



Suited Up

Testing on the Mark III and AX5 space suits ends in the WET-F. Story on Page 3.



Galileo Group

The crew of STS-34, scheduled for an October launch, pose for their official portrait. Picture on Page 4.

Space News Roundup

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Volunteers needed for new efforts

JSC's Lunar and Mars Exploration Office is looking for about 15 "aggressive and innovative" engineers to help develop the technical details of President Bush's recently announced lunar and Mars exploration initiative.

All center employees who qualify will be given the opportunity to volunteer for permanent lateral reassignment. The deadline for applications is the close of business today. Anyone interested should deliver their completed request for reassignment from JSC Announcement 89-139 to Susan Braymer in the Human Resources Office, AH73, x33084.

An agencywide technical study group has begun an examination at JSC of the missions, vehicles and technologies needed to meet the President's new space exploration goals. The first phase is a 90-day effort to provide information to Vice President Dan Quayle and the National Space Council. The second phase of the study, beginning in January, will expand the detail of the early effort and look toward procurements and preliminary mission design.

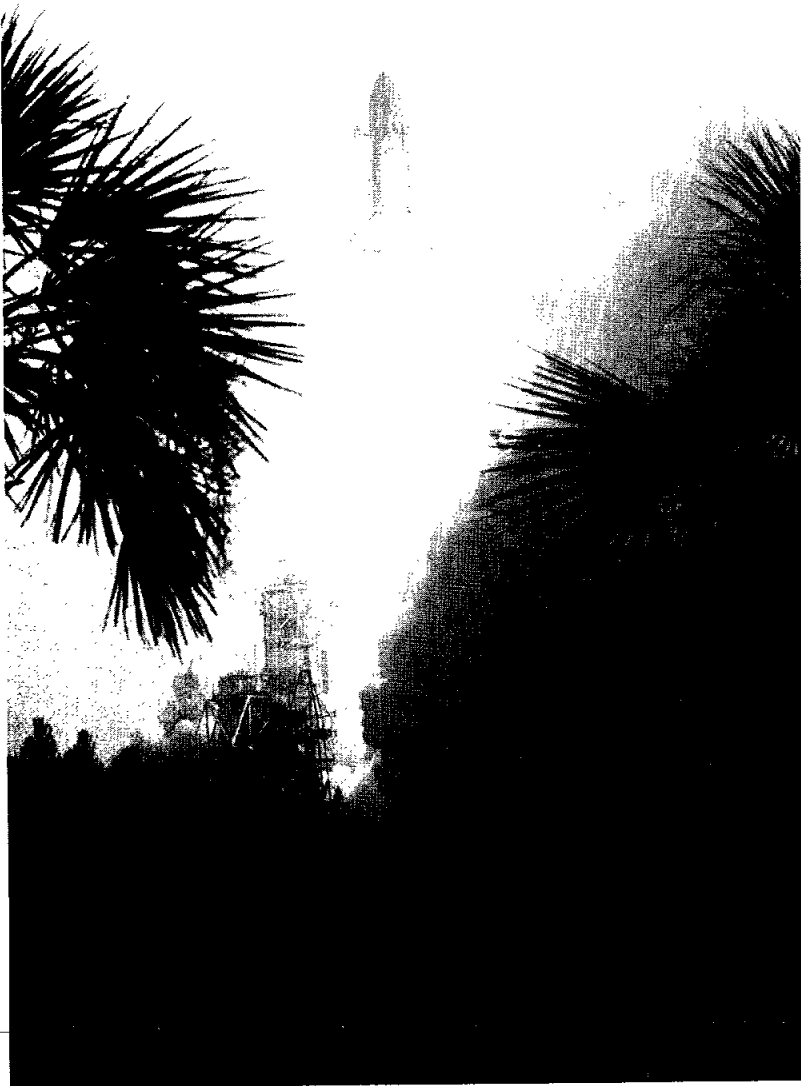
JSC Director Aaron Cohen is leading the agency's response to the President's call for specifics on the organization, resources and timetable for establishing a lunar base and sending humans to Mars. Frank Martin, associate administrator for exploration, is in charge of the technical study group, and Mark Craig, manager of the Lunar and Mars Exploration Office, is directing the study group's efforts at JSC.

As the activities mature, the Lunar and Mars Exploration Office will be reorganized into a program/project office with existing employees forming the nucleus of the new organization.

"We're getting organized and positioned for the really major activity beginning in fiscal '91," said Bill Huffstetler, manager of JSC's New Initiatives Office. "These people will be working on the more detailed studies related to an implementation plan."

A brief list of the offices and the engineers they are seeking includes:

- Mission Analysis and System Engineering Office—This office will serve as the Level II program office, Please see **VOLUNTEERS**, Page 4



Columbia, obscured by the morning haze at Kennedy Space Center's Launch Pad 39-B, thunders into orbit Tuesday. Landing is scheduled for Sunday morning.

Columbia knifes through fog on secret mission

By Kelly Humphries

The Space Shuttle *Columbia* knifed through a haze of low fog Tuesday morning, ending a three-and-a-half year hiatus from flight and beginning a secret five-day Department of Defense mission.

As the last of the three shuttles to return to flight thundered smoothly into orbit from

Kennedy Space Center's Pad 39B at 7:37 a.m. CDT, it carried a special distinction for

the men and women of the Mission Control Center at JSC—the first flight controllers to fly aboard a shuttle.

Commander Brewster Shaw, Pilot Dick Richards and Mission Specialists Jim Adamson, Dave Leestma and Mark Brown were reported to be doing well. Adamson, a former aerodynamics officer and guidance, navigation and control officer, and Brown, a former flight activity officer, became the first NASA flight controllers to go into orbit.

"The launch was smooth and *Columbia* responded perfectly," said a smiling Launch Director Bob Sieck.

NASA Deputy Administrator J. R. Thompson said the launch was an important milestone for NASA and America's space program.

"It's good to get *Columbia* flying

again. And we need three flying orbiters in order to fly off the manifest we've got," Thompson said minutes after the launch. "So from that standpoint, today was a big day."

As the countdown reached the beginning of the three-hour launch period Tuesday, weather officials at Patrick Air Force Base announced

that fog had reduced visibility to unacceptable levels and that a hold was necessary. But Astro-

naut Mike Coats, flying the Shuttle Training Aircraft, reported that visibility was sufficient for a return to launch site landing. The count picked up at the T-minus-9-minute mark at 7:28 a.m. and continued without a hitch until launch.

Around two hours and 12 minutes into the flight, the crew was given a go for orbit operations and Mission Control reported that both the spacecraft and the crew were doing well.

Although an exact landing time is not expected to be released until 24 hours before landing, officials reported Wednesday that the mission's three-hour landing period would begin at 8 a.m. and end at 11 a.m. CDT Sunday.

The flight is the eighth for *Columbia*, Please see **STS-28**, Page 4



Marks named JSC Women's Program Manager

Freda Marks, Human Resources development specialist and coordinator of JSC's Vocational Office Education (VOE) programs, has been named Federal Women's Program Manager in the Equal Opportunity Programs Office. She succeeds former manager Shirley Price, who will now be coordinating discrimination complaints within that office.

Marks, who served a two-year term on the Federal Women's Committee in the early 80's, looks upon her appointment as an excellent opportunity to help the advancement of women throughout the center.

"I have worked with students for so

long that this position makes me feel I have 'stepped up,' since I'll be working with professionals at various levels, even top managers," Marks said.

Although in her new job for less than a month, Marks plans to be "up to speed" quickly, since she says she "can't address the issues the office will be dealing with without being thoroughly briefed."

Her agenda for the next few weeks includes meetings with Assistant Administrator for Equal Opportunity Programs Harriet Jenkins and her staff at Headquarters, and attending a workshop at Kennedy Space Center which will include her peers from all

the NASA centers.

Upon her return, Marks hopes to have focus groups, selected from a random sample of female federal JSC employees, meeting to discuss the issues the program is dealing with now, or will soon be facing, in September.

I intend for the program to be visible at the center all year round," Marks said, "not just during our traditional Women's Week activities once a year.

Marks cites the planned JSC child care center as a very positive step, and considers job-sharing and flexplace to be the next vital topics on her 'list.'

Also in September, the Federal Women's Committee will be looking for

all-new membership to its 10-person board, since the current members are all completing their terms.

"The call will be going out soon for new members," said Marks. "We will be looking for both union and non-union participation, as well considering a representation that reflects the current professional, technical, and clerical makeup of JSC's female employees."

A Houston native, Marks was first employed at JSC in 1973 as a VOE student from Worthing High School. She joined the Human Resources Department full time upon graduation the following year, and continued her career in that office.

Total lunar eclipse, meteor shower coming

By Pam Alloway

Many ancient cultures considered lunar and solar eclipses omens of war, famine, communal disaster or the gods' anger. Consequently, great value was placed on those who could predict eclipses so people could prepare sacrifices to appease the deities.

Modern day North American dwellers can prepare for a total lunar eclipse and a meteor shower, both of which will take place this month. And the only required sacrifice is that of time that might otherwise be spent in bed rather than in a field peering into the nighttime sky.

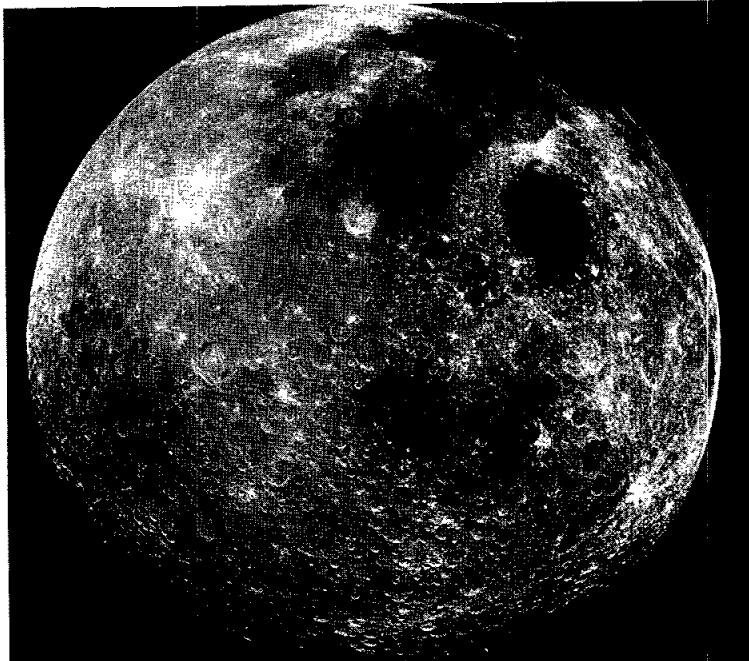
The Perseids meteor shower, so named because the meteors appear to radiate from the constellation Perseus if retraced across the sky, will occur between 3 a.m. and sunrise tomorrow high in the northeast part of the sky.

"The Perseids shower is probably the best known and, indeed, it has brighter meteors than any other meteors year after year," said Dr. Karl Henize, astronomer and retired astronaut.

"Traveling around the sun are these highways of particles from comets' orbits that form a railroad of sorts ... we see these showers when we, the Earth, plow through those tracks and run into that debris which burns up as meteors."

The comets eventually disappear, either because they use up most of their ices or because their nucleus is covered with a crust, yet their dust remains in orbit around the Sun. Whenever the Earth passes through the dust, the dust burns up in the Earth's atmosphere, a phenomena many people refer to as shooting stars.

Please see **ECLIPSE**, Page 4



Now you see it, but on Wednesday you won't. That's when the Moon will fall into the Earth's shadow for the first total lunar eclipse in seven years. The Moon will begin to be obscured at 8:21 p.m. Wednesday.

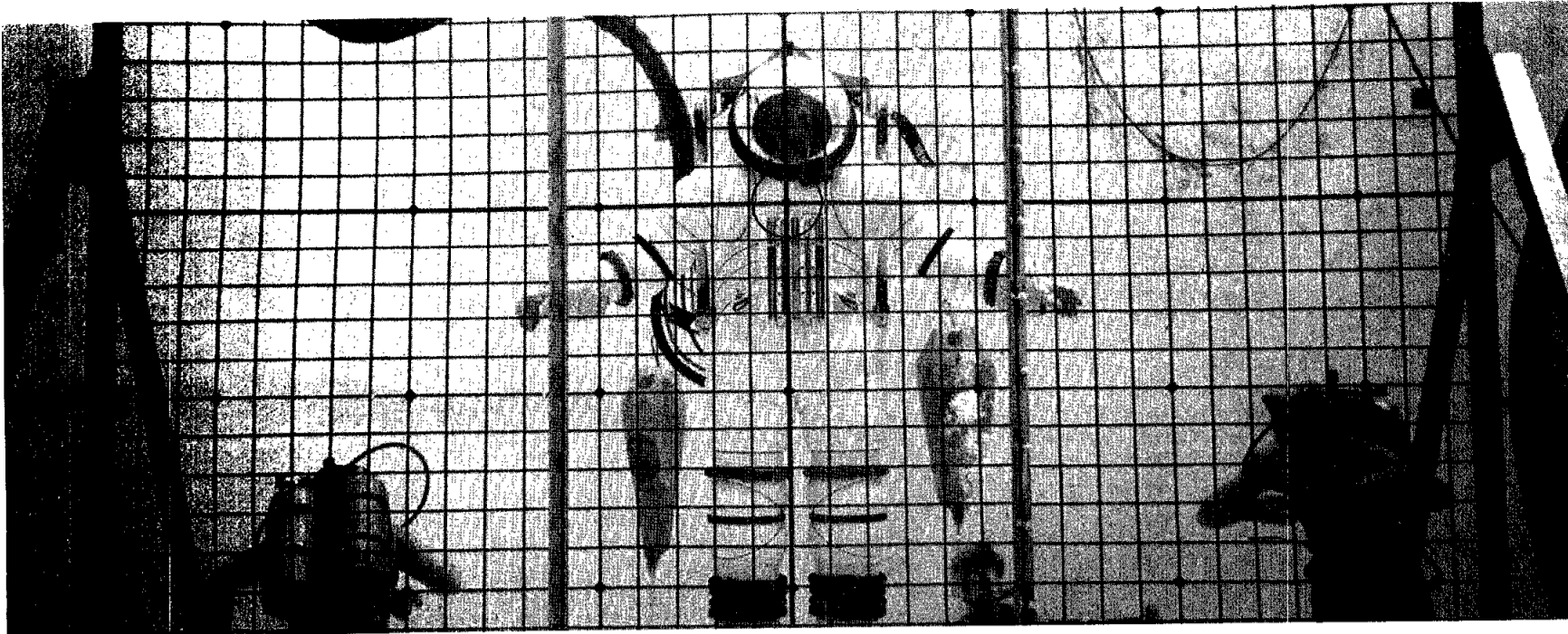
Welcome home ceremony set for STS-28 crew

A ceremony to welcome the crew and families of STS-28 is scheduled for Ellington Field approximately eight hours after *Columbia*'s landing at Edwards AFB on Sunday.

The window for landing is 8 through 11 a.m. CDT, with the exact time to be announced 24 hours prior to landing. If *Columbia* were to land at the beginning of the window, for example, the return ceremony would be scheduled for 4 p.m.

All JSC employees and their families are encouraged to join Acting Center Director Paul Weitz in welcoming them home. The ceremony will take place on the east side of Hangar 990. Parking will be on the west side of the hangar. No identification will be necessary, and the entire space in front of the platform will be open to all without any special viewing area.

Updates on landing and return-to-Houston information will be available on the Employee Information Service telephone line x36765.



Suit Testing

Evaluations of two candidate designs for space suits to eventually be used on the Space Station *Freedom* were completed in the Weightless Environment Training Facility (WET-F) on July 28. The goal of the tests, conducted on the JSC-designed Mark III suit, and the AX5, designed at Ames Research Center, is to select components of both and build the best hybrid suit for space station applications.

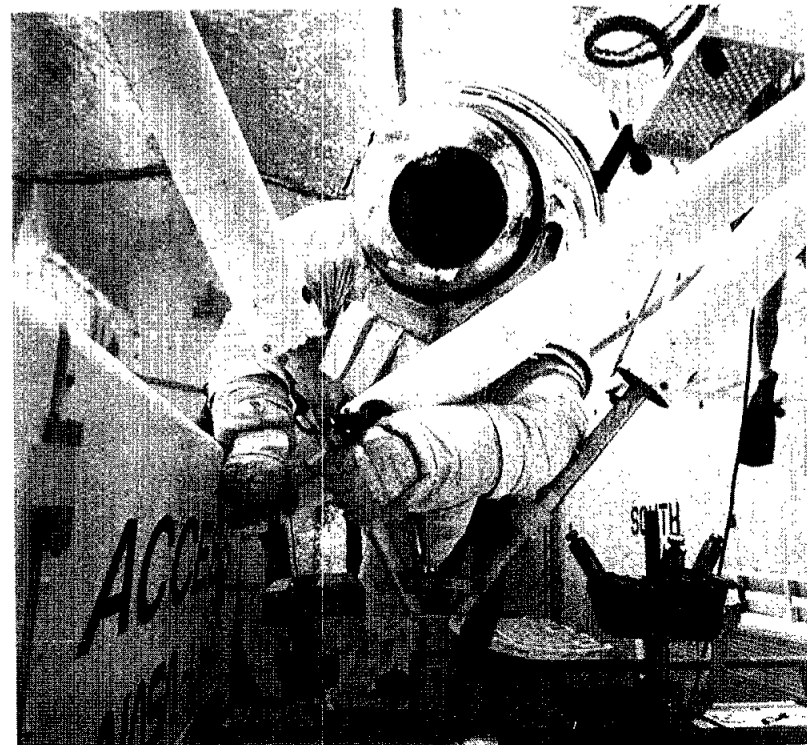
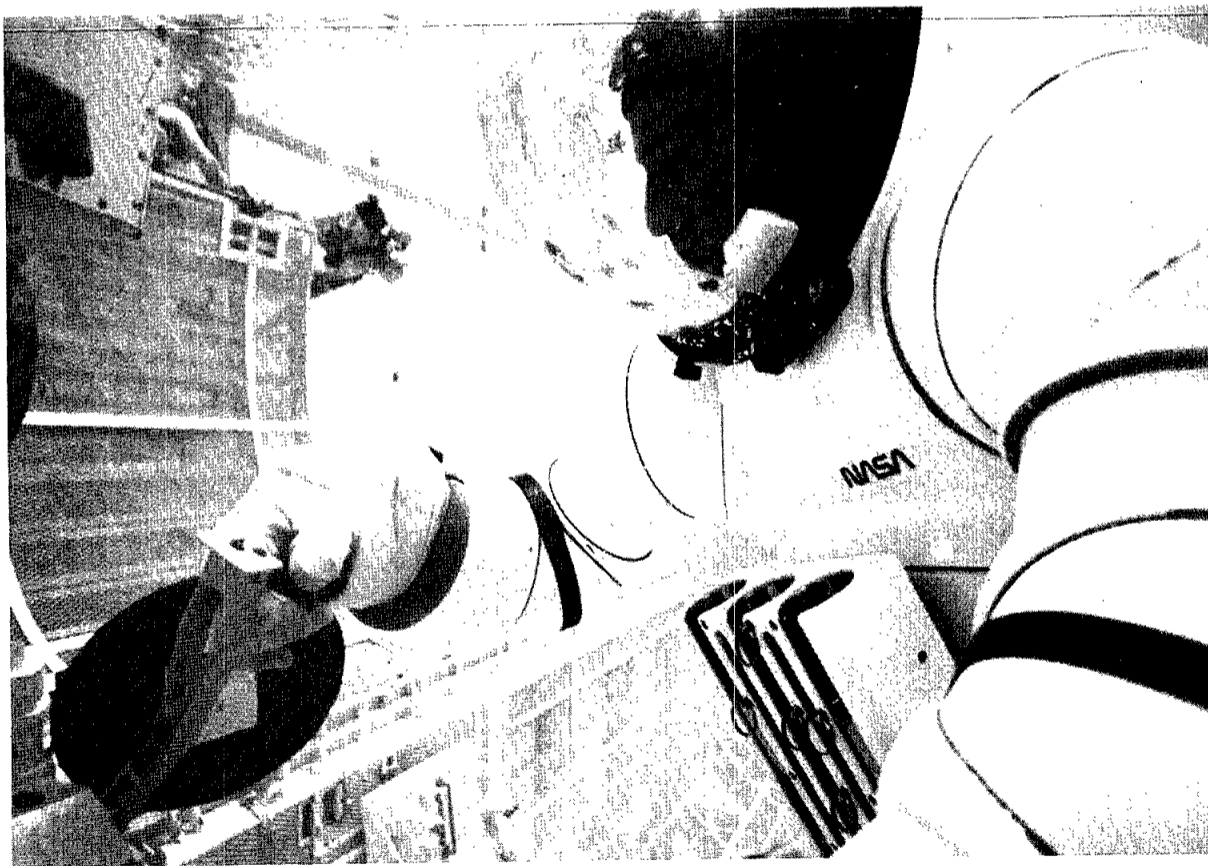
The tests evaluated mobility, the reach envelope (how far the astronaut can reach in the suit), maximum force output (how much torque can be applied to a shaft), and task performance capability (how well the suits let astronauts perform a task).

Unmanned evaluations of both suit models will continue over the next few months, with data to be reviewed by year end.



JSC Photos

Counterclockwise from the left-Mission Specialist Dave Hilmers evaluates the reach envelope of the AX5 behind a photographic grid board; Hilmers (wearing the AX5), passes through the extravehicular activity (EVA) hatch of the Space Station *Freedom* airlock mock-up; Hilmers (wearing the current shuttle suit that serves as the baseline for the evaluations) and Mission Specialist Sonny Carter (wearing the Mark III suit) prepare for a two man EASE (Experimental Assembly of Structures with EVA) ACCESS (Assembly Concept for the Construction of Erectable Space Structures) evaluation; Mission Specialist Jerry Ross (in the Mark III suit) assembling the EASE structure; Mission Specialist Jeff Hoffman (wearing the AX5) performing an STS payload bay door contingency winch operation evaluation to determine the level of difficulty of the task; and Carter performing a task similar to pushing an EVA ratchet while the amount of torque he is able to apply is measured.



Corporate 'neighbors' contribute to visitor center

The national corporate fund-raising campaign for Space Center Houston, JSC's planned new visitor center, received a tangible measure of "hometown" support last month. Three locally-based contractors, plus supporters of the lunar landing anniversary's "Thousand Points of Light" Clear Lake celebration, announced donations totaling \$312,000.

The Boeing Company announced a \$200,000 contribution for the development of the \$50 million center to be built on site, near the main gate on Nasa Rd. 1. Grumman Space Systems Company and Computer Science Corporation (CSC) each made \$50,000 donations to the national fund-raising effort.

In addition, the Eagle Twenty Group, the non-profit organization sponsoring the boat and fireworks extravaganza celebrating the twentieth anniversary

of the lunar landing, presented Manned Space Flight Education Foundation members a \$12,000 check from the proceeds of the July 20 1989 event.

Byron McKenzie, Boeing's Houston Operation Manager, said that "Boeing is very pleased to make a substantial donation to Space Center Houston.

"Sparking interest in our children and educating them about our space efforts are priorities to those of us in the aerospace industry," McKenzie adds. "Space Center Houston will help enhance those efforts, as well as provide a much needed new visitors center for JSC."

Grumman and Computer Science Corporation share Boeing's enthusiasm in supporting the project.

"Space Center Houston will tell an important story in a new and exciting way," said Jerry Bostick, vice pres-

ident of Houston Operations for Grumman. "I can't think of a better way to encourage our young people to pursue higher education in science and engineering."

"Joining the team of companies who have already contributed to the national fund-raising campaign for Space Center Houston is a great feeling for all of us at CSC," said Bill Berry, CSC's central region vice president for applied technology. All of our employees can take pride in the Center and feel a part of the effort that will bring this terrific new facility to JSC."

In making Space Center Houston the principal beneficiary of the proceeds from the "Thousand Points of Light" boating celebration, Eagle Twenty co-chairman John McLeaish said the center was "the obvious choice for our largest donation. Not

only does Space Center Houston represent a national resource in terms of space flight education, it will also become the leading tourist attraction for Clear Lake, with millions of new visitors and tremendous economic benefits for the entire area."

The latest contributors join a growing list of supporters that already includes Lockheed, McDonnell Douglas and Rockwell, representing more than \$1.2 million in donations.

The national corporate campaign is the second and final element of the overall funding campaign for Space Center Houston. Initial fund-raising efforts, launched late last year, have raised more than \$4.2 million in the Houston and Clear Lake area and are continuing at this time.

To fund the project, approximately \$8 million in corporate contributions

is sought. The remainder will be funded through revenue bonds. No federal government money is available for the project.

The Manned Space Flight Education Foundation, Inc. (MSFEFI) is the non-profit organization spearheading the Space Center Houston project. MSFEFI is responsible for the design, construction, financing and operation of the planned center.

According to Harold Stall, director of public affairs and president of MSFEFI, construction on the center is scheduled to begin late this year, and should be fully operational in 1991.

The facility, designed by Walt Disney Imagineering, is expected to attract an estimated two million visitors and contribute approximately \$100 million to the local economy during its first year of operation.



The official portrait of the crew of STS-34 includes: seated (left to right), mission specialist Shannon W. Lucid, Ph.D.; Franklin Chang-Diaz, Ph.D.; and Ellen S. Baker, M.D. Standing are (left) Donald E. Williams, commander and Michael J. McCulley, pilot. The crewmembers, scheduled for an October 12 launch aboard the Space Shuttle *Atlantis* that will see the deploy of the Jupiter probe *Galileo*, designed their crew patch, which appears in the right corner.

Program to celebrate Asian-Pacific heritage

The second annual JSC Asian Pacific American Heritage Day will be Sept. 8. Day-long activities will include professional workshops, a luncheon, a general session featuring the Honorable Hana Chow as keynote speaker.

Channel 13 reporter Shern-Min Chow will serve as emcee for a multi-national program of cultural performances.

The morning workshops, held at the Gilruth Recreation Center, will cover topics such as dynamic leadership in meetings, career development, community and political involvement, business/social manners, and how to

cope with discrimination.

Following a luncheon in the Bldg. 3 cafeteria, the afternoon activities will be held in Teague Auditorium. Cultural performances will feature the countries of Bangladesh, Burma, Cambodia, China, Hawaii, India, Japan, Korea, the Philippines, and Vietnam. Refreshments will be served afterward.

Volunteers are still needed to help make the event a success. For additional information, please contact Kumar Krishan, x36777; Richard Long, 333-6183; or Sophia LeCour, 282-3798.

Hurricane information available

When hurricane Chantal hit the Clear Lake area recently, JSC was closed for a full day. Even though the announcement was made as early as possible and carried on local television news, some employees still failed to get the news.

Acting JSC Director P.J. Weitz reminds all employees that there are two recorded telephone services at JSC that will carry information about hurricane closings.

The hurricane information line, x33351, is used to provide information on potential storms, as well as plans and procedures for safeguarding work areas. The Employee Information Service, x36765, also will contain information about closings as soon as they are announced.

All employees are urged to consult these numbers in the event of storms that have the potential to cause a center closing.

Volunteer engineers sought

(Continued from Page 1)
developing and integrating the strategic pathways for human exploration missions to the Moon and Mars.

Mission Analysis Engineers are needed to manage and participate in the development of mission concepts in terms of trajectories, manifests, abort options, launch windows, performance requirements and flight technique support.

Operations Analysis Engineers are needed to develop integrated operations concepts, communications and navigation requirements and flight techniques.

System Engineers will be needed for

requirements development, function and resource allocation and system level analyses and trade studies related to integration of spacecraft, launch vehicles, space station, lunar outpost and unmanned precursor options.

Program Support Engineers are needed for schedule development and control, budgeting, configuration control, document maintenance, data base development and risk assessment.

• Planet Surface Systems Office—This office will serve as the Level III project office to define and develop concepts for a permanently manned outpost on the Moon as a research facility, operations node and test bed for Mars mission hardware and operation.

Mission Analysis Engineers are needed to develop mission concepts.

Operations Analysis Engineers will work on the development of integrated operations concepts.

System Engineers are needed for requirements development, function and resource allocation and system level analyses and trade studies.

Project Support Engineers are needed in the areas of schedule development and control, budgeting, configuration control, documentation maintenance, data base development and risk assessment.

• Mars Rover Sample Return Office—This office will manage JSC's involvement in the joint project with NASA's Jet Propulsion Laboratory to develop a Mars sample return mission.

System Engineers are needed for requirements development, function and resource allocation and system level analyses and trade studies.

Element Lead Engineers will be needed to develop element requirements and corresponding flight system concepts.

NASA-JSC

Launch "smooth"; mission going well

(Continued from Page 1)

the first space shuttle to make its way into orbit more than eight years ago. Its most recent flight had been STS-61C, which ended just 10 days before the *Challenger* accident.

About 258 modifications were made to *Columbia* during its standdown, including the critical return-to-flight improvements made on all three shuttles and about 16 that are unique to *Columbia*.

The modifications have added about 2,500 pounds to *Columbia*,

making its dry inert weight with three main engines but no payload, experiments or propellants about 179,833 pounds. The hardware required for the modifications cost \$12.6 million. Overall cost of the modifications to all three orbiters averaged \$105 million.

Despite the many modifications and the long refurbishment period, Shaw was confident about its status when he arrived at the Shuttle Landing Facility at the Cape on Saturday.

"I flew on *Columbia* a long time ago and it was a great machine," Shaw

said, "it'll be a great machine again."

Columbia, which flew the first five flights of the shuttle program, features more research and development instrumentation than the other two ships. Much of that instrumentation is hooked up for this flight, including about 400 strain gauges on the wings, payload bay doors and vertical stabilizer to monitor loads, pressures and temperatures during flight. For aerothermal analysis, about 140 sensors have been installed in the wing area.

Eclipse to treat area observers Wednesday night

(Continued from Page 1)

Because the Earth travels along the same orbit through the Solar System each year, meteor showers such as the Perseids are annual events. The Perseids shower is visible every year either on Aug. 11 or Aug. 12. There are 10 of these annual meteor showers visible from the northern hemisphere of the Earth, but the Perseids is the most visible. More meteors are visible after midnight because the Earth has turned so that it is plowing into interplanetary dust.

Observers will not need any equipment to see the Perseids but would be well advised to steer clear of bright city lights for the best viewing, astronomers said.

"Characteristically meteors move very rapidly," said Paul Maley, a member of the JSC Astronomy Club and a Rockwell engineer in the Flight Director's Office. "But many years meteors don't put on a big display. Calling it a shower isn't really accurate. People in Clear Lake can expect

to see one meteor every five minutes and if they're away from city lights probably one meteor every two minutes."

Observers normally won't see more than one meteor an hour from Clear Lake, Maley said, although there is an increase in meteor activity from the end of July through the end of August.

The Aug. 12 shower won't be the only headliner on August's celestial calendar. On Wednesday, a total lunar eclipse will be visible to North Americans. The last total lunar eclipse in North America occurred seven years ago.

Observers will begin to see the Earth's shadow on the Moon's face at 8:21 p.m. CDT Wednesday before the total eclipse begins at 9:20 p.m. CDT, said Maley. The total portion of the eclipse will end at 10:56 p.m. CDT as the Moon begins to emerge from the Earth's shadow.

The Moon's orbit is tilted 5 degrees with respect to the Earth's so usually

the Moon does not pass exactly into the Earth's shadow each month. If both the Moon and the Earth's orbits were in the same plane, there would be a solar and lunar eclipse every time the Moon circled the Earth.

When the Moon does pass through the Earth's shadow, there is a total lunar eclipse with the Sun, Earth and Moon in a line. Alternately, when the Moon passes between the Earth and sun, its shadow falls on the Earth creating a solar eclipse.

The dark part of the Earth's shadow, called the umbra, takes about two hours to cover the Moon although the total part of the lunar eclipse may only last an hour or so.

Bending of the sun's rays by the Earth's atmosphere makes the Moon visible, even during a total eclipse, as a reddish disc.

"The color is usually a dark, coppery color," Henize said. "It may vary dependent on the way the light travels through the atmosphere but generally it's a coppery color."