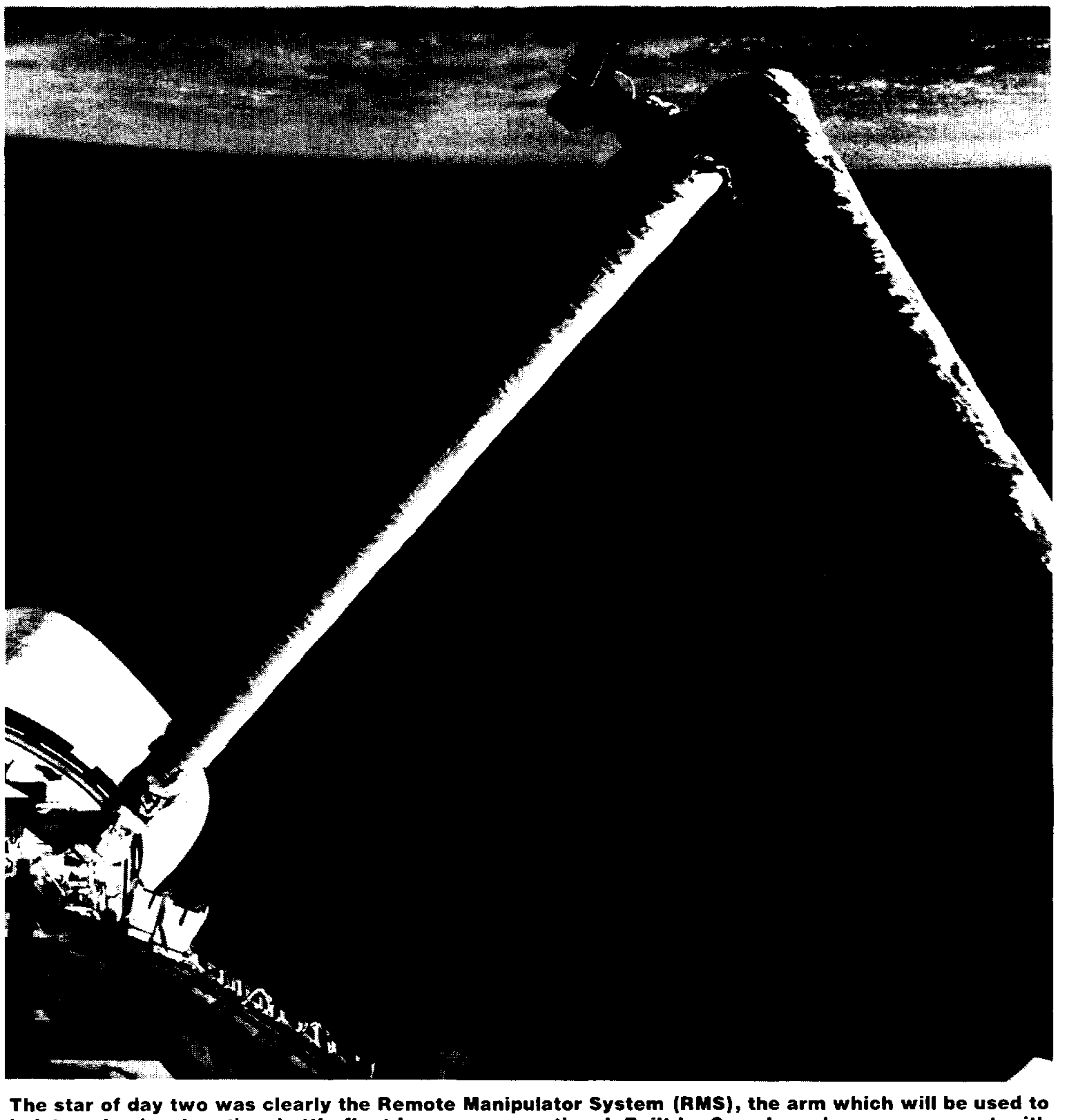
The Shuttle's lift over drag coefficient began to rise, from about 1:1 at entry to around four feet forward for every one foot decrease in altitude by the time Engle executed the pre-flare maneuver.

At Mach 2.5 the Terminal Area Energy Management (TAEM) guidance system took over. At 50,000 feet *Columbia* was traveling subsonically, and Engle shortly thereafter steered the Orbiter onto the heading alignment circle, a maneuver which involved a 180-degree left bank and the highest G forces (about 2 Gs) that the crew would experience on entry.

At Mach .6 the wings began to level out relative to the the ground, and as Engle executed the pre-flare, *Columbia* was in view of Runway 23 at Rogers Dry Lake, Erds Air Force Base. *Columbia* had gone from a 20-degree glideslope to one of three degrees in this time, and as the craft lined up for the final flare and touchdown, the speed had decreased to about Mach .5.

At two days, six hours and thirteen minutes into the mission, *Columbia's* main landing gear raised puffs of dust on Runway 23, and the most ambitious flight of an Orbiter to date was complete. After a

(Continued on page 2.)



The star of day two was clearly the Remote Manipulator System (RMS), the arm which will be used to hoist payloads when the shuttle fleet becomes operational. Built by Canada under an agreement with NASA, the RMS, according to Richard Truly, flew like a charm.

"A national treasure"

Reagan, Bush visits mark firsts at JSC

JSC Director Christopher C. Kraft Jr. explains the ground tracking map in Mission Control to a "visiting CapCom" during the flight of STS-2. President Reagan was the first Chief Executive to visit the floor of the JSC landmark during a mission. Also accompanying the President were NASA Administrator James Beggs, Deputy Administrator Hans Mark, and White House Aide James Baker.

President Ronald Reagan emerged from a freight elevator, and amid a phalanx of Secret Service agents and top NASA officials, became the first sitting Chief Executive to step onto the floor of Mission Control during a flight.

Two days later, on Nov. 15, JSC played host to Vice President George Bush, who ate breakfast with the STS-1 and STS-2 crews at the Gilruth Recreation Center. It was the first back-to-back visit of the nation's two highest officials to JSC.

The Presidential visit came during the second day of the STS-2 mission, a few hours after Pilot Richard Truly had successfully completed tests of the Canadian-built Remote Manipulator System.

JSC Director Christopher C. Kraft, Jr., flanked by NASA Administrator James Beggs and Deputy Administrator Hans Mark, pointed out functions of various consoles and screens within the Mission Operations Control Room (MOCR). The President shook his head with a smile of amazement, and sat down at the CapCom position to speak with Astronauts Engle and Truly:

"Joe, Dick — this is Ronald Reagan."

"Hello Mr. President."

"Hello. I just wanted to make a request," Reagan said. "I wondered if when you go over Washington before your landing at Edwards Air Force Base, could you pick me up and take me out? I haven't been to California since last August."

Amid chuckles from the crew and laughter on the ground, Engle said, "We'll be proud to, sir."

"Okay, thank you very much," Reagan said. "Let me just say, I'm sure you know how proud everyone down here is and how this whole nation, and I'm sure the world, but certainly America, has got its eyes and its heart on you."

"Well, thank you very much, Mr. President," Engle said. "We're awfully honored that we've got the opportunity to take part in this, and we're very glad that you're getting a chance to meet all the people there in Houston that are making it happen."

"Well, I've enjoyed meeting them. I told them when I came in this was a rare experience for an old horse cavalry officer," Reagan said.

"We certainly do appreciate you taking the trouble to show all the people working on the Space Shuttle how much you care, and it makes us mighty proud," Engle said.

(Continued on page 2.)

Bulletin Board

R/C Club Fly-In rescheduled for Sunday

The antenna test range behind Bldg. 14 will be buzzing Sunday as the JSC R/C Club holds a Fly-In for remotely controlled miniature aircraft. Inclement weather forced cancellation of the Fly-In scheduled for earlier this month. The activities begin at 9:30 a.m.

Toys for Tots campaign is underway

The Singer-Link Houston Chapter of the National Management Association and the U.S. Marine Corps Reserve are sponsoring collection points for the annual Toys for Tots campaign. Collection barrels at JSC will be placed in the receptionist area of Bldg. 5, and in the lobby of Bldg. 35. Toys collected during the drive will be given to underprivileged children in the Houston area for Christmas.

NARFE Christmas dinner planned

Chapter 1321 of the National Association of Retired Federal Employees will meet for a traditional Christmas dinner and entertainment at 6 p.m. Dec. 4 in the Clear Lake Park Bldg. on NASA Road 1. Along with entertainment, the meeting will feature the installation of new officers for 1982. All federal retirees are invited to attend, and may call Shell Martin at 471-0490 for more information.

LPI issues first call for papers

The Lunar and Planetary Institute and JSC have issued the first call for papers for the 13th Lunar and Planetary Science Conference to be held March 15-19, 1982 at JSC. Currently in the final phases of organization, the conference is scheduled to bring together specialists in such fields as petrology, geochemistry, geophysics, geology and astronomy. Scientists in all lunar and planetary programs are being invited to submit abstracts by Jan. 10, 1982. Conference officials have also tentatively planned to hold the Second Annual Lunar and Planetary Chili Cook-Off during the conference.

Family Affair Project goal is $3,500

The JSC Family Affair Christmas Project, which begins Nov. 30, is seeking contributions of $3,500 or more in an effort to make Christmas a little brighter for a projected 135 families. Since 1971, JSC and contractor employees have taken part in the project, which helps supply toys and food to underprivileged families at Christmas. Employees who would like to help or make other contributions may call Julius Mayhorn, x3381, or Doris Roberts, x2761. The fund drive will end Dec. 11.

Toastmasters aid communications skills

The Spaceland Toastmasters Club, an organization which promotes better communication and leadership skills through public speaking, next meets at 11:30 a.m. Dec. 2 at the Bldg. 3 Cafeteria. The Toastmasters invite interested persons to attend the next meeting and see what the club is all about. For more information, call Ann Sullivan at X2231, or Darrell Boyd at X3141.

JSC Exchange Store offers deals

The JSC Exchange Store, open from 10 a.m. to 2 p.m. is offering several bargains, which include Plitt Theatre tickets for $2.25 each; General Cinema tickets for $2.40 each; Astroworld/Six Flags tickets for $9.50 each; Entertainment '82 coupon books for $17.50 each; Gold C Values coupon books for $5 each; and 20 cents postage stamp books for $4 each. For more information, contact Bea Brown at the Exchange store.

ESA Ariane launch scheduled for Dec. 19

The European Space Agency's Ariane LO-4 launch has been rescheduled from Dec. 14 to Dec. 19 from the launch site in Kourou, Guiana. The launch was postponed due to a strike at the Toulouse Space Centre. Ariane will carry aloft the European Maritime Communications Satellite, MARECS-A. The launch is now scheduled for the early morning hours of Dec. 19.

Second test flight

(Continued from page 1.)

rollout of about 7,500 feet, the spacecraft came to rest exactly on the centerline of the runway.

The preceding thirty minutes were ones for which Engle and Truly had been training since the mid-1970s, for the entry interface when *Columbia* was pitched and rolled and yawed to see what kind of flying machine she really is. The verdict, said Richard Barton, Entry Performance and Dynamics Section Head: "Excellent, and as advertised." And from Claude Graves, Flight Performance Branch Assistant Chief, came the one-word summation, "Formidable."

The journey had begun 54 hours before at the Kennedy Space Center on Nov. 12 in the wake of one postponed launch Nov. 4. On Nov. 11, the revised flight schedule was placed in some jeopardy by the malfunction of one of *Columbia's* multiplexor/demultiplexor units. Early in the morning of Nov. 11, a similar unit was flown to the Cape from JSC, but it too failed. Another had to be stripped from *Challenger*, itself scheduled for launch in approximately a year and a half (see related story, page 3), and hurriedly flown to KSC.

The launch was pushed back several hours due to that problem, but at 10:10 a.m. EST on Nov. 12, the Space Shuttle Main Engines ignited with the equivalent output of 23 Hoover Dams, and three seconds later the Solid Rocket Boosters kicked in, lifting *Columbia* from Launch Pad 39A with 6.425 million pounds of total thrust.

Within an hour of reaching orbit, it became apparent that another problem had developed in one of *Columbia's* fuel cells. Silver Team Flight Director Neil Hutchinson said that difficulty was among "a couple of not too keen events" which ultimately forced NASA officials to opt for the minimum mission flight plan. JSC Director Christopher C. Kraft Jr., saying the decision was "the prudent thing to do at this point in our test program," added that the flight accomplished "just about everything we set out to do."

The next morning, awakened to the strains of "Pigs in Space," the astronauts began operating under an abbreviated crew activity plan, designed to get the most out of the least. By 9 a.m. Houston time, Truly had unlimbered the 50-foot-long Canadian-built Remote Manipulator System (RMS) for a morning workout.

From the aft end of the flight deck, Truly became the first astronaut to operate the $14.2 million system, developed by the National Research Council of Canada for NASA. He successfully completed the Group One primary objectives, which included polarity and phasing, and dynamic checks of the arm. In the meantime, he and Engle participated in another first: conversing with the first female Capsule Communicator, Astronaut Sally Ride.

As for *Columbia*, the Orbiter is now being serviced at Dryden Flight Research Center by a team of technicians from KSC. Launch Director George Page said the unloading of hypergolic propellants for the RCS system should be completed today. Saturday closeout procedures will be underway for the scheduling mating of Columbia with the 747 carrier aircraft by late Sunday. The ferry trip to KSC should begin Monday or Tuesday, with an overnight stop at Bergstrom Air Force Base, Texas.

The next test flight, STS-3, is now expected in mid-March, 1982.

NASA
Space News Roundup

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Editor . . . . Brian Welch

Reagan, Bush

(Continued from page 1.)

"Well, I care, and again, God bless you both, and from all of us here — we are watching with great pride."

Then, with two minutes left in the communications pass over the Buckhorn tracking station, the MOCR and STS-2 crews got back to business, discussing the order of activities when the next acquisition of signal came over the Quito tracking station.

Following his conversation with the astronauts, Reagan paused for a short talk with the Engle and Truly families, and then left for a dinner in Houston.

Vice President Bush, in his remarks following breakfast Sunday, called JSC "a national treasure," and pledged understanding from the Executive Branch of the problems and future goals of NASA. Asked if his comments meant NASA would be exempt from future budget cuts, Bush said, "Well, I'm not going to go that far. This nation is in a very serious economic situation. But the more all of us understand NASA's mission, the more sensitive we can be to NASA's needs.

"This nation," Bush continued, "owes a great debt of gratitude to all of those at NASA who exress the best in professional competence and integrity. It is essential that this center, this national treasure, be preserved, and it will be."

Far from Hollywood, students see real space program

Houston businessman Doyle Brewington was in Central America last April, spending the night with friends, and he could not sleep. It wasn't the weather or the food or business concerns which kept him awake, but rather a remark made by the young son of his hosts.

The boy had said that America's space program is a product of Hollywood, fiction and not fact, and he said this while the Space Shuttle Columbia was in orbit on STS-1.

Brewington, President of Houston-based Multi Systems International, has made a fortune promoting global business ties in well over 100 countries. He spent that night agonizing over the young student's spectacular bit of misinformation. In the morning, he questioned the boy again, and learned that his opinions had been shaped in school.

"His teacher told him that," Brewington recalled. "She was one of hundreds of Central American teachers who studied in Havana. Apparently she made a number of very, very derrogatory comments about our country in the classroom."

Brewington's immediate reaction, in the wake of pride over Columbia's successful first mission, was one of frustration and a determination to do something. "I kept asking myself, 'How many minds are being poisoned like that?' and I knew something had to be done."

That something turned out to be a contest for science students, organized through the Organization of American States and financed largely by Brewington's company. The result was a recent tour of American space facilities by 66 students, three from each of 22 OAS countries.

It was an idea suggested by Brewington, and from the beginning he had four qualifications in mind for winning students: they had to be oriented toward science

Brewington in the 1-G Trainer

in their studies, they had to be in the upper 15 percent of their classes, they had to come from urban and impoverished backgrounds, and they had to be willing to go back and talk about what they saw in America.

Students entered the contest by writing scientific essays, akin to amateur tech reports. The essays of the top six in each country were then judged by Multi Systems and the OAS, who then chose the top three.

All of this took place last spring and summer, and the students arrived in Miami from their various countries just before the scheduled launch of STS-2 on Nov. 4. How did the scrub affect the tour group? "We decided not to worry about that," Brewington said. "They were all so excited anyway just to see the Shuttle and be in the U.S. that it really didn't put that much of a damper on our trip. And when they got to Johnson, they were all amazed. They couldn't believe the size of the place, and the fact that there were so many buildings, each with its own particular function."

Brewington said the reaction of Houstonians, as well as NASA and the OAS, has encouraged him to think seriously about turning the essay contest and trip into a periodic affair. "There's a very good chance we may do this again for STS-3 and STS-4," he said, "and perhaps someday it may result in even closer scientific ties between the U.S. and Latin America."

As for the students themselves, the experience of one perhaps summarizes their affinity for American ways. A 14-year-old mathematical whiz from Guatemala was handed a Rubik's Cube while at Kennedy Space Center. He had nevery seen one before. He studied it for a few moments, and although the odds were several million to one against him, he solved it in about five minutes.

The 66 students from 22 Organization of American States Countries were agog as they toured the mockup facility in Bldg. 9A. The group later journeyed to the Dryden Flight Research Center as part of their extensive visits to NASA facilities.

Orbiter update

About 40 miles from where *Columbia* has landed on Runway 23 at Edwards Air Force Base sits a building where the next vehicle in the Space Shuttle fleet is steadily taking form, with scheduled delivery to NASA in mid-summer 1982.

This is Rockwell's Palmdale assembly facility, where Nov. 2 the Orbital Vehicle (OV) 099, *Challenger*, was powered up for the initial subsystems checkout. If all goes according to schedule, *Challenger* could be transported overland to NASA's Dryden Flight Research Center at Edwards and then ferried to the Kennedy Space Center atop the 747 carrier aircraft by June.

Work crews at Palmdale have installed *Challenger's* vertical stabilizer, and by the end of this month will have begun to mate the payload bay doors and the body flap, one of the Shuttle's primary flight control surfaces. More than half of Challenger's 30,553 thermal protection system (TPS) tiles have been bonded to the spacecraft.

In September, OV 101, *Enterprise*, was moved from its berth at Palmdale to make room for components of the third flightworthy shuttlecraft, OV 103, *Discovery*.

Enterprise was towed overland to Dryden, where it now awaits possible use by the Air Force for form and fit test checks to launch facilities under construction at Vandenburg Air Force Base.

OV 102, Columbia

The first operational Orbiter on STS-1 ascent.

Components of *Discovery* taking shape at Downey include the forward fuselage, aft fuselage, pressurized crew compartment module and the forward reaction control system (RCS) structure. *Discovery* is scheduled for delivery to NASA in the fall of 1983.

Challenger, meanwhile, is now in the first phase of a five-part certification program. Plans call for completion of the Initial Subsystems Test early in 1982. Under that phase, various subsystems are activated and verified, gradually to be merged with other interactive subsystems.

During the early spring, those subsystems will be tested, working in conjunction with one another in the Subsystems Test, scheduled for completion around the end of April.

The Final Acceptance Test, the third phase of the certification program, involves verification of *Challenger's* many complex systems in integrated form.

In May and June, the Post Checkout phase will be underway, with even closer scrutiny of the Orbiter's integrated functions. Complete configuration Inspection follows in June, just before preparation for overland transport to Edwards and the ferry flight to KSC.

At KSC, *Challenger* will enter Bay 2 of the Orbiter Processing Facility, and could fly by the end of 1982 or early 1983. L. Michael Weeks, Acting Associate Administrator for Space Transportation Systems, said OV 099 could possibly fly the first operational mission, STS-5.

Between STS-4 and STS-5, *Columbia* is scheduled for a relatively lengthy modification overhaul at Palmdale. The crew ejection seats and associated pyrotechnics will be removed, as well as several thousand pounds worth of developmental flight instrumentation (DFI). For the initial test program of four flights, *Columbia* has been and will be flying with hundreds of sensors aboard. These include accelerometers, strain gauges, thermal sensors under various critical tile locations and myriad other devices to assess operational parameters. During overhaul, *Columbia* will be fitted with a galley and sleeping berths for a crew of seven.

Challenger will be delivered with those systems already aboard, and will not operate with a crew ejection system. In addition, *Challenger* will have 254 less TPS tiles than *Columbia*. This is due to the installation of Advanced, Flexible Reuseable Surface Insulation (AFRSI) blankets which will be affixed to *Challenger's* Orbital Maneuvering System (OMS) pods.

The AFRSI plan is eventually to replace the majority of low temperature tiles on the orbiters. The blankets are in three layers, closed with quartz thread and produced in approximately one meter squares. The thickness of the blankets varies from .45 to .95 inches. The blankets can be cut to fit, and are attached using the same room temperature vulcanizing (RTV) adhesive now employed on *Columbia*.

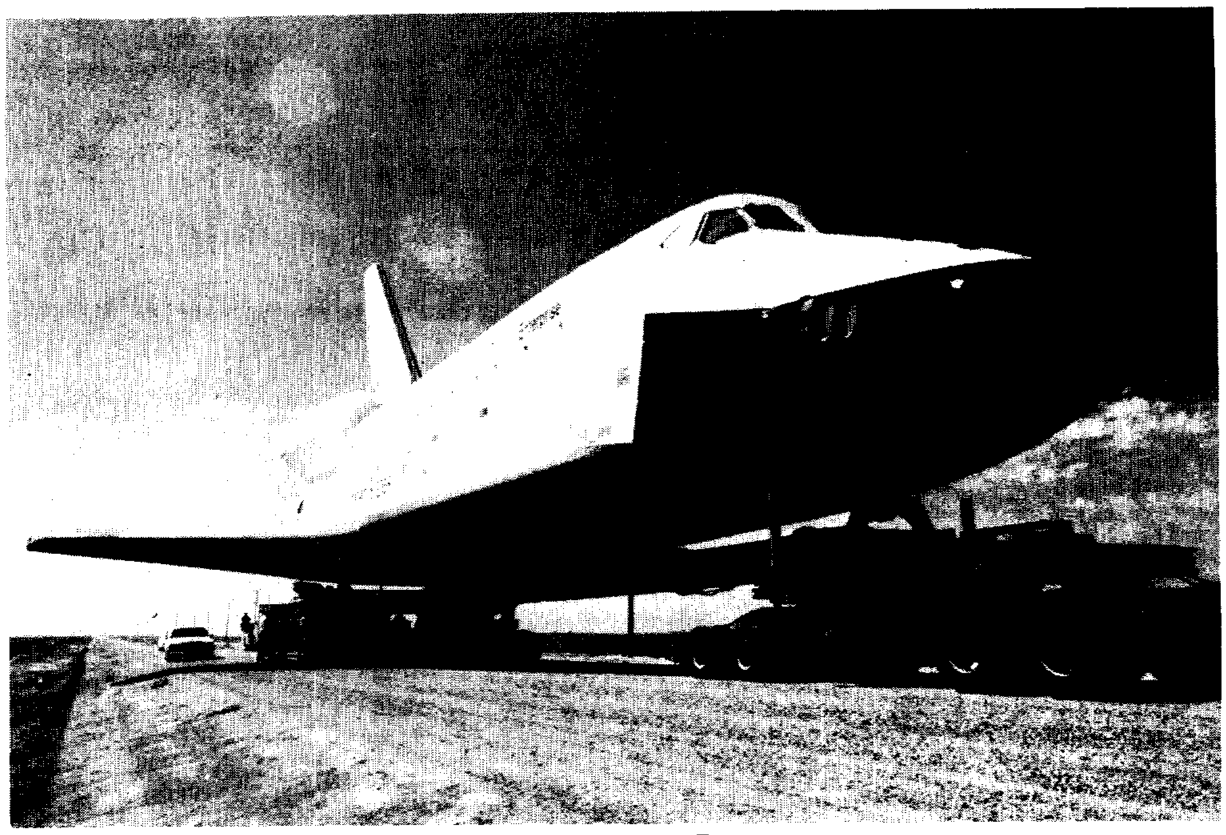
The blankets basically consist of standard TPS material sandwiched between an outer waterproof woven silica high temperature fabric and an inner layer of lower temperature glass-based fabric. The flexible blankets are directly bonded, without the need to use strain isolation pad material. The blankets also will be attached to the aft OMS/RCS pods on OV 099.

Challenger also will be structurally strengthened, although a detailed weight control program will have reduced its dry weight by about 2,000 pounds less than *Columbia*.

The AFRSI blankets may also replace the majority of low temperature tiles on *Discovery*, which is scheduled for delivery in the fall of 1983. Major components of *Discovery* will begin arriving at Palmdale for assembly early in 1982. Both the lower forward fuselage and the wings are scheduled to be on hand in April, and the upper forward fuselage, vertical stabilizer, payload bay doors, aft fuselage and crew module for OV 103 will all be ready for installation by this time next year.

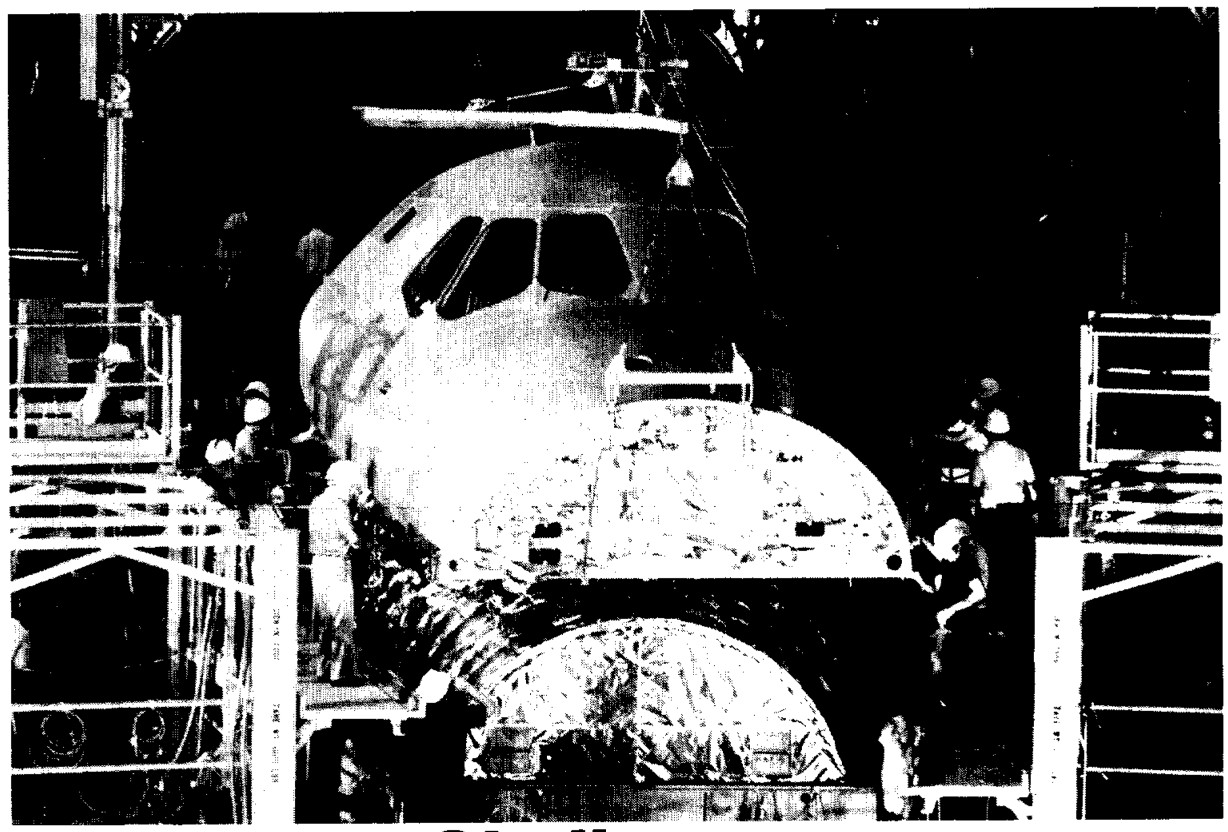
Long lead items are in the procurement process for the last currently planned orbiter, OV 104, *Atlantis*. Major work schedules on *Atlantis* will not begin until 1983, and delivery is scheduled for 1985. By that time, two launch facilities, pads 39A and 39B, will be available at KSC, and the Air Force launch facility should be operational at Vandenburg.

Challenger actually was built before *Columbia*, but because OV 099 was initially intended to be a structural test article, *Columbia* preceded it in orbital flight capability. The first orbiter built was OV 101, *Enterprise*. Then came 099, *Challenger*, followed by OV 102, *Columbia*. In the late 1970's, it was determined that *Challenger* was significantly closer to structural design specifications than *Enterprise*, so OV 099 became the designated second spaceworthy shuttle



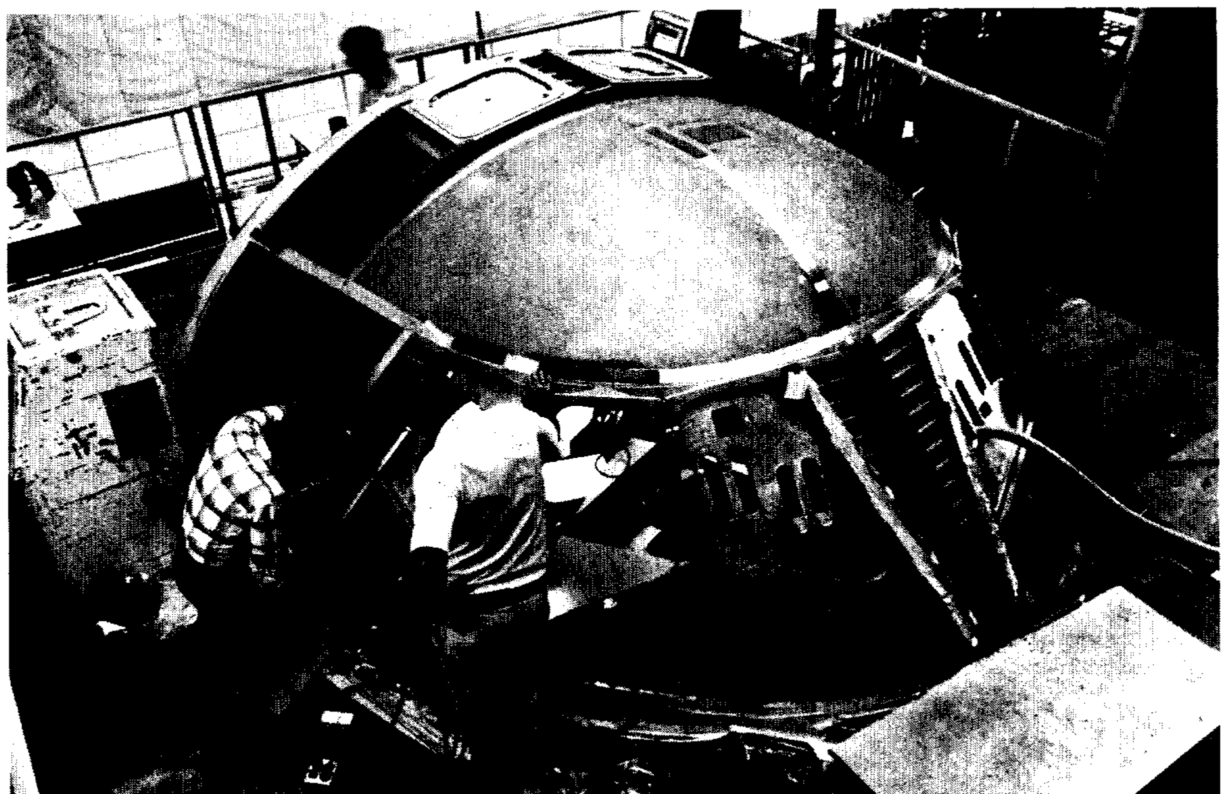
OV 101 **Enterprise**

The Orbiter named by popular acclaim was mobile again in September as it was moved from its berth at Rockwell International's Palmdale assembly facility to Dryden Flight Research Center at Edwards Air Force Base. *Enterprise*, which last flew during the Approach and Landing Tests in the late 1970s, may be used to help configure Air Force launch facilities at Vandenburg Air Force Base.



OV 099 **Challenger**

The upper forward fuselage was installed over the pressurized crew module on *Challenger* in late October. Work began this month on installing reinforced carbon carbon to the wing leading edges and nose cap. The spacecraft could be delivered to NASA as early as June. At that point it will enter the Orbiter Processing Facility at the Kennedy Space Center.



OV 103 **Discovery**

Major components of the Orbiter *Discovery* are already taking shape around the country. Here technicians at Rockwell's Downey facility work on the upper forward fuselage of the third scheduled operational Orbiter. *Discovery* will sport new Thermal Protection System blankets, as opposed to individual tiles, in the low temperature locations, primarily on the upper wing surfaces and the OMS/RCS pods.

Gilruth Center News

Call X3944 for more information

Defensive driving

Learn to drive safely and qualify for a 10 percent reduction in your auto insurance for the next three years. Class meets from 8 a.m. to 5 p.m. Saturday, Jan. 9. The cost is $15 per person and space is limited.

IRA seminar

The JSC Credit Union is sponsoring a seminar for those interested in the new Individual Retirement Accounts (IRA), which will be held at 7:30 p.m. Dec. 2 in the Rec Center. The guest speaker, David Boranian, a specialist in the IRA field, is associated with Bankers Systems. The seminar will cover new regulations, effective Jan. 1982, on regular IRA's, Spousal IRA's, Rollover IRA's and Simplified Employee Pensions.

Children's Christmas party

Tickets go on sale early at the Bldg. 11 Exchange Store for this year's festivities for children at the Rec Center. The Children's Christmas party will be held from 10 a.m. to noon Dec. 5, with features such as cartoons, popcorn, soft drinks, a magician, pictures with Santa and the traditional Christmas stocking. The cost is $1.50 per child. Tickets are limited.

Arts and crafts

There are still some tables open for the Rec Center's crafts sale. All types of homemade and handmade items will be on sale. This early opportunity for some Christmas shopping will last from 1-5 p.m. Sunday, Dec. 6. Food will be available and admission is free.

Blood drive scheduled

The third JSC sponsored blood drive of 1981 will be held at the Rec Center from 8:30 a.m. to 4 p.m. Dec. 8. A donation of one pint insures the doner and his or her immediate family of any blood services required for one year. Blood drive officials say it is possible to donate as often as every eight weeks. The JSC Blood Bank includes Civil Service and most contractors associated with the Center. The 1982 blood drive schedule will be published in the forthcoming JSC phone directory. To make an appointment for the Dec. 8 blood drive, call Rachel Windham, x6493, Helon Crawford, x3159, or Jim McBride, x6226.

EAA adult Christmas parties

This year's EAA Christmas parties will be held on Dec. 12 and 13, and will feature a roast beef dinner the first night, prime rib the second night, and two bands on both evenings. A social hour will be observed before both dinners, with dancing starting at 9 p.m. The cost for the roast beef dinner on Dec. 12 is $13.50 per person, and the cost for the prime rib dinner Dec. 13 is $18.50 per person. Both night's festivities begin at 7 p.m. Tickets go on sale Nov. 23 at 10 a.m. Reserved seating will be used.

Adult dinner theatre

"The Star Spangled Girl" will be presented in two shows Nov. 20 and 21 at the Rec Center. A social hour begins at 6:30 p.m., followed by a roast beef dinner at 7:30 p.m. and showtime at 8:15 p.m. both nights. The cost is $10 per person, and tickets are available at the Bldg. 11 Exchange Store.

Team competition race

Entry blanks are available for the Second Annual Team Competition Race to be held at the Rec Center at 9 a.m. Nov. 21. Teams will be formed in the commercial (all from the same company) and non-commercial categories. Men's, women's and mixed teams are invited. The cost is $5 per team, and medals will go the winners in each category.

STS-2 Pilot Richard Truly floats with a printout of instructions from Mission Control while in Zero G during the mission. He is pictured here in Columbia's mid-deck area.

Cookin' in the cafeteria

Week of Nov. 23 - 27, 1981

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: Holiday

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

Week of Nov. 30 - Dec. 4, 1981

Monday: French Onion Soup; BBQ Sliced Beef; Parmesan Steak; Spare Rib w/Kraut; Chili & Macaroni (Special); Ranch Style Beans; English Peas; Mustard Greens. Standard Daily Items: Roast Beef; Baked Ham, Fried Chicken; Fried Fish; Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

Tuesday: Split Pea Soup; Meatballs & Spaghetti; Liver & Onions; Baked Ham w/Sauce; Corned Beef Hash (Special); Buttered Cabbage, Cream Style Corn, Whipped Potatoes.

Wednesday: Seafood Gumbo; Cheese Enchiladas; Roast Pork w/Dressing; BBQ Link (Special); Pinto Beans; Spanish Rice; Turnip Greens.

Thursday: Beef & Barley Soup; Roast Beef w/Dressing; Fried Perch; Lasagne w/Meat; Chopped Sirloin; Chicken Fried Steak (Special); Whipped Potatoes; Peas & Carrots; Buttered Squash.

Friday: Seafood Gumbo; Fried Shrimp; Baked Fish; Beef Stroganoff; Fried Chicken (Special); Okra & Tomatoes; Buttered Broccoli; Carrots in Cream Sauce.

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 rent: Friendswood, 3-2-2, fireplace, fence, new paint, formal dining, large kitchen, $525/mo. plus deposit. 482-6609.

For lease: Baywind I condo., 2 BR, 2 bath, W/D, pool clubhouse, $425/mo., available Dec. 29. G. Franklin, x3491, or 474-5267.

For sale: Dickinson, custom 3-2 1/2-2 Old English, wooded one acre, block paneling, Jenn Aire, fireplace, pool. $139,500 by owner. 337-1610.

For sale: 1/2 acre lot on Sam Rayburn Lake. Near San Augustine Park. Call x2156 or 474-3554 after 5 p.m.

For sale: Lot at Hilltop Lakes, paid $5,500 six years ago, will sell for $5,000. Call 554-6201.

Cars & Trucks

1976 Datsun 280Z, 2 door, 4 spd., AM/FM, excellent condition, $4,975. Call 484-1794.

1981 Dodge K-Car, 2 door, AM/FM, bucket seats, 10,000 miles, like new, $6,950. Call 484-1794.

1975 Chevrolet Impala Coupe, all power, A/C, new shocks, water pump and hoses, good tires, $1,400. Call x3271 or 332-4692 after 6 p.m.

1980 Toyota Celica GT, like new, $7,000. Call 488-5945 or 483-3471.

1974 Chev SW, V8, power, 2 new tires, seats 8, luggage rack, reliable, $1,100 or best offer. Call 334-4773 after 5:30 p.m.

1980 Trans Am, p/s, p/b, p/w, p/dl, a/c, auto, tilt steering, cruise, 31K miles, velour interior, $6,500. Call 339-1723 after 5 p.m.

1973 Cadillac Sedan DeVille, loaded, good condition, asking $1,050. Call 921-1715.

1979 Camaro Berlinetta, blue, excellent condition, new tires, tilt/cruise, AM/FM/8 track, $5,200. Call Witt, x5447 or 945-6056.

1974 Chevrolet, one owner, excellent condition, make offer. Call 333-4669.

1980 Chrysler LeBaron, excellent condition, cruise, A/C, p/b, p/s, AM/FM, 2 door, 17,000 miles, $5,800. Call x3991 or 488-7576.

1979 VW Rabbit, A/C, tape, excellent condition, $5,500. Call 486-7043 after 5 p.m.

1968 VW Bug, auto, new radial tires & muffler, 61K miles, original owner, excellent condition. Call Mike M. at x3522 or 488-3102.

1981 Sierra Classic pickup, 5,000 miles, two tanks, A/C, AM/FM/cassette, tilt wheel, clock, heavy duty battery, NASA blue inside & out, $8,000. Call 782-9884.

1975 Chevy Malibu, 2 door, auto, p/s. Call Roger Hutchinson, 367-0870 after 5:30 p.m.

1966 Corvair, 4 spd. transaxle; 1965 Corvair, 3 spd. transmission. Call Trey, 483-2016 after 4 p.m.

Household

Two brand new Karastan Earthtone carpets, 1 shag and 1 looped w/bound edges, both 12' x 16', $200 each. Call 474-3637.

Fiberglass shower enclosure, 3 ft. size, white, includes faucets, like new, $125. Call x3977 or 420-2936 after 6 p.m.

Bathroom lavatory, white, includes faucets, like new, $40. Call x3977 or 420-2936 after 6 p.m.

Two love seats, Mediterranean style, wood trim, green-gold upholstery, like new. Call 482-8781.

Exquisite Oriental rug, hand made, Aubusson, 6' x 9', barely used, $650. Call 723-1640.

Sheffield heavy silverplated 5 pc. tea set, never used, perfect condition, $150. Call Cindy, 483-7236.

Curtis Mathis entertainment center, w/reel to reel AM/FM stereo, turntable, microphone, non-working 21" color TV beautiful wood cabinet, $70. Call Jerry, x2968 or 471-8556.

Pets

AKC Male Doberman pups, champion bloodline, must see, $150. Call 337-1610.

Stud service available, AKC registered silver miniature poodle, obedience title. Call Barbara at x4695.

Wanted

Would like to buy mobile home trailer, 1 or 2 bedroom, at reasonable rate. Will furnish own lot. Call Yolanda, x5107 after 2:30 p.m. or 986-6174 after 5 p.m.

Wanted: RC trans. and rcvr, for a beginner. Call Harley Weyer, x7272.

Boats & Planes

1975 Skyhawk, 1/4 or 1/2 interest, 850 hrs. on new RAM 160, IFR w/NARCO Centerline, ILS, HSI, DME, 3 axis A/P, 1 yr. alumigrip, LaPorte based, $6,500 for 1/4. Call x4491 or 487-3857.

Aircraft radios: King KR85 ADF w/harness, $1,000; King KN62 DME, $1,600; King KT76 x-ponder, $400; NARCO AR500 encoding alt., $400; Century IIB from Bonanza, $1,590. Call 481-3600 after 6 p.m.

One person Bass Hunter boat, swivel seat, trolling motor, battery, other extras, like new, $320. Call R. Sanders, x3458 or 481-6928.

Lido-14 sailboat, w/galv/tilt trailer and sails, new condition, used 1 yr., $2,995 or terms. Call R. Hoover, 337-2392.

Dolphin Sr. 16 ft. sailboat w/trailer, $450. Call Joe, x5437.

FAA Pilot Ground School, $10. Instructors, two seat trainer available, low rates. Gulf Coast Aero Club. Call Mark at x4436 or 480-2634.

Stereos & Cameras

Sony receiver, Sony 8-track tape player, 2 Epicure speakers w/pedestals, 2 Advent speakers, all hookup wire, $140. Call Mike Lake, 523-2137.

Carpools

Urgently need someone in Galveston to carpool, will pay any cost, live at 4608 Q1/2. Hours are 7:30 a.m. to 4 p.m., willing to stay until 4:30 p.m. Call Jackson, x3411.

Wanted, ride to and from work for visually handicapped person, will pay necessary expenses, residence in El Lago area. Work at 1300 Bay Area Blvd., Computer Sciences Corp. Call Jim Sherman, 486-8153, x307, or 334-3058 after 5 p.m.

Wanted, carpool from Galveston to JSC, M-F, 7:30 a.m. to 4 p.m. If interested call Barbara at x4696.

Musical Instruments

Wanted, flute in good condition for band student. Call Kay, x4655 or 333-5373.

Player piano and lots of old rolls recently reconditioned. Call Waite, x4241 or 333-2442.

Wersi "Entertainer" electric organ, single keyboard, portable, practice/starter instrument, $400 ($95 less than kit), assembled & tested. Call Samouce, x4727.

Cycles

1979 Honda XL-75, $400; 1977 Suzuki RM-80, $300. Excellent kid or light adult trail bikes. McNeely, x5954 or 482-1549.

1980 Honda Hawk 400, bought new in '81, has 1,600 miles, must sell, $1,200. Call 334-6074.

1974 Suzuki dirt bike, no papers, many parts, $50. Call 484-1241 evenings and weekends.

1978 Honda Hawk, good mechanical condition, engine needs new cam chain, $750. Call Hendrickson, x4891 or 488-6304.

Raleigh 10-speed bicycle, excellent condition. Call Waite, x4241 or 333-2442.

Schwinn 3-speed bicycle, small frame, $65; RS 3-speed bicycle, 26 in. large frame, $45. Call Rysavy, x3085 or 481-3787.

1977 Honda 750E, new Michelin tires, excellent condition, one owner, $1,650. Call 481-3770 after 5 p.m.

Miscellaneous

Trailer hitch w/ 1 7/8" ball will fit most cars & SW's, like new, $15. 4 burner Tappan table top range, $20. 34" shop fan w/motor, $75. 24" fan w/220 volt motor, $50. 12 volt Honda batt., good condition, $10. Call 921-7212.

3' x 6' pool table, $75. Call McNeely, x5954 or 482-1549.

Vega steel sleeve block, IECO head and camshaft, and accessories, $300. Call Albert, 482-5681.

1977 Layton Travel trailer, 20', sleeps 6, roof air, awning, self contained, tandem axle, clean, $4,000. Call 339-1723.

1974 tailgate for Chevrolet Smoothside pickup, fits '72-'79, good condition, $40 or offer. Call Brown, x4637.

Firewood for sale, split oak, $135 cord and $70 half cord delivered. Call 470-1311.

Motorhome for rent, weekly or daily rates, 24', A/C, 4KW generator, fully self-contained. Call 486-9144 or 488-4969.

F.A.O. Schwartz toy castle construction set, in perfect condition, $10; New Water Pik oral hygiene unit, still in box, $15. Call John, x4393 or 488-0559.

Fly 2-for-1 Pan Am coupons to Mexico, Germany, India, Australia and 9 other countries. Call Doris Wood, x4464, or Bruce Wood, x2267.

Space Shuttle stamps, $9 per sheet. Other space stamps available. Call Jeff, x7429 or 482-5393.

Kleinschmidt printer, good for parts, or needs power supply, $25; ASCI parallel to BAUDO serial board for home computer, $15. Call Hartman, x4562.

Sears rowing action exercycle, seldom used, $20 or best offer. Call Mary, x4010 or 486-1766.

Wide tread tire, B60-13, raised white letters, $10. Call Thompson, 483-4823.

Girls 3-speed bike, $55; 20' ladder, $35; bamboo roll-up blind, $15; 90' CPVC, $22; ottoman, $10. Call 333-4528.

28' self contained Mobile Scout travel trailer, $3,800; 16' four-horse trailer, $1,150. Call Tarpley, 534-2167.

Two 1200 x 16.5 mud tires and rims, good tread, $100. Call Don, x2962.

Radiator for 1976 Jeep CJ-5, no leaks, $30. Call Don, x2962.

Four steel belted radial whitewalls, GR70 x 15, $70. Call Blucker, x3533.

Empty freon tanks, 50 lb. capacity, $3; 30 lb. capacity, $1. Call Jim McBride, x6226 or 337-4643.