

Space News Roundup

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National Aeronautics and Space Administration

Learning curve shows on turnaround

Columbia is now on the pad at the Kennedy Space Center as preparations for the third launch progress at a record pace.

"There is a great deal of learning on the part of technicians and engineers here," said John Presnell, one of JSC's Orbiter Project representatives at the Cape. "We're taking advantage of the learning curve and becoming able to do the turnaround work better and faster."

The numbers tend to bear out that observation. During the preparations for STS-1, *Columbia* was in the Orbiter Processing Facility (OPF) for 612 working days, in the Vehicle Assembly Building (VAB) for 35 days, and on the launch pad for 104 days. For STS-2, the spacecraft was in the OPF for 103 days, in the VAB for 21 days, and on the pad for 34 days. For the latest mission, *Columbia* was in the OPF for only 47 days, in the VAB for 11 days and will probably be on the launch pad for about 25 to 30 working days.

The numbers on thermal protection tile replacement are also encouraging. After the first mission, 1,872 tiles had to be removed and replaced. That number dropped by more than one third after the second flight, with 449 tiles having to be replaced.

The launch team is still aiming for a March 22nd liftoff, although Launch Director George Page said it may be possible to go one or two days earlier.

"The next big event is the Cryogenics Load Test on Feb. 26," he said at a news conference during *Columbia*'s rollout Feb. 16, three days ahead of schedule. "If we come out clean on that," he continued, "then we go right into hypergolic loading on March 4."



Columbia being hoisted for stacking in the VAB

FY '83 budget boosts Galileo and Shuttle

President Reagan's proposed \$6.6 billion NASA budget for Fiscal Year 1983 will, if approved by Congress, allow for continuation of the Galileo mission to Jupiter and further progress in the space shuttle program.

"Given the tightly constrained fiscal environment in which this budget was prepared, I believe we did well," NASA Administrator James M. Beggs said. "It represents an overall increase of \$673 million, or 11 percent, over the revised plan for FY 1982. Factoring in inflation, we will have a slight increase in purchasing power throughout this fiscal year."

The \$5.3 billion allocated for research and development constitutes 81 percent of the total request, with more than half of that, \$3.5 billion, going for the shuttle, Spacelab, upper stages and NASA's stable of expendable launch vehicles.

The amount requested for shuttle operations will, for the first time, be about even with that requested for shuttle production, system upgrading and performance improvements.

The budget could also provide for a go-ahead in the plans to repair in orbit the troubled Solar Maximum Mission satellite, a mission which would require an astronaut EVA to retrieve the satellite and place it in the payload bay of the shuttle for repairs. If the plan is approved by Congress, the flight could come as early as December 1983, or in the first quarter of 1984 (see related story, this page).

JSC's research and program management allocation under the proposed budget is \$192.3 million, the highest of the NASA centers. The Marshall Space Flight Center would receive \$177.7 million, and the Kennedy Space Center would be allocated \$169.5 million. In each case, the allocations represent increases over FY 1981 and 1982 levels.

Under the plan, JSC's total number of permanent civil service positions at the end of the fiscal year would be 3,293, a drop of 53 positions over the FY 1982 level of 3,346.

Highlights of the budget request include:

- Continued progress in production of the third and fourth or-

(Continued on page 2)

Slayton will retire from NASA in March

Donald K. "Deke" Slayton, 58, manager for orbital flight tests in the Space Shuttle Program Office, will leave NASA about March 1 after 23 years with the space agency. Slayton is the last of the original seven astronauts still with NASA who were selected in 1958 for Project Mercury.

Slayton retired from NASA in February 1981, but stayed on the job on a temporary appointment as a rehired annuitant.

He will serve as a consultant to Aerospace Corporation of El Segundo, California and to Space Services, Inc. of Houston, from a Clear Lake-area office.

Slayton said of his two decades with the space program: "There's nothing I'd rather have been doing. I really looked forward to getting

up each morning. But this new phase of my career looks like it also should lead to constructive, enjoyable work."

Grounded from space flight in August 1959 because of a suspected heart condition, Slayton later was approved for flight status and was part of the American crew in the July 1975 US-Soviet Union Apollo-Soyuz joint space rendezvous and docking mission.

While grounded, Slayton served as head of the Astronaut Office and Director of Flight Crew Operations at the Space Center. Slayton resigned from the Air Force in 1963 and joined NASA. He was manager for the approach and landing tests with Space Shuttle Orbiter *Enterprise* from 1975 to

1977 after his space flight. In 1977 he was named to manage the four-mission orbital flight test program with Orbiter *Columbia* to bring the Shuttle Space Transportation System to operational readiness.

Slayton joined the Air Force in 1942 as an aviation cadet and flew 56 combat missions in Europe and seven over Japan as a B-25 bomber pilot. He was a test pilot at Edwards Air Force Base, California when he was selected as a Mercury astronaut. Slayton has logged more than 7,000 hours flying time, most of which is in jet aircraft.

He holds a bachelor's degree in aeronautical engineering from the University of Minnesota and attended public schools in his home town of Sparta, Wisconsin.



Slayton in ASTP docking tunnel in 1975

Space News Briefs

New Saturnian moons discovered

Scientists using data from the Voyager 2 encounter with Saturn have found another four and perhaps as many as six new satellites to add to the growing number of known moons around the ringed gas giant. The latest discoveries bring the number of known satellites to between 21 and 23. The "possible" moons were seen in only one Voyager observation each, so their orbits have not yet been confirmed. The others are known to have diameters of around nine to twelve miles. Before the Voyager missions, Saturn was known to have 10 moons, but 11 to 13 additional ones have been discovered since then. The latest moons were discovered by Dr. Stephen P. Synnott of the Jet Propulsion Laboratory with the collaboration of JPL scientist Richard Terrile.

Lousma and Fullerton press conference set

Commander Jack Lousma and Pilot C. Gordon Fullerton, the crew for the upcoming mission of the Space Shuttle, will meet with the press in the final pre-mission news conference next week. The conference will be held at 9 a.m. Feb. 26 in the Olin E. Teague auditorium in the Visitors Center.

WESTAR IV poised for launch at ESMC

Western Union's latest communications satellite, WESTAR IV, is poised atop a Delta 3910 rocket for launch no earlier than Feb. 25 from Complex 17A at the Eastern Space and Missile Center in Florida. The new geosynchronous communications satellite is double the size of the previous WESTARS now in service, and will have four times the capacity. WESTAR IV carries 24 transponder channels, twice the number of the existing WESTARS, develops 40 percent more transmitting power than most domestic communications satellites, and will produce in excess of 800 watts of solar-derived power. The satellite is scheduled to go into an elliptical transfer orbit about 25 minutes after launch. On the seventh apogee, WESTAR IV's kick motor will fire and send it into near-synchronous orbit.

Shuttle greenhouse delivered for STS-3

The Plant Growth Unit has arrived at the Kennedy Space Center in preparation for loading aboard Columbia's mid-deck area late in the launch countdown for STS-3. A total of 96 plants will be carried aboard the orbiter in a test to see what effect weightlessness has on the formation of lignin in plants. The compact greenhouse project is being managed by the Ames Research Center in conjunction with the principal investigator, Dr. Joe R. Cowles of the University of Houston. Lignin is the woody substance in plants which allows them to grow against the pull of gravity, gives them their characteristic shapes and supports the organs which carry food and chemicals. The Plant Growth Unit is the size of a filing cabinet and requires no crew interaction, with all functions completely automatic and all data stored within the experiment package. Results from the flight will be compared with those of identical seedlings grown on Earth.

Fuel cell power plants to be studied

Forty-five fuel cell power plants — terrestrial versions of the systems used to generate electricity in the U.S. manned space program — will be installed at commercial and residential sites across the nation in a technology advancement study in 1983. The high efficiency, virtually non-polluting fuel cells will be built, installed and studied in a joint effort of the Lewis Research Center, the Department of Energy, the Gas Research Institute and United Technologies' Power Systems Division. Each fuel cell will be capable of generating 40 kilowatts of electricity, as well as heat for commercial or residential buildings. Engineers estimate the combined output of electricity and heat will result in the use of more than 80 percent of the total energy in the fuel. Conventional electrical generators typically deliver only slightly more than 30 percent of the fuel's energy to the user. Potential sites include apartment buildings, nursing homes, recreation centers, restaurants, banks, stores, laundromats and warehouses. The fuel cells will be designed to use natural gas, but future systems could derive their energy from coal-based synthetic gas, methyl alcohol or hydrogen.

A direct approach

High orbit insertion technique studied

The "coupled mission effect" is a phrase which may become familiar in the future as JSC planners continue to define a technique for getting shuttles and their payloads into orbit as efficiently as possible.

The technique is known as direct orbital insertion, and it could be the means to carry substantial payloads into high orbits with a greater degree of efficiency and economy. In one particular scenario, direct insertion could end up saving NASA as much as \$100 million.

Stated simply, direct insertion would change the circumstances of a shuttle ascent into space. Under certain conditions, the flight path angle would be steeper, and the vehicle's velocity at Main Engine Cutoff (MECO) would be increased. This would result in a direct boost to an apogee of around 280 nautical miles on the first leg (the process has so far been verified for apogees ranging from 270 to 320 nautical miles with a due east launch from KSC). Another result would be a splashdown of external tank fragments in the Pacific Ocean south of Hawaii.

The idea of using direct insertion was first proposed in 1979 by the Mission Planning and Analysis Division. It was later refined with respect to external tank impact by Jim Allison, a McDonnell Douglas employee. And most recently, the idea has been expanded on by Dr. Vince Darcy of the STS Utilization Planning Office.

In many cases, a coupled mission can present logistical problems, because some satellites must be placed in very specific positions, while others must be retrieved at great distances from that position. Shuttle orbital maneuvering capability can thus become a critical factor in planning such flights. Direct insertion could also be used for other types of missions in which high orbits are desired.

The impetus behind direct insertion has come as planners survey flight manifests for the busy years to come, in which "coupled missions," or those which deploy and retrieve satellites in the same flight, are being considered.

"Direct insertion could take advantage of the energy inherent in

the Space Transportation System," said Robert Everline, Manager of the STS Utilization Office. "It could give more maneuvering capability to the OMS (Orbital Maneuvering System), and it could, under some conditions, allow you to use the Space Shuttle Main Engines to supplement the OMS."

The preliminary planning involved in the proposed flight to retrieve and repair the Solar Maximum Mission satellite is a case in point. While the mission itself has not been authorized by Congress, NASA has been conducting some preliminary investigations of the idea in order to present a detailed proposal to the House and Senate. The thinking has been that repairing Solar Max would not only restore a very valuable investigative tool to the scientific community, but could also demonstrate a long-advertised capability of the shuttle for the first time.

In one particular scenario, direct insertion could end up saving NASA as much as \$100 million.

Doing so, however, would require some intensive planning. First of all, there is a set of givens with a mission to Solar Max: a pallet would be needed to hold the satellite while it is being repaired in the payload bay, and the shuttle itself would have to go to a relatively high orbit of about 280 nautical miles for a rendezvous. To get to that high orbit, it was thought that an add-on to the OMS, an OMS kit as it is called, would be needed.

"So if you go after Solar Max, you need a pallet and an OMS kit," Everline explained, "but carrying that alone is not a very efficient use of the Shuttle's payload bay. So the question is, what else could we take up on that mission? Well, there's only one payload around which could fit the need, and that's LDEF (the Long Duration Exposure Facility). But LDEF has to be retrieved after a year, and so that requires another flight to go up and get it."

"But with LDEF and a pallet for Solar Max and an OMS kit, the

weight would be such that you probably couldn't boost it all. You couldn't do it with OV 102 (*Columbia*) because it is too heavy, and you might be able to do it with OV 103 (*Discovery*), which will be lighter, but even that is questionable if you use an OMS kit. So we had to look for something else."

That something else is direct insertion. By going directly to an apogee of, for instance, 280 nautical miles, instead of orbiting the Earth once after liftoff at about 160 nautical miles and then using the OMS to burn into a higher orbit, planners believe all of the above components could be carried safely on one flight.

"And if you could do that," Everline continued, "then you could come along a year later when LDEF needs to be retrieved, and you could take the Space Telescope up, deploy it, and then go get LDEF and bring it back home. So instead of making one flight to repair Solar Max, then another flight to take up LDEF, and then another to take the Space Telescope up, and yet another to go back and get LDEF, you could combine four potential flights into just two, and you could eliminate the need for the OMS kit on these missions altogether. At about \$40 million per flight and about \$20 million for the OMS kit, that's a rough savings of about \$100 million."

There would also be another benefit of direct insertion. Because the velocity and flight path angle would be different, the external tank would impact the Earth later in the flight. According to the calculations of the Utilization Office, this would cause the ET to drop into the Pacific Ocean — where there are several tracking stations — instead of the Indian Ocean, where there are none. The precise conditions could be designed so that the external tank breakup on its fall from orbit could be tracked for the first time, giving NASA some very definitive information that has not been available previously.

"We could get data back from entry at about 400-600,000 feet, from the rupture of the liquid oxygen and hydrogen tanks at about 245,000 feet and from the breakup of the ET itself at about 185,000 feet by using tracking facilities at Kwajalein, Maui and Oahu," Everline said.

People and Places

One of the Soviet cosmonauts here during preparations for the Apollo-Soyuz Test Project and a familiar face to the people of Bldg. 4, Col. Vladimir Dzhanibeckov, last week was named to command a flight to the Salyut space station this summer. Dzhanibeckov, known as Johnny to the Americans, will command the flight on which French cosmonaut Jean-Loup Chretien will be one of the crew members. "Johnny's English was very good," said Astronaut Robert Crippen, "and I guess like most old fighter jocks, he's very gregarious and easy going." Dzhanibeckov, a Soviet Georgian whose wife is a Georgian princess, became a cosmonaut in 1970 and has flown two previous missions in space.

Astronaut Dr. Joseph P. Kerwin, science-pilot on the Skylab 2 mission, has been appointed to serve as NASA's senior science representative in Australia effective in April. Kerwin will act as liaison between NASA's office of Space Tracking and Data Systems and Australia's Department of Science and Technology during the two-year assignment. NASA has had representatives in Australia for almost 20 years to help with the operations of two tracking stations at Yarragadee and Ororal Valley. Kerwin will coordinate NASA tracking requirements and keep the Australian government apprised of the agency's plans in space. He will return to the Astronaut Office at JSC at the conclusion of the assignment.



Dzhanibeckov and friends at JSC in 1975

Indications are that an experiment suggested by Minnesota high school student Todd Nelson, 17, will be flown on one of the space shuttle missions in the near future. Todd's experiment, the first of several in the Space Shuttle Student Involvement Project, would examine the way various flying insects react to the weightlessness of space. The flight performance of such insects as the common house fly and the Monarch butterfly would be chronicled by photographic means, and compared to the characteristics of flight by similar insects on Earth. The chamber for housing the insects in orbit would be

mounted in the middeck area of the shuttle.

JSC Director Christopher C. Kraft Jr., and Rockwell International North American Space Operations Division President George Jeffs have been named the recipients of the 1982 Astronautics Engineering award presented by the National Space Club. Norman L. Baker, chairman of the committee which made the award selection, said Kraft and Jeffs were selected for their leadership in the Space Shuttle Program. The award presentation will be made in Washington, D.C. in March.

FY '83 budget

(Continued from page 1)

biters, *Discovery*, OV 103, and *Atlantis*, OV 104;

- Provision of upper stages for planetary, geosynchronous and other special missions;

- Launch of the first Spacelab mission and procurement of the second Spacelab flight unit;

- \$682 million for space science programs, with support for the Galileo Jupiter probe, Voyager's encounter with Uranus in 1986 and launch of the Gamma Ray Observatory in 1988;

- Performance augmentation to reduce the weight of the solid rocket boosters and enhance the shuttle's ascent performance;

- Test, checkout and initial operation of the Tracking and Data Relay Satellite System.

One area which did not fare well in the FY 1983 budget proposal was aeronautics, with cut-back in aeronautical systems, materials and structures, propulsion, general aviation systems technology and avionics and flight control systems technology.

Beggs said the \$232 million requested for aeronautics research and technology does represent a reduction from past levels, but that experimental facilities and skilled

personnel at the NASA aeronautics research centers would be maintained.

NASA

Space News Roundup



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Editor

Brian Welch

Extensive drill simulates contingency EVA

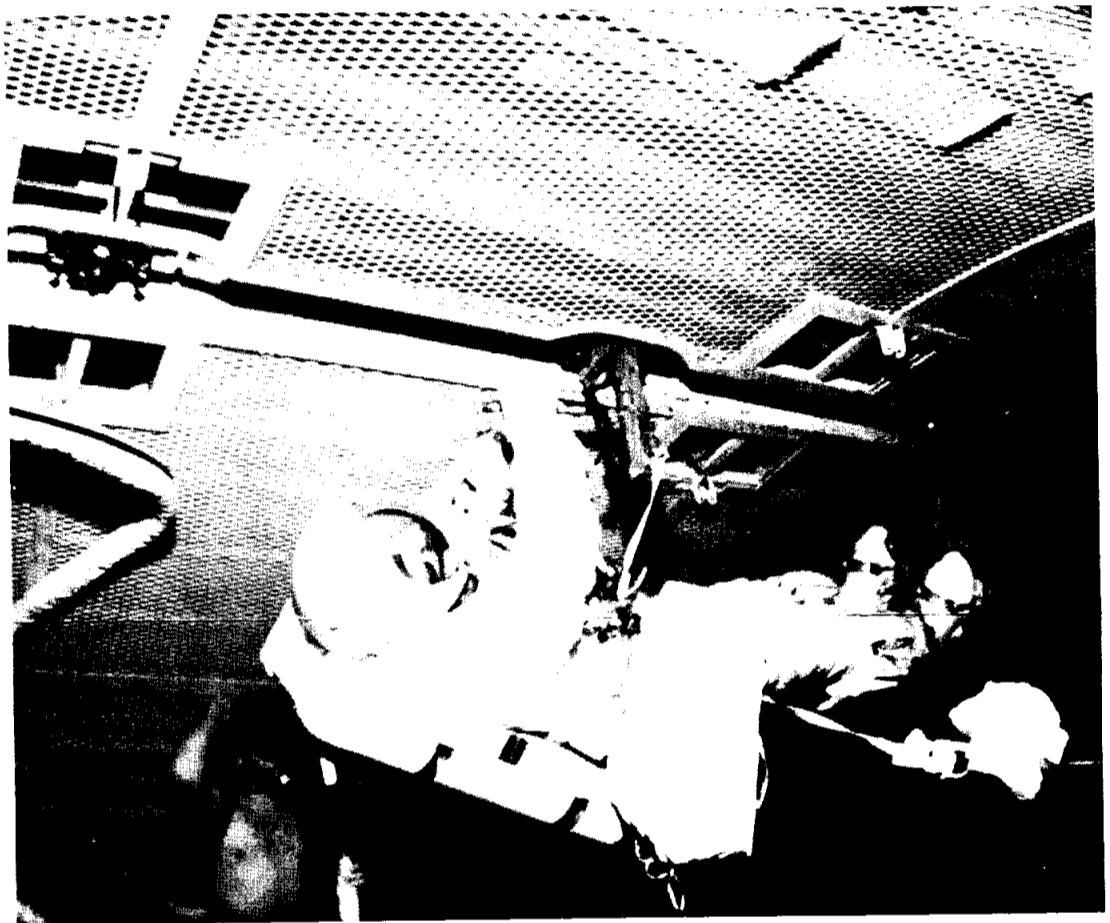


In a drill of unusual depth, several of the simulation facilities at JSC were brought together recently to participate in a real time practice of a contingency EVA.

The scenario thrown out by the simulation people was that *Columbia's* payload bay door latches were balking, and would not close prior to reentry. An EVA into the payload bay would be necessary to do the job manually.

So with STS-3 Commander Jack Lousma assuming his role from the aft flight deck of the Bldg. 5 Shuttle Mission Simulator (top left), Astronaut Dr. William Fisher waited to be lowered into the tank in the Bldg. 29 Weightless Environment Test Facility (top right). STS-3 Pilot C. Gordon Fullerton had been sidelined that day with a sore throat, and Fisher was called to fill in. Meanwhile, in Bldg. 9A, test subject John W. Samouce donned a spacesuit and simulated the procedure for entering the airlock on the middeck in the 1 g Trainer. By this time, Fisher had been lowered into the tank in Bldg. 29, and with the movements choreographed by personnel in the Bldg. 30 Missions Operations Control Room and by controllers at poolside in Bldg. 29 (bottom left), Fisher "exited" the airlock and began the two-hour procedure to close *Columbia's* payload bay doors (bottom right).

"It was a good exercise," Fisher said later. Using a centerline latching tool ("There's absolutely nothing like it in the world," Fisher said), he ratcheted the doors closed and *Columbia* was ready to come home.



Photos by Andrew Patnesky and Terry Slezak

Software Production Facility now operational

A ceremony Feb. 8 marked the end of a three-month installation process and a move into operations for the Shuttle Avionics Software Production Facility (SPF) on the third floor of Bldg. 30.

The SPF is where flight software for space shuttle missions is developed, and with the installation of a new IBM 3033N central processor, the facility now has, in a single processor, more capability than it had in five processors of an earlier vintage, with the ability to execute several million instructions per second.

The updating of equipment reflects the initial step into shuttle

operations, and will allow the SPF to develop software for each mission on a reliable, economic basis.

The five AP-101 computers aboard *Columbia* and the flight software are the heart of the vehicle's management and control. Because of this, software is designed to incorporate a great deal of data which defines each mission, the particular spacecraft, and the payloads being carried. Reconfiguration of the software for each mission usually begins about six months before the scheduled launch date, and involves hundreds of people.

For the last eight years, this flight software development was accomplished using the IBM 360/75 computers which once functioned as the Mission Control Center Real Time Computer Complex. The effort to upgrade that hardware has been underway for about three years, and culminated in the Feb. 8 ceremony.

"The SPF is operational," said Jack Garman, Deputy Chief of the Spacecraft Software Division, "but not as operational as we are going to be." The installation of new equipment, he said, is but one step in the process of setting up software development and recon-

figuration somewhat in the manner of a production line.

One way of doing that will be to maintain catalogs of all vehicle, mission and payload data characteristics in mathematical form, as required for flight software and the simulations which test it. Those catalogs, as well as the SPF simulator and other software tools, will allow JSC to quickly configure and test avionics software for a particular shuttle mission.

Although the amount of software development and change is declining as NASA moves further into the Shuttle era, the workload due to software reconfiguration for

each mission will increase with the flight rate. Reconfiguring software for each mission — with some 60 or more missions planned by 1986 — would be almost impossible without a significant change in the way flight software definition is handled, and the degree of automation used in the SPF.

Two more phases of hardware delivery are planned over the next three years, with funding shared between NASA and the Air Force, as the computational needs of the SPF rise with the flight rate. Accordingly, two additional processors and associated equipment will be installed by 1985.

Schedule set for planetary science conference

Future directions of Earth and planetary exploration will be among the topics discussed as scientists from around the world gather at the 13th Lunar and Planetary Science Conference to be held March 15 - 19 at JSC.

Almost 300 oral presentations will be delivered during the five-day event in 25 wide-ranging topics. Almost all of the conference activities, technical sessions, exhibits and poster sessions will be held on the second floor of the Gilruth Recreation Center.

Session topics for the conference include early evolution of

the crust of terrestrial planets, lunar and asteroid regoliths, lunar petrology, lunar geology, planetary physics, the origin and history of meteorites, isotopic anomalies in early solar system materials, meteorite chronology, cratering and shock studies, satellites of the major planets, and presentations on Mars and Venus.

The Conference will begin at 6 p.m. Sunday, March 14, with registration and open house at the Lunar and Planetary Institute. Registration will continue the following days at the Gilruth Center.

On Monday evening, a special

session will convene in the Gilruth Center at 8 p.m. for a presentation on the activities of the NASA Solar System Exploration Committee. The session will be open to conference attendees only.

On Tuesday evening, a chili cook-off and barbeque will be held on the grounds of the Lunar and Planetary Institute. Tickets for the event will be available at the registration desk and will cost approximately \$10 to \$12 for the evening.

A highlight of Wednesday's activities will be a special plenary session beginning at 1:30 p.m. in the Gilruth Center auditorium to

discuss new opportunities for Earth and planetary research in the 1980s. Topics to be discussed during the session include future directions for NASA programs, recent advances in remote sensing, the Space Telescope and the Long Duration Exposure Facility. Members of the panel will include Jesse Moore and Mark Settle from NASA Headquarters, Charles Elachi and Alex Goetz from the Jet Propulsion Laboratory, Vince Salomonson from the Goddard Space Flight Center, William Kinard from the Langley Research Center, and John Caldwell representing the State University of New York.

That evening, another special session will be held to discuss "Prospects for Man on Mars in the Twenty-First Century." The session will be organized by a group from the Laboratory on Atmospheric and Space Physics at the University of Colorado, where a three-day colloquium entitled "The Case for Mars" was held in May 1981.

In addition to those activities, a number of presentations will be going on throughout each day in the Gilruth Center. A technical poster exhibit will also be on display in the Gilruth Center throughout the conference.

Bulletin Board

Credit Union elections will be March 5

The JSC Federal Credit Union elections will be held from 10 a.m. to 4 p.m. in the Credit Union lobby and from 5:30 until 7:30 p.m. at the Gilruth Recreation Center on Friday, March 5. The Credit Union's annual meeting will also be held that day at 7:30 p.m. in the Gilruth Center. Running for two three-year terms on the Credit Committee are: John Thier, Chief of the Procurement Operations Office, a credit union member for 20 years and a Loan Committee member for 7 years; Lois Bradshaw, Manager of the Program Administrative Office, a credit union member for 19 years and a Loan Committee alternate for the past year; and Maynard Huntley, Data Systems and Analysis Division staff, a credit union member for 16 years with experience in both technical and financial management areas. Running for three three-year terms and one one-year term on the Board of Directors are: Harold Feresse, Program Coordinator in the Tracking and Communications Development Division, with four years as a loan officer, four years on the Credit Committee and ten years on the Board of Directors; Roy Stokes, Program Operations Office, with four years on the Credit Committee and three years on the Board of Directors; Peggy Ann Zahler, an analyst in the Program Procurement Division, with three years on the Credit Union Supervisory Committee and Board of Directors appointee since October 1981. Additional candidates were being considered at press time for positions on the board, but had not definitely committed to run.

NARFE dinner meeting scheduled

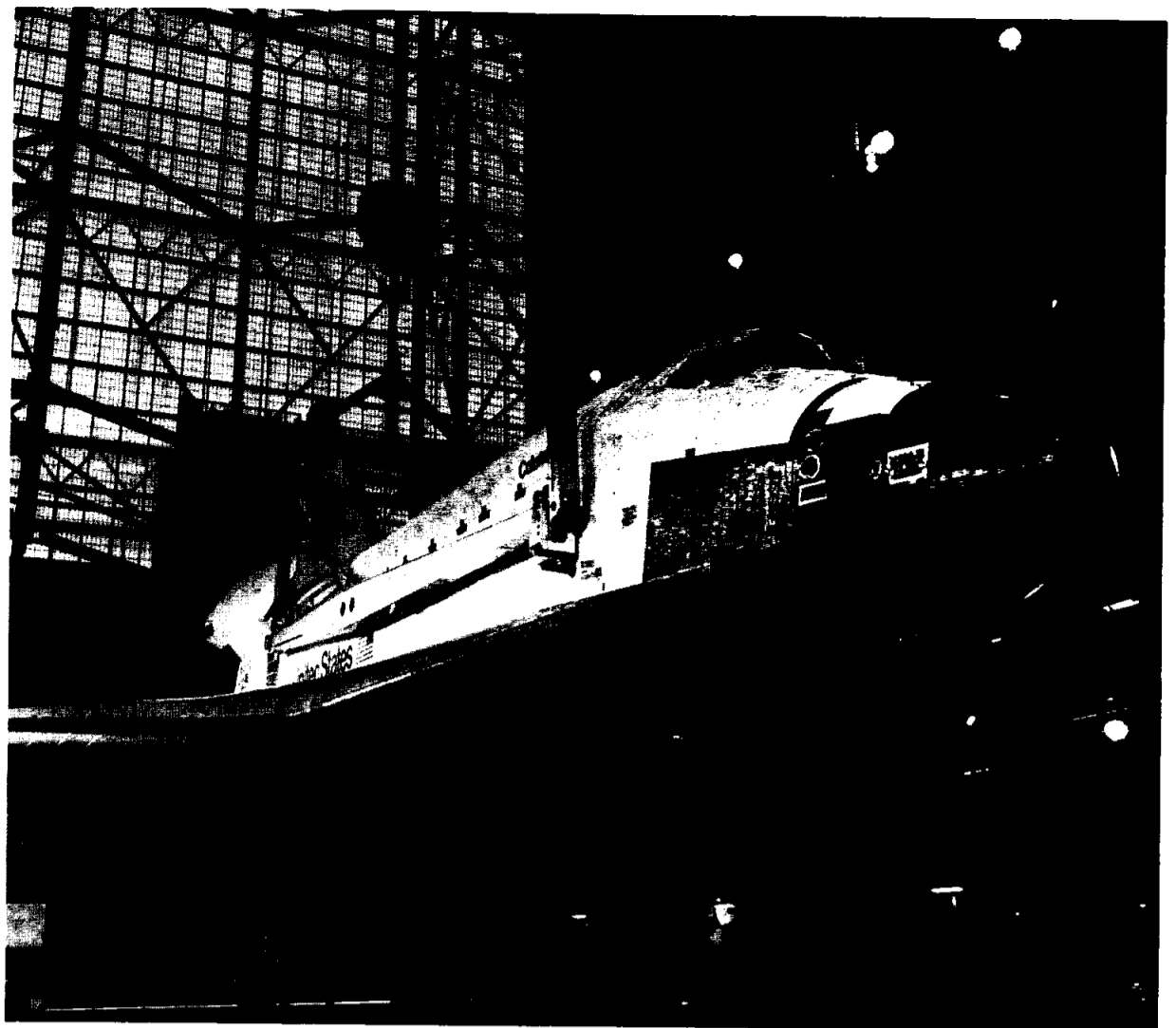
Chapter 1321 of the National Association of Retired Federal Employees will hold a covered dish dinner at 6 p.m. March 2 in the Clear Lake Park Bldg. on NASA Road One. Meredith's Malahinis Hawaiian Group will entertain. Visitors are welcome. For more information, call Burney Goodwin at 334-2494.

Lunarfins offering refresher course

The JSC Lunarfins SCUBA club will offer a mini-refresher course consisting of a short lecture session and a two-hour pool session Feb. 24. The cost to club members will be pool fees and equipment rental if necessary. Non-members with C-cards are invited to participate at a cost of \$12 plus equipment rental. The fee includes a one-year membership in the Lunarfins. For registration and more information, call Jim Derbonne at 483-2281.

Bicycle club sponsoring ride next weekend

The JSC Bicycle Club's next ride will be a jaunt to the Houston Zoo on Feb. 28. Riders will be leaving from the South Belt exit of I-45 in the Sagemont area. For more information on the ride to the zoo, call Mike Downey at 483-4027 or 482-4120. The club itself is open to riders of all capabilities, and meets the first Monday of each month at 5 p.m. in the conference room of Bldg. 350. The next meeting is March 1. Visitors and new members are welcome.



This was the scene in the Vehicle Assembly Building at the Kennedy Space Center earlier in the month when *Columbia* was being hoisted for mating with the external tank and solid rocket booster combination prior to rollout. In this view, the spacecraft was being lifted high enough to allow for clearance before the orbiter was tilted into the nose-up position.

Cookin' in the Cafeteria

Menu

Week of February 22 - 26, 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 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 Turbo; 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 March 1 - 5, 1982

Monday: Cream of Celery Soup; Braised Beef Ribs; Chicken a la King; Enchiladas w/Chili; Italian Cutlet (Special); Brussels Sprouts; Navy Beans; Whipped Potatoes. Standard Daily Items: Roast Beef; Baked Ham; 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 Cobette; 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 w/Onions; Deviled Crabs; Roast Beef w/Dressing; Seafood Platter; Tuna & Noodle Casserole (Special); Whipped Potatoes; Peas; Cauliflower.

No furloughs foreseen

JSC employees will likely not be required to take days of leave without pay during this fiscal year, according to the Personnel Office. "Our current operating plan for the rest of the fiscal year does not envision the need to furlough employees," said Harv Hartman, Deputy Personnel Officer. "To the best of our knowledge, none of the other NASA centers are planning any furloughs either." Because of budgetary constraints, some federal agencies are instituting mandatory furlough programs this year.

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 lease: luxurious 1 BR condo in Friendswood, deluxe kitchen, fireplace, washer/dryer, garage, \$370/mo. Call 482-9712.

For sale: waterfront lot, Lake Livingston, Point Lookout Estates, Point Blank, Texas. Call 472-5667.

Two BR condo available for one or two weeks in either Vegas, Tahoe, Spain, Nice, Acapulco, Maui, Hawaii, or Oahu, \$350/wk. Call Jaap, 534-2415 after 5 p.m.

For sale: acreage in Centerville area, woods cabin, deer, some with utilities. Call x4643 or 921-7212.

For sale: five acres undeveloped land, Alvin area, \$3,500/acre. Call Scarlett, x3271.

For sale: League City, 3-2-2, central AC, built-ins, fenced, \$53,000 owner financed, \$10,000 down and \$576 monthly. Call Pearson, x3768 or 332-7812.

For sale: One acre ranchette, lots of trees, Ivanhoe Land-of-Lakes Estates near Woodville, make offer. Call Martin, x4981 or 534-4825.

For sale: 1/2 acre in downtown League City, huge oak trees. Call 554-2790.

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

Cars & Trucks

1979 GMC heavy half 350 V8, AC, PS, PB, AT, Dual tanks, \$4,200. Call 488-8036.

1968 Olds, V8, good motor, solid body, \$200. Call 337-3261.

1973 Dodge Maxivan, standard trans., AC, PS, PB, AM/FM, CB, 360 V8, 67K miles, \$2,500. Call 482-7156.

1964 Buick Wildcat, 2 dr., \$400. Call 333-2395.

1973 Buick Century Luxus, PS, PB, AC, auto, cruise, radials, \$1,100. Call Gill, x2855.

1974 Ford Maverick, 2 dr., auto, PS, new tires, new motor, \$800 or best offer. Call 480-1959 or 486-9673 after 6 p.m.

1976 VW Rabbit, yellow, AC, FM, 4 spd., new tires, one owner, 60K miles. Make offer. Call 641-4941.

1979 Dodge van, fully customized, excellent condition, 318 engine, \$8,500. Call Art, x4907.

Cycles

1980 Yamaha MX 100, \$650. Call Andy, x6351 or 486-4034.

1979 Yamaha YZ125, \$500. Call Pat Loftus, 482-5432.

1980 Kawasaki 1000 Ltd., custom king-queen seat, excellent condition, 6,800 miles, \$2,500. Call 337-5018 after 5 p.m.

1975 Yamaha 250 Enduro. Very good condition, street or trail, Bell helmet, new battery, \$550. Call Cooke at x5557 or 480-2214.

1969 Suzuki dirt bike, 250cc, \$250. Helmet, \$50. Call Madeline, x3686 or 485-2987.

1975 Suzuki 500, fairing, sissy bar, crash bars, rack, new tires, excellent condition, two helmets, \$800. Call 488-5881.

Motorcycle helmet, ladies/children size, red, \$20. Call Blucker, x3533.

Raleigh boy's bicycle, 21" frame, red, caliper brakes, Sturmey Archer 3-spd. hub, air pump, tour bag, horn, water bottle and carrier, \$50. Call Meek, x4851 or 334-5323 evenings.

Boats & Planes

1975 Skyhawk, Narco Centerline IFR w/electric attitude, HSI and DME, ILS coupled 2-axis Mitchell autopilot, 830 hrs. on new RAM 160 HP conversion, plus many extras, \$24,000 firm. Call Bill Pruett, x4491 or 487-3857 after 5 p.m.

Beat the high cost of flying — use our super equipped P35 Bonanza and share expenses on hourly basis. This is not a club, but cost is comparable to qualified pilots. Minimums required: IFR, 500 total; 100 retract; 25 Bonanza, and \$20,000 non-owner insurance. Call Pruett, x4491 or 487-3857 after 5 p.m.

Video & Audio

19" color TV, \$50. J.C. Penney stereo with turntable, 8 track player/recorder, AM/FM, speakers, two years old, \$75 or best offer. Call Debbie Smith, x6393.

Garrard 4HF turntable w/Shure M44-7 Dynetic cartridge, auto cutoff, \$40. Call Somouce, x4727.

Computers

Persons wishing to join a Commodore VIC20 computers users group, call Bob Brekke, x3141 or 482-9576 after 5 p.m.

Pets

Weaned, wormed, paper trained cocker terriers, 6 wks. old, smart, black, or white, 4 left, \$29. Call 334-1177.

Wanted

Want boy's 20" bike. Contact Dick Ramsell, x5381.

Household

Hoover concept 1, upright vacuum cleaner, like new, purchased Nov. 81, \$100. Call 333-2395.

Green and gold studio couch, makes into double bed, like new, \$100. Call Dick Ramsell, x5381.

Medicine cabinet, wall gas heater, lighting fixtures, drapery rods, call 333-4669.

Sears washer and electric dryer, 9 yrs. old, both work well, \$200. Call Joe, x3576 or 944-7042.

Miscellaneous

Regulation size ping pong table, 5' x 9', 3/4" plywood w/frame, painted green. Call Joe, x3576 or 944-7042.

VW trailer hitch, pre 1973 Beetle, \$11 or trade for value. Also, Porta-Potti, make offer. Call Martin, x4981 or 534-4825.

Basketball backboard, basket and mounting brackets, all in good condition, pick up the lot for \$15. Call Jim, x5181.

Looking for a wedding gift for the special couple that will last a lifetime and cost less than \$500? Call 481-4372 after 5:30 p.m.

Used auto seat, electrical 6-position unit, make driving more comfortable, from early 70s GM auto, \$20. Call Ray, x3701.

Complete sport instrument/dash unit from 1973 Vega GT, w/wiring harness to firewall, tach, clock, gauges, all intact. Call Ray, x3701.

Two Tasco telescopes: 4-1/2" reflector, equatorial mount, \$125; 2-1/4" refractor, altazimuth mount, \$100. Both with tripods and accessories. Call Gary, x2091 or 333-9276.

Pan AM two-for-one round the world coupon, \$50. Call Carl, x5835.

Four G78/15 tires mounted on wheels w/covers, removed from Ford pickup, all for \$40. Call Hagen, x5040 or 488-0044.

Royal electric typewriter, \$80. Set of World Book of Knowledge encyclopedias, \$75. Call Brenda, x3836.

Sea Line 400 fishing reel and rod, used twice, \$45. Super King waterbed mattress, \$45. Call Gary, x4568 or 486-4345.

Two Appliance 14 x 8, 5-lug mag wheels with G60 tires, both for \$100. Call Mike, x4606 or 488-2185 after 4:30 p.m.

Hawes .357 revolver, excellent shape, \$175. Call Scarlett, x3271.

Roundtrip passage for two on space available basis wherever Metro flies, \$50. Call Heydorn, x3394 or 334-5792.

Cane game table, four chairs, \$225; 6' TV screen & projector, sacrifice, \$700; two 8' lighted display counters, \$500 each. Call 488-8821.



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