

# Space News Roundup

Vol. 20 No. 24

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National Aeronautics and Space Administration



## High ride

### Astronaut EVA considered for possible repair mission

This artist's conception of the traverse from orbiter to satellite during a repair mission illustrates the independence afforded astronauts with the Manned Maneuvering Unit. No tethers to the orbiter would be required, and the extravehicular activity could last for up to six hours.

NASA is considering a tentative proposal to send an orbiter to visit the troubled Solar Maximum Mission satellite, and exercise for the first time the Space Shuttle's orbital repair capabilities, possibly by late 1983.

Such a mission, now in the preliminary planning stages pending project approval by Congress, would require an astronaut spacewalk to traverse from orbiter to satellite and stabilize the slowly spinning object. The satellite would then be grappled by the Shuttle's remote manipulator arm and lowered into the payload bay for repairs.

The satellite was launched aboard a Delta rocket on Valentine's Day 1980, and soon began what was described as the most exhaustive study of the Sun ever undertaken. Within weeks it was declared a scientific success, and Solar Max, as it was dubbed, came to be regarded as a very valuable new research tool.

But six months into the mission, three fuses blew in the satellite's attitude control system. Orbital mechanics took over, and Solar Max began to rotate uncontrolled about its own axes, at around one revolution every six minutes in an otherwise stable 310 nautical mile orbit. This greatly reduced the satellite's capabilities, and put four of the seven scientific instruments aboard effectively out of commission, as they could no longer be accurately trained on the sun.

Speaking before a Senate subcommittee on science and technology last week, Dr. Stanley Weiss, NASA Associate Administrator for Space Transportation

Operations, noted the scientific value of Solar Max, and said a repair mission is under consideration because of a desire to move ahead with orbital operations.

Deputy Administrator Hans Mark told the same subcommittee that NASA is eager "to turn a technical success into an operational success" as soon as possible.

So far a preliminary idea only, with finer technical points still to be worked out, the mission would require Congressional project approval to acquire several items which otherwise would not be used for several years. Those items might include two Orbital Maneuvering System kits, essentially add-ons to that propulsion system, which would allow an orbiter to boost Solar Max into a higher orbit of around 460 nautical miles and increase its orbital lifespan.

Jerry Bostick, JSC Acting Manager of STS Operations, said the revisit mission has been tentatively listed on the latest flight manifest for STS-11 in December, 1983, "but that is for planning purposes only. We are not going to go off spending money until we get project approval."

Astronaut Bruce McCandless, the Astronaut Office point man for Manned Maneuvering Unit (MMU) operations, said two astronauts would exit an orbiter during such a mission, with one traversing to the satellite to steady it, while the other waited in the payload bay for the repair work to begin.

"The Shuttle would stand off about 100 yards," he said, "anywhere from 300 to 500 feet. At one or two feet per second with the MMU, the astronaut could traverse

in about four or five minutes."

The satellite could be steadied in one of two ways, he said. The astronaut could use the MMU's three rotational axis gyroscopes for input to the 24 nitrogen thrusters, some of which would be fired to take out the rotational rates and orient the satellite properly. Or the astronauts could take directions from astronauts aboard the Shuttle for stabilizing and pointing Solar Max's grapple fixture toward the spacecraft.

All systems on the MMU are good for a six hour EVA, McCandless said, except for the propellents, which would need to be replenished about every two hours. Once attached to the remote manipulator arm, Solar Max would be lowered onto a cradle in the payload bay, where repairs would begin.

The first of the generic spacecraft to come out of the Multimission Module Concept developed at the Goddard Space Flight Center, Solar Max was designed for just such an operation, and the repair would consist of sliding out the four-foot-square, eighteen-inch-deep control module and replacing it with a new one. Planners are also discussing the possibility of having astronauts repair an ailing scientific instrument aboard, the coronagraph which studies the solar corona. "Solar Max would be fully operational when we are done," McCandless said.

Also being considered is the proposal to take as many as two payloads into orbit on the mission, one of them perhaps the Long Duration Exposure Facility, and

(Continued on page 4)

## Kraft reflects on 1981

As the Holidays approach and give us time for reflection after a tremendously busy and productive year, we have every reason to look back with pride at 1981, and to take comfort in a most promising future.

This year we accomplished two launches of manned spacecraft, the first time that has happened since 1973. But more importantly than sending four men into orbit, we opened a new era, not just in space transportation, but in the improvement of our capabilities for confronting the challenges of the future.

We now have within our grasp the operational use of tools which will allow almost unlimited potential for adding to our knowledge of Earth, her sister planets, and the universe. We will soon be branching out into areas scarcely dreamed of even a decade ago, as we begin to use the benefits of outer space in the manufacture of new materials, in the improvement of our communications, in the development of new medicines and in our ability to give humankind new footholds in the cosmos. It has been an extraordinary undertaking, and we are just beginning.

In the year ahead, we will take part in three more Space Shuttle missions, and we will see the delivery of a new Orbiter, the Challenger. Next year, this Space Transportation System on which we have pinned so much work and energy will at last be operational. All of you bear credit in some way for these remarkable achievements.

We have fulfilled the promise of the early days of NASA; we are setting sail on a new ocean, and we are in space to stay. The year 1981 may ultimately be seen as one of the Agency's most significant. Our technological childhood is ending, and as John Young said after STS-1, we are not too far from reaching for the stars.

Happy holidays to all of you.

# 1981

## Saturn becomes the Shuttle's



**A**s millions of Americans sat down to watch the Rose Bowl game on the first day of the year, Voyager 1 was on the far side of Saturn, over 900 million miles out, cruising toward the edge of the solar system. At the same time, the Space Shuttle *Columbia*, having been rolled out from the Vehicle Assembly Building a few weeks before, was on the pad and being readied for America's first manned launch since 1975.

Proceeding apace with those developments were NASA's plans for launching 15 expendable rockets with a variety of payloads during the year. Among the items lofted into orbit during 1981 were two weather satellites, two scientific exploration payloads, and eight geosynchronous communications satellites.

In January, NASA accepted \$60,000 from the Viking Fund, the first grassroots effort by citizens to finance some form of space exploration. By special dispensation, the funds were directly earmarked for use in the extended mission of the Viking 1 Lander on Mars.

Also during January, the sixth long-duration simulation for the first flight of *Columbia* was conducted at JSC. This came only a few weeks before the most ambitious combined test in the Shuttle development process, the Countdown Demonstration Test and the Flight Readiness Firing in mid-February.

That eleven-day operation was a dry run of all elements in the Space Transportation System, from boosters and spacecraft to ground controllers, Solid Rocket Booster recovery operations and landing contingencies to the crew. It culminated February 20, when *Columbia's* three main engines roared to life for 20 seconds, at throttle settings of from 94 to 100 percent thrust.

Then in April, after seven long-duration simulations over the years at JSC, 1,300 hours in the mission simulators for John Young and Robert Crippen, and almost ten years of development, the Space Shuttle Main Engines came alive for the real thing, and Americans in space aboard the most complex flying machine ever built was at last a reality.

In May, President Reagan nominated aerospace executive

James M. Beggs to be the new NASA Administrator, the sixth person to hold that post. The next month, the planetary science community was startled by the report that an infrared laser, with five times the total power output of the United States, was occurring naturally in the atmosphere of Mars.

That same month, Space Shuttle Program Manager Robert Thompson announced his resignation from government service to pursue a new career in the homebuilding industry. He had headed the shuttle development program from drawing board to the first launch. Other notables on the retirement roster were Director for Engineering and Development Maxime A. Faget, and Astronaut Alan Bean, who resigned from NASA to devote himself full time to his painting. Bean ranked first on the list among active American astronauts for time in space, with 1,671 hours.

In July, the first long-duration simulation for STS-2 was held over a two-day period, with crew Joe Engle and Richard Truly on station in the fixed-base Shuttle Mission Simulator in Bldg. 5.

The highlight of August had to be Voyager II's dramatic flyby of Saturn, with close encounters with Titan and several other moons, and an impressive array of images which were even better than those returned by Voyager 1 several months before.

In September, NASA researchers at Dryden Flight Research Center announced they had solved a major computer graphics problem, that of obscuring hidden lines from a computer's three dimensional rendition of an object. The solution was capable of being applied to any three-dimensional scene, and was judged the first to be reliably accurate.

In October, a spill of highly corrosive oxidizer forced the scheduled STS-2 launch date to be rescheduled for November.

After several delays, the first reusable space vehicle was reused for the first time, as Joe Engle and Richard Truly took *Columbia* aloft for the second flight test of the Space Transportation System and returned safely 54 hours later.

1981 — all in all, a most spectacular year.



*The sights of 1981 included Columbia during STS-1, with the limb of the planet. At Crippen exchange knowing response to overwhelming President Ronald Reagan's second day of their mission JSC Director Christopher C. his retirement as Director of Columbia's progress from position for mating with the final preparations on Laur boosters during liftoff, and hours later. At right, a mu moon Enceladus taken from is about 10 times larger.*



# ...mes a place, ...n reality

above, this view of Earth taken from the aft flight deck of the vertical stabilizer of the orbiter in silhouette against the sky. Top left, STS-1 Commander John Young and Pilot Robert Scobee glance during one of many press conferences held in the first orbital flight test. Middle left, Young and Scobee with STS-2 crew Joe Engle and Richard Truly on the flight deck. At bottom left, attention to detail shows in the faces of Joe Engle and Dr. Maxime A. Faget, who in 1981 announced the Space Shuttle Engineering and Development. Below, a multi-frame study of the orbiter being hoisted into the Vehicle Assembly Building. Middle right, a thundering display from the solid rocket boosters during a picture perfect landing at Edwards Air Force Base. Bottom right, a long-exposure image of Saturn's battered and time-scarred surface. Voyager II resembles the Jovian moon Ganymede, which

**F**ew contemporary writers have worked with perspective as widely — or well — as James Michener, one of the most widely read authors of our time. Now in Florida editing his latest book, this one about America's odyssey in air and space since World War II, Michener agreed to answer some questions for the **Roundup** on the events and significance of 1981.

**Roundup:** How would you rate the significance of 1981, given two Space Shuttle launches and the flybys of Saturn?

**Michener:** I think the mix is a very exciting one. The remarkable pictures and the understandings we have gained at Saturn would alone have justified a year of space exploration. But then add to that the successful demonstration of a reusable space vehicle, and all that implies, and it means 1981 was really a focal year. And there was a third important factor in 1981, and that was the election of a new administration with its own problems and directions.

**Roundup:** As a historian, would you feel comfortable applying the phrase "beginning of a new era" to 1981?

**Michener:** Oh yes. In some ways it was the beginning and ending. The Saturn flyby in August essentially ended the era of widespread planetary exploration. And the Space Shuttle's performance, and the performance of those four young men, Young and Crippen and Engle and Truly — it was a marvelous demonstration on the one hand of an unmanned vehicle, showing what you can do with those, and a manned vehicle, showing what is possible in that arena.

**Roundup:** What are your thoughts about entering the shuttle era in a time when planetary programs are being greatly reduced? Is it a case of moving to near-earth introspection now that we have this new ability?

**Michener:** The problems of the planetary program were inescapable intellectually. You reach certain plateaus, when you say 'this is a good time to mark time.' It was germane to the program to have a breathing spell and examine all of this tremendous data we have. We are in a position now of digesting. Hans Mark is entirely correct. This is a time to consider what we have learned so far, and to go from there, using the shuttle as our primary tool.

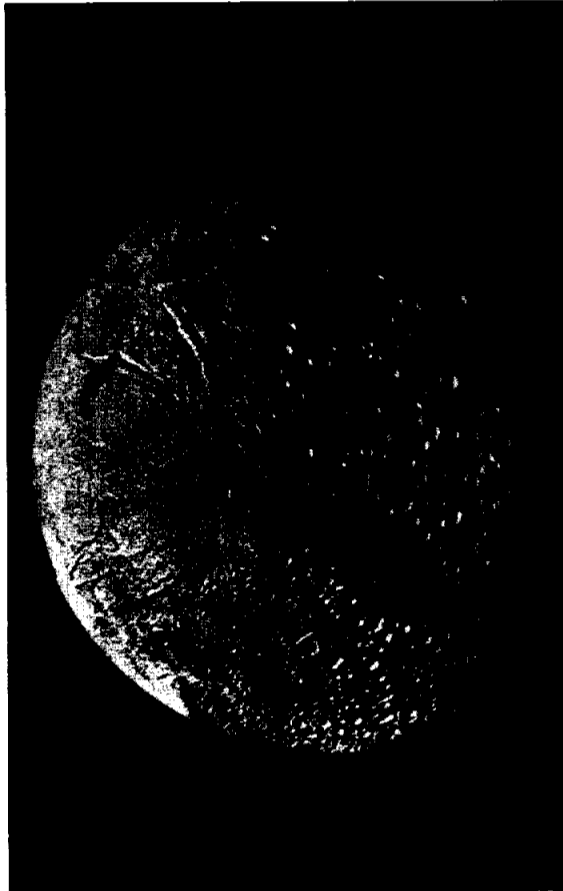
**Roundup:** We are quickly moving toward an operational shuttle, a prime component of the kind of push into space you and others have been calling for. But we also are in a very tight budgetary climate, and the cost of spaceflight is still high. Do you

see such a push coming, and do you think we need it right now?

**Michener:** Right now, no, I do not see a rush into space, but that attitude could be dislodged by external happenings. I'm a member of a study group which has been considering the possibilities ahead in the years 2010 and 2020. NASA convenes these study groups about every two years. The last big conference was at Woods Hole in 1980. We laid a groundwork at that meeting, and our conclusions have become codified and a part of our thinking in 1981. The thought seems to be that by the turn of the century there will be some kind of permanent manned station in orbit. That idea seems even closer now. Of course, it could be the Russians or the Japanese, or even a consortium that does it.

**Roundup:** What sort of projects would such a station pursue? Orbital manufacturing?

**Michener:** Well, that, but also the utilization of solar energy and zero-g would be a part of it. And also there is the continued exploration of outer space. I don't think this 10 or 15 year lag we may be embarking on is anything to get upset over. A decade is *nothing*. It's a weekend. I share the concerns of others about the cutbacks in planetary exploration, but I'm not alarmist about it.



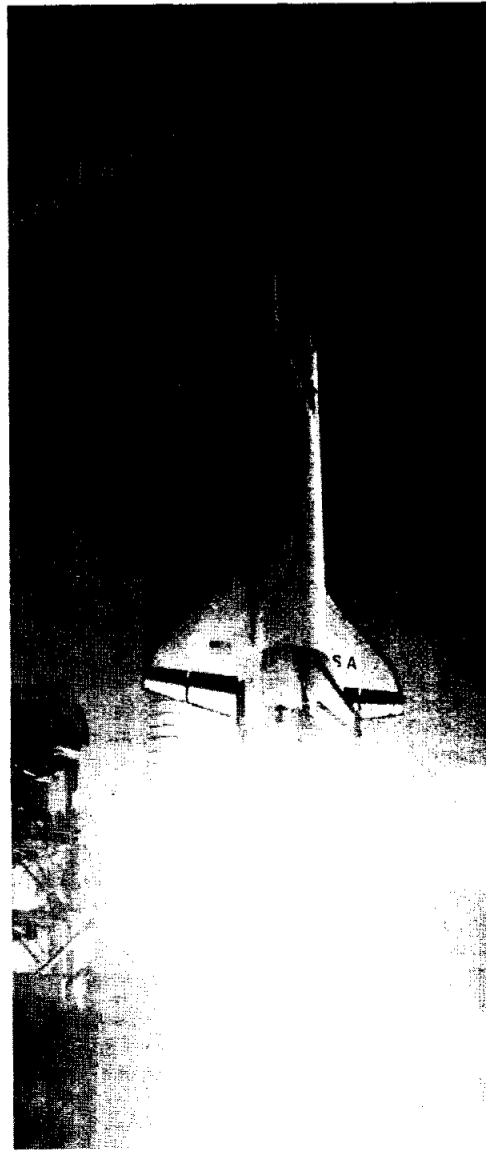
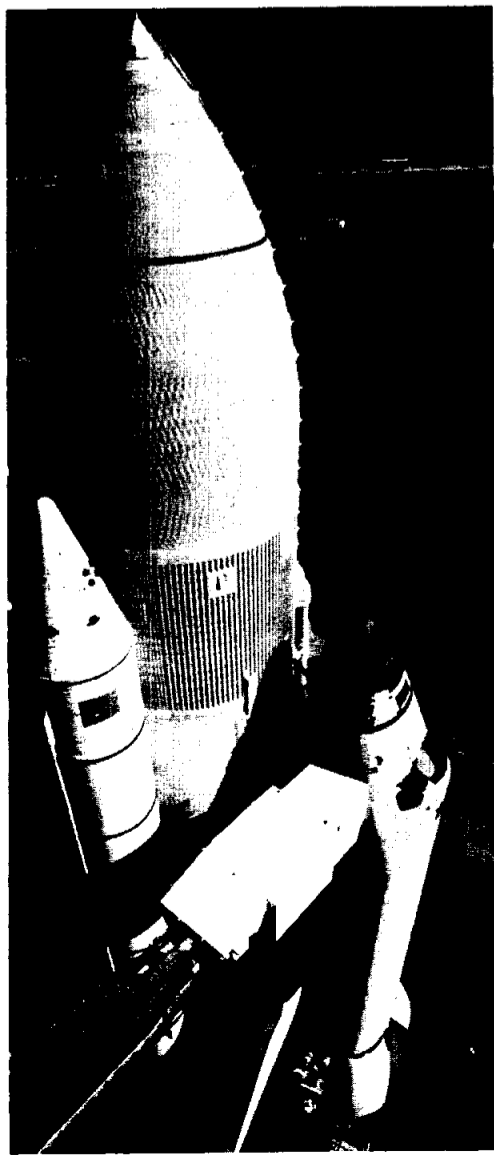
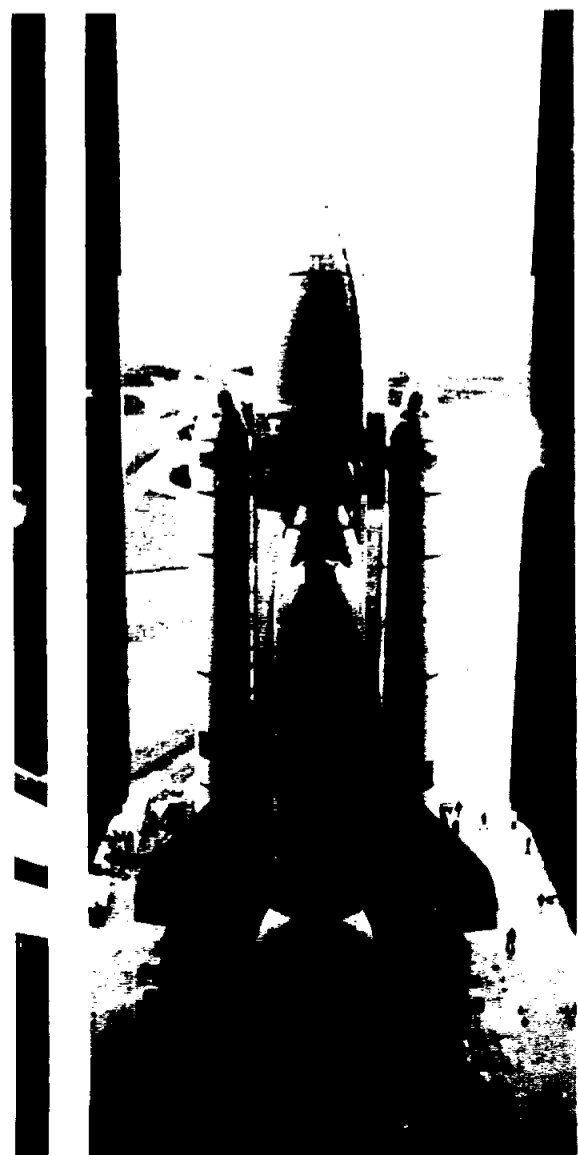
exploration, but I'm not alarmist about it.

**Roundup:** You've spoken often of the possibilities that other nations will soon engage in space activities on a broad scale, perhaps even proceeding ahead of us. But in light of two Shuttle launches, how do you characterize America's ability to make the technological hurdles that will be required for such projects?

**Michener:** We are remarkable on that score. I like the American pattern of solving technical problems and meeting challenges. I am not in the least downcast about it. There come times when a bold break has to be made in concept. That was what happened when we turned from programs like Dyna-Soar and the X-15 to rockets and ballistic forms of spaceflight. We learned a great deal from that, and that is why the Space Shuttle is possible today.

Winged flight at that time, the mid-1960s, had reached a limit. It was not readily apparent to the American people just what a wonderful limit that was. I think those men who participated in the X-15 program were shortchanged historically in that regard. But to answer your question, yes, America is remarkably able to harness and utilize its technology.

(Continued on page 4)



## Space News Briefs

### Japanese newspaper to sponsor experiment

The Asahi Shimbun, one of Japan's major daily newspapers, will fly a small Get Away Special payload aboard an early Space Shuttle flight, possibly in late 1982. The payload will use the space environment to make pure artificial snow crystals directly from a gaseous substance, and is expected to contribute significantly to crystallography, especially the crystal growth of semi-conductors or other materials from a vapor source. The experiment was chosen from some 17,000 suggestions submitted by the newspaper's readers, and was suggested by two Japanese high school students.

### HEAO-3 reenters over South Pacific

HEAO-3, NASA's third and last in a series of High Energy Astronomy Observatories launched in the 1970s, fell from orbit Dec. 7 at 9:43 a.m. CST and burned up harmlessly in the atmosphere over the South Pacific. The first HEAO reentered the Earth's atmosphere in 1979. The second HEAO, nicknamed the "Einstein Observatory," is still in orbit but no longer operational, and is expected to reenter by spring. HEAO-3 was launched in September, 1979 to observe cosmic and gamma rays, the two highest energy radiations in the universe. Although it had been designed for a mission life of six months, it continued to send back data until June of this year. Gamma ray studies from HEAO-3 are expected to shed further knowledge on such astronomical question marks as black holes, pulsars, quasars and supernovas.

### Intelsat to be circularized Saturday

Intelsat V-C, launched from the Cape Canaveral Air Force Station at the Kennedy Space Center at 5:35 CST Tuesday, is now in transfer orbit and is scheduled to be boosted to Geosynchronous Earth Orbit early Saturday morning. The 4,000 pound satellite, 22 feet high and 50 feet from tip to tip, has 12,000 telephone channels and two color television channels aboard. It was launched by an Atlas Centaur into a clear cold sky Tuesday evening, according to a KSC spokesman, and was visible for about five minutes. The satellite will become Intelsat 5-C when on station.

# Project review was end of the beginning for BLM

The Bureau of Land Management (BLM) administers the use of over 500 million acres west of the Mississippi, in a patchwork expanse so vast perhaps only astronauts can truly imagine it.

The BLM began seeking that kind of spaceborne perspective in 1976, when the Federal Land Policy and Management Act was passed, and careful monitoring of those lands for generations of use became national policy.

In the summer of the next year, BLM and NASA began a pilot test to show the uses of satellite imagery from Landsat. By the time it was completed earlier this month at JSC with a project review, the pilot test had been able to show a 90 percent cost savings for inventory and monitoring costs of broad scale data. Moreover, a small cadre of BLM employees emerged with knowledge of how to use Landsat information to meet the problems of the Bureau, and that, said James Ruch, Director of the Denver Service Center, is where BLM moves into a whole new phase.

"We now need to pass that knowledge around, and ultimately develop a hierarchical system of information centers, each with broad knowledge of its particular area," he said. "We need our line managers and district managers and forest supervisors to be able to say, 'A wilderness area goes here, and a gas line goes there,' and they have to be able to do that

based on the best information possible. They have to have confidence in the technology they are using. They have to be exposed, and see it in use."

The Applications Pilot Test, or APT, was the first opportunity to see Landsat at work. Ken Hancock, Forest and Rangeland Branch, Earth Resources Applications Division, remembered the reaction of one recreation specialist, whose job was to identify suitable wilderness preserves among thousands of possible sites: "He said it told him where not to go, and up there that narrows it down a lot."

Others in Arizona were able to identify particular vegetations on a broad scale, and in actual operations would have been able to direct herds and grant rangeland permits based on precise knowledge of the best areas of feeding.

The APT was divided into three parts, with primary emphasis on inventory of rangeland vegetation. The first began in 1977 in Alaska, where the prime contractor for the test, ESL Inc. of Sunnyvale, California, performed the Landsat data processing in a large area called the Denali Test Site. It was at Denali that BLM employees began their training in using and interpreting the images from space.

The second phase took place later in Arizona, where ESL classified the rangelands, and

added the capability of producing estimates for timber and grassland populations in an area northwest of the Grand Canyon. During this phase, the BLM worked with U.S. Geological Survey EROS Data Center to test their findings.

The third phase was in Idaho, where another broad swath of public land was inventoried, and the BLM personnel performed the entire operation. ESL in turn produced the final project documentation, a training syllabus and a computer program document.

All parties concerned are eager for the upcoming launch of Landsat D, now scheduled for July, 1982, because the satellite will carry a thematic mapper, capable of giving a 30 meter resolution as compared with the 75 meter resolution available now. "It will be invaluable for us," Ruch said. "We're very excited about the possibilities of satellite sensing, tied in with aerial photography and ground sampling, especially with the national need to identify potential energy and strategic mineral sources, and protect wildlife areas."

"Once a program such as this is fully implemented," Ruch said in the keynote address at the project review, "we must then look to the future. The whole system of Earth Observation Satellites offers exciting new possibilities for increased mapping detail and accuracy. The application of these future technologies to range, forest, geology, energy, minerals and the like seems almost limitless, particularly with the launch of the Thematic Mapper."

## 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 deadline is the first Wednesday after publication.

Editor..... Brian Welch

## Michener

(Continued from page 3)

**Roundup:** In the past few years, you have been writing another book, this one about the people and machines of aerospace exploration. Has the process reached the point where you might welcome some advance notice?

**Michener:** Well, it is finished, and we are editing it now. I don't know what we'll call it yet, but it will be in the bookstores next autumn.

**Roundup:** Could you give us just the barest outline?

**Michener:** Well, I'll say this much: like all of my books, it starts in prehistoric time, which in the case of spaceflight is the year 1944, and comes down to December of 1981 — that's this week.

**Roundup:** So it will have some mention of STS-1 and STS-2.

**Michener:** Oh, of course. Definitely.

**Roundup:** Thank you very much sir.

**Michener:** Thank you.

## Cookin' in the Cafeteria

Week of December 21 - 25, 1981

**Monday:** Chicken Noodle Soup; Round Steak w/Hash Browns; Weiners & Beans; Meatballs & Spaghetti (Special); Okra & Tomatoes, Carrots, 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; Beef Stew; Shrimp Creole; Fried Chicken (Special); Stewed Tomatoes, Mixed Vegetables, Broccoli.

**Wednesday:** Christmas Special — Waldorf Salad; Roast Turkey with Giblet Gravy; Cornbread Dressing; Green Beans Almondine; Candied Yams; Roll; Butter and Beverage. Regular daily items also available.

**Thursday:** Cream of Chicken Soup; Turkey & Dressing; Enchiladas w/Chili; Weiners & Macaroni; Stuffed Bell Pepper (Special) Zucchini Squash, English Peas, Rice.

**Friday:** HOLIDAY

Week of December 28 - January 1, 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:** HOLIDAY

## EVA

(Continued from page 1)

deploy them before going on to rendezvous with Solar Max. "Something like this would be the first opportunity we'll have to tie together all of the capabilities of the Space Transportation System," said Headquarters spokesman Charles Redmond.

James Bilodeau, Chief of the Crew Training and Procedures Division, said the astronaut corps already has EVA capability, "and has had since STS-1." He said additional training would be required to meet the specific requirements of Solar Max stabilization and retrieval. One challenge involved, he added, would be to accurately simulate the satellite's motions in the Weightless Environment Test Facility or some other trainer.

# Roundup Swap Shop

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

### Property & Rentals

For sale: 210 acres, Big Bend country, highway frontage, mule deer, \$165/acre, \$500 down, balance for 30 years at 11%. Call 481-5943.

For sale: Beverly Hills, 3BR, 2 bath, 9 7/8 non-escalating assumption, fence, landscaped, miniblinds, ceiling fans, available Dec. 18. Call Judy, 485-6242.

For sale: 25 acres, hill country, \$825/acre, \$500 down, balance for 20 years at 11%. Call 481-5943.

For rent: Heritage Park (new section), 3-2-2, fireplace, fence, microwave, high ceiling, \$575/month plus deposits. Call Frank Wang, x5303.

For lease: Alameda, 3-1 1/2-2, available Jan. 5, \$550. Call 923-2375 or 483-2693.

For rent: furnished bedroom, all bills paid, in El Cary Estates, \$200/month. Call Jamie, 334-2375 or Mary, x6308.

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

### Cars & Trucks

1981 Ford Granada 2 dr. sedan, white w/red buckets, auto, air, PS/PB, AM radio, less than 8.5K miles, excellent condition, \$6,500. Call

488-1550 after 5 p.m.

1970 Opel GT, Weber carb, mag wheels, AM/FM/cassette, runs well, needs minor body work, \$750. Call Jay, 471-0778 after 5 p.m.

1971 Toyota Corona, 4 dr., air, AM/FM stereo, runs great, \$1,200 or best offer. Call 528-0728.

1976 Honda CVCC station wagon, 5 dr., new tires. Call Brad, 337-4984.

1971 Buick Sportwagon, auto, air, PS/PB, one owner, excellent condition. Call Dick Sauer, x2759 or 554-6290.

### Household

Five piece Sheffield heavy silver-plate tea service, perfect condition, \$150. Call 947-0319 after 5 p.m.

China, Noritake Norma Pattern, 45 pc., incomplete place settings. Can be ordered through Koza's. Valued at \$622, will sell for \$300. Call 452-0460.

Dining room set, new condition, 4 swivel chairs, pedestal table, no wear, \$150. Call 554-6673 after 5 p.m.

King size round bed, matching blue velvet bedspread, curved headboard, curved foot bench, \$350. Call 486-8564.

Light fixtures, wall gas heater, drape rods, make offer. Call 333-4669.

Chinese-Indonesian hand-carved living and dining room suites for sale,

must see to appreciate. Living room, \$4,000; Dining room, \$5,000. Call x5844 or 943-7980 after 5 p.m.

Braided rug, 5 1/2' x 8', good condition, \$30. Call Mary, x4010 or 486-1766.

Heathkit 25" color TV, solid maple cabinet, works, \$150. Call Nering, x7204 or 481-0608.

Apartment-size washer and electric dryer, washer rolls to kitchen faucet hookup. Both work as well as STS-1, total price \$300. Call Rita, x2417 or 480-5130.

### Wanted

Twin stroller for infant and toddler, call Mary, 488-4366.

Persons interested in bus trip to ski in New Mexico at Red River. Call Pat Wilson, x 4562 or 477-8585.

Barbell set and exercise bench, also trampoline, call Mickey, x5276.

Young group experienced at having fun at low cost needs at least two more people to complete reservations to ski the Summit in Colorado Jan. 3-8, six days on slopes. Please call soon. Call Margaret or Dennis, 554-6056.

Female roommate to share 2BR, 1 1/2 bath apartment in Webster, \$150 bills paid, \$125 deposit, quiet and non-smoker, available January. Call Kay, x5049.

Portable drafting table, about 42" x 36", in good condition. Call Hendrix, x4065.

Reliable, economical car with good mileage for female college student. Call Malcolm Jones, x2394 or 471-3303.

Four pole portable gas generator, 4 to 6.5 KW. Call Waite, x4242 or 333-2442.

### Boats & Planes

1977 Catalina 27 sailboat. Atomic 4 inboard. Call Bob, x6444 or 486-1766.

### Cycles

1980 Honda CB125, excellent condition, less than 1,500 miles, \$650. Call Ann, x3738.

1978 Honda Hawk auto, must sell, very low miles, many extras. Call 738-4802 after 6 p.m.

### Stereos & Cameras

Konika 35mm camera, AF2 w/case, never used, retails \$170, sell for \$110. Call Nancy, x4381.

### Miscellaneous

Large antique steamer trunk, \$25. Call Dick Sauer, x2759 or 554-6290.

Anglo-Arab Dressage and cross country show gelding, 11 yrs. old, \$4,000. Call McCollum, 474-3839.

The next issue of the Roundup will be distributed Jan. 8, 1982. Typed or handwritten swap shop ads are due by close of business Wednesday, Dec. 30.