

# Space News Roundup

Vol. 21 No. 15

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National Aeronautics and Space Administration

## 'The best game in town'

*STS-5 crew set for first operational flight of Space Shuttle System*

When two satellites are spring-launched into space by the crew of the *Columbia* this November, the space program will have taken a great leap forward, but for the crew it will be just the beginning of a busy mission designed to bridge the gap between flight tests and operations.

During the four and possibly five-day mission, the crew will not only deploy two communications satellites. They will also carry into orbit a variety of scientific and developmental flight experiments, possibly demonstrate for the first time the new Shuttle spacesuit outside the Orbiter, and at the end of the mission, they may even bring *Columbia* home using the autoland system for the first time all the way to touchdown.

Commander Vance Brand, noting the tremendous amount of testing already done on *Columbia*, said the further testing will be "frosting on the cake." In many ways, STS-5 is designed to be just a bit more flexible, a tad less conservative than the developmental flights, and help pave the way for some spectacular operations to follow. (See the flight manifest and Mission 5 particulars on page three.)

But the primary objective, of course, is to launch the satellites, and the crew left no doubt about that during a briefing for the news media Monday. Brand said successful demonstration of the Shuttle's satellite deploy capability is "vital."

Other deployments using the same system are coming up on the seventh and eighth flights, he noted, and it is important that the fifth mission lay the groundwork.

Asked if they feel any competition from other nations in the satellite launching business, Mission Specialist Joe Allen said, "Sure, and competition is good. People excel when there is competition and we as a crew will do our best to make sure the satellites are deployed properly." His colleague, Mission Specialist William Lenoir added, "But over and above that, we still feel we have the best game in town. I don't think we feel excessively pressurized by the competition."

Another pathfinding aspect to the flight will be studying the habitability of the Orbiter with more than two people aboard. It could get crowded. Pilot Robert Overmyer said, "That is an area of

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Meeting with the media earlier this week were STS-5 crew members, from left to right, Joseph Allen, William Lenoir, Robert Overmyer and Vance Brand. Their trip to space is scheduled to depart November 11.

## Landsat-4 will improve Earth imaging

From 435 miles up, the face of Earth looms silent and immense as the diagnosis machine passes over from north to south in lockstep with the Sun.

Servos whir and reaction wheels spin inside the spacecraft as a high gain antenna seeks a target thousands of miles away. A large solar array presents itself to the Sun, while inside a processing system ingests streams of data beamed in from space, and busily calculates its own three dimensional position and velocity.

Elsewhere on the spacecraft, two scanning systems are methodically taking the planet's pulse. They measure chlorophyll absorption and moisture content in plants to provide an overview of their health worldwide; they distinguish between such crops as barley, wheat, corn and soybeans and help keep track of global food production; they identify possible

sites for the presence of minerals like copper, zinc, lead and uranium; they distinguish between clouds and snow cover, and are able to chronicle huge stands of trees by type and condition. Rangelands are evaluated by virtue of their temperature and the types of light they reflect. Uncharted islands are catalogued, atolls are measured, and the topography of water bottom along the coastlines is plotted.

Each day, 300 scenes of the planet are generated in this manner, as a hundred different sensors measure the reflected light and thermal energy of some 4 million square miles of the Earth. The same swath of ground is measured again 16 days later, and over the operational lifetime of the spacecraft, this will result in the most complete chronicle of the status of Earth that humankind has ever produced.

That, in sum, is the purpose and the promise of Landsat 4, launched into a near-polar sun synchronous orbit within 840 milliseconds of its scheduled liftoff time July 16. The flawless launch was the first use of the new updated Delta 3920 rocket, but with a host of new capabilities built in, that's but the lead item in a long list of firsts associated with Landsat 4.

One of the most important aspects of the new Earth sensing satellite is the presence of a device known as the thematic mapper. The mapper represents what NASA thinks of as an aggressive experiment, in which a highly touted and very promising piece of equipment will be stringently tested in space, compared to another device, the multispectral scanner (which has been the standard Landsat sensor in the past), and eventually turned

over to the Department of Commerce for operational use. The thematic mapper fills a gap in remote sensing capability that has in the past been pointed up by such projects as AgRISTARS, in which JSC plays a large part.

For the first time, a powerful instrument will be sending back images in the visible and near infrared bands of the electromagnetic spectrum. It will also make major contributions through the presence of new spectral bands in the blue-green portion of the spectrum, allowing more precise vegetation analysis and natural color images for the first time on a Landsat.

The mapper will also incorporate greater spatial and radiometric resolution. The mapper's spatial resolution is an instantaneous field-of-view of 98 square feet, compared to 240 square feet for the multispectral scanners on the

first three Landsats. This means the thematic mapper can inventory much smaller fields, such as those which are commonly five to ten acres in the eastern and southern U.S. and in countries like China, India, and in Europe and South America.

The upshot is that features once blurry on previous Landsat images will now be much better defined. Urban planners, for instance, will be able to study changing land use patterns with greater accuracy, as will hydrologists investigating storm water management.

Insofar as radiometric resolution is concerned, Landsat 4 will present a threefold improvement over previous satellites. Energy reflected or emitted from ground targets is a basic key to how all of this data is gathered and interpreted. In order to improve the

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### Beggs offers congratulations

**Center Director Christopher C. Kraft Jr. received a message from NASA Administrator James M. Beggs recently on the completion of the Shuttle Orbital Flight Tests. The message is quoted as follows:**

"In his remarks on the landing of the Space Shuttle Columbia, President Reagan stated that "...now we will move forward to capitalize on the tremendous potential offered by the ultimate frontier of space."

Clearly, the President's remarks reflected his confidence in our ability to do the job—a confidence that has been built and fostered by NASA's proven excellence on Mercury, on Apollo, and, more recently, on the Space Shuttle. They have been great successes.

However, the credit for these successes belongs to every member of the NASA team. All of you have continued to demonstrate the same selfless dedication to total performance that has characterized NASA since its inception.

It would be impossible for me to give everyone at the Johnson Space Center the individual recognition that is so richly deserved. Nevertheless, I would be most appreciative if you might convey to every member of the JSC team—both our civil service personnel and our contractors—my thanks and appreciation for a job very well done!"

### Suiting up won't be the same when Schmitt leaves

When Suit Technician Joe Schmitt helped Alan Shepard into the cumbersome Mercury flight suit that May morning in 1961, he would never have dreamed that 21 years later he would be among the last to help astronauts don that kind of garment for space travel.

With the launch of STS-4, the escape suits which have characterized the Orbital Flight Tests and the ventilators which have been used since the first manned space flight will go the way of the leather goggle cap and the silk scarf.

Astronauts will no longer head for the launch pad wearing the bulky escape suits or carrying the battery-powered ventilators. From now on, they will enter and exit Space Shuttles dressed as most any pilot would be — in light weight suits, gloves, boots and helmets.

But according to Schmitt, who retires in December after a 45-year career in aerospace, "there will always be a need for people doing this sort of job. Pilots shouldn't have to worry about their equipment. They should be able to pick up a piece of equipment and know that it is in top condition."

For Schmitt, the years have passed quickly. "Forty-five years seems like a long time, but it has gone by fast because I've had an interesting job, and I've met lots of interesting people."

During the course of that job, he has helped astronauts suit up on 16 different missions, received high praise from them for his work, and been awarded a NASA Exceptional Service Medal for contributions to the Shuttle program. Until his retirement, he said, he plans to "work feverishly" with his co-

workers to prepare for the next phase of Shuttle activities.

The team he works with has extensive training in many different areas. They must know first aid, and be able to perform rescue and repair duties should something go wrong at the top of the launch tower. He does not consider the work to be exactly the safest around.

"Launch morning is a dangerous time to be in the spacecraft," he said. "It's like standing on top of a loaded firecracker that is ready to go off. We have to be fully aware of the dangers." He asked a listener to imagine being perched in a small white room on the end of a swing arm high above the ground and listening to the sound of extra fuel being burned off in a burn pond not far from the spacecraft.

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## Space News Briefs

### Video obtained of sunken SRBs

The SCARAB deep diving platform operating off the recovery ships Freedom and Liberty has succeeded in obtaining video of the two solid rocket boosters from STS-4, which sank in the Atlantic about 160 miles due east of the Kennedy Space Center on launch day June 27. The SCARAB platform, owned by Ocean Search Inc., a subsidiary of AT & T, was built for use in the laying of underwater cables, and is equipped with a video system and rope cutters, grippers and other devices. It has its own propulsion and is remotely controlled from surface ships. The SCARAB also has a light salvage capability. The investigative board formed to find out why the SRBs sank in 3,500 feet of water will decide if any components will be retrieved. The video was returned to KSC during the week and sent on for the board to use in its investigation.

### Boeing studies space sortie vehicle



The Boeing Aerospace Co., under a contract with the U.S. Air Force, has determined that an air-launched sortie vehicle like that shown above could make its maiden voyage as early as 1988. The spacecraft, designed to be unmanned, could be uprated to carry a crew. Much of the technology for this proposed craft is based on NASA's Space Shuttle work. The vehicle would use a thermal protection system similar to the Shuttle's, as well as a single disposable external tank. The 747 shown here as an airborne launch pad would climb to 22,000 feet, pull up to a 5-degree angle and ignite its tail-mounted Space Shuttle Main Engine. The plane would continue to climb, now at a 60-degree angle of attack, release the sortie vehicle at 37,000 feet, pull out, and return to base. Boeing's findings were recently turned over to the Air Force Rocket Propulsion Lab at Edwards Air Force Base.

### Marshall studies radio astronomy system

The possible future of radio astronomy is depicted at left in an artist's concept of a prototype antenna to be used in a system known as Very Long Baseline Interferometer. Such a prototype test of the VLBI has been proposed for the late 1980s by the Marshall Space Flight Center, with a permanent system in orbit by the late 1990s. The space borne antenna would greatly increase the capabilities for imaging distant celestial radio sources. The longer the distances, or baselines, between antennas, the larger the effective radio telescope diameter. One of the longest baselines on Earth, for instance, is 6,600 miles between interferometer antennas in California and Australia. "That system is highly sensitive," said Marshall's Dr. Samuel Morgan, "but imagine the resolution you'd get if you were to link it with an antenna far out in space." One proposal by a working group set up to study VLBI possibilities is to link an antenna in a 3,000-mile orbit with antennas on Earth. This would produce a resolution greater than one milli-arc-second, comparable to the view a person in Los Angeles would have of a dime placed in New York.

## Bulletin Board

### EAA will hold dinner-dance in August

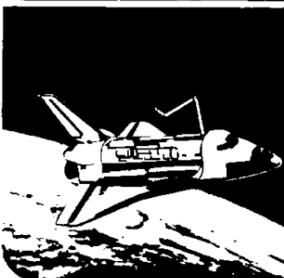
The Employees Activities Association will host an end of summer dinner-dance August 21 in the Gilruth Recreation Center. The evening will begin at 7 p.m. with a social hour followed by dinner at 8 p.m. The dancing begins at 9 p.m. with music provided by the Dave Berry Combo, a five-piece band. A special presentation will come at 10:45 p.m., when Lance and Cliann Stevens, instructors for the Rec Center's ballroom dance classes, will give an exhibition of the step patterns they teach in American and Latin dances. Lance is a national champion and operates the Stevens of Hollywood Dance Studio in Houston. Tickets are \$10 per person and will be on sale from July 27 through August 17 at the Bldg. 11 Exchange Store. Group table reservations will be accepted, but the total seating will be limited to 150 people. For additional information, call Mike Gaudiano at x2851.

### Police Chief to speak at awards banquet

Houston Police Chief Lee Brown will be the guest speaker at this year's Summer Employees Award Banquet to be held August 12 in the Gilruth Center. Reservations are being taken until 4 p.m. August 6. The banquet itself will be held at 11:30 a.m. August 12. All summer aides, OE students, supervisors and parents are invited to attend. Some of the summer employees will be receiving special performance awards for their outstanding and noteworthy efforts at JSC, according to Freda M. Lowe, Summer Aid Coordinator. Cost of the luncheon is \$5, with prepayment required. For more information, call Freda Lowe at x5266.

NASA  
Lyndon B. Johnson Space Center

## Space News Roundup



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Editor

Brian Welch

## Cohen named head of E&D

Aaron Cohen has been named Director of Engineering and Development at JSC, replacing Robert O. Piland, who was recently appointed manager of the newly-formed Space Station Office here.

Cohen served as manager of the Space Shuttle Orbiter Project Office since June 1972. His deputy in the new assignment with

E & D is Sid Jones, former manager of the Engineering Office, Orbiter Project. Arnold D. Aldrich, former deputy of the Space Shuttle Program Office, assumes Cohen's prior assignment as manager of the Orbiter Project Office.

Prior to joining NASA in 1962, Cohen was a design engineer with RCA and a research engineer with General Dynamics/Astronautics.

He managed the command and service module spacecraft office at JSC during the Apollo lunar landing era.

Cohen holds a masters degree in applied mathematics and an honorary doctorate from Stevens Institute of Technology. He also holds a bachelors degree in mechanical engineering from Texas A & M University.

## Schmitt

(Continued from page 1)

"It sounds like someone is firing a large caliber gun. It's nerveracking until you get used to it," he said.

But getting used to it is part of the job, he added, as is the realization that while potential danger is ever present on launch days, lighter moments can compensate

for it. A case in point came during the close-out procedure for STS-4. One of the crew members had jokingly asked for watermelon as an inflight snack, and with due respect for his wishes, the close-out crew presented Commander T. K. Mattingly and Pilot Henry Hartsfield with two ten-pound watermelons. For a number of reasons, the melons did not make the trip, however.

For Schmitt, the melon presentation will join a long line of memories from a rewarding and often demanding career with the space program, a career which in its own way has spanned two very important points of progress. When he began suiting up astronauts, things were as they had never been before, and when he leaves, the same will be true. —Teia Hoover.

## Landsat

(Continued from page 1)

use of this data, it is important that the energy be quantified on as many discreet levels as possible. Landsat 4 can detect differences in reflected light energy as small as 0.5 percent, which translates into a 10 to 20 percent improvement over multispectral scanner

classifications used on earlier Landsats.

In order to assess all of these improvements, the program calls for a period of investigations performed by NASA. Software in the thematic mapper, for instance, will likely go through a series of modifications as scientists learn

how to finesse the instrument. The investigations will run through 1985 and involves 25 different avenues of research, pursued by universities, industry, other government agencies and foreign scientists, in many cases at no cost to NASA due to the extremely high interest in the success of Landsat 4.



**Your co-ops at work** — Shown here are some scenes from the first annual Co-op Picnic, held at the Gilruth Center earlier this month. Activities included softball, in which representatives from Engineering & Development beat co-ops from the Flight Operations Division by a score of 20 to 17. The score had been 11 to 1 in E & D's favor at the top of the third inning. There was also volleyball, frisbee throwing and the inevitable mugging for the camera during the picnic, which drew about 100 revelers from JSC's co-op contingent.



# The manifest

## Next up: STS-5

Flight 5 of the Space Transportation System will board at Launch Pad 39A of the Kennedy Space Center and depart for low Earth orbit early on the morning of November 11.

Aboard will be four crew members, two satellites and a host of scientific and developmental payloads. Mission Commander is Vance Brand, Pilot is Robert Overmyer and the Mission Specialists are Joseph

Allen and William Lenoir.

The Orbiter *Columbia* will be launched into an orbit inclined 28.5° relative to the equator, with flight requirements calling for main engine cutoff at 55 nautical miles and orbital insertion at 160 nautical miles.

The flight has a baseline duration of four days, with the capability of a one day extension for extravehicular activity by the two mission specialists

and two days of contingency operations.

Primary objective will be the first launch of satellites from the Space Shuttle. Both are communications satellites in the 10,000-pound weight class and will be boosted into geosynchronous Earth orbit by kick motors in their Delta-class Payload Assist Module upper stages.

SBS-C, which will be deployed on flight day one, is a Satellite Business Systems payload designed to provide all-digital communications for

large industries, government and other users.

Telesat-E, also called ANIK-C, will be deployed on flight day two. It was built by Telesat Canada Ltd. and will provide voice and television communications to a trans-Canada network of Earth stations.

The deployment sequence for both satellites is as follows: various restraining arms and clamps are released by crew command and the satellite begins to spin at 5 rpm about one half hour before deployment. This spin becomes its

stabilizing motion for the remainder of its life in space. The final release from the payload bay occurs when pyrotechnics break a clamp and springs eject the assembly at about two and a half feet per second. A 45-minute timer aboard the PAM-D upper stage begins to count down while the Orbiter backs away to a distance of about 10 miles. Forty-five minutes after deployment, the apogee kick motor fires for 86 seconds and places the satellite in a 160 by 22,500 nautical mile transfer orbit.

## STS-6

Date: January 1983  
Orbiter: *Challenger*  
Inclination: 28.5°  
Altitude: 150 n.m.  
Crew: Four  
Duration: 3 days  
Payload: TDRS-A

STS-6 will be the first mission of Orbiter 099, the *Challenger*. The Tracking and Data Relay Satellite, TDRS-A, is a NASA communications satellite which is the first of three scheduled to provide a continuous network of high-capacity communications. An Inertial Upper Stage (IUS) will place TDRS in a synchronous equatorial orbit. It is a two-stage solid propellant booster developed by Boeing, with the first flight version already delivered to NASA.

## STS-7

Date: April 1983  
Orbiter: *Challenger*  
Inclination: 28.5°  
Altitude: 160 n.m.  
Crew: Four  
Duration: 6 days  
Payload: OSTA-2  
SPAS-1  
TELESAT-F  
PALAPA B-1

STS-7 will deploy two communications satellites and carry two major scientific payloads. PALAPA B-1 is a synchronous-orbit satellite for the Republic of Indonesia, for which Permutel is the responsible development organization. TELESAT-F is another in a series of Canadian communications satellites. Of the scientific payloads, SPAS-1 stands for Shuttle Pallet Satellite and is managed by Messerschmitt-Bölkow-Blohm, a West German aerospace concern. SPAS-1 consists of a basic platform with a complement of experiments to demonstrate its use as a carrier for a variety of scientific ventures. Its second function is to serve as a test article for deployable operations with the remote manipulator arm of the Shuttle. OSTA-2 is the second payload sponsored by NASA's former Office of Space and Terrestrial Applications, now called the Office of Space Science and Applications. It will be used to conduct materials processing experiments in space.

## STS-8

Date: July 1983  
Orbiter: *Challenger*  
Inclination: 28.5°  
Altitude: 150 n.m.  
Crew: Four  
Duration: 3 days  
Payload: INSAT 1-B  
TDRS-B

With the launch of the second TDRS on STS-8, NASA will have one communications satellite over the Pacific and another over the Atlantic, and constraint in air-to-ground communications will hereafter be drastically reduced. TDRS-B will be lofted into synchronous equatorial orbit by an Inertial Upper Stage. INSAT 1-B, the Indian National Satellite, is a communications — voice and television — and meteorological satellite for India's Department of Science, and will be launched into its orbit with a D-class Payload Assist Module.

## STS-9

Date: October 1983  
Orbiter: *Columbia*  
Inclination: 57°  
Altitude: 135 n.m.  
Crew: Six  
Duration: 7 days  
Payload: Spacelab-1

This will be the first mission for *Columbia* since the major modifications which will follow STS-5. In her cargo bay will be Spacelab-1, a laboratory built for NASA by the European Space Agency. It will be a frequent passenger in the NASA Space Shuttle fleet on missions lasting from seven to thirty days. The first Spacelab will carry out investigations in stratospheric and upper Earth atmospheric physics, space plasma physics, biology, medicine, astronomy, solar physics and technology experiments in such areas as thermodynamics and lubrication.

## STS-10

Date: December 1983  
Orbiter: *Challenger*  
Payload: DOD 84-1

STS-10 will carry the second Department of Defense cargo.

## STS-11

Date: January 1984  
Orbiter: *Columbia*  
Inclination: 28.5°  
Altitude: 160 n.m.  
Crew: Four  
Duration: 7 days  
Payload: LFC-1  
PDRS/PFTA  
PALAPA B-2

STS-11 will come closer on the heels of the previous mission than all others previously. It will carry PALAPA B-2, the second in a series of Indonesian communications satellites, which will be lofted into synchronous orbit by a D-class Payload Assist Module. LFC-1, the Large Format Camera's first mission in space, will demon-

strate stereoscopic high resolution photography of the Earth's geophysical features, and will later be flown on OSTA-3. The PDRS is the Payload Deployment and Retrieval System test article, also known as the Payload Flight Test Article. It is a 16-by-15-foot rectangular frame with lead ballast, and will be used to test the reactions of the elbow, wrist and shoulder joints of the robot arm.

## STS-12

Date: March 1984  
Orbiter: *Discovery*  
Inclination: 28.5°  
Altitude: 150 n.m.  
Crew: Four  
Duration: 5 days  
Payload: MEA-1  
TDRS-C

STS-12 will be the first mission for NASA's third operational orbiter, *Discovery*, Orbiter Vehicle 103. It will carry the third TDRS satellite, thus essentially completing NASA's Tracking and Data Relay satellite network (a fourth TDRS will be sent into orbit on STS-15 to act as a spare for the first three). STS-12 will also carry the Materials Experiment Assembly, a self-contained facility for a variety of multi-discipline materials processing experiments. Activation, deactivation and status monitoring will be done by the crew.

## STS-13

Date: April 1984  
Orbiter: *Challenger*  
Inclination: 28.5°  
Altitude: 272 n.m.  
Crew: Four  
Duration: 5 days  
Payload: LDEF-1  
SMM repair

This promises to be one of the most interesting Shuttle missions yet. It will be the highest orbit yet attained by an Orbiter, and will probably see the first operational use of the Manned Maneuvering Unit. If Congress approves, NASA will send *Challenger* to rendezvous with the ailing Solar Maximum Mission satellite, and carry out the first on-orbit repair. The mission will also see the first launch of the Long Duration Exposure Facility, a free-flyer crammed with a number of passive experiments which require long-term exposure to space. It will be retrieved on a later flight, probably the one which carries the Space Telescope.

## STS-14

Date: May 1984  
Orbiter: *Columbia*  
Inclination: 28.5°  
Altitude: 160 n.m.

Crew: Four  
Duration: 5 days  
Payload: OAST-1  
SYNCOM IV-1  
TELESAT-1  
RCA-K

SYNCOM will be the first of five spacecraft built by Hughes Communications Services and is unique because it contains all the propulsion necessary to attain the proper orbit. TELESAT is another Canadian communications satellite and, like the RCA commercial communications satellite also aboard on this flight, will be launched into synchronous orbit with a D-class Payload Assist Module. OAST-1 will be the first payload for the Office of Aeronautics and Space Technology and will conduct space technology experiments. One first on this flight will be the deployment and retraction of a large solar array. It will be used to study the interactions of a large structure with the dynamics of the Orbiter's reaction control thrusters.

## STS-15

Date: June 1984  
Orbiter: *Discovery*  
Inclination: 28.5°  
Altitude: 150 n.m.  
Crew: Four  
Duration: 3 days  
Payload: SBS-D  
TDRS-D

SBS-D is another in a series of Satellite Business Systems communications satellites. TDRS-D will function as an in-orbit spare for any of the other three Tracking and Data Relay satellites. SBS-D will be launched by a PAM-D, while TDRS-D will be launched from the Shuttle by an Inertial Upper Stage.

## STS-16

Date: July 1984  
Orbiter: *Challenger*  
Payload: DOD 84-2

STS-16 will carry the third Department of Defense payload.

## STS-17

Date: August 1984  
Orbiter: *Columbia*  
Inclination: 57°  
Altitude: 160 n.m.  
Crew: Four  
Duration: 7 days  
Payload: ERBS  
OSTA-3  
SPARTAN-1

ERBS is the Earth Radiation Budget Satellite. OSTA-3 will re-fly many of the experiments carried on OSTA-1 during the STS-2 mission, as well as the Large Format Camera. SPARTAN-1 is a new class of small astronomical

payloads which would normally fly aboard a sounding rocket. The mission will also fly a payload of opportunity, as yet unscheduled.

## STS-18

Date: August 1984  
Orbiter: *Discovery*  
Inclination: 28.5°  
Altitude: 160 n.m.  
Crew: Four  
Duration: 4 days  
Payload: ARABSAT-A  
TELESTAR 3-C  
SYNCOM IV-2  
WESTAR VII

With the launch of STS-18, NASA will for the first time have sent two Orbiters into space during the same month. On this, the second flight of *Discovery*, ARABSAT-A, for Arabian Satellite, will be launched on a PAM-D for an Arab consortium. TELESTAR is a domestic communications satellite for AT & T, and will also use a PAM-D to achieve orbit. SYNCOM IV-2 is the second of five Hughes commercial communication satellites. WESTAR VII is another in a series of Western Union communications satellites and will also use a PAM-D.

## STS-19

Date: September 1984  
Orbiter: *Challenger*  
Inclination: 57°  
Altitude: 200 n.m.  
Crew: Six  
Duration: 7 days  
Payload: Spacelab-3

This is scheduled to be the first operational Spacelab mission. Spacelab-3 will actually fly before Spacelab-2, which will be a developmental flight of a different configuration. Experiments on Spacelab-3 will be conducted in materials processing, space technology and life sciences. Additional experiments will also be conducted in astrophysics and environmental observations.

## STS-20

Date: October 1984  
Orbiter: *Columbia*  
Inclination: 28.5°  
Altitude: 160 n.m.  
Crew: Four  
Duration: 7 days  
Payload: SPC-B  
RCA-L  
OSTA-4

SPC-B is a commercial communications satellite for the Southern Pacific Communications concern. RCA is another in a series of domestic communications satellite for that corporation. OSTA-4 is another Office of Space Sciences and Applications payloads. Another payload of opportunity may also be flown.

## Gilruth Center News

Call X3944 for more information

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

**Defensive driving** — Learn to drive safely and qualify for a 10 percent reduction in your insurance for the next three years. Class is held from 8 a.m. to 5 p.m. August 21 at a cost of \$18 per person.

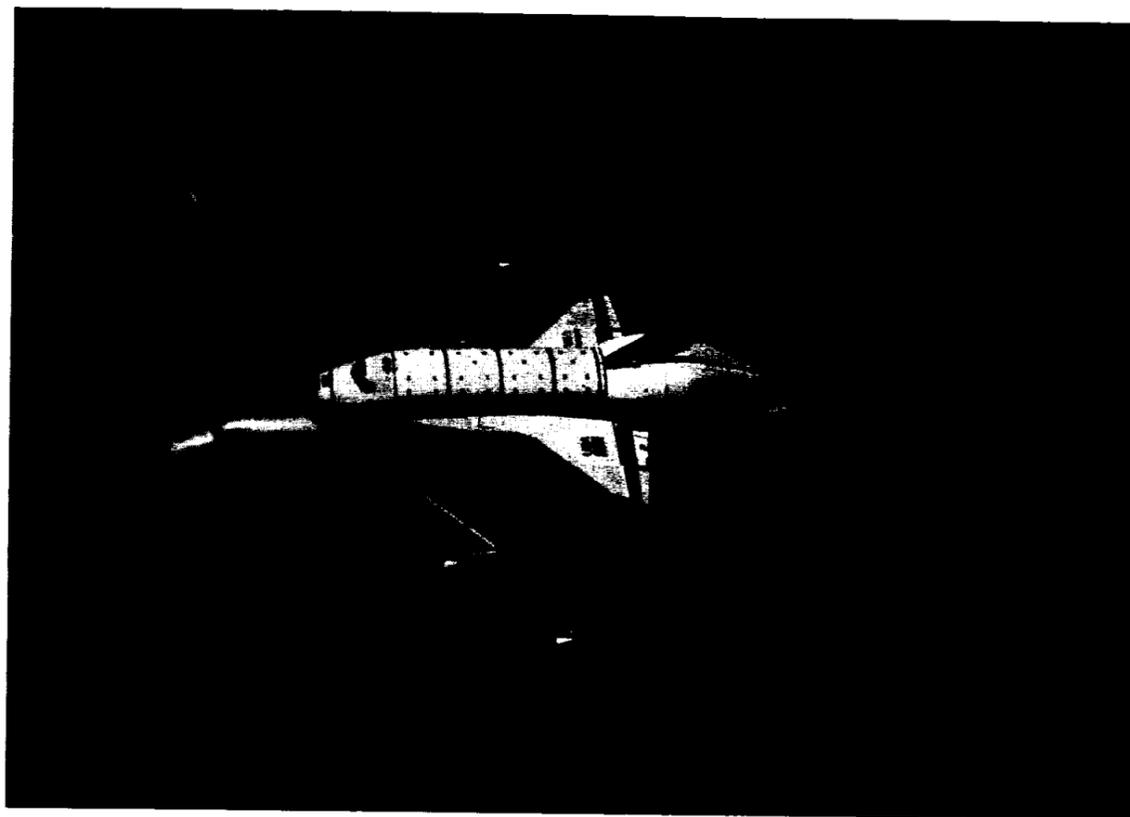
**Dancercise** — Part dance, part exercise, all fun. This class will gradually get you into shape. The six-week course began July 15 and meets on Tuesdays and Thursdays from 5:30 p.m. to 6:30 p.m. The cost is \$20 per person.

**Overnight trip** — This trip to Evangeline Downs includes bus, hotel, breakfast and two tickets to the club house. Trip dates are August 14 and 15, and the cost is \$65 per person. Space is limited. Call x3594 for more details.

**Table tennis** — Come and test your skills at the first annual JSC Table Tennis Tourney. This event will take place July 31 at 1 p.m. The entry fee is \$1 per player. Events will be in men's and women's singles. First and second place trophies will be awarded.

**Ladies exercise** — Come stretch with the gang for only \$12 at the Rec Center's ladies exercise class. Sessions start each month and run continuously. For more information, call x3594.

**Dinner theatre** — Based on characters of Damon Runyon, the next play at the Rec Center is a musical fable of Broadway. Performances are Aug. 13 and 14 beginning with a social hour at 6:30 p.m. and the show at 7:30 p.m. Cost is \$10 per person, and the deadline for reservations is 2 p.m. Aug. 11.



This recently released photo, taken during the ferry flight of Challenger to Houston and then the Kennedy Space Center on July 4 and 5, is one of the first to show the new graphics scheme for NASA's Orbiters. The USA insignia has been moved from the starboard to the port side wing. On the starboard wing, the NASA logo has been added, as has the name of the Orbiter.

## Cookin' in the Cafeteria

### Week of August 2 - 6, 1982

**Monday:** Chicken Noodle Soup; Weiners & Beans, Round Steak w/Hash Browns, 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:** Seafood Gumbo; Fried Perch, New England Dinner, Swiss Steak (Special); Italian Green Beans, Cabbage, Carrots.

**Thursday:** Cream of Chicken Soup; Turkey & Dressing, Enchiladas w/Chili,

Weiners & Macaroni, Stuffed Bell Pepper (Special); Zucchini Squash, English Peas, Rice.

**Friday:** Seafood Gumbo; Baked Flounder, 1/4 Broiled Chicken w/Peach Half, Salisbury Steak (Special); Cauliflower au Gratin, Mixed Vegetables, Buttered Cabbage, Whipped Potatoes.

### Week of August 9 - 13, 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 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 Steakw/Corbread 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

## Crew set

(Continued from page 1)  
concern to us. We can see that preparing food for four people, versus two, in *Columbia* is going to be a chore." Such activities as eating, sleeping and disposing of trash and waste will be that much more important, he added. "We don't see it as a big stopper or a big problem," he said, "but we realize that we're going to have to make a lot of effort to make those systems work for use so we don't

get overwhelmed with just living on orbit with four people. We could really be up to our elbows if we're not careful."

Brand indicated from the very first, however, that those kind of considerations pale when compared to the chance to fly in space. "Needless to say, we're all really thrilled, really happy to be up next to bat. We have a super mission, a hard charging crew and very competent guys."

## 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: 1 BR condominium, washer and dryer, covered parking, ceiling fan, burglar alarm, overlooks pool, two balconies, close to clubhouse, sauna and tennis courts, \$425/month plus deposit. Call Mark x4436.

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

For rent: Galveston Jamaica Beach, central AC, furnished 3 BR, boat mooring, \$375/week. Call Darrell Smith 337-3970.

For sale: 1978 Mobile Home, 2 BR, 1 bath, \$5000 Equity, assume payments of \$142.38, 12% interest. Call Gail 483-4952.

For lease: Executive home w/3 BR on golf course, \$1100/month. Call Shani after 5 p.m. 585-8798 or Bandula before 5 p.m. 849-1264.

For Sale: Water front lot, Lake Livingston, Point Lookout Estates, Point Blank, Texas. Call 472-5667.

### Cars & Trucks

1975 Honda CVCC, blue, 4 dr wagon, 4 speed, AC, tinted glass, low mileage, original owner, blue book \$1,600, sell for \$1,450. Call W. Der Bing x4241 or x3734.

1973 T-Bird, very clean, all black, vinyl roof, leather, all power, good tires, runs well. Call Ritz x4973 or 333-3352

1973 Olds Delta 88 H/T, auto, AC, PS, \$1195. Call 480-6321 after 5 p.m.

1971 Volkswagon, red, good condition. Call 996-9516 after 6 p.m.

1979 Datsun 280 ZX, very good condition, 5 speed, with G/L package, \$8,700. Call 333-4614 day or 337-3401.

1978 Le Baron Town and Country Wagon, exceptionally clean, auto, AC, PS/PB, leather interior, AM-FM stereo, tilt wheel, speed control, rack, \$4,025. Call 474-2906 after 5

1980 Subaru GLF H/T, or 1981 Plymouth Reliant, AC, both in excellent condition, sell one below book. Call 472-3858.

Jaguar XKE Fixed Head Coupe, 4-speed manual, twin carbs, wire wheels, power disc brakes, original black

leather interior, factory air, documented listings up to \$20,000, sell for \$7,500 cash firm. Call Horton x5350.

1971 AMC Javelin, restorable, needs body work, runs well, new tires and rims, \$500 or best offer. Call Judy x3541.

1982 Porsche 924, silver metallic, am/fm cassette, AC, pwr windows, removeable top. Call 332-6670 after 5 p.m.

1976 Plymouth Fury Wagon, needs motor. Call Richard 741-9743 after 6:30 p.m.

1975 Chevy Caprice, white, 4/dr. AC, radio, PS/PB, tinted glass, adj. steering column, dependable, Blue Book \$1,500 sell for \$1,250. Call Der Bing x4241 or x3734.

1969 Ford XL 2 dr. h/t, 302 V8, new paint, radials, auto, AC, easily tuned, many extras, call Jerry x4601.

1980 Chevy Silverado, 6 cyl., fully loaded, 40,000 mi. excellent condition, \$5,500. Call Steve at 672-3633, M-F, 8 a.m. to 5 p.m.

### Cycles

1977 Suzuki RM 80, excellent youth cycle, runs well, \$200. Call McNeely 482-1549.

1975 750 Yamaha, custom paint, many extras, must see to appreciate, asking \$1,800. Call Brenda x4735 or 486-4276.

Motorcycle tires, tubes, chains, oil filters, tuneup kits, batteries, rainsuits, 2 stroke oil, low prices. Call 488-7899 after 5 p.m.

1979 Honda 185 Twinstar, 9,000 miles, good commuter bike, 75 mpg., or 1969 Honda CB350 with fairing, whichever goes first, both negotiable. Call Steve at x5111 or 554-2435 after 5:30 p.m.

1981 Honda XL100S, car carrier, helmet, new tune, good condition, \$600. Call Perry x5576 or 486-8351.

1975 Honda XR75 dirt bike, in good condition, runs well, looks great, \$250, Call 554-6027.

### Photography

35MM SLR Mamiya NC 1000 automatic camera, shutter speed priority, f-17 normal lens, used for one roll of film only, \$115. Call St. Leger x3166.

Mamiya Super Press 23 Camera, 100mm 3.5 lens, 2-120 roll film holders,

focusing screen holder, rubber eye piece, \$350 cash. Call Frank x3836 or x3837.

### Boats & Planes

Sunfish sailboat, no trailer, \$400. Call 488-4493 after 6 p.m.

For rent: Piper Lance, AC, club seating, \$65/hr Wet. Call L. Damewood 482-5572.

14-foot Hobie Cat, galvanized trailer, lots of extras, \$1,500. Call Carla x2623 or 538-1148 after 5 p.m.

14-foot aluminum flatbottom boat w/1980 15 HP Johnson, galvanized trailer and accessories, excellent condition, \$1,850. Call Steve 671-3633, M-F, 8 a.m. to 5 p.m.

### Computers

New brand name 5 1/4 diskettes in plastic box, used by TRS 80's, Apples etc., 10/box \$22.95. Call Huntley x5858.

TRS-80 MOD I, 48k, disk, carrying case, diskettes, programs. Macro-assembler, \$1,300 or best offer. Call Donny Siner x5061 or 486-1741.

Heathkit H-88 computer kit, mostly in original boxes, cost \$1,300, will sell for \$650. Call Clay Jones x3155.

### Household

Ivory drapes 107"x70", kirsh drapery rods, light fixtures, very reasonable. Call 333-4669.

Apt. gas stove, king size bed spread, 10 foot round rug. Call 482-7073.

Chrome and formica dinette table with 6 chairs, \$40. Call Peggy x6343 or 488-2168.

Loveseat, Early American, needs reupholstering, \$40; Encyclopedias, Funk and Wagnall, \$40. Call 482-4373.

Desk w/chair, student danish modern, and casual vinyl chair, good condition, \$100 for both. Call Herm 482-7669.

Teakwood stereo cabinet. Call 483-4111.

### Musical Instruments

Clarinets, B flat, good condition \$250 and \$200. Call 482-4373.

Yamaha acoustic, 6-string guitar, case included, excellent condition, \$200. Call 538-2035 after 5 p.m.

Hammond M-100 Spinet Organ, drawbars, presets, pedals, reverb., \$900; Leslie 147 tone cabinet, \$300. Call x2880 or 333-2359.

### Animals

Dachshund needs home, neutered male, loveable, eager to please, inside or out, food bowls, supplies included. Call 488-1777 after Sunday.

Wirehair Fox Terrier pups, healthy, adorable, AKC champion bloodline, ready July 26, start \$200. Call 337-3691.

Cocker Spaniel pups, male, tails bobbed, ACK parents, \$100 each while they last. Call Horton x6130.

### Wanted

Roommates Fall 1982, Texas A & M, to share townhome, near campus, on shuttle bus, large 2 BR, washer and dryer available. Call Jenny 482-7860.

Need ride from UH/TSU area to NASA on 8:30 a.m. to 5 p.m. shift, can change shift. Call Richard x4731.

Would like to carpool from the Heights to NASA, 8 a.m. to 4:30 p.m. Call Ed 486-1323.

Two-horse trailer in serviceable condition. Call Terry White 332-5177.

BMM Movie Projector. Call D. Thompson x4171 or 332-2229.

Female roommate to share 3-2-2 house, Heritage Park by August 1, 1982, \$250 + 1/3 utilities, fenced. Call 488-2357 before 4:30 p.m. or 534-3316 after 5:30 p.m.

Male professional wants to rent a furnished room for about one month beginning early August. Call Clay Jones x3155.

One non-smoking rider from Gulf Freeway/Edgebrook Area, 7:30 a.m. to 4 p.m. shift. Call Tom x2653 or Ron x3526.

Need ride in case of emergency to/from Pearland, Sherwood Subdivision. Call Bob x2504 or Madeline x4426.

Need ride to/from Bellaire or from 7380 Fannin Street. Call Samuel at x5803.

Roommate, responsible, non-smoker to share 3 BR Dome Home, short term okay. Call 486-2172 or 489-1059 after 5:30 p.m.

### Found

A pair of ladies prescription glasses, gray plastic frames, were found several weeks ago in front part of building 9 parking lot. Call Reggie x4717.

### Miscellaneous

Floor model Duracraft drill press, 1-year-old, \$250; 10" Craftsman arm saw with table, \$225. Call Jim Wiley 483-7473 7 a.m. until 4 p.m.

Van seat, new, blue, \$50. Call 474-3861.

Pennzoil motor oil, 10W40, 5 quarts, \$4. Call Carman x2447.

Wisconsin engine, 8 horsepower, horizontal shaft, 4-stroke, runs well, \$65. Call Andrei William 334-3180.

Hand-quilted patchwork bags, two, 14" x 14" x 4", handles, beautiful, extremely sturdy, \$25. Call Ginny 488-7647 or 486-9169 after 5 p.m.

GM 14" chrome wire-spoke wheel covers, 4; five good tires, E78-14 mounted on steel rims from 1978 Pontiac Phoenix, all for \$75. Call J. Dornbach 337-3459.

1/2 ton P/U Camper covers, 1 short/wide shell, 1 long/wide, insulated with storage cabinet. Call x4188.

Flat bed trailer, 8' x 26', excellent condition, heavy duty jacks, 3 axles, for big loads, \$1,500. Call E. Bullock 482-6401.

Honey, spring crop, quarts and gallons; Bicycle, 26" man's standard single speed, \$25; Dog house, approx. 3 foot square, asphalt shingle roof, \$25. Call W. Ward x4976.

For rent: Pasture/stalls, near Friendwood/Clear Lake area, \$40/month. Call; 482-7079.

Eight track tapes, used, classical through Sinatra, B. Seger, Crystal Gayle, Eagles and Bill Monroe, \$2.50 each. Call Dave 480-1447 after 5 p.m.

Concrete border blocks, scalloped, 2 feet long, 75 cents each. Call McNeely 482-1549.

Edger, gasoline, excellent condition, \$75; steel shelves, \$10; hydraulic jack, \$5; portable stereo., \$10; army cots, \$10. Call 482-4373.

Boy's bicycles, 26", good condition, \$35; Wards stereo, turntable/speakers, \$35. Call Mat 480-3910.