

Space News Roundup

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National Aeronautics and Space Administration

News Briefs

Challenger remembered

All U.S. flags at NASA Headquarters and field centers will be lowered to half-staff at exactly 10:38 a.m. CST on January 28, 1987, to observe the first anniversary of the *Challenger* accident. Following the flag lowering, NASA and contractor employees are asked to observe 73 seconds of silence at their individual work stations. Flags will remain at half-staff until they are lowered and retired at dusk. NASA Administrator Dr. James C. Fletcher said the observances reflect that *Challenger* exploded at that same time a year ago 1 minute and 13 seconds after launch. The moment of silence also will recognize the sacrifice of all astronauts who have died while serving the space program. January 27 marks the 20th anniversary of the Apollo 1 fire.

Voyager route changed

Scientists at the Jet Propulsion Laboratory (JPL) have tentatively decided to keep Voyager 2 farther from Neptune than planned during a 1989 flyby to avoid hazards posed by the atmosphere and orbiting rings. The trajectory change would bring the probe within 3,000 miles of the top of Neptune's atmosphere instead of 800 miles as originally planned. The probe will fly within 24,000 miles of the Neptunian moon Triton instead of the previously planned 5,000 miles. JPL's Ellis Miner, deputy Voyager project scientist, said scientists feared the closer trajectory would take Voyager close enough to create "drag" that could pull it out of alignment for taking desired photographs, and that it would risk collisions with debris that makes up Neptune's rings. High quality television pictures should still be possible. If given final approval, the altered trajectory will make Voyager's closest approaches to Neptune at 10 p.m. CDT August 24, 1989, and to Triton four hours later.

Test stand OK'd

NASA will proceed with construction of a second horizontal test stand for redesign and recertification of the Space Shuttle's Solid Rocket Motor (SRM) at the Morton Thiokol Wasatch facility in Utah. The new test stand will simulate more closely than the existing stand the stresses on the SRM during launch and ascent. In addition, the second test stand will provide the capability for additional testing prior to resumption of Shuttle flights, and redundancy if the existing stand were to become unavailable. The stand's foundation will be financed and owned by Morton Thiokol, but the removable test equipment will be owned by NASA and available for use at another site after the redesign and recertification process. The decision was supported by the National Research Council panel overseeing the SRM redesign.

Wind shear researched

NASA and the Federal Aviation Administration (FAA) have signed a memorandum of agreement calling for a joint 5-year, \$24-million research project to develop technology for airborne wind-shear detection and avoidance. The most dangerous type of wind shear, the microburst, is a small intense downdraft which, upon striking the ground, spreads out into a circular vortex radiating in all directions. When encountered at low levels on approach or takeoff, the pilot usually has little time to react. Between 1964 and 1985, at least 26 accidents and three incidents involving 626 fatalities and 235 injuries have been blamed on wind shear. Researchers will cover five major areas: technology assessment, present position sensor integration, hazard characterization, pilot factors in wind shear and effects of heavy rain. The results of the research program will be made available to the aviation industry.



Santa Claus appears to be dreaming of a lunar Christmas this year as he climbs the ladder of the lunar lander trainer on display at the Building 2 Visitor's Center. Santa had some inside help with his visit to JSC from Rich Holtje, a Bendix employee who works in the Shuttle Avionics Integration Laboratory (SAIL).

Astronaut Joe Engle retires

Astronaut Joe H. Engle has retired from active duty as a colonel with the U.S. Air Force and resigned from the NASA astronaut corps effective Nov. 30.

Engle became an astronaut in April 1966. He was commander of the second flight of Shuttle *Columbia* in November 1981. He also commanded Orbiter *Enterprise* on its second and fourth approach and landing tests and commanded Orbiter *Discovery* mission 51-L in August-September 1985.

The latter mission deployed three communications satellites and rendezvoused with and repaired and redeployed a failed on-orbit satellite. Engle was Deputy Associate Administrator for Office of Space Flight, NASA Headquarters, from March to December 1982.

Engle will remain in the Houston area. A native of Kansas, he has been appointed by the Governor of Kansas and the Secretary of the Air Force as an adviser to the Kansas Air National Guard. He also will be active in aerospace consulting work and will be associated with sporting and wildlife interests.

Fletcher picks interplanetary boosters

NASA has chosen the Inertial Upper Stage (IUS) and the Transfer Orbit Stage (TOS) as workhorses for boosting interplanetary probes on missions to Mars, Jupiter, Venus and the Sun.

Administrator James C. Fletcher announced Nov. 26 his selection of the IUS as the upper stage for the Galileo, Magellan and Ulysses missions. He also announced that the TOS upper stage will be used for the Mars Observer mission in the early 1990s.

Fletcher also said that while the Shuttle is now considered the baseline means of transportation for carrying the upper stages and payloads into low Earth orbit for deployment, an option will be kept open until early 1987 for flying both the IUS and TOS missions on a Titan IV expendable booster.

The announcement follows NASA's publication of a notice in Commerce Business Daily in August that proposed a study of alternative launch vehicles for planetary missions in the aftermath

of the *Challenger* accident and cancellation of the Shuttle/Centaur Upper Stage.

"Because of an urgent and compelling need to reestablish NASA's planetary program," the Nov. 26 NASA Headquarters announcement said, the Agency chose the IUS because it has "the unique capability to meet the mission requirements."

The IUS missions will be the first to employ that upper stage to send probes to other bodies in the Solar System. The IUS is built by the Boeing Aerospace Co. under a U.S. Air Force contract.

Both the Galileo and Magellan missions, to Jupiter and Venus, respectively, will use a standard two-stage IUS. The Ulysses mission to study the poles of the Sun will use a two-stage IUS with the addition of a McDonnell Douglas Payload Assist Module (PAM). The added kick stage will be needed for the additional energy to reach a proper orbit about the Sun.

The Transfer Orbit Stage, to be used as the booster for the Mars

Observer, is a product of Orbital Sciences Corp. The 12-ton, 11-foot-long TOS can accommodate both the Shuttle and a Titan IV, and is built for Orbital Sciences by Martin Marietta's Denver Aerospace Division.

The TOS is a medium-capacity vehicle designed to carry payloads in the range between those serviced by the PAM and the IUS.

The IUS is a two-stage, 17-foot-long vehicle weighing more than 16 tons. It has so far only been used to send payloads to geosynchronous Earth orbit, but has always been intended for either Earth orbital or planetary missions.

The three missions scheduled to use the IUS will be launched in 1989 and 1990.

Magellan, baselined for launch aboard *Atlantis* on STS-33 in April 1989, will orbit Venus and map its surface with radar, since the cloud cover of the planet obscures direct imaging. The probe was formerly known as the Venus Radar Mapper.

Galileo and Ulysses are baselined for launch aboard the Shuttle

either on STS-39 in November 1989 or STS-49 in October 1990.

Galileo will orbit Jupiter for nearly two years to measure electromagnetic fields, plasma particles and other conditions in the Jovian system. Galileo will send a probe into the Jovian atmosphere and will conduct the most detailed studies yet of Jupiter's major moons. The mission is a joint project of NASA and West Germany, which developed the retro-propulsion system for the probe's descent into the clouds of Jupiter.

Ulysses, a joint project of NASA and the European Space Agency, was formerly named the International Solar Polar Mission. Its study of the solar poles will be the first of those regions of the Sun. The probe was funded and built by ESA and includes some American-built scientific instruments.

All four planetary probes are managed by the Jet Propulsion Laboratory. The upper stage integration for each of the missions is being managed by the Marshall Space Flight Center.

Boeing opens Shuttle 'central supply'

In the simplest of terms, Boeing Aerospace Operations' new Flight Equipment Processing facility might be considered "central supply" for all future space shuttle missions.

The new building, less than a half-mile away from JSC officially opened Nov. 22. It houses everything that will go aboard the shuttle when flights resume in 1988. That means everything from basic needs, like food, clothing and toiletries for the crew, to communications gear, cameras and exercise equipment, to the extravehicular mobility units that allow astronauts to perform work outside of the shuttle.

NASA awarded BAO the \$76.5 million, three-year Flight Equipment Processing Contract (FEPC) in December 1985. The BAO contract, which includes one two-year option and two five-year options, consolidates work previously performed by some 17 individual companies. BAO, which is headquartered in Cocoa Beach, Fla., is a division of Boeing Technical Operations, Inc., a subsidiary of The Boeing Company, Seattle.

Larry Elton, Operations Manager for Boeing-Houston said BAO hired a large number of people who had worked for the previous flight equipment processing contractors, and the biggest challenge

so far has been coordinating all the activity and personnel under one roof.

"By having everything under one roof, we're going to be doing a much better job for NASA at a much lower cost. We'll also be a lot more efficient," Elton added.

The "roof" Elton mentions is the FEPC processing laboratory, a 48,000-square-foot, one-level building, which is the second of what will be a three-building BAO complex in the Clear Lake area of Houston. BAO broke ground on the processing lab on Jan. 20, took initial possession just three months later and assumed full occupancy in June. The lab and the other two

identical, 40,000-square-foot office buildings, one of which is still under construction, form the nucleus of Boeing-Houston operations, which employs about 518 people in the local area. Approximately 185 of those employees currently work under the Flight Equipment Processing Contract, Elton said, but that number likely will grow to about 300 next year when preparation intensifies for Shuttle flights.

What keeps 185 people busy in the meantime? Elton said that as part of the contract, BAO provides NASA with all the equipment and food needed for astronaut training

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Holiday Events

EAA Christmas Dances are Dec. 12 and 13

Employees are invited to dance to the strains of the Nick Navarro Orchestra and Sunshine Festival Dec. 12 or Dec. 13 when the Employee Activities Association sponsors the annual JSC Christmas Dinner Dances at the Gilruth Recreation Center. The entree on Friday night is roast beef at \$12.50 per person. The prime rib dinner Saturday evening is \$17.50 per person. Festivities on both nights will begin with a social hour at 7 p.m., followed by dinner at 8 p.m. and dancing from 9 p.m. to 1 a.m. Tickets are on sale until 2 p.m. Dec. 9 in the Bldg. 11 Exchange Store. Coordinator Larry Davis advises that ticket lines often form before 8 a.m. and that a limited number of tickets are available for either night. For more information, call Davis at x2855.

New Year's Eve dance scheduled

The Employee Activities Association will sponsor a New Year's Eve dance beginning at 7 p.m. at the Gilruth Recreation Center. Music will be by the Nick Navarro Combo and Sunshine Festival. The evening will begin with a social hour at 7 p.m., a cold cut buffet at 8 p.m., dancing from 9 p.m. to 1 a.m. and breakfast from 12:30 to 1:30 a.m. Tickets are \$12 per person and will go on sale at 8 a.m. Dec. 9, in the Bldg. 11 Exchange Store. The tickets will be on sale until 2 p.m. Dec. 23.

PSI plans Christmas social

The Clear Lake/NASA Area Chapter of Professional Secretaries International (PSI) will hold a Christmas social during the next monthly meeting Dec. 10 at the Sheraton Kings Inn on NASA Road One. The activities will begin with a brief business meeting at 6 p.m., followed by dinner at 6:30 p.m. and a Christmas social afterwards. Members are asked to bring a canned good for donation to the needy. Tickets for the dinner are \$8.50 and may be obtained by calling Carrol Cribbs at 488-7070. For additional information, call Chapter President Jessie Gilmore at x2411 of Membership Chairman Betty Cobb at x3811.

Bulletin Board

Griffin to address NMA Wednesday at Gilruth Center

Former JSC Director Gerald D. Griffin, now head of the Houston Chamber of Commerce, will address the JSC Chapter of the National Management Association during the next dinner meeting, to be held at 5 p.m. Dec. 10 at the Gilruth Recreation Center. Donations of money or canned goods for Christmas giving will be collected at the door. The social hour will be followed by dinner at 6 p.m. in keeping with the holiday spirit, spouses and friends are invited. For reservations, contact your booster.

AIAA Section observes 25th anniversary

The Houston Section of the American Institute of Aeronautics and Astronautics will observe its 25th anniversary with a champagne reception beginning at 5:30 p.m. Dec. 18. The reception, to be held at the Gilruth Recreation Center, will feature champagne and hors d'oeuvres from 5:30 to 6:30 p.m., remarks from past chairmen, fellows, honorary fellows and distinguished guests from 6:30 to 7 p.m., and a slide presentation by Dick Underwood, "The Past 25 Years of the AIAA at JSC." Mementos of the occasion will be given to each person in attendance. Tickets are \$9 and reservations are due by noon Dec. 15. For reservations, call Pat at 333-4150; Susan or Emily at x2741, Joanie at 280-1500, x3499, Dee Dee at 333-6492, or Toby at (409) 845-1600.

'Frontiers of High Technology' is Dec. 17

The Clear Lake Council of Technical Societies, the Institute of Electronic and Electrical Engineers and the Instrument Society of America will host a 2-hour video program Dec. 17 on some of today's most advanced technologies. The program, "Frontiers of High Technology," covers topics such as fiber-optics, artificial intelligence, micron and submicron line technology, automotive electronics and alternative energy sources. For more information on the program, call Dr. Zafar Taqvi, 333-6544, or Ray Baker at x4509.

BAPCO's next meeting is Jan. 20

BAPCO, the Bay Area PC Organization, will hold its next monthly meeting at 7:30 p.m. Tuesday, Jan. 20, at the Holiday Inn on NASA Road 1. The group has recently organized a special interest group for beginners, and will cover DOS, word processing, spreadsheets and databases. The local IBM PC users group is open to all persons with an interest in microcomputers and meets regularly on the third Tuesday of each month. For more information, call Earl Rubenstein, x3501 or Jack Calvin, x2983.

Cohen to speak at AFCEA luncheon

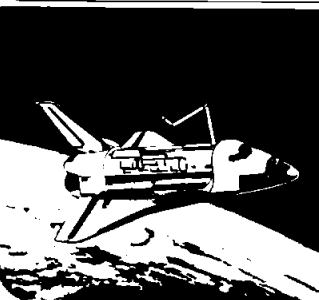
Dr. Aaron Cohen, JSC director, will be guest speaker at the Armed Forces Communications and Electronics Association (AFCEA) luncheon December 16. The AFCEA Houston Space Chapter meeting will begin at 11:30 a.m. at the Holiday Inn on NASA Road 1. Cost is \$8. To make reservations, due by Friday, December 12, call Sharon Carr at 280-6018 or Jerri Huff at 280-6019.

NACA reunion planned for 1988

Planning is under way for the fourth reunion of former employees of the National Advisory Committee for Aeronautics, one of the predecessor organizations of NASA. The reunion will be held in the San Francisco bay area Sept. 20 through Oct. 2, 1988. To ensure receiving more definite information on the reunion when it becomes available, interested people should send their current address to: NACA Reunion Committee, Mail Stop 241-4, Ames Research Center, Moffett Field, CA, 94035.

NASA
Lyndon B. Johnson Space Center

Space News Roundup



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Astronauts Pierre Thuot and Frank Culbertson (with helmet) assist Astronauts G. David Low and Jerome Apt after their slide-wire basket has descended from a "trouble-plagued" Atlantis during recent emergency egress exercises at Kennedy Space Center. The Astronauts didn't actually ride the slides during the simulation on Pad 39B for safety reasons.

JPL geologist finds ancient Mojave move

Violent earthquakes along the San Andreas Fault millions of years ago may have rotated the northwest Mojave Desert region about 25 degrees clockwise, according to a recently completed Jet Propulsion Laboratory study.

According to JPL Geologist Dr. Matthew Golombek, "results of magnetic studies of volcanic rocks taken from 19 sites suggested the movement was caused by shear from the Pacific Plate sliding along the fault past the North American Plate in a northwesterly direction".

Shear is the force that causes parallel planes, such as the Earth's tectonic plates, to slide past or over one another.

Golombek, who conducted the study this past summer with Dr. Laurie Brown of the University of Massachusetts, said the tectonic motion occurred in a series of violent earthquakes over millions of years. More than 100 core samples were taken from the 20-million-year-old Saddleback Basalt and 56 samples were taken from the Red Buttes Quartz Basalt around Boron and Kramer Junction, he said.

"We believe the rotation occurred between 20 million and 16 million years ago. Magnetic minerals line up parallel to the Earth's magnetic field to the north. Because the magnetic minerals in the rocks are now pointing about 25 degrees to the east of the north magnetic pole, we could determine that tectonic movement rotated the rocks," Golombek said.

"From the period of 16 million years ago to the present, there is no indication of rotation. Clockwise rotation of the northwest Mojave agrees in direction with the bending of the southern Sierra Nevada Mountains due to shear from the tectonic motion along the San Andreas Fault. The rotation occurred before the formation, about 10 million years ago, of the Garlock Fault which separates the Mojave from the Tehachapi Mountains and runs in a northeast-southwest line," the NASA scientist concluded.

The study was made for the Geodynamics Branch of NASA's Earth Science and Applications Division, NASA Headquarters.

NET logo wins contest

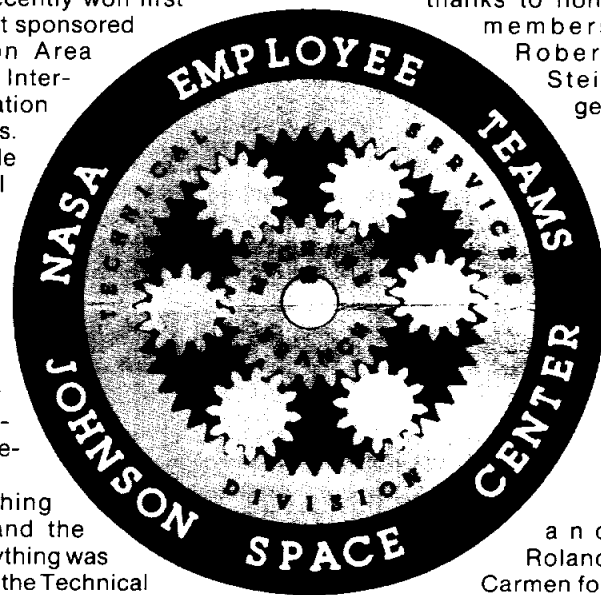
A logo designed and built by the Machine Branch NET (NASA Employee Team) recently won first prize in a contest sponsored by the Houston Area Chapter of the International Association of Quality Circles.

The team, made up of Technical Services Division employees, accepted the award at the Houston Marriott Astrodome on November 13. It was the only NASA team recognized at the ceremony.

"The whole thing was designed and the artwork and everything was done right here in the Technical Services Division," said Don Petty, co-leader.

The other team members are co-leader Kevin Lezenski, Terry Bromley, Joyce Davis, Ray Dunn,

Willie Richardson, Joe Zamatis and Tom Hall. The team offered special thanks to non-members Robert Steiger



and Roland Carmen for their help with the logo artwork.

Twenty-one NETS have been established at JSC since the program began in April 1984.

Computer experts seek commonality

Participants challenged to 'change the world'

By Kelly Humphries

NASA computer experts are discussing ways to curb the proliferation of program-specific hardware and software that is adding to the cost of space flight.

More than 350 computer experts gathered October 28-30 at JSC to discuss the issue of commonality in computing for NASA flight systems. Participants representing all NASA centers, numerous contractors, other federal agencies, and universities came from as far away as New York and Oregon for the conference.

"I think the time for commonality is now and I hope you people are here to change the world in that regard," said Dr. Winston Royce of the LMSC/Lockheed Software Technology Center in his keynote address, "Why Hasn't Commonality Happened?"

In the long run, he said, productivity is directly related to the amount of existing work that can be used in developing new software. But the necessarily parochial attitude of program managers trying to meet deadlines using limited resources requires development of ways to calculate the initial added cost of building reusable systems and decisions on who will pay that

cost. The key to meeting those needs is establishing quantitative measures of degrees of reuseability, he said.

In welcoming participants to JSC, Joseph P. Loftus, assistant director for plans, said that the trend in NASA is to use computers to help complete more work with less money and fewer workers. Software is a crucial element in that equation, he said, as it provides an important economic lever. The commitment to reusable facilities makes the topic of computer commonality important to the future of all NASA programs, not just the Space Station, he said.

William Djinis, program manager in Headquarters' advanced programs office, called the escalating cost of computing a "nightmare" that will be compounded by the increasing complexity of interactive space flights.

Robert Musgrove, of JSC's avionics system division data operations branch, spent six months coordinating the workshop with the help of Lockheed Engineering and Management Services. He said he was pleased with the attendance.

"We got a different slice (of people) within the agency than normal conference goers," he said.

There was a good mix of people from academic institutions, industry and government, he explained, and a good contingent of people from the institutional level who will have to implement commonality if it is embraced.

"What came out of this is that commonality is a great thing, but then the budget kind of shifts that aside," Musgrove said. "The charge of the panels was, 'Don't let it die here.'"

One consistent theme during panel discussions was that any commitment to commonality has to come from the top levels of management if the effort is to succeed, he said. Some of the conference participants are working to develop a coalition of Code M, Code S and Code E managers dedicated to reaping the cost savings that computer commonality appears to present.

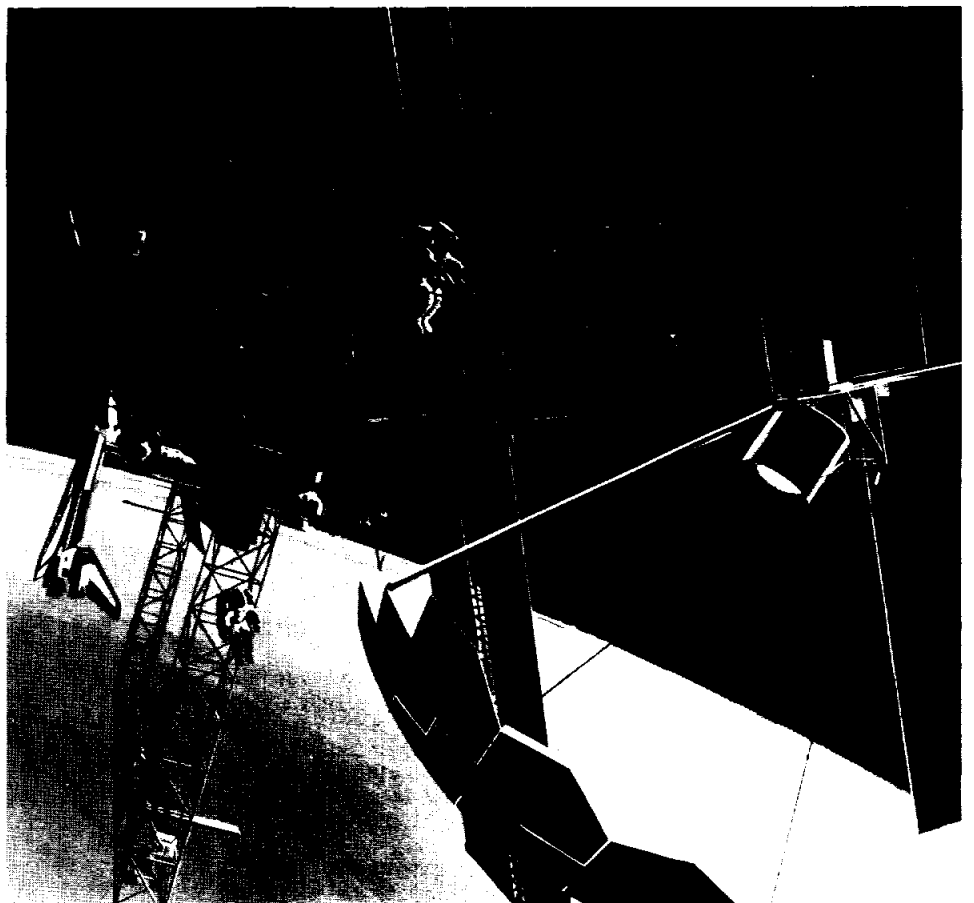
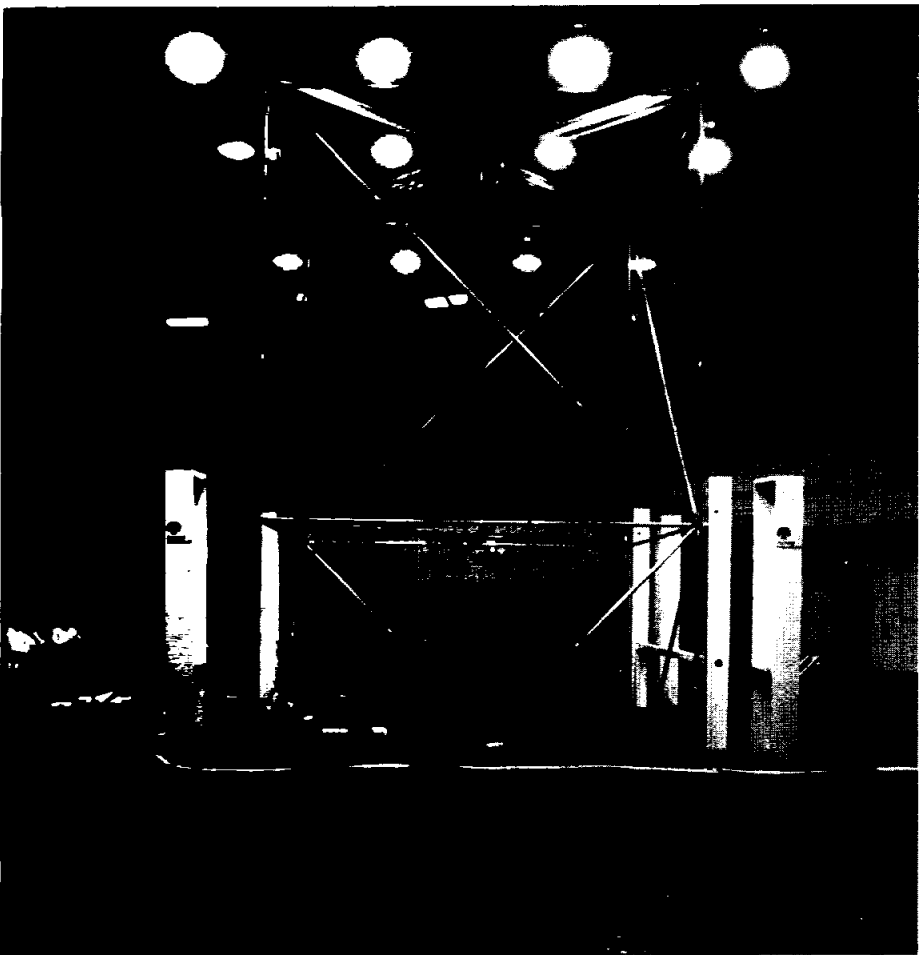
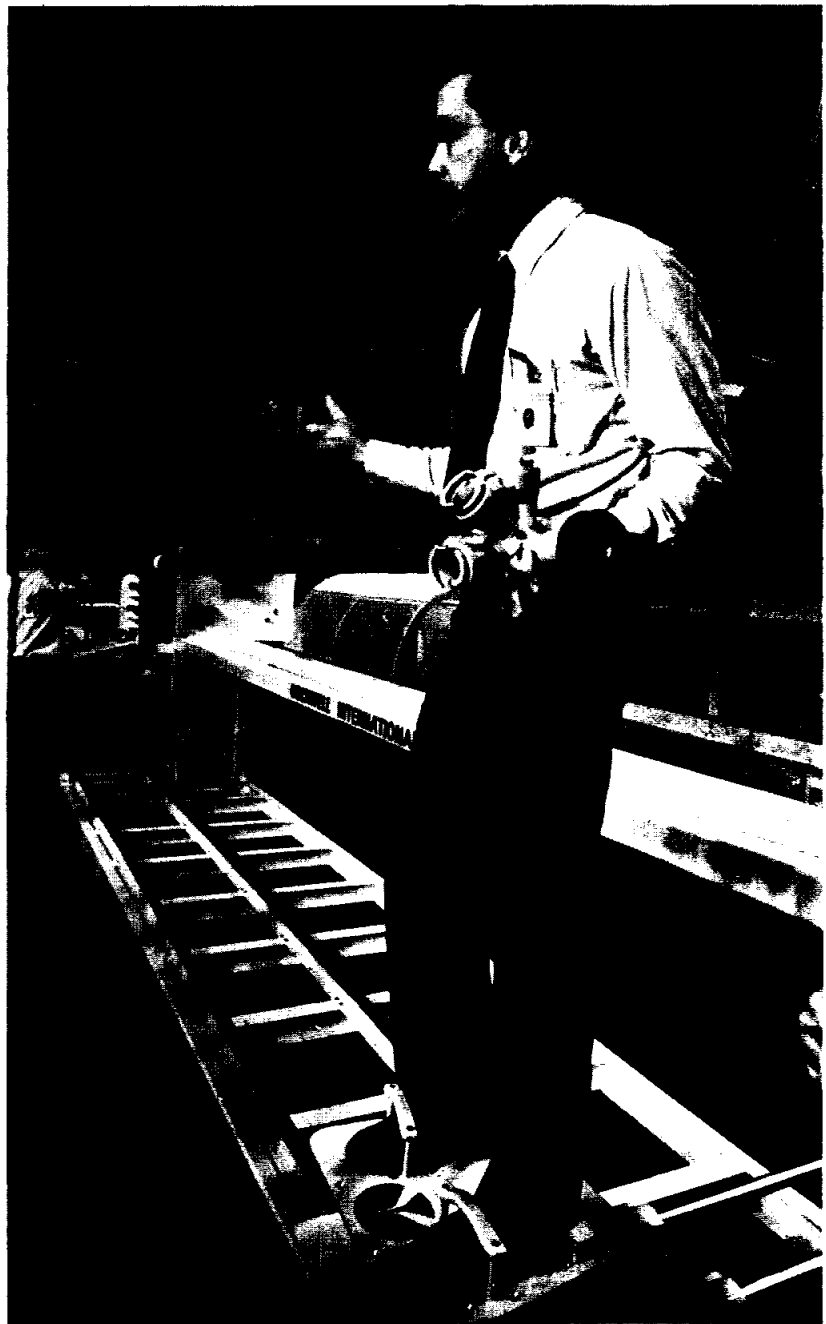
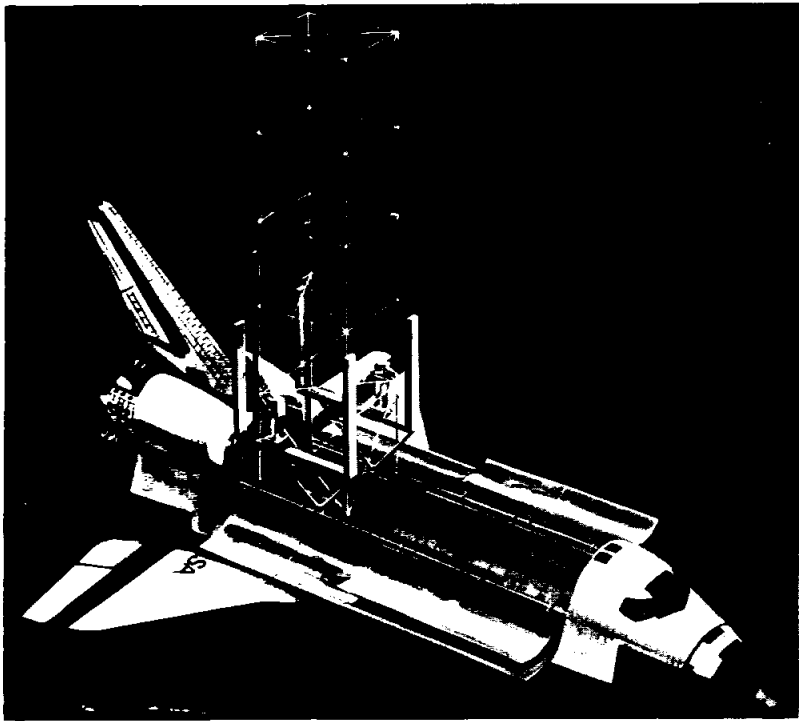
During Mercury, Gemini and Apollo, he said, systems had short, finite lifespans. But moving into the Space Shuttle and Space Station programs means that systems have to be developed that will continue to work for 20 years.

"The get-in, get-out kind of mindset has gone by the boards now," Musgrove said.

In Space Station we truss

For the past several weeks, Rockwell International's Space Station Systems Division has been performing engineering evaluations and astronaut tests on its new Space Station Truss Assembly Fixture (SSTAF) in JSC's Weightless Environment Training Facility (WET-F). Astronauts will stand on the SSTAF's sliding foot restraints as they connect each graphite/epoxy strut to form cubes that will be the building blocks for the dual keel Space Station frame.

Clockwise from right, Paul DeWolfe, project manager, explains the operation of corner fittings; an artist's rendition of the Space Station in orbit; one of the five-meter cubes rises out of the WET-F tank; and an artist's rendition of a truss being assembled.



Half of FEPC work is processing space suits

(Continued from page 1)

and simulated flight exercises. Other current BAO activities include setting up an inventory of Shuttle supplies, procuring necessary equipment, organizing operating systems, food processing, fitting astronauts for space suits, and refurbishing, repairing and recycling equipment used in crew training.

BAO has completed three simulated flights and is now working on another, Elton said. Future simulations are scheduled for April and July 1987.

Essentially, the simulated flights are carried out the same as the real thing. The only difference is that equipment assembled for training exercises is not sent on to the

Kennedy Space Center as it would be for an actual launch. Ed Young, FEPC deputy program manager, compared it to a dress rehearsal.

"What we do is simulate a mission," Young said. "We go through all the exercises to get the flight ready, but we just don't send it to KSC."

That includes what's known as a bench review by the astronauts assigned to that "mission." Young said after assembling all the necessary equipment and ensuring that it's all in proper working order, FEPC employees load the supplies into "isopods," which are the actual storage lockers placed aboard the shuttle. The crew for that particular "mission" then reviews the contents and makes final decisions on equipment needs, just as it would

prior to a real flight.

After the bench review, Young said the lockers are taken to Ellington Field to simulate air transport to KSC. But then reality sets in, and as Young said, "we make believe there's an airplane" at Ellington to ship the lockers to KSC.

Instead, the lockers actually are taken to JSC where NASA personnel mix up the contents to simulate astronauts hurriedly putting everything away prior to landing.

The simulation continues with BAO employees going through the returned inventory, reprocessing the equipment and recycling what can be used again for another mission — simulated or real. The entire process takes about 60 working days.

In addition to the simulated flights, Elton said other training exercises keep FEPC personnel busy and help maintain processing proficiency. One example is the underwater, or "neutral buoyancy," testing that helps astronauts experience a zero-gravity environment. This training takes place at NASA's facility, but BAO employees are responsible for fitting astronauts in the space suits called extravehicular mobility units, or EMUs.

"About half of the total FEPC work is processing the space suits," Elton said. "They have to be processed properly because when the astronauts are outside the shuttle, they are vulnerable."

The blue in-flight coveralls that are the regular astronaut uniform also are provided by the FEPC

facility. While it's a basic design, Young said minor modifications can be made to accommodate individual astronaut requests, such as an extra pocket. Boeing employees also attach the various patches, logos and emblems that symbolize a particular mission.

The FEPC food facility allows astronauts to pick from more than 100 menu items, including fruit cocktail, steak, broccoli au gratin and chocolate pudding. John Satterlee, FEPC factory manager, said a variety of methods are used to prepare the foods for the zero-gravity atmosphere of space, some of which are freeze drying, rehydrating and irradiation. But he said some food can be packed in its natural form, like bread, cookies and nuts.

