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NASA News

National Aeronautics and
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Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

Jeffrey E. Carr
RELEASE NO. 88-001

February 04, 1988
3 pm CST

NASA ANNOUNCES SHUTTLE CREW

NASA today announced crew members for Shuttle mission STS-28, currently targeted for late 1988. STS-28 will be a Department of Defense (DOD) mission aboard the Space Shuttle Columbia.

The crew will be commanded by Col. Brewster H. Shaw, Jr. (USAF). Pilot for the mission will be Cdr. Richard N. Richards (USN). Cdr. David C. Leestma (USN), Lt. Col. James C. Adamson (USA), and Maj. Mark N. Brown (USAF) have been assigned as mission specialists.

Shaw has previously flown as pilot on STS-9 and as commander of STS-61B. He was born May 16, 1945 in Cass City, MI.

Richards will make his first Shuttle flight. Richards was born Aug. 24, 1946 in Key West, FL, but considers St. Louis, MO his hometown.

Leestma has flown previously as a mission specialist on mission STS-41G. Leestma was born May 6, 1949 in Muskegon, MI, but considers Tustin, CA his hometown.

Adamson will make his first Shuttle flight also. He was born March 3, 1946 in Warsaw, NY, but considers Monarch, MT his hometown.

Brown will also make his first spaceflight. Brown was born Nov. 18, 1951 in Valparaiso, IN.

# # #

NASA News

National Aeronautics and
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Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

Kyle Herring
Release No. 88-002

Feb. 8, 1988

NEW INITIATIVES OFFICE FORMED AT JOHNSON SPACE CENTER

NASA Johnson Space Center has formed a New Initiatives Office, Director Aaron Cohen has announced.

The office will be the initial JSC focal point for NASA Headquarters, other agencies and private industry in the activation and development of all new initiatives. It is responsible for supporting all JSC elements in the development and management of science and technology projects and flight demonstrations. It also will support headquarters in forming strategies for exploration of space.

"The exploration and exploitation of space by American astronauts will force us to develop new solutions to old problems and create new technologies to meet new challenges," Cohen said. "The New Initiatives Office will focus JSC's activities in that area and help translate ideas into full-scale approved projects."

William Huffstetler, previously assistant director of engineering, has been assigned as manager of the New Initiatives Office. Other personnel assignments within the organization are:

Jerry Craig, manager of the Crew Emergency Return Vehicle (CERV) Office. He previously was deputy manager of the Space Station Projects Office. CERV will be used should an emergency evacuation of the Space Station be required.

William Milligan, Jr., manager of the Advanced Projects Definition Office. He has been deputy manager, Flight Projects Engineering Office.

Harry Erwin, Jr., manager Technology and Commercial Projects Office. He was manager of the Flight Projects Engineering Office.

Curtis LeBlanc, manager, Flight Projects Office. He has been manager, Project Implementation Office.

Mark Craig, manager, Lunar and Mars Exploration Office. He was special assistant to the director of engineering.

Assignments of Senior Executive Service members Huffstetler and J. Craig will be on an acting basis until approved by NASA Headquarters.

# # #

NASA News

National Aeronautics and
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Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

February 12, 1988

Terry White
RELEASE NO: 88-003

NOTE TO SCIENCE EDITORS:

NASA JOHNSON SPACE CENTER HOSTS 19TH
LUNAR & PLANETARY SCIENCE CONFERENCE

Almost 700 scientific and technical papers will be presented at the 19th Lunar and Planetary Science Conference March 14-18, 1988 at the NASA Johnson Space Center in Houston.

Concurrent sessions begin each morning at 8:30 in the JSC Gilruth Recreation Center. The conference will have 27 technical sessions and one evening special session. A total 696 papers will be presented.

Session topics cover geology and geophysics of Mars and Venus, planetary impact cratering; and meteorites, asteroids and comets. The evening special session Tuesday March 15 is on noble gases and solar system history.

Media covering the conference should register in Gilruth Center Room 201 where conference abstract volumes will be available.

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NASA News

National Aeronautics and
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Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

Kyle Herring
RELEASE NO. 88-004

February 29, 1988
9:00 a.m. CST

ASTRONAUT GROUP PROVIDES INTERFACE WITH SPACE SHUTTLE CUSTOMERS

Astronauts at NASA's Johnson Space Center have created an Astronaut Science Support Group to provide direct interaction with prospective experimenters on Space Shuttle and Space Station missions.

Members of the group and their specialties are Franklin Chang-Diaz, plasma and space physics; Mary Cleave, biological materials processing; Bonnie Dunbar, materials processing; Jeff Hoffman, astrophysics and remote sensing; Jerry Ross, extravehicular activity, satellite servicing and space construction; and Rhea Seddon, life sciences.

The group focuses on increasing scientific and engineering flexibility of experiments in space without violating Shuttle operational guidelines.

Based on experience gained from Space Shuttle missions, the group believes that increasing crew involvement in the design, development and operation of experiments will improve the return of data and simplify repair of equipment in space. This is particularly important in maximizing the scientific return from each experiment.

The group considers its primary goals to be:

- Transmitting operational experience gained from Shuttle missions to the science and technology user community to optimize the use of Orbiters as test beds for scientific and engineering research.

- Utilizing the crew as a critical element, both on the ground and in flight, in more efficient experiment operation while giving the experiment an added degree of flexibility for real-time repair and fine tuning.

- Serving as advisors to the National Space Transportation System and the Space Station programs on science and technology issues.

-more-

• Maintaining a group of scientists and engineers to do research and interact with potential experimenters in a wide variety of areas.

Since many Shuttle experiments are being designed for possible use on the Space Station, the group is working with the Space Station program to ensure proper transition from one to the other. To do this, the group is working with NASA organizations responsible for manifesting and integrating science and technology payloads including the Payload Integration Office, Crew Integration Office, Space Station Office, and Flight Training Branch.

In order to enhance scientific return by balancing automation with crew involvement in Shuttle experiments, the group meets with potential customers and principal investigators in three formats:

First, a highly informal and interactive one which meets once a week and focuses on specific Shuttle-related experiments seeking to identify operational issues early in the design process.

Second, a bi-monthly astronaut science colloquium which involves multiple presentations and scientific exchanges with invited lecturers from particular disciplines. This is a more formal two-way exchange lasting half a day.

Third, a 30-minute film developed by the group entitled "Shuttle Science Operations: Lessons Learned" is used by astronauts during speaking engagements and other presentations to scientific and technical groups.

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NASA News

National Aeronautics and
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Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

Jeffrey Carr
February 29, 1988
RELEASE NO. 88-005

NASA TO ADD SECOND SHUTTLE CARRIER AIRCRAFT TO FLEET

NASA today announced plans to acquire a Boeing 747-100 jetliner to serve as a second Shuttle Carrier Aircraft (SCA) for the Space Transportation System.

A letter contract has been signed with Boeing Military Airplane Co., a division of The Boeing Company to reserve the aircraft for NASA use. The additional SCA will provide increased ferrying capability and eliminates a potential single-point failure in the Space Transportation System.

The 231-foot long aircraft will be modified to carry Shuttle orbiter vehicles from landing sites to orbiter processing facilities at the Kennedy Space Center. Modifications will be made by Boeing at their manufacturing facilities in Wichita, Kansas. The 747-100 is nearly identical to the original SCA, and was selected in order to minimize costs associated with modifications and operation.

The original SCA has transported orbiters since 1977 when the orbiter Enterprise was first used for unpowered atmospheric flight tests. Since then, Columbia, Challenger, Discovery, and Atlantis have all been ferried coast to coast atop the SCA.

Total cost of the aircraft and the required modifications is currently under negotiation. That figure is expected to be available this summer.

# # #

NASA News

National Aeronautics and
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Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

March 1, 1988

Jeffrey E. Carr
RELEASE NO. 88-006

ASTRONAUT PARKER TO HEAD SPACEFLIGHT/SPACE STATION INTEGRATION

Veteran astronaut Robert A.R. Parker, Ph.D. has been assigned temporary duty at the Office of Space Flight, NASA Headquarters in Washington D.C. effective immediately.

Parker will serve as Director of the Space Flight/Space Station Integration Office, reporting directly to the Associate Administrator for Space Flight, Rear Adm. Richard H. Truly.

The Space Flight/Space Station Integration Office was established in 1987 to facilitate the integration of the Space Station and its unique requirements into the Space Transportation System. The office coordinates the exchange of information between the two programs and serves as a forum for presenting and resolving technical and programmatic issues.

Prior to his selection as a scientist-astronaut in 1967, Parker was an associate professor of astronomy at the University of Wisconsin. After joining NASA, he served as a member of the astronaut support crews for Apollo 15 and 17. Parker also served as Program Scientist during the three manned Skylab missions. In November and December of 1983, he made his first space flight as mission specialist on STS-9, the first Shuttle/Spacelab mission.

He has received the NASA Exceptional Scientific Achievement Medal (1973) and the NASA Outstanding Leadership Medal (1974).

Parker replaces former director E. William Land who retired in January.

# # #

NASA News

National Aeronautics and
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Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

Brian Welch
RELEASE No. 88-007

For Release
March 10, 1988

THREE NEW FLIGHT DIRECTORS NAMED

Three new flight directors have been named within the Mission Operations Directorate at the Johnson Space Center.

The three, all of whom are former flight operations controllers, are Robert E. Castle, Jr., N. Wayne Hale, Jr., and Robert M. Kelso.

Mission Operations Director Eugene F. Kranz also announced that Michele A. Brekke, a flight director since 1985, has accepted a position as a payload integration manager in the National Space Transportation System Integration and Operations Office.

During Space Shuttle missions, flight directors lead the large cadre of operators within the Mission Control Center who are responsible for monitoring spacecraft systems and operations. Flight directors have overall responsibility for the conduct of the mission and for real-time decision making as mission events unfold.

Castle, Head of the Communications Section, Systems Division, has served as Instrumentation Communications Systems Officer, or INCO, for several Shuttle missions. He began his career at JSC in June 1976 as a summer intern and is the recipient of numerous group achievement and performance awards.

He was born Nov. 7, 1953, and graduated from Lord Botetourt High School in Daleville, Virginia, in 1972. From 1972 to 1978, he attended Virginia Polytechnic Institute and State University, where he earned a bachelor of science and a master's in electrical engineering.

Hale, Head of the Propulsion Systems Section, Systems Division, has also served as Head of the Communications Section and as a senior propulsion systems flight controller on Shuttle missions. He began his career at JSC in June 1978 and has received numerous group achievement and performance awards.

-more-

Hale was born July 5, 1954, and graduated from Hobbs High School in Hobbs, New Mexico, in 1972. He earned a bachelor of science in mechanical engineering from Rice University in 1976 and a master's in mechanical engineering from Purdue University in 1978.

Kelso, Head of the Payload Support Planning Section, Operations Division, has served as a payloads flight controller on several Shuttle missions. He began his NASA career at JSC in May 1973 as a cooperative education student and summer aide. He is the recipient of numerous group achievement and performance awards and is the author of several technical papers.

Kelso was born Jan. 16, 1954, and graduated from LaMarque High School in LaMarque, Texas, in 1973. He earned a bachelor of science in physics from Austin College in 1977.

# # #

NASA News

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

Jeffrey Carr
March 17, 1988
RELEASE NO. 88-008

NASA ANNOUNCES THREE NEW SHUTTLE CREWS

NASA today named crew members for three Shuttle missions scheduled to fly in 1989. This announcement concludes crew selection activities planned prior to the resumption of Shuttle flights in August of this year.

Shuttle mission STS-29, scheduled for launch January 19, 1989 will be commanded by Capt. Michael L. Coats (USN). Pilot for the mission aboard Discovery will be Col. John E. Blaha (USAF). Col. James F. Buchli (USMC), Col. Robert C. Springer (USMC), and James P. Bagian, M.D., have been assigned as mission specialists.

The primary mission objective will be to deploy a third Tracking and Data Relay Satellite (TDRS-D). Based on the current Shuttle flight manifest, STS-29 is scheduled to fly after STS-27 and before STS-28.

A five-member crew has also been named for Shuttle mission STS-30, slated for launch April 27, 1989. Commanding the four-day mission aboard Atlantis will be Capt. David M. Walker (USN). The pilot will be Col. Ronald J. Grabe (USAF). Norman E. Thagard, M.D., Mary L. Cleave, Ph.D., and Maj. Mark C. Lee (USAF), have been named as mission specialists.

Their mission objective will be to deploy the planetary probe Magellan. Magellan is scheduled to arrive at Venus in mid-1990, and will map the entire surface of Venus for the first time, using specialized radar instruments.

STS-31 will feature deployment of the Hubble Space Telescope and is targeted for launch June 1, 1989. Col. Loren J. Shriver (USAF) will command the mission. Pilot will be Col. Charles F. Bolden (USMC). Steven A. Hawley, Ph.D., Capt. Bruce McCandless II (USN), and Kathryn D. Sullivan, Ph.D., will fly as mission specialists.

-more-

From its position in orbit 373 miles above the earth, HST will be used to gather astronomical data with resolution 7 to 10 times greater than that of Earth-bound telescopes.

STS-29

Coats has flown as pilot on mission STS 41-D in August 1984. Coats was born January 16, 1946 in Sacramento, CA, but considers Riverside, CA, to be his hometown.

Blaha will make his first space flight since his selection in 1980. He was born August 26, 1942 in San Antonio, TX.

Buchli will make his third Shuttle flight. His first was as a mission specialist aboard Discovery for the first Department of Defense mission, STS 51-C in January 1985. He also served as mission specialist on STS 61-A (Spacelab D-1) in October 1985. He was born June 20, 1945 in New Rockford, ND, but considers Fargo, ND, his hometown.

Springer was selected by NASA in 1980, and will make his first space flight. He was born May 21, 1942 in St. Louis, MO, but considers Ashland, OH, to be his hometown.

Bagian will make his first space flight since his selection in 1981. He was born February 22, 1952 in Philadelphia, PA.

STS-30

Walker flew previously as pilot aboard Discovery on mission STS 51-A in November 1984. Walker was born May 20, 1944 in Columbus, GA, but considers Eustis, FL, to be his hometown.

Grabe will make his second space flight also. He flew as pilot on STS 51-J, a Department of Defense mission. Grabe was born June 13, 1945 in New York, NY.

Thagard makes his third space flight after serving as mission specialist on STS-7 in June 1983 and on STS 51-B in April 1985. Thagard was born July 3, 1943 in Marianna, FL, but considers Jacksonville, FL, to be his hometown.

Cleave flew previously as mission specialist on STS 61-B in November 1985. She was born February 5, 1947 in Southampton, NY.

Lee makes his first flight in space since his selection in 1984. He was born August 14, 1952 in Viroqua, WI.

--more--

STS-31

Shriver has flown previously as pilot on Department of Defense mission STS 51-C in January 1985. Shriver was born September 23, 1944 in Jefferson, IA, but considers Paton, IA, to be his hometown.

Bolden was pilot on STS 61-C in January 1986, and makes his second space flight. Bolden was born August 19, 1946 in Columbia, SC.

Hawley makes his third flight after serving as mission specialist on STS 41-D in August 1984 and again on STS 61-C in January 1986. Hawley was born December 12, 1951 in Ottawa, KS, but considers Salina, KS, to be his hometown.

McCandless flew previously as mission specialist on STS 41-B in February 1984. McCandless was born June 8, 1937 in Boston, MA.

Sullivan served as mission specialist on STS 41-G in October 1984, and makes her second space flight. She was born October 3, 1951 in Paterson, NJ, but considers Woodland Hills, CA, to be her hometown.

# # #

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

March 21, 1988

Terry White
RELEASE NO. 88-009
NOTE TO EDITORS:

HOUSTON SYMPOSIUM COVERS
NEXT-CENTURY SPACE EFFORTS

A three-day scientific and technical symposium on what may be the nation's 21st century space goals will be held April 5-7, 1988 at the Westin Galleria Hotel in Houston's Galleria Shopping Mall.

The Lunar Bases and Space Activities of the 21st Century symposium will be sponsored jointly by NASA, the American Institute of Aeronautics and Astronautics, American Nuclear Society, American Society of Civil Engineers, American Geophysical Union, Space Studies Institute, National Space Society and the Lunar and Planetary Institute. NASA Johnson Space Center Director Aaron Cohen is symposium general chairman.

Concurrent sessions will cover the scientific and technical aspects of establishing and supporting lunar bases and exploration of Mars, and the policy and social issues that go with solar system exploration.

Media correspondents planning to cover symposium sessions and to interview participants should register at the Symposium registration desk.

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NASA News

National Aeronautics and
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Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

Terry White
RELEASE NO. 88-010

For Release
March 24, 1988

EVA RETRIEVER FACT SHEET

EVA Retriever concept is an autonomous free-flying robot for retrieving equipment or a spacewalking astronaut drifting in separated flight near the Space Station. The device combines the proven Manned Maneuvering Unit (MMU) with a robot latched in where an astronaut normally would be. MMU was flown eight times from Space Shuttle's cargo bay in test flights and for satellite repair spacewalks.

Responding to voice commands from the Space Station crew, EVA Retriever would activate and check itself out, search for and lock onto the "target," thrust toward, rendezvous with, and grapple the target---automatically avoiding any obstacles such as Space Station structure en route. After grappling the target, the EVA Retriever would search for the Space Station, and, finding it, return home.

A ground-based prototype of the EVA Retriever is under development at JSC. The project has just completed the first year of a two-year program.

Television tracking and laser radar ranging signals are used by "smart" software in an onboard computer to plan and command search and rendezvous maneuvers in a simple environment without obstacles. Robotic arms and hands are used to grapple the target when in range.

The developmental EVA Retriever currently is using nine words of a 200-word vocabulary to which it responds: Activate and Quick-Activate, Search, (tool, astronaut, home), Rendezvous, Reach (extend arm with open hand), Grapple (close hand), Manual (allows operator to modify Retriever's automatic sequencing), Wait and Shutdown. Not only does EVA Retriever carry out the commands it hears, but it also acknowledges those commands with a human voice.

In JSC ground tests, EVA Retriever is "flown" in two dimensions on a 3-thousandths-inch layer of compressed air on the Precision Air-Bearing Floor.

If EVA Retriever is approved and funded for space operations, the device first would be tested from Space Shuttle's cargo bay before signing on for permanent employment aboard Space Station in the 1990s.

-more-

EVA Retriever is a joint development of JSC Tracking and Communications Division, Crew and Thermal Systems Division, Systems Development and Simulation Division, and Avionic Systems Division.

Industry participants in the EVA Retriever development are:

Martin Marietta Aerospace: MMU
Odetics: 3-D Imaging Laser Radar
McDonnell Douglas Astronautics Company: Video Tracking System
Inmos Corporation: Central Computer
Votan: Voice Control System
Remote Technology Corporation: Robot Arms/Hand
JSC (in-house): Software; Retriever Body and Hand.

NASA News

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

Terry White
March 25, 1988
RELEASE NO. 88-011

NOTICE TO EDITORS:

JSC ENGINEERS DEMONSTRATE

ROBOT SPACE RETRIEVER

The EVA Retriever will be demonstrated for the media at 10 am April 7 in the Johnson Space Center Building 9A.

EVA Retriever concept is a free-flying robot for retrieving objects and astronauts accidentally separating from Space Station that will combine the Manned Maneuvering Unit with computerized tracking and ranging systems and robotic arms and hand. Retriever obeys voice commands.

Current JSC ground tests are aimed toward designing and demonstrating highly-autonomous robotic hardware and software for self-checkout and activation, searching for and acquiring targets, tracking and maneuvering toward targets, grappling targets, and, job done, flying EVA Retriever home.

The EVA Retriever is ground-based developmental prototype that will activate itself, seek out, fly toward and grapple a simulated tool in the press demonstration. The prototype serves as a hardware/software technology-development testbed.

The EVA Retriever is "flown" on a 3-thousandths-inch layer of compressed air on the Building 9A Precision Air-Bearing Floor west of the Full-Fuselage Trainer and Crew Cockpit Trainer mockups.

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NASA News

National Aeronautics and
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Lyndon B. Johnson Space Center
Houston, Texas 77058
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Billie Deason
Release No. 88-012

For Release
March 24, 1988

JOHNSON SPACE CENTER TO HOST SAFETY SEMINAR

The Gulf Coast Chapter of the American Society of Safety Engineers will sponsor a safety seminar titled "Hazard Communication Standard: An Update" at the Gilruth Recreation Center, Johnson Space Center on Friday, April 1.

The seminar will review: Federal revisions to Hazard Communication Standard; user inventory systems for chemicals and MSDS's; community right-to-know and emergency planning; and effective industry and community planning in local chemical emergency.

Jay H. Greene, Chief, Safety Division, JSC, will deliver the keynote address.

The American Society of Safety Engineers seeks to promote the advancement of all safety disciplines.

Registration and additional information may be obtained from Arthur D. Shenoi at 713-483-6370 or Kim Gray at 713-483-6366.

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NASA News

National Aeronautics and
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Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

Kyle J. Herring
March 28, 1988
RELEASE NO: 88-013

NASA SELECTS BARRIOS TECHNOLOGY FOR JOHNSON SPACE CENTER CONTRACT

Barrios Technology Inc., Houston, has been awarded a five-year, $10,991,000 cost-plus-award-fee contract to perform technical support to the NASA Johnson Space Center's Mission Support Directorate.

All work under the Production Engineering and Information Management Support Contract will be performed at JSC and include technical support to a broad range of production engineering and information management tasks of the Mission Support Directorate's responsibilities related to the National Space Transportation System (NSTS), Space Station and institutional programs and projects.

Other bidders were Network Solutions Inc. and Omniplan Corp., both of Houston.

-end-

NASA News

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

April 7, 1988

Barbara Schwartz
Johnson Space Center, Houston
(Phone: 713/483-5111)

Barbara Selby
Headquarters, Washington, D.C.
(Phone: 202/453-2352)

RELEASE: 88-014

TELESCOPING POLE CHOSEN FOR CREW ESCAPE SYSTEM

A telescoping pole has been chosen as the egress method for the Space Shuttle's new crew escape system to be incorporated into the orbiter Discovery prior to the STS-26 flight in August.

The selection of the telescoping pole, over an alternative tractor rocket extraction system, was made at NASA Headquarters by National Space Transportation System Director Arnold D. Aldrich following a review of system design, test performance and flight hardware status.

"The NASA-contractor team has done a fantastic job in providing both the tractor rocket and telescoping pole systems to support the next Shuttle flight," Aldrich said. "The telescoping pole was selected as it has shown to be safer, simpler to operate, lighter weight and easier to support than the tractor rocket system, while meeting all escape system performance requirements."

Tests conducted in February and March, using a fixed pole extending through a hatch-like opening in a C-141 aircraft, demonstrated that the pole would provide adequate orbiter clearance in an emergency egress situation.

Navy parachutists, approximating the sizes of astronauts from the smallest to the largest, completed a total of 66 jumps using a lanyard attached to their parachute harness to slide down the pole and descend to a safe landing. Analysis of aerodynamic and photographic data showed that all the jumps provided the necessary clearance margins.

- more -

The telescoping pole, designed and manufactured at NASA's Johnson Space Center, Houston, is made of light-weight aluminum and steel and weighs 241 pounds. It is about 70 pounds lighter than the tractor rockets system. The rockets also have a 5-year operational shelf life limitation and additional processing requirements between flights.

The pole housing attaches to the orbiter's middeck ceiling and is 126.75 inches long. The primary extension is 112.54 inches (arched length), and the end extension is 32.65 inches.

For launch and landing, the unextended pole will be oriented toward the closed crew hatch. During on-orbit operations, the pole will repositioned toward the middeck lockers and stowed on the ceiling such that it will not interfere with the various flight crew activities in the middeck area.

This decision completes the crew escape system package. Already approved and implemented are the orbiter primary crew hatch jettison capability and crew support equipment -- a partial pressure suit, oxygen equipment, a parachute, a life raft and survival equipment for each crew member.

The escape system provides crew escape capability from the orbiter during controlled, gliding flight following failures or difficulties during ascent or entry where landing at a suitable landing field cannot be achieved. Previous procedures for ascent contingency aborts, where no landing site could be reached, required orbiter ditching in the ocean, a condition which has been shown by structural analysis to be extremely hazardous.

The side hatch jettison system also can be highly beneficial for certain ground contingencies following non-normal landings. A crew escape slide, similar to those provided on commercial airliners, has been implemented in conjunction with the jettisonable hatch to support rapid post-landing contingency egress.

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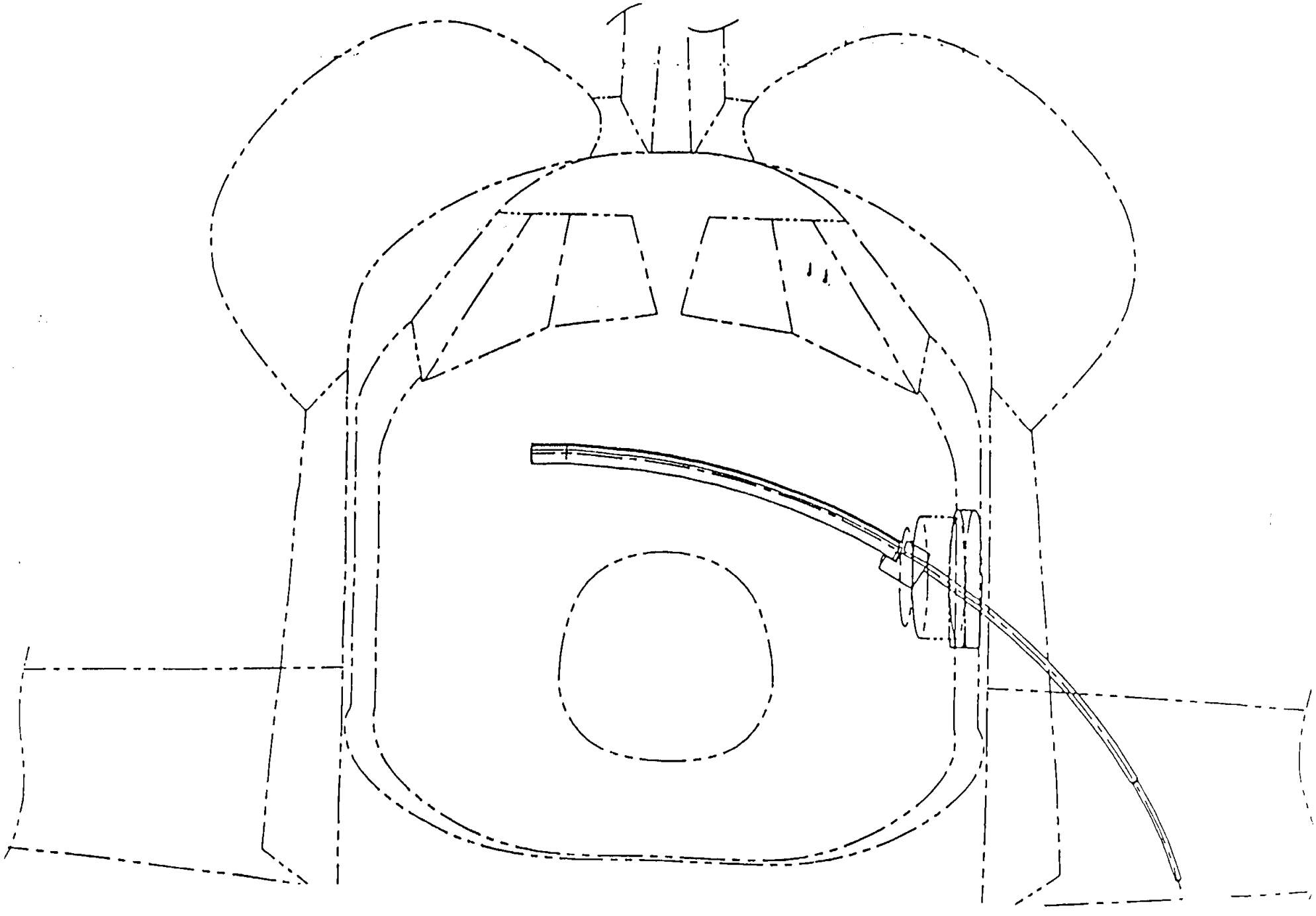
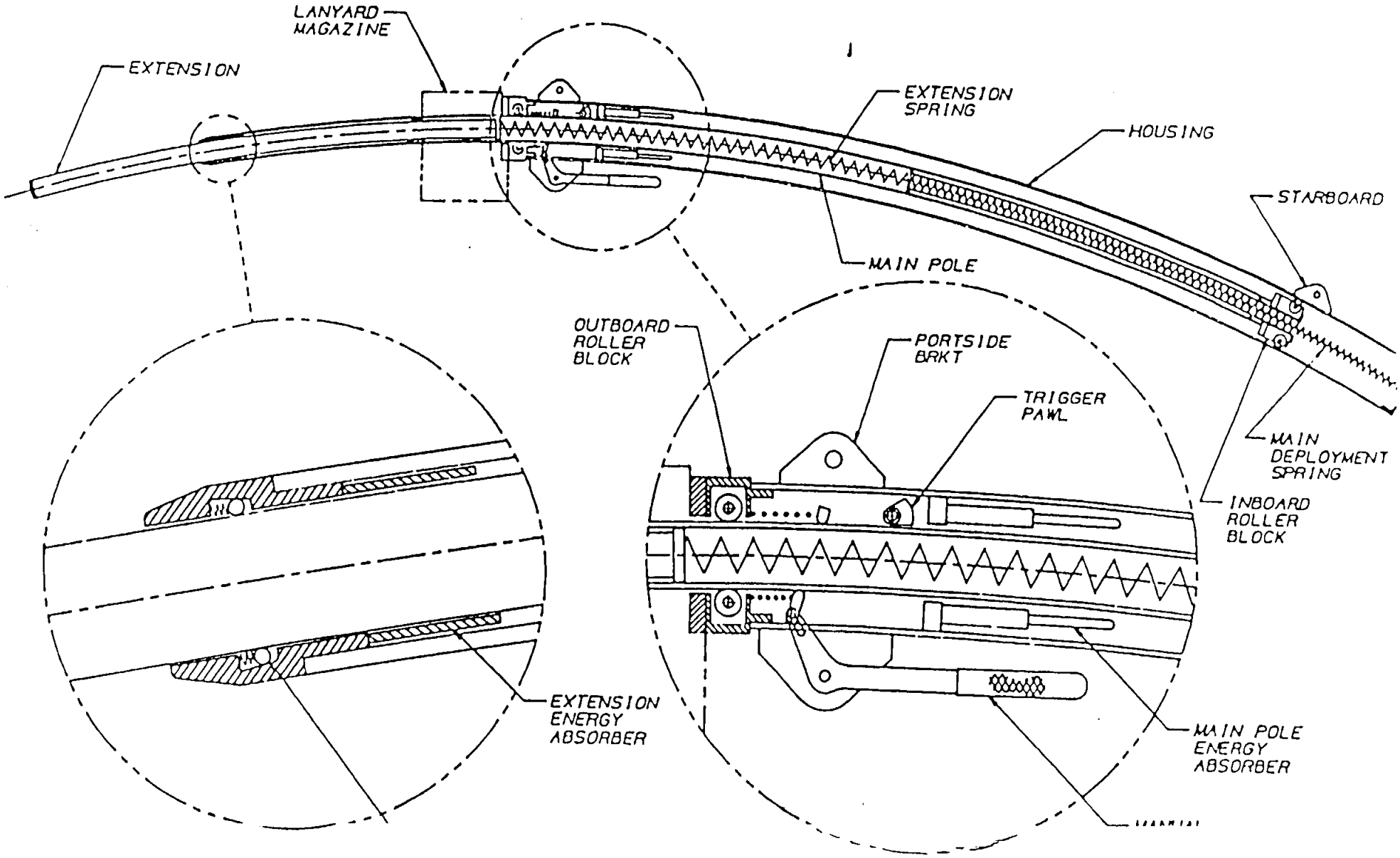
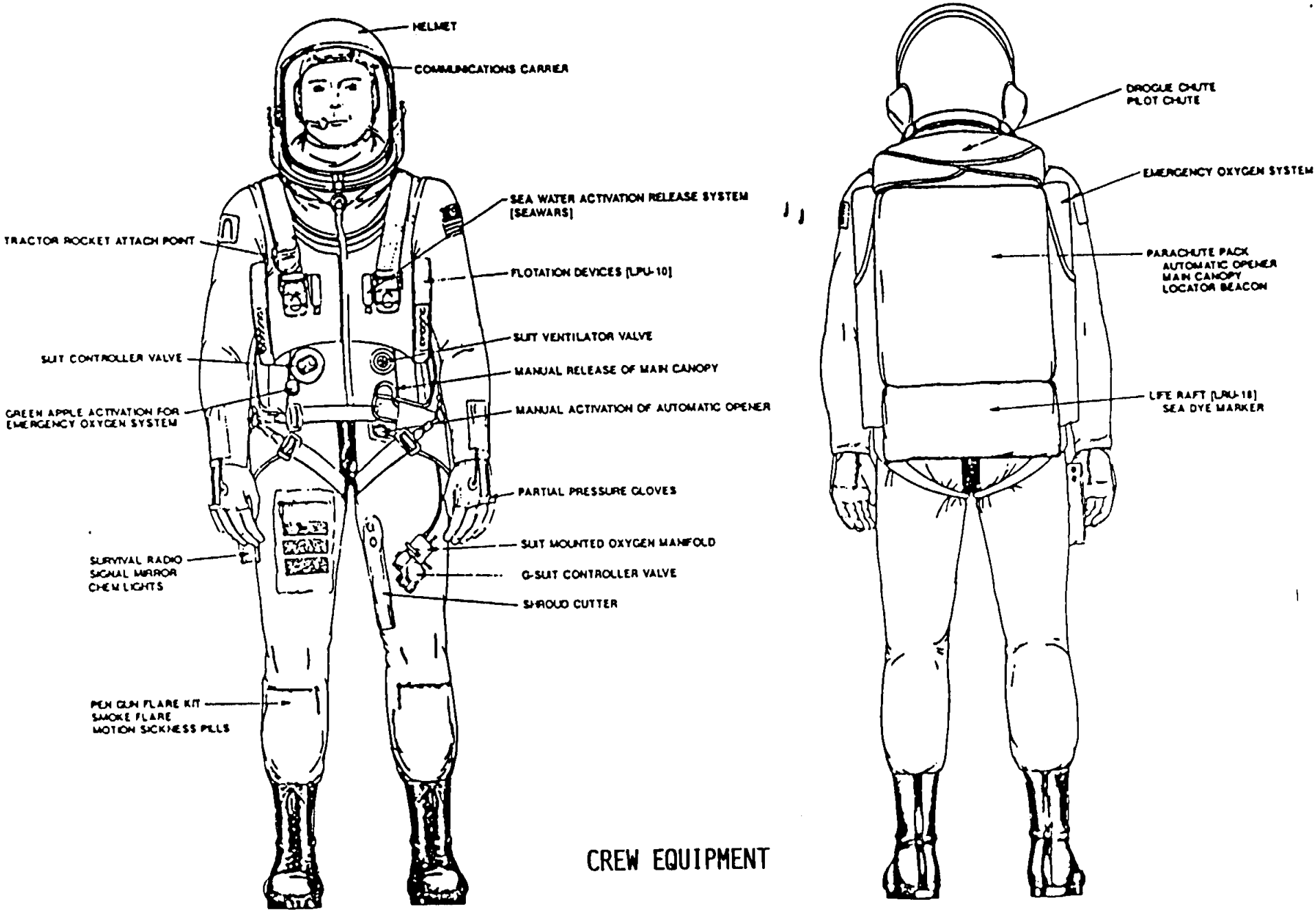
NOTE TO EDITORS/NEWS DIRECTORS: Still photographs and video are available at Johnson Space Center. Call 713/483-4231 for photographs and 713/483-8643 for video.



CREW ESCAPE SYSTEM TELESCOPING POLE

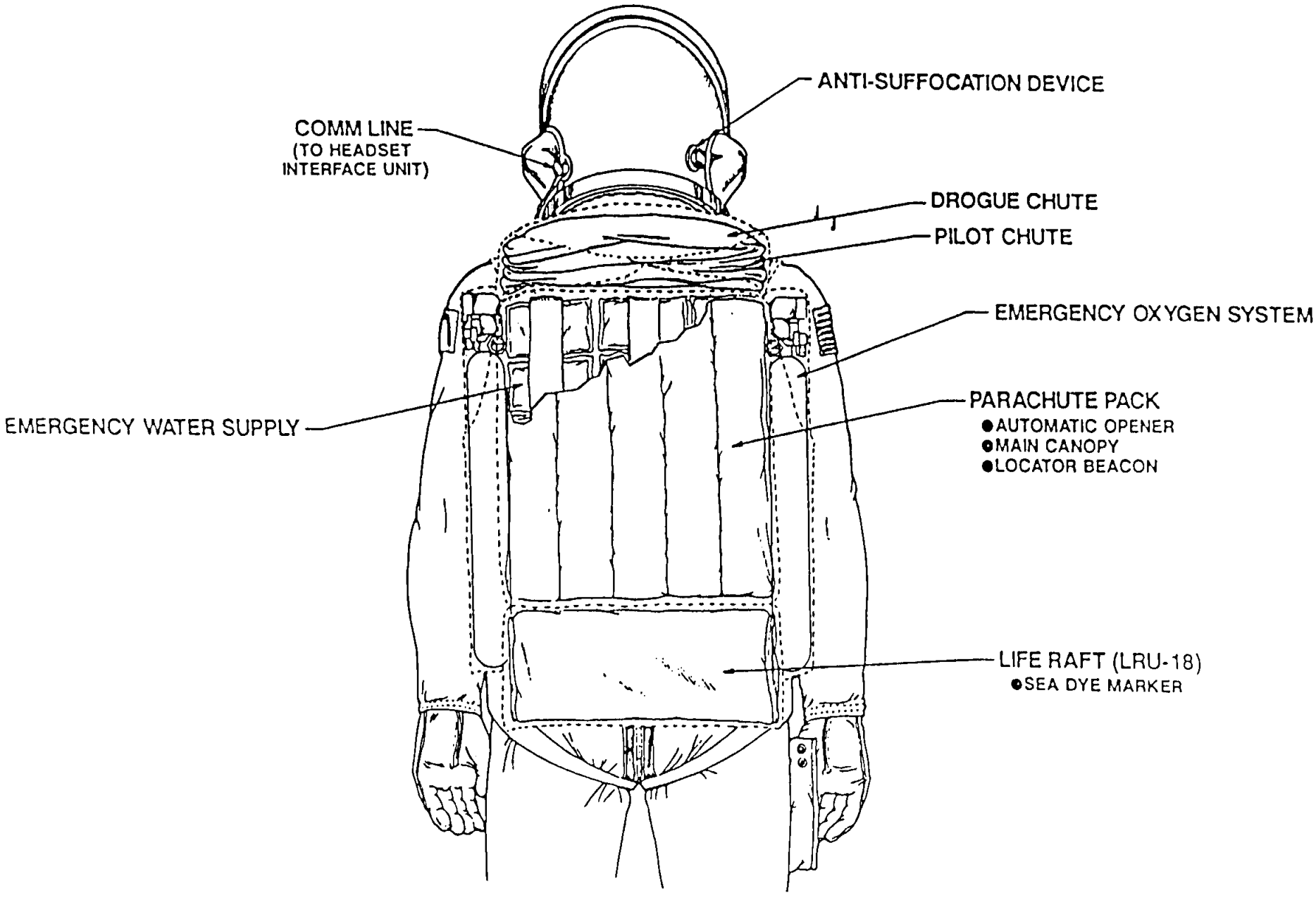
CREW ESCAPE SYSTEM TELESCOPING POLE





CREW EQUIPMENT

CREW EQUIPMENT



NASA News

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

Kelly Humphries

For Release

RELEASE NO. 88-015

April 11, 1988

MYERS, TRULY TO PRESENT NASA HONOR AWARDS AT JSC

Fifty-six JSC employees and one group will receive NASA Honor Awards for outstanding contributions to the activities of the agency at 3 p.m. Wednesday, April 13, in Johnson Space Center's Bldg. 2 Teague Auditorium.

NASA Deputy Administrator Dale Myers and Rear Adm. Richard Truly, NASA associate administrator for space flight, will present the awards with the help of JSC Director Aaron Cohen and JSC Deputy Director Paul J. Weitz.

The awards ceremony follows a March 15 NASA Headquarters presentation that included awards to JSC employees. Distinguished Service Medals were bestowed upon JSC employees Henry W. Hartsfield Jr. and Weitz. Cohen, Robert L. Crippen and Jay F. Honeycutt received NASA Outstanding Leadership Medals at that ceremony, and Manley L. Carter Jr., Daniel M. Germany, Tommy W. Holloway, James B. Jackson and Joseph P. Kerwin, M.D., received NASA Exceptional Service Medals.

Medals to be presented Wednesday at JSC include:

NASA Outstanding Leadership Medal -- Daniel C. Brandenstein, Robert L. Gibson, William R. Kelly and Brewster H. Shaw Jr.;

NASA Exceptional Scientific Achievement Medal -- Nitza M. Cintron, M.D.;

NASA Exceptional Engineering Achievement Medal -- George D. Nelson, Ph.D., James A. Smith Jr., William E. Thornton Jr., M.D.;

NASA Exceptional Service Medal -- Robert L. Blount, Charles F. Bolden Jr., Vance D. Brand, James F. Buchli, Franklin R. Chang-Diaz, Ph.D., Gil Chisholm Jr., Mary L. Cleave, Ph.D., James L. Cole, John O. Creighton, Patrick M. Duffin, Bonnie J. Dunbar, Ph.D., Elsie M. Easley, Eugene G. Edmonds, Anthony W. England, Ph.D., Anna L. Fisher, M.D., William F. Fisher, M.D., Jerry R. Goodman, Ronald J. Grabe, S. David Griggs, Steven A. Hawley,

Ph.D., David C. Hilmers, Jeffrey A. Hoffman, John D. Hold, Nickolas Jevas, Daniel L. Knight, John P. Kochner;

Also receiving Exceptional Service Medals will be Cheever H. Lambert Jr., David C. Leestma, James L. Lewis Jr., John K. Lottinville, John M. Lounge, Shannon W. Lucid, Ph.D., Richard E. Mayo, James B. McCaulley, F. Story Musgrave, M.D., Steven R. Nagel, Bryan D. O'Connor, Robert A.R. Parker, Ph.D., Edward L. Pavelka Jr., Jerry L. Ross, Margaret R. Seddon, M.D., Sherwood C. Spring, Kathryn D. Sullivan, Ph.D., Leslie J. Sullivan, Norman E. Thagard, M.D., Donald E. Williams, and Roger C. Zwieg;

NASA Public Service Medal -- Robert B. Young, Lockheed Engineering and Management Services Inc.; and

NASA Group Achievement Award -- Space Station Thermal Test Bed Team.

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NASA News

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

Kelly Humphries

For Release

RELEASE NO: 88-016

April 18, 1988

HIGH SCHOOL SENIORS TO WATCH NASA MANAGERS IN ACTION

Managers at NASA's Johnson Space Center have volunteered to host 24 seniors and four teachers from local high schools for a "Management Experience Day" on April 27.

Each student and teacher will be assigned to accompany a manager or supervisor through his or her afternoon activities. The observers will be matched with managers working in their fields of interest, and will be authorized to be present during every business task performed.

The experience is being sponsored by the JSC Chapter of the National Management Association, which hopes to make the pilot program an annual event.

"We hope that by bringing seniors into the program we can provide some exposure to what constitutes management within a government agency, and possibly influence their choice of future education and training," said Daniel A. Nebrig, Executive Assistant to JSC Director Aaron Cohen.

The students, from Clear Lake, Clear Creek, Pearland and Friendswood High Schools, were recommended by educators at their schools. They were chosen for their interpersonal and leadership skills, interest in learning about NASA leadership, and intent to attend college. Faculty members were chosen from each school for their leadership skills, interest in practical application of management theory and ability to share the experience with other faculty and students.

The experience day will begin at 8:30 a.m. with a welcome briefing and tour of JSC. After lunch, observers and managers will be paired from 1 to 4 p.m. A debriefing will be conducted at 4 p.m.

-end-

NASA News

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

Steve Nesbitt
May 2, 1988
RELEASE NO. 88-017

NOTE TO EDITORS: TEXAS GOVERNOR CLEMENTS TO TOUR JSC WEDNESDAY

Texas Governor William Clements will tour the NASA Johnson Space Center Wednesday and meet with several JSC officials.

Clements is scheduled to arrive at approximately 9 a.m. at Bldg. 1, the Project Management Building, and will be greeted by Aaron Cohen, center director.

Other media photo opportunities include Clements' tour of the space shuttle mockup in Bldg. 9A, scheduled for 12:35 p.m., and his tour of the space station mockup in Bldg. 15 at 1:15 p.m. A 10-minute Q&A opportunity is planned for the Bldg. 15 stop.

Clements will depart the center at 2:10 p.m.

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NASA News

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

Jeffrey E. Carr
RELEASE NO. 88-018

May 11, 1988
3:00 pm CDT

NASA ANNOUNCES 2-YEAR ASTRONAUT SELECTION CYCLE

NASA has announced plans to conduct astronaut candidate selections on a two-year cycle, and has scheduled the next class of candidates for 1990. NASA has, in the past, selected astronauts as needed with selections in 1978, '80, '84, '85 and '87.

The two-year process will moderate the demand on NASA resources required for candidate selection and training, while maintaining the manpower levels necessary to meet mission requirements.

The next selection cycle will begin July 1, 1989, with the cutoff date for applications. Applications received after that will be eligible for consideration in the next cycle. Nominees will also be submitted by the military services at the same time. After six months of screening, medical evaluation, and interviews, selections will be announced in January 1990, and candidates will report to the Johnson Space Center in July.

The selection process will begin again in July 1991 with the cutoff for applications to be considered in the 1992 selection. The number of selections made every two years will be based on projected requirements.

NASA will continue to accept and review applications from the general public on an ongoing basis. Applicants for the Astronaut Candidate Program must be citizens of the United States.

Applications can be obtained by writing to the following address:

NASA, Lyndon B. Johnson Space Center
Astronaut Selection Office
ATTN: AHX
Houston, Texas 77058

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NASA News

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

Kelly Humphries
RELEASE NO: 88-019

May 16, 1988

AMERICAN INDIAN SYMPOSIUM TO FOCUS ON SCIENCE AND TECHNOLOGY

Johnson Space Center and the Center for the Advancement of Science, Engineering and Technology (CASET) will sponsor the first annual American Indian Symposium on Science and Technology May 25 through 27, 1988, at JSC's Gilruth Recreation Center.

The symposium will consist of presentations on the educational and science, engineering and technology career status of American Indians, and workshops on recruitment and retention strategies, according to Dr. Nina W. Kay, CASET project director.

Wilma Mankiller, principal chief of the Cherokee Nation, will be the keynote speaker at the symposium's 9 a.m. Wednesday, May 25, opening session. Guests will include representatives from JSC and the Houston Mayor's Office. Published conference proceedings will be circulated to policy makers and educators.

First-day presentations will be open to the public; the remaining days' workshops will be open only to conference participants.

CASET, with on-site offices at JSC, is currently studying factors related to recruitment and retention of women and minorities in the science, engineering and technology fields. CASET is funded by the Department of Defense, and receives support from the Department of Labor and NASA.

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NASA News

National Aeronautics and
Space Administration
Lyndon B. Johnson Space Center
Houston Texas 77058
AC 713 483-5111

For Release

Jeffrey Carr
Johnson Space Center, Houston
RELEASE NO: 88-020

June 3, 1988
FOR IMMEDIATE RELEASE

ASTRONAUT SPRING REASSIGNED TO ARMY SPACE POST

NASA astronaut Sherwood "Woody" Spring (Col., USA) has announced that he will leave NASA in August of this year to accept an assignment as Director of the U.S. Army Space Program Office in Fairfax, VA.

Spring will report for duty September 1 for nine months of familiarization and training before assuming his responsibilities as director in June of 1989.

Spring was selected as an astronaut in May 1980. He served as mission specialist on Shuttle mission STS 61-B launched in November 1985. During that mission, Spring assisted in deploying three communications satellites and performed two spacewalks, totaling 12 hours, which investigated large structure assembly techniques in orbit. Spring logged 165 hours in space on that mission.

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NASA News

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

James Hartsfield
Johnson Space Center, Houston, Tx.
(Phone: 713/483-5117)

June 6, 1988

RELEASE: 88-021

JSC SPECIAL ASSISTANT TO DIRECTOR CHARLESWORTH RETIRES

JSC Special Assistant to the Director Clifford E. Charlesworth retired effective Friday, June 3, 1988, completing a 26-year NASA career at JSC he began as a flight controller for the Mercury Program and later a flight director for the Gemini and Apollo programs.

Charlesworth came to JSC in 1962 as a flight dynamics officer. He became a flight director during the early Gemini Program and continued in that capacity through the Apollo missions. He was the lead flight director, involved in all aspects of flight control from launch to splash down, for Apollo 11, man's first landing on the Moon.

From 1970 to 1972, he served as deputy manager of the Skylab Program, and from 1972 to 1976, he assumed duties as manager of the Earth Resources Program, overseeing all Earth resources functions assigned to JSC.

In 1976, Charlesworth became acting manager of the Shuttle Payload Integration and Development Office, and was assigned as manager of that office in 1977. In 1979, he became acting deputy director of JSC and was assigned as deputy director from 1980 to 1983. He served as director of space operations from 1983 to 1986.

Charlesworth has held his current post since 1986, assisting the director with the technical and administrative management of center programs, projects and resources.

"Cliff's career has been exemplary of the kind of dedication and motivation needed to advance man's exploration of space," JSC Director Aaron Cohen said. "During his years here, manned space flight became a reality. He has been an integral part of the achievements of NASA and JSC since the beginning, and I've worked closely with him on many projects. He will be missed."

Charlesworth, 56, is a resident of Friendswood. His many awards and honors include: the NASA Exceptional Service Medal, January 1969 and October 1969; the Manned Spacecraft Center Flight Operations Directorate Group Achievement Award for Apollo 11, July 1969; NASA Group Achievement Award for Skylab, February 1974 and April 1974; NASA Outstanding Leadership Medal, 1981; NASA Distinguished Service Medal, 1983; and the Presidential Rank of Meritorious Executive in the Senior Executive Service, May 1983.

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NASA News

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

June 15, 1988
9 a.m. CDT

Jeffrey Carr
RELEASE NO. 88-022

ASTRONAUT ENGLAND ACCEPTS POSITION WITH UNIVERSITY OF MICHIGAN

NASA astronaut Anthony England, Ph.D., will leave NASA in October this year to accept a position with the University of Michigan as professor of electrical engineering. England will head up the university's space remote sensing research for the Electrical Engineering and Computer Sciences Department at Ann Arbor.

England was selected as an astronaut in August 1967. He served as support crewman for Apollo missions 13 and 16 before taking a position as research geophysicist for the U.S. Geological Survey in 1974.

In 1979, he returned to the Johnson Space Center and was subsequently assigned to Shuttle mission STS-51F (Spacelab-2) as a mission specialist. During that flight, which featured experiments in astronomy, solar physics, life sciences, and atmospheric research, England was responsible for operating the Spacelab Instrument Pointing System. England logged 188 hours in space on that mission.

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NASA News

National Aeronautics and
Space Administration
Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release:

Release No. 88-023

June 23, 1988
For Immediate Release

Kelly Humphries

JSC CONTRACTOR RECEIVES SMALL BUSINESS ADMINISTRATION AWARD

Pioneer Contract Services, Inc., a Johnson Space Center prime contractor since 1973, has received the "Small Business Administration's Administrator's Award for Excellence."

James L. Neal, JSC's Director of Procurement, nominated Pioneer. The award was presented during the Small Business Administration's 21st Annual Joint Industry/SBA procurement Conference and Awards Banquet held May 11-12, 1988, in Washington, D.C.

Under a cost-reimbursement contract, Pioneer provides JSC with logistics support services such as identification and cataloging of property, receipt and inspection of property, warehouse operations for stores stock items, bondroom operations of program stock, operation of a temporary storage program, packing and shipping, transportation support services, supply documentation processing, redistribution and utilization of Government property, and logistics plans and analysis support.

Ed Fritcher is president of Pioneer, 7770 Blankenship, Houston, Texas.

NASA News

National Aeronautics and
Space Administration
Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

RELEASE NO.: 88-024 July 1, 1988

GROUNDWATER CONTAMINATION AT WHITE SANDS TEST FACILITY

NASA has entered into discussions with the U.S. Environmental Protection Agency (EPA) regarding assessment of groundwater contamination at the White Sands Test Facility (WSTF). It is anticipated that these discussions will lead to a formal agreement.

NASA has an agressive environmental program at the WSTF, including contamination assessment, waste minimization, and containment. The assessment program incorporates the extensive use of groundwater monitoring wells, the use of soil gas testing and analysis, and seismic techniques. In addition, WSTF has discontinued use of on-site waste storage impoundments under formal agreements with the EPA and the New Mexico Environmental Improvement Division.

NASA has confirmed that the groundwater beneath WSTF had been ontaminated with low levels of hazardous constituents, principally trichloroethylene and freon. The major source of the contamination appears to have resulted from the original construction of WSTF in the mid-1960's when organic solvents were utilized to precision clean piping. In addition, the on-site cleaning facility has used various solvents and degreasing agents to meet operational and testing requirements.

WSTF has established operating procedures for the management of hazardous wastes that comply with both the EPA and New Mexico environmental regulations. These safeguards are preventing the introduction of additional contaminants into the groundwater.

While test results have indicated that contamination has migrated beyond the facility boundaries, no hazardous chemicals have been detected in drinking water supplies, including the NASA water supplies located 3.5 and 4 miles from the facility boundary.

-MORE-

It is anticipated that the written agreement to be negotiated with EPA will incorporate NASA's contamination assessment plans and will include additional processes needed to determine whether remedial action is necessary. Pending the written agreement, NASA is continuing its efforts to assess the situation and will keep the public fully informed of the results.

WSTF operates as an organizational element of the NASA-Johnson Space Center in Houston. Facilities at WSTF include materials test laboratories and capabilities for special laboratory tests of spacecraft components. WSTF presently performs development, evaluation, and qualification testing of Space Shuttle propulsion systems, materials, and components for spacecraft. Established in 1963, the facility actively supported the Apollo, Skylab, Viking and other NASA programs.

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NASA News

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

July 5, 1988

Steve Nesbitt
RELEASE NO.: 88-025

NOTE TO EDITORS: ELECTRONIC NEWS SERVICE AVAILABLE

A 24-hour electronic news service providing NASA press releases and other information is now available to news organizations, information services and aerospace industry public affairs representatives.

The service, called the Johnson Space Center Electronic Newsroom, is accessible by personal computer users through dial-in phone lines. It is open to accredited organizations and individuals only and not to the general public.

The electronic newsroom may be reached using most PC-based communications software. The main data line access number at the Johnson Space Center is (713) 483-2500. When connection is established, press RETURN twice. The system will ask for a data number. Enter 60213 or 60214 and press RETURN. Wait for a response from the newsroom computer and follow the prompts This will provide an introductory look at what the Electronic Newsroom contains. For full accreditation, follow the on-line instructions given to new users.

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NASA News

National Aeronautics and
Space Administration
Lyndon B. Johnson Space Center
Houston Texas 77058
AC 713 483-5111

For Release

July 13, 1988

Steve Nesbitt
RELEASE NO. 88-026

NOTE TO EDITORS: STS-26 BACKGROUND BRIEFINGS SCHEDULED AT JSC

A series of pre-flight background briefings and a press conference with the astronaut crew for the upcoming STS-26 Space Shuttle mission are scheduled for August 1 at the NASA Johnson Space Center in Houston.

Background briefings will cover an overview of the flight, hardware and software changes to the shuttle system made since the Challenger accident, the crew escape system and associated equipment, the launch decision process and organizational changes in NASA, and the payloads to be carried on the flight.

The briefings begin at 8 a.m. CDT and should be complete by 5 p.m. The astronaut crew press conference will begin at 1 p.m. All events will take place in Room 135 of Bldg. 2 at JSC.

The briefings and astronaut press conference will be carried on NASA Select Television (Satcom F2R, transponder 13, 72 degrees west longitude) with two-way question and answer capability.

# # #

This and other JSC and NASA Headquarters press releases are available on the JSC Electronic Newsroom, a computerized bulletin board system operated by the Media Services Branch at the Johnson Space Center. For information on how to use the Electronic Newsroom, call (713) 483-5111.

THE WHITE HOUSE

Office of the Press Secretary
(Santa Barbara, California)

For Immediate Release

July 18, 1988

STATEMENT BY MARLIN FITZWATER
ASSISTANT TO THE PRESIDENT FOR PRESS RELATIONS

The President today announced that the permanently-manned Space Station being developed by the United States, Canada, Europe and Japan will carry the name "Freedom."

The name Freedom was recommended by a team of NASA representatives and international partners. The yearning for freedom is a basic human emotion, and freedom of the individual is a value shared by all the nations that will work together to build and use the Space Station. In a literal sense, the Space Station will provide freedom from the confines of Earth's gravity, enabling scientific and technological research, new commercial uses of space, and opening the way for continued human exploration of space. The name was selected from more than 700 suggestions sent to NASA from its employees, its contractors, the international partners and the general public.

The name Freedom is tied to the President's earliest statements on the program. When the President announced his decision to build a Space Station in his January 1984 State of the Union address, he noted that he was inviting our friends and allies to join us so "we can strengthen peace, build prosperity and expand freedom for all who share our goals."

Space Station Freedom will consist of three laboratory modules -- one each from the United States, Europe and Japan -- and a habitat module that will accommodate a full-time crew of eight. Canada will provide a Mobile Servicing Center to help assemble and maintain the manned base. Earth-observing unmanned polar-orbiting platforms provided by the U.S. and Europe are also part of the Freedom program.

Freedom is planned to be launched aboard the Space Shuttle and assembled in orbit beginning in 1995. It will provide a versatile research laboratory for conducting science, developing new technologies, exploring the solar system, and stimulating private-sector investment in space.

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NASA News

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

July 22, 1988

Steve Nesbitt
RELEASE NO. 88-027

NOTE TO EDITORS: STS-26 BACKGROUND BRIEFINGS RESCHEDULED

The background briefings and astronaut press conference for the 26th Space Shuttle mission have been rescheduled to August 22 at the Johnson Space Center in Houston.

The briefings originally were planned for August 1, but possible conflict with other pre-flight events necessitates a schedule change. The August 22nd date will be maintained whether an early September launch is planned or a later date is required.

Background briefings will cover an overview of the flight, hardware and software changes to the shuttle system made since the Challenger accident, the crew escape system and associated equipment, the launch decision process and organizational changes in NASA, and the payloads to be carried on the flight.

The briefings begin at 8 a.m. CDT and should be complete by 5 p.m. The astronaut crew press conference will begin at 1 p.m. All events will take place in the Olin E. Teague Visitor Center auditorium at JSC.

The briefings and astronaut press conference will be carried on NASA Select Television (Satcom F2R, transponder 13, 72 degrees west longitude) with two-way question and answer capability.

# # #

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NASA News

National Aeronautics and
Space Administration
Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release:

Kelly Humphries
Release No: 88-028

August 2, 1988

HISPANIC SYMPOSIUM FOCUSES ON SCIENCE, ENGINEERING AND TECHNOLOGY

Johnson Space Center and the Center for the Advancement of Science, Engineering and Technology (CASET) will sponsor the first annual Hispanic Symposium on Science, Engineering and Technology August 10 through 12, 1988, at JSC's Gilruth Recreation Center.

The symposium will consist of presentations on the educational and career status of Hispanics in science, engineering and technology, and workshops on recruitment and retention strategies, according to Dr. Nina W. Kay, CASET principal investigator and research professor.

Astronaut Franklin Chang-Diaz will be the keynote speaker at the symposium's opening session at 9 a.m. Wednesday, August 10. Other NASA representatives are expected to attend.

First-day presentations and speeches will be open to the public until 11:30 a.m.; the remaining days' proceedings will be open only to symposium participants.

CASET sponsored a similar symposium for American Indians in May. With on-site offices at JSC, CASET is studying factors related to recruitment and retention of women and minorities in the science, engineering and technology fields. CASET is funded by the Department of Defense and receives support from NASA and the Department of Labor.

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NASA News

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

Kari Fluegel
RELEASE NO. 88-029

August 8, 1988

MATH, SCIENCE EDUCATORS ATTEND NASA SPACE SCIENCE WORKSHOP

Janice Monroe, a mathematics teacher at Cole Junior-Senior High School in San Antonio, Texas, recently completed a two-week workshop at the NASA Johnson Space Center in Houston, Texas, for mathematics and science educators.

Selected from an eight-state region covering North and South Dakota, Nebraska, Kansas, Oklahoma, Colorado, New Mexico and Texas, the 21 teachers received an overview of the latest space technology developments from engineers, scientists, astronauts and researchers at JSC during the July 25-Aug. 5 workshop. Each participant maintained a journal of activities and observations for use in developing classroom teaching materials.

JSC's space science education specialists also provided teachers with printed materials, computer programs and audio-visual aids for use in classrooms.

Workshop participants were chosen for their interest in space sciences and in professional growth.

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NASA News

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

August 10, 1988
9:30 CDT

Jeffrey E. Carr
RELEASE NO. 88-030

NASA BUYS SECOND SHUTTLE CARRIER AIRCRAFT

The NASA Johnson Space Center has signed a definitive contract with Boeing Military Airplanes of Wichita, KS to modify a Boeing 747-100 for use as a second Shuttle Carrier Aircraft (SCA).

Space Shuttle orbiters are ferried "piggy-back" atop the SCA from any Shuttle landing site to orbiter processing facilities at the Kennedy Space Center. The additional SCA will provide backup ferrying capability and eliminate a potential single-point failure in the Space Transportation System.

NASA announced plans to acquire a backup SCA in February of this year. The airplane selected is nearly identical to the original SCA which will minimize costs associated with modifications.

The work will be accomplished at Boeing facilities in Wichita and will include structural modifications to enable attach pylons to be mounted atop the aircraft and additional changes to permit better flight control during ferry flights. The agreement calls for delivery of the backup SCA in October of 1990.

The cost-plus-fixed fee contract is valued at $55 million.

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NASA News

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

Kari Fluegel
RELEASE No. 88-031

Aug. 15, 1988

NOTE TO EDITORS: STS-26 MEDIA WORKSPACE STILL AVAILABLE AT JSC

Media workspaces at the Johnson Space Center still are available for the 26th Space Shuttle mission through the JSC Public Affairs Office-Media Services Branch in Houston.

During STS-26, mission commentary and change-of-shift briefings will originate at JSC. Contractor representatives also will be present at the JSC News Center during the flight.

Workspace for media representatives will be available in four trailers located near the Olin E. Teague Visitor Center and, if demand merits, inside the Visitor Center Exhibit Hall.

Accreditation, which is required, must be arranged through the Kennedy Space Center no later than 30 days before flight, and is valid at all NASA centers. To assure workspace at JSC, however, requests should be forwarded to Kari Fluegel in the JSC media services office at (713) 483-5111.

Space is limited. Phone service must be ordered through Southwestern Bell no later than three to five working days prior to launch.

-end-

NASA News

National Aeronautics and
Space Administration
Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release:

Kari Fluegel
Immediate
RELEASE NO. 88-032

NASA BEGINS NEGOTIATIONS WITH LOCKHEED FOR WHITE SANDS SUPPORT

NASA's Johnson Space Center will begin negotiations with Lockheed Engineering and Sciences Company of Houston that will lead to the awarding of a contract for NASA White Sands Test Facility (WSTF) site support services.

The cost-plus-award-fee contract, at a proposed cost of approximately $152 million over a five-year period, will be an add-on to the current Lockheed contract for the same effort at WSTF. The contract performance will be from Feb. 1, 1989, to Jan. 31, 1994.

Under terms of the contract, Lockheed will provide technical, managerial, and administrative support services for WSTF for the functional areas of propulsion and power systems testing, laboratory test activities, technical support services, and management and administrative services. The contract will be mananged by NASA-WSTF.

In addition to Lockheed, NASA received a proposal from EC III, Inc., of Albuquerque, N.M., a joint venture of EG&G and Cortez III.

- end -

NASA News

National Aeronautics and
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Lyndon B. Johnson Space Center
Houston Texas 77058
AC 713 483-5111

James Hartsfield
RELEASE: 88-33

For Release
August 29, 1988
FOR IMMEDIATE RELEASE

NASA'S T-38 FLEET TO SOON SURPASS 200,000 FLYING HOURS

Beauty is simplicity, speed and grace as far as NASA's fleet of 27 T-38 Talon jets is concerned, and this week the fleet will surpass a total of 200,000 flying hours, equal to 23 years in the air, 24 hours a day, seven days a week.

The supersonic jets are used by NASA as spaceflight readiness trainers for pilot astronauts, among other tasks. Ask NASA pilots what the charm of the T-38 is, and you'd better be ready to listen.

"It's handling characteristics, the way it flies, are part of it--it's an extraordinarily honest airplane," says Astronaut Dr. Story Musgrave, the man who has flown more in a T-38 than anyone on Earth "and maybe in the universe"--about 6,100 hours. Musgrave, like almost all T-38 pilots, becomes a bit sentimental as he speaks.

"It's like a really sensitive polo pony, move the reins over a little bit and it responds perfectly. Whenever it does something, you know why it did it, you know why it got that way," he says. "You become attached to airplanes because they become an extension of yourself, your body and mind, especially a plane that's so responsive, so extraordinarily agile. The plane and the pilot become one."

The first T-38 was manufactured in 1958, and the plane became the advanced trainer for Air Force pilots. Whenever the time comes to replace the T-38s, NASA may never do better, pilots say. NASA got its first T-38 24 years ago, and the fleet is still going strong because of a crew of about 230 workers at Ellington Field in Houston, headquarters for the NASA fleet, that provide "the best maintenance in the world," Musgrave says. "Our engines are better kept and better tuned than anyone's."

As supersonic jets go, maintenance on the T-38 is relatively easy, says Ace Beall, former T-38 project pilot and now a Shuttle carrier aircraft pilot. "It was built with ease of maintenance in mind," Beall says. "It's got simple systems, and if something breaks, it's easy to fix."

The two 2,900-pound thrust engines in a T-38 can slide in and out, and if an engine needs work, it is quickly replaced with one of 15 spares on hand. "They're totally interchangeable in all the airplanes," Beall says. "That's a common concept in planes now, but when the T-38s were built, it was just coming into being." About 70 percent of the T-38s NASA owns fly daily.

But the basic reason for the superb performance of NASA's T-38s comes down to the hands that work on them. Many of the mechanics at Ellington have worked on NASA's T-38s since they first came into existence. "They know those airplanes," explains Henry Hartsfield, deputy director of Flight Crew Operations at the Johnson Space Center. "We're very fortunate to have a lot of maintenance people who've been with us for years and years. These guys are really good."

Maintenance standards at Ellington are far above any other such standards for T-38s in the world, explains Jose Rengau, T-38 maintenance officer. "We've added more preflight items that are critical to our checklist than the Air Force or anyone," Rengau said. "We're really perfectionists. You know, one engine problem is too many."

From flight to flight, turnaround maintenance on NASA's T-38s is usually not extensive. "Almost all you've got to do is check the oil, put in gas and go," says Hartsfield. "It's almost that simple."

And what keeps it that simple is a rigorous program of built-in inspections. Each T-38 undergoes a two-day inspection every 150 hours of flying time; a three-week inspection every 450 hours; and is virtually completely taken apart during a month-long inspection every 900 hours, Rengau says. The extensive inspections keep day-to-day problems in check.

The T-38 is lightweight for a trainer, about 12,500 pounds with two crew members. It cruises at nine-tenths of the speed of sound, and it can leave sound far behind at only 5,000 feet, a speed and altitude that's enough "to pin your hair back to your ears," in the words of Ken Cockrell, current T-38 project pilot.

In the early 1960s, the T-38 set a host of records for quick climbs, closed-course speed and short-distance speed. It's maneuverability and simplicity make it perfect for NASA's needs.

"It's a good, stable, forgiving airplane. Its twin engines make it reliable," Hartsfield says. "From handling a high-performance airplane you learn the man-machine characteristics you use on the Orbiter. Night flying, formation flying, acrobatics, the kind of flying that makes you a good pilot, we do all of that. It does a super job."

"It is primarily a flying machine," Musgrave says. "The simplicity of its systems means you can concentrate on flying."

The T-38 is a good spaceflight readiness trainer, adds Beall. "It's good just to get you used to that 18-degree glide slope of the Orbiter. We had to bolt on special speed brakes to get the steep descent necessary to chase the Orbiter. It's just too sleek."

NASA's T-38 fleet is now undergoing a renovation program that will be completed in 1993. One by one, the planes are being modified by strengthening the wings, improving the skin and reinforcing their structural backbone, the dorsal longeron, to extend their operable lifetimes.

The Air Force has announced plans to continue using T-38s, which have not been manufactured since 1972, until 2010. And NASA may do the same. "They're cost-effective. They're all paid for and the maintenance is not that high," says Hartsfield. " We've looked at others, but we've never gotten far."

For one thing, most trainers today aren't supersonic. And the more modern the airplane, often the more complex are its systems and its maintenance.

"Whenever we do have to replace the T-38s, it's going to cost more and we're going to get less," Cockrell says.

With their blue paint and logo, the T-38s have the "classic fast-jet look," Beall says. And the look doesn't lie.

"It's beauty isn't only skin deep," explains Musgrave. "There's a direct relationship in the world of airplanes between beauty and performance."

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NASA News

National Aeronautics and
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For Release

August 29, 1988

Kelly Humphries

Release No. 88-034

NEW WAYS OF USING COMPUTERS TO EVALUATE FLIGHT DATA TESTED

Johnson Space Center flight controllers and engineers will look at several new methods of using computers to evaluate flight data during a Long-Duration Simulation Aug. 30 through Sept. 1 and the next Space Shuttle mission, STS-26.

The test methods will allow one set of flight controllers in the Mission Control Center to use graphic displays of the data being sent back to Earth by Discovery, and allow some flight controllers and engineers to review real-time and near real-time flight data in a "control room of the future" and their own offices.

In Mission Control, the Instrumentation and Communications Systems Engineer (INCO) will be able to evaluate the performance of an INCO Expert System Project being developed by the Mission Operations Directorate (MOD) in parallel with its usual data processing methods. The expert system uses artificial intelligence methods to reduce data, automate fault detection routines and display data in graphic schematic form.

In using the existing text display format, flight controllers must first evaluate the data to construct a mental "picture" of the system before attempting to evaluate the configuration. The expert system is designed to display the information in "picture" form, allowing the controller to concentrate on problem solving. The expert system also is able to highlight for the controller where anomalies are located within a system.

The Mission Support Directorate (MSD) and eight backup flight controllers will monitor real-time flight data in a control room of the future, the Transition Flight Control Room (TFCR), using four programmable workstations. The programmable

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workstations allow controllers to display actual flight data in graphic form by providing a variety of graphs, charts, imitation analog gauges and pictures of the Space Shuttle -- all computer generated -- and to arrange them in any combination required. The new workstations allow individual flight controllers to tailor data displays to their own disciplines and preferences.

Outside Mission Control, both MOD and the Engineering Directorate will evaluate a new method of distributing computerized data to other buildings in the JSC complex. Subsystem experts will be able to review and experiment with data from the spacecraft on a real-time or near real-time basis in their offices. They will evaluate whether the ability to distribute data outside the MCC can allow more productive use of personnel.

The data will be for evaluation only by flight controllers and subsystem engineers on the ground, and no altered data will be sent back to Mission Control or the spacecraft.

In MOD, distributed data processing systems are being evaluated as a means of reducing the number of full-time staffers in the Multipurpose Support Rooms (MPSR) who perform periodic support and systems checks on current flights, respond quickly to any in-flight contingency and provide planning expertise for future flights.

In Engineering, distributed systems are being evaluated as a means of enhancing support for the Mission Evaluation Room (MER) and eventually reducing the number of full-time dedicated staffers needed in the MER. Engineers in the MER monitor system performance 24 hours a day using real-time and near real-time flight data to support Mission Control response to contingencies. They also evaluate systems in relation to upcoming missions, pinpointing the causes of malfunctions and identifying equipment that needs to be replaced before the vehicle's next flight.

Through the use of a newly installed "gateway" that allows the Engineering Directorate's Digital Equipment Corp.-based computer network to "talk" to the MCC's IBM equipment, near real-time data may be distributed to engineers at their workstations in other buildings. There, they will be able to manipulate the data using their engineering computer terminals and recommend system changes in a matter of hours instead of days, speeding the orbiter processing flow at Kennedy Space Center.

The expert systems work in MOD is being funded through the Office of Aeronautics and Space Technology at NASA Headquarters.

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NASA News

National Aeronautics and
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Lyndon B. Johnson Space Center
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For Release

James Hartsfield
RELEASE: 88-035

September 9, 1988
FOR IMMEDIATE RELEASE

SECOND-GENERATION SET OF ONBOARD FLIGHT COMPUTERS AT JSC

The first complete ship's set of an updated version of the Space Shuttle orbiter's five onboard flight computers, more than twice as powerful but half the size of those now flying, is being tested at the Johnson Space Center (JSC) and may fly in 1990.

Every flight control function aboard an orbiter is initiated by or through the five onboard general purpose computers (GPCs), including the movement of all aerodynamic surfaces and control of the main engines. "The computers now flying were designed in the 1960s, using 1960s' technology," explained Ned Trahan, chief of the Data Processing Section at JSC. "The new ones have 1980s' technology."

The rapid advance of technology during that period is evident in the appearance of the new GPCs now in the JSC Avionics Engineering Laboratory (JAEL). The new computers are half the size of the current orbiter GPCs, made up of a single unit as compared to two units for the current computers.

And the new GPCs operate three times as fast; have more than twice the memory capability; and weigh half as much as those now flying, Trahan said. "They also have an error correcting code, you could have a failure in one of the memory chips and the code would automatically correct the data," Trahan said.

It all adds up to what will be a tremendous boost in reliability and performance, plus an open road for innovation. The current GPCs operate at 80 percent of their capability during periods of highest activity. Using the same software, those same periods will push the new GPCs to only 40 percent of their capacity.

"We want to run the old software in the new machines with a minimum of changes. It's proven reliable," Trahan said. "But eventually we'll modify it over a period of time to take advantage of the extended capabilities."

Development of the second-generation GPCs began in 1983, but the race with the rapid evolution of high technology never ends. "You can see that from development to machine takes a long time," Trahan said.

Improved integrated circuits cut down the size of the new GPCs, and instead of the iron core memories in the current flight computers, the new ones have a complementary metal oxide silicon (CMOS) memory.

IBM, manufacturer of the current GPCs, also manufactures the new GPCs and began delivery of the actual flight-types to JSC in February. The JAEL had been working with pre-production prototypes of the computers since 1986, refining the design and operations.

Now the JAEL has six GPCs actually designated for flight, and they differ from the prototypes very little except in their parts. Prototypes were built with off-the-shelf, commercial hardware; flight GPCs are built with high-reliability, space-qualified components.

"With the actual flight units, and the first flight set of five, we're now doing what we call burning them in," Trahan said. "It's a process where we put as many operating hours on them as we can, hoping that any weak components in the system will fail." JAEL workers plan to put at least 500 hours on each GPC.

While the flight computers are burning in, the prototypes are being used in simulated flights via a link between the test bays in the JAEL and the high-fidelity Orbiter simulator in the Shuttle Avionics Integration Laboratory (SAIL). So far, the new GPCs have lived up to their billing. "In preliminary testing, they've performed as well as advertised," Trahan said.

At least 19 more of the second-generation GPCs will be delivered to the JAEL, enough to outfit four orbiters plus a spare flight set. The lab should continue to receive about one new GPC a month, Trahan said.

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For Release

Johnson Space Center
(713) 483-5111

IMMEDIATE
September 21, 1988

RELEASE NO. 88-036

PRESIDENT REAGAN TO ADDRESS NASA EMPLOYEES THURSDAY

President Ronald Reagan will address NASA workers and family members Thursday afternoon at the Johnson Space Center in Houston, one week before the scheduled launch of Space Shuttle Discovery.

It will be a return visit for the President who spoke at JSC during the memorial service for the Challenger astronauts in January 1986.

The President will be greeted at Bldg. 9A by NASA Administrator James Fletcher, Associate Administrator for Space Flight Richard Truly and JSC Director Aaron Cohen. He also will meet with the astronaut crew of Discovery before addressing assembled NASA and contractor employees and family members at approximately 3:15 p.m.

The center will be closed to public visitors all day Thursday.

NOTE TO EDITORS: Media interested in covering the President's visit to NASA should call the White House Houston staff office at 650-1357 for credentials. Only White House-issued credentials will be valid for this event.

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NASA News

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
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For Release

Brian Welch
Release No. 88-037

September 22, 1988

FLIGHT CONTROL OF STS-26

Flight control for the twenty-sixth voyage of the Space Shuttle will follow the same procedures and traditions common to all U.S. manned space flights since the Mission Control Center was first used for Gemini IV in 1964.

As on past flights, responsibility for conduct of the mission will revert to the Mission Control Center (MCC) in Houston once Discovery clears the tower of Launch Pad 39-B at the Kennedy Space Center. Mission support will begin in the MCC at 4:30 a.m. CDT on the morning of launch and will continue around the clock through the landing and post-landing activities.

The mission will be conducted from Flight Control Room One (FCR-1) on the second floor of the MCC, which is located in Bldg. 30 at Johnson Space Center.

All of the traditional hallmarks of Shuttle missions will be available to news media covering the flight. Throughout the mission, NASA will continue its practice of providing around-the-clock, live release of air-to-ground transmissions between the spacecraft and the MCC. Live views of the activities within FCR-1, alternating with views of the large situation map in Mission Control, will be fed continuously on NASA Select television.

NASA also will hold change-of-shift press conferences with offgoing flight directors, approximately every eight hours, as warranted by mission events and media interest. The press conferences will originate from the Teague Auditorium at Johnson Space Center and will be carried live on NASA Select, with two-way question and answer capability available at Kennedy, the Marshall Space Flight Center and the Dryden Flight Research Facility.

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During events such as press conferences or satellite playbacks of downlink television from Discovery, the live release of all air-to-ground transmissions will continue uninterrupted on the satellite-fed Mission Audio circuit, which is accessible at each of the NASA news centers around the country. The Agency also will continue to provide real-time mission commentary throughout the flight.

NASA Select video and audio distribution will be on GE SATCOM F2R, Transponder 13. Mission Audio distribution will be on GE SATCOM F2R, Transponder 9, RF subcarrier 6113.3 MHz. NASA Select audio is also available within a radius of approximately 10 miles from JSC on public service band radio at 171.15 MHz.

As in the past, four teams of flight controllers will alternate shifts in the control center and in nearby analysis and support facilities at JSC. The handover between each team takes about an hour and allows each flight controller to brief his or her oncoming colleague on the course of events over the previous two shifts. Change-of-shift press conferences generally take place 30 minutes to an hour after the shift handovers have been completed.

The four flight control teams are referred to as the Ascent/Entry team and the Orbit 1, Orbit 2 and Planning teams. Generally, the STS-26 crew's working day is split between the Orbit 1 and Orbit 2 shifts.

The Ascent/Entry team, led by Flight Director Gary E. Coen, will conduct the launch and landing phases of the flight. While Discovery is in orbit, this same shift, operating from 2 to 11 a.m. each day, is known as the Orbit 1 team and will be led by Flight Director J. Milton (Milt) Heflin. Because the shifts overlap in this manner, some of the flight control positions will be staffed by the same personnel for both Ascent/Entry and Orbit 1 operations. Other positions will alternate between specialists in launch/landing activities and orbital operations.

The Orbit 2 team, led by Flight Director Charles W. (Chuck) Shaw, will be on-console each day from 10 a.m. to 7 p.m. The Orbit 2 team has primary responsibility for the deploy of TDRS-B on Flight Day One at approximately 6 hours into the mission. Two additional deploy opportunities, at approximatley 7 hours, 45 minutes elapsed time and again at around 10 hours elapsed time, will be available on Flight Day One. Although the Orbit 2 team specializes in TDRS deploy activities, the Orbit 1 team also has been extensively trained for this phase of the mission. That additional expertise would come into play only if a Flight Day

Two backup deploy opportunity for TDRS-B were to become necessary. This final deploy window will occur during the Orbit 1 shift on Flight Day Two, at approximately 21 hours, 15 minutes into the flight.

The Planning Team, led by Flight Director Larry Bourgeois, will be on-console from 6 p.m. to 3 a.m. each day. The Planning shift, which for the most part operates during the crew's sleep period, has the dual responsibility for monitoring the systems aboard Discovery and updating schedules or coordinating any changes in the flight plan as may be dictated by real-time mission events.

Bourgeois, who also is the Lead Flight Director for STS-26, has 22 years of experience in manned space flight operations. He served as a communications flight controller for the Lunar Module during Apollo and as an experiments officer during Skylab and Apollo-Soyuz. He entered the flight director program in 1981 and has served in that capacity on a number of missions beginning with STS-7 in 1983.

Coen has worked in space flight operations at JSC since 1964. He served as a flight controller specializing in both guidance and navigation and propulsions systems during the Gemini, Apollo, Skylab and Apollo-Soyuz programs. He began training as a flight director in 1981, specializing in ascent and entry, and has served in that role on the majority of Shuttle missions since STS-3 in 1982.

Heflin specialized in spacecraft recovery operations during the Apollo, Skylab and Apollo-Soyuz programs. He served as an environmental systems flight controller on the first nine Shuttle flights before entering the flight director training program in 1984. He has served on five previous Shuttle missions as a flight director.

Shaw, a Lt. Colonel in the U.S. Air Force, has been assigned to JSC since 1980. He served as a Shuttle training instructor and later as a simulation supervisor before entering the flight director program in 1984. He specializes in payload deploy operations and has served as a flight director on four previous Shuttle missions.

MCC POSITIONS AND CALL SIGNS FOR STS-26

The flight control positions in the Mission Control Center, their call signs and their functions are:

Flight Director (FLIGHT)

Has overall responsibility for the conduct of the mission.

Spacecraft Communicator (CAPCOM)

By tradition an astronaut; responsible for all voice contact with the flight crew.

Flight Activities Officer (FAO)

Responsible for procedures and crew timelines; provides expertise on flight documentation and checklists; prepares messages and maintains all teleprinter traffic to vehicle.

Phase Specialist (PROCEDURES)

A specialty position operating from the FAO console; provides expertise and ready reference on all ground and onboard actions required to accomplish a particular phase of flight. For STS-26, this position will be activated for the TDRS deploy operations.

Integrated Communications Officer (INCO)

Responsible for all Orbiter data, voice and video communications systems; monitors the telemetry link between the vehicle and the ground; oversees the uplink command and control processes.

Flight Dynamics Officer (FDO)

Responsible for monitoring vehicle performance during the powered flight phase and assessing abort modes; calculating orbital maneuvers and resulting trajectories; and monitoring vehicle flight profile and energy levels during reentry.

Electrical, Environmental & Consumables Manager (EECOM)

Responsible for all life support systems, power management, heating and cooling systems, transducers and vehicle lighting; monitors fuel cells; manages consumables.

Payloads Officer (PAYLOADS)

Coordinates all payload activities; serves as principal interface with remote payload operations facilities.

Data Processing Systems Engineer (DPS)

Responsible for all onboard mass memory and data processing hardware; monitors primary and backup flight software systems; manages operating routines and multi-computer configurations.

Propulsion Engineer (PROP)

Manages the reaction control and orbital maneuvering thrusters during all phases of flight; monitors fuel usage and storage tank status; calculates optimal sequences for thruster firings.

Booster Systems Engineer (BOOSTER)

Monitors main engine and solid rocket booster performance during ascent phase.

Guidance, Navigation & Control Systems Engineer (GNC)

Responsible for all inertial navigational systems hardware; monitors radio navigation and digital autopilot hardware systems.

Guidance Procedures Officer (GUIDANCE)

Another specialty postion, operating at the GNC console during launch phase; monitors all ascent dynamics parameters and all guidance and navigation software.

Ascent Procedures Officer (ASCENT PROC)

Another specialty position for the launch phase only, operating next to the Guidance Procedures Officer; provides ready reference on all flight crew procedures or documentation which could be employed during ascent. Beginning with STS-27, this position will be combined with the Guidance Procedures Officer function, with the call sign GPO.

Ground Controller (GC)

Coordinates operation of ground stations and other elements of worldwide space tracking and data network; responsible for MCC computer support and displays.

Maintenance, Mechanical, Arm & Crew Systems (MMACS)

Formerly known as RMU; responsible for remote manipulator system; monitors auxilliary power units and hydraulic systems; manages payload bay and vent door operations.

EVA Specialist (EVA)

Another specialty position, activated for planned or contingency extra-vehicular activity; operates from the MMACS console; monitors timeline and all preparations leading up to an EVA; monitors spacesuit parameters and provides ready reference on procedures during an EVA.

Flight Surgeon (SURGEON)

Monitors health of flight crew; provides procedures and guidance on all health-related matters.

Public Affairs Officer (PAO)

Provides real-time explanation of mission events during all phases of flight.

STS-26 FLIGHT CONTROL TEAM STAFFING

Position	Ascent/Entry	Orbit 1	Orbit 2	Planning
FLIGHT	Gary E. Coen	J. Milton Heflin	Charles W. Shaw	Larry Bourgeois (Lead)
CAPCOM	John. O. Creighton Blaine Hammond	G. David Low Kathryn C. Thornton	Lacy Veach Mark Lee	Kathryn D. Sullivan Pierre Thuot
FAO	Neil A. Woodbury	Neil A. Woodbury	Robert L. Schaf	Anne F. Ellis
PROCEDURES*	/////	/////	Fisher Reynolds Donald W. Lewis	/////
INCO	Harry Black	Harry Black	John F. Muratore	J.E. Conner
FDO	Brian Perry (A) Greg Oliver (E)	Edward P. Gonzalez	Timothy D. Brown	Mark Haynes
EECOM	Steve McLendon	Steve McLendon	David G. Herbek	Charles Dingell Paul M. Joyce
PAYLOADS	Mark Childress	Mark Childress	James L. Clement	Ben L. Sellari
DPS	Terry W. Keeler	Terry W. Keeler	Michael Darnell	Gloria Araiza
PROP	Anthony Ceccacci	Anthony Ceccacci	James B. McDede	Richard D. Jackson
BOOSTER	Jenny M. Howard	/////	/////	/////
GNC	Jeffrey W. Bantle	Jeffrey W. Bantle	Edward F. Trlica	James M. Webb
GUIDANCE*	Dennis M. Bentley	/////	/////	/////
GC	Norman Talbott John Snyder	Chuck Capps Robert Culbertson	Mike Marsh John Wells	Julius Conditt Al Davis

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STS-26 FLIGHT CONTROL TEAM STAFFING
(Continued)

Position	Ascent/Entry	Orbit 1	Orbit 2	Planning
MMACS	Paul F. Dye	Paul F. Dye	David F. Thelen	Richard C. Poch
EVA‡	Charles Armstrong	/////	/////	/////
SURGEON	Richard Jennings	Jeffrey Davis	Patricia A. Santy	/////
PAO	Steve Nesbitt (A) Brian Welch (E)	Brian Welch	Billie A. Deason	Barbara L. Schwartz

* = Specialty position activated for specific flight phases.
‡ = On call.
(A) = Ascent; (E) = Entry

NASA News

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Lyndon B. Johnson Space Center
Houston, Texas 77058
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For Release

October 5, 1988

Jeffrey E. Carr
RELEASE NO. 88-038

NOTE TO EDITORS

DISCOVERY CREW PRESS CONFERENCE - TUESDAY, OCT 11, 2 PM

STS-26 astronauts Rick Hauck, Dick Covey, Mike Lounge, Dave Hilmers, and Pinky Nelson will meet with news media in a press conference on Tuesday, October 11 at 2 pm central time at the Johnson Space Center in Houston.

The press conference will consist of a briefing by crew members on their mission featuring film and photography taken during the flight, followed by questions from JSC and other participating NASA field centers. The event will be broadcast live on NASA Select television.

NASA Select programming is carried on Satcom F2R, transponder 13 located a 72 degrees W. longitude and is in the public domain.

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NASA News

National Aeronautics and
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For Release

Kelly Humphries
RELEASE No: 88-039

October 6, 1988

SYMPOSIUM TO FOCUS IN SCIENCE AND TECHNOLOGY CAREERS FOR BLACKS

Johnson Space Center and the Center for the Advancement of Science, Engineering and Technology (CASET) will sponsor the first annual Black Symposium on Science, Engineering and Technology October 12 through 14, 1988, at JSC's Gilruth Recreation Center.

The symposium will consist of presentations on the educational and science, engineering and technology career status of blacks, and workshops on recruitment and retention strategies, according to Dr. Nina W. Kay, CASET project director. This is the third symposium in a series which previously addressed the needs of Hispanics and American Indians in high-tech education and employment.

State Rep. Wilhelmina R. Delco will present welcoming remarks at the symposium's 9 a.m. Wednesday, Oct. 12 opening session. Dr. Shirley M. Malcom, program head of the Office of Opportunities in Science for the American Association for the Advancement of Science, will be the keynote speaker.

First-day presentations will be open to the public; the remaining days' workshops will be open only to conference participants.

CASET, with on-site offices at JSC, is currently studying factors related to recruitment and retention of women and minorities in the science, engineering and technology fields. CASET is funded by the Department of Defense, and receives support from NASA and the Department of Labor.

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NASA News

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For Release

October 7, 1988
3 p.m. CDT

Kari Fluegel
Johnson Space Center
(Phone: 713/483-5111)

Barbara Selby
Headquarters, Washington, D.C.
(Phone 202/453-2352)

RELEASE NO. 88-040

NASA Begins Negotiations for Logistics Support Services Contract

The National Aeronautics and Space Administration will open negotiations with Pioneer Contract Services Inc. of Houston for a five-year, cost-plus-fixed-fee contract for logistics support services.

The five-year contract includes a one-year basic performance period, beginning on or about Dec. 1, and four one-year options. The proposed cost for the five-year program is approximately $60.3 million.

Contracted services include identification, cataloging, receipt and inspection of property; acquisition and inventory management; warehouse operations for stores stock, bondroom operation of program stock and operation of a temporary storage program; logistics plans and analysis; packing shipping and transportation of support services; and redistribution and utilization, supply documentation processing and NASA Equipment Management System documentation processing.

Also submitting a proposal was Staffall Inc. of Houston.

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Kari Fluegel
Release No. 88-041

For Release
Oct. 11,1988

LOCKHEED, ROCKWELL RECOGNIZED WITH JSC TEAM EXCELLENCE AWARDS

Lockheed Engineering and Sciences Co. of Houston and the Space Transportation Systems Division of Rockwell International in Downey, Calif. have been selected as recipients of the 1988 Johnson Space Center Team Excellence Awards, JSC Director Aaron Cohen announced today.

The Team Excellence Award recognizes aerospace companies demonstrating outstanding dedication and commitment to quality and productivity in support of U.S. manned spaceflight programs as contractors and partners of the Johnson Space Center.

"Recognition is accorded these companies and their employees not only for their high quality products and services, but for their leadership and commitment to continuous quality and productivity improvement," Cohen said. "It is this type of dedication to continuous improvement which will enable us to sustain our leadership in manned spaceflight."

Lockheed Engineering and Sciences Co. furnishes JSC with various engineering and science services in support of the Space Shuttle and Space Station Freedom programs and provides other advanced technology development initiatives.

Rockwell's Space Transportations Systems Division builds the orbiter and provides systems integration for National Space Transportation System (NSTS) Engineering and Payload Integration.

Cohen will present the awards in ceremonies at contractor facilities in Houston and Downey. Accepting the awards will be R.B. Young, president of Lockheed Engineering and Sciences Co., and S.Z. Rubenstein, president of Rockwell's Space Transportation System Division.

Presentation of the award coincides with NASA's 30th anniversary and with National Quality Month. "This is an appropriate time to reinforce our dedication to excellence by recognizing the outstanding work of JSC's contractors," Cohen said.

Both companies now are finalists for this year's NASA Excellence Award for Quality and Productivity. The NASA award will be presented this week.

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NASA News

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For Release

Oct. 14, 1988
Immediate

Barbara Selby
NASA Headquarters
(Phone: 202/453-8536)

Kari Fluegel
Johnson Space Center
(Phone: 713/483-5111)

Release No. 88-042

NASA SIGNS $84 MILLION CONTRACT WITH HAMILTON STANDARD FOR EMU

National Aeronautics and Space Administration recently finalized a contract with the Hamilton Standard Division of United Technologies Inc. in Windsor Locks, CT, for hardware and program and design support of the Extravehicular Mobility Unit (EMU).

The contract, valued at $84,698,800, is a cost-plus-award-fee agreement.

The contract provides for the production of hardware to replace one EMU; for program management and support; and for the design, development and implementation of operational utilization enhancements to improve ground-turnaround operations and on-orbit maintainability.

Work associated with the agreement will be performed at the contractor's facility in Windsor Locks, at various subcontractor facilities and at the Johnson Space Center in Houston.

The contract was negotiated non-competitively with Hamilton Standard, the prime contractor for the EMU.

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NASA News

National Aeronautics and
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For Release

James Hartsfield
Release No. 88-043

Oct. 24, 1988

JSC DEVELOPING AN IN-HELMET COMPUTER MONITOR FOR SPACESUITS

During future spacewalks, astronauts may have more than just the universe before their eyes--they may have just about any information they require from a transparent, television-quality computer monitor on their visors.

That's the goal of a team at the Johnson Space Center (JSC) working on a helmet-mounted display for spacesuits. And the difference that a helmet-mounted view screen can make could be essential to the demanding orbital work that will be required for America to build its permanently manned space station in the 1990s.

Heads-up displays, where images are projected onto a windshield, have already been developed and are in use in some jet aircraft. But the helmet-mounted display would be far different, projecting an image onto a visor only inches away from the astronaut's eyes, and such a display must be extremely compact.

During an extravehicular activity (EVA) now, astronauts have one 12-character liquid crystal display at the top of a large, cumbersome control module attached to the chest of their spacesuit. The 12-character strip displays vital suit information, such as suit pressure, available oxygen, available water and available power, in an abbreviated form. And the tiny readout is inconveniently located, where astronauts must strain to read it.

But outside the vehicle at work in space, convenience and quick access to information are the difference between a task completed and a task made impossible. The helmet-mounted display under development has resolution comparable to a television, said Jose Marmolejo, a project engineer in JSC's Crew Systems Branch. Among the items it can display are a quick, easily read graphic of the spacesuit's status; all of the pages of a bulky wrist checklist now worn during spacewalks; and just about any other data item, including video, Marmolejo said.

"During space station operations, astronauts could be outside nearly every other day, three times a week, for 90 days. That's about 36 EVAs," he said. "I believe a helmet-mounted

display is the only way to go."

The helmet would be linked to the spacesuit's computer, providing a capability to display information on the vital functions of the suit or transmitted data from other computers, originating from the space station or from the ground. Checklists, schematics, even video could be shown on the monitor, and a possible voice-controlled system could let the astronaut choose displays and use video-displayed controls hands-free. However, manual switches would still be used to control critical suit functions, Marmolejo said.

Progress toward an operational helmet-mounted display is well under way since the work began in 1984. Two demonstration units have been studied at JSC. The first, delivered in March 1987, was built in conjunction with Wright-Patterson Air Force Base and featured 1-inch cathode ray tubes that projected a binocular image onto a semi-transparent, curved plate. The second, delivered in June, is more advanced.

Built by Hamilton-Standard, the demonstrator projects a liquid crystal display image through five lenses onto a plate that serves as a screen, folding the image back to the viewer, Marmolejo said. The screen is partially transparent, and it can be seen through easily when the liquid crystal projector is off. The display serves as a black-and-white, binocular monitor that has a resolution high enough to show low-quality video, Marmolejo said. "Most people have been very pleased with this. It's very easy to view, and there's virtually no eye strain."

The next version of the display, to be built by April 1989, will employ holographic elements and be constructed in a helmet that may be close to the project's final form. Special, holographic materials will be deposited directly on the pressure helmet, the innermost visor, and the protective visor, the second visor of a helmet. A third, moveable, gold-plated sun visor completes the makeup of the helmet, he explained.

The image will be projected by being bounced between the holographic deposits on the two surfaces. Such a system could reduce the packaging size, Marmolejo said. The team is aiming at developing a display in a helmet that would be only 1.5 inches taller than the current pressure helmets. The display would not be a holographic, three-dimensional display, and holography will be used only in creating the special reflective deposits needed.

One of the biggest attributes of the holographic deposits is that such a view screen could reflect 90 percent of the projected light back to the viewer and, at the same time, be 90 percent transparent when the projector is off, he said. The screen should present close to a 30-degree diagonal field-of-view image and be located just above the normal line of sight.

"The helmet-mounted display is not a weight-critical item,"

Marmolejo said. "Its size and the power it uses are the main concerns."

Training astronauts for the large demands of space station EVAs will be extensive. But a helmet-mounted display could minimize that training by having virtually unlimited checklists at the beck and call of the astronaut during EVAs. "I've seen the amount of training that the astronauts go through for just one pair of Shuttle EVAs. And there's no way you can do all that training here on the ground to get a guy totally ready for 90 days worth of work," Marmolejo said.

The helmet-mounted display also could be used as a television monitor to show astronauts using a television camera the video they're sending back to Earth.

Marmolejo and his team also are working with other software that could be used in the display, including a graphic informational aid for astronauts flying the manned maneuvering unit. "If we can prove that the holographic display is feasible, there's really not a whole lot left to work on except reducing the volume and increasing the resolution," Marmolejo said.

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NASA News

National Aeronautics and
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James Hartsfield
Release No. 88-044

For Release
Oct. 28, 1988

JSC ENGINEERS STUDYING HUMAN-LIKE HANDS FOR SPACEWALKING ROBOT

The designs of Mother Nature are part of the inspiration for engineers at the Johnson Space Center developing hands for a spacewalking robot that will retrieve tools dropped by astronauts constructing America's space station in the 1990s.

Larry Li, an electrical engineer at JSC, is at work developing "smart hands" for the Extravehicular Activity (EVA) Retriever, a robotic assistant for spacewalking astronauts. A variety of robotic hands are being evaluated by Li and a team in the Special Projects Branch of the Crew and Thermal Systems Division (CTSD).

The hands now on EVA Retriever, first demonstrated to the public in January, are anything but human-like. The right one is basically a three-clawed gripper and the left only two-fingered tongs. But the appearance of many of the hands the team is evaluating makes it apparent the inspiration for them was found in flesh and blood.

"We're not saying a dexterous, human-type hand is the way to go," Li said. "But just looking at nature, it seems pretty obvious that Mother Nature seems to always have the best design."

In fact, debating the value of human-like, or anthropomorphic, versus a non-human-like, or non-anthropomorphic, design is a key ingredient of the team's current work, Li said.

"There are basically two approaches we could use. First, we could develop a specialized hand for specific tasks, such as is very effective in industry, but the drawback is that it would take a wide variety of them for the multitude of planned tasks," he explained. "And, second, we could develop a generic, smart hand that can grip a variety of objects, with the software that allows the hand to judge for itself how it should grip an object."

Some of the hands being studied are not only like a human hand in appearance, but they can actually feel. Sensors on the fingers can gauge the pressure with which they grip, and another set can register a feather-light touch. And some sensors even surpass human senses--proximity sensors can register when the

hand is close to an object without actually touching it.

Strolling through the EVA Robotics Lab in Bldg. 34, Li displayed a host of hands the team is working with, starting with strict mechanics and moving toward models that are an almost eerie imitation of flesh in steel.

One of the hands destined to be installed on EVA Retriever for the project's Phase 2 demonstration in January 1989 is a three-fingered design with one finger opposing the other two. The hand is similiar to the right hand now on EVA Retriever and was designed by CTSD Engineer Tom Grubb.

The hand, designated CTSD-2, has three degrees of movement and basically differs from the current hand on EVA Retriever in the force and touch sensors it includes. Also, the hand is mounted to a wrist featuring gears that can provide simultaneous pitch and yaw movement, much like a human ball joint. The hand is powered by three separate electric motors.

The right hand to be installed on the Retriever for Phase 2 will be a robotic derivation of a mechanical hand originally designed as a remote manipulator, an alternative to spacesuit gloves, by consultant Dr. John Jameson. The robotic Jameson Hand is now being fabricated by JSC's Technical Services Division. It will have two fingers and a thumb in a human-like configuration and will be powered by seven motors packaged in a forearm. The hand will have six degrees of freedom.

"We have to minimize the degrees of freedom we need but maximize the mobility," Li explained. "You have to strike a compromise, because the more degrees of freedom you have, the more hardware and software you'll need to control it."

The more a hand appears human, the more complicated it becomes. And the Salisbury Hand, so named for designer Dr. Ken Salisbury, attempts to improve upon Mother Nature.

The three fingers on the hand can overextend, basically, bend backward. The overextension could allow the hand to grasp some objects in ways humans can't, such as grabbing a ring by putting the hand through it and bending the fingers back. The Salisbury Hand features nine degrees of freedom and is driven by 12 separate motors.

The most complex in this spectrum of hands is the Utah-MIT hand, a mechanical appendage so adept that it can catch a ball. Developed by the University of Utah and the Massachusetts Institute of Technology, the NASA team is using the hand as a test bed for research into the advantages and disadvantages of human-like designs. The way it's built, the Utah-MIT hand will never make it onto EVA Retriever.

The hand is run by pneumatic cylinders and tendons, an

impractical method for space due to its bulk. It features 16 degrees of freedom, but it can be limited to fewer degrees of freedom if certain joints are locked, making it an excellent model for developing software, evaluating sensors and studying the advantages of anthropomorphic design, Li said.

What EVA Retriever's final hands will look like is uncertain, but it will probably end up a combination of the variety of possibilities under study. After the January 1989 demonstration is completed, a new set of hands will be installed on the robot for a Phase 3 January 1990 demonstration.

Creating a robot hand is a task filled with problems. "For a robot, gripping an object is a tough problem even on Earth," Li said. "But on Earth, you've always got that fallback, the ground--if an object's dropped, it will hit the ground. In space, though, it's unlimited."

And that lack of limits, coupled with lack of weight, means grabbing an object is a delicate chore. Motion must not be imparted to the target object before the robot hand is ready to grasp it. For that reason, a proximity sensor system being developed by Li and Cliff Hess may prove invaluable.

The sensors, placed on the hand, will be able to judge where an object is before it is touched by bouncing infrared light off of it. Such a perception could allow the hand to curl around an object before it closes, thus reducing the risk of accidentally knocking the object away during a grasping attempt. Li and Hess are in the process of patenting the sensor system.

Also in development is the software that will give EVA Retriever the artificial intelligence it will require to make judgements about where to grasp things and how it should maneuver in order to carry through with that decision. In the final product, EVA Retriever is planned to be highly autonomous so that all astronauts will have to do is give simple, verbal commands such as, "Retrieve."

Li has high hopes for EVA Retriever. "If it works out the way we want it to, it could serve as more than just a retriever. It could be an astronaut helper," he explained. "It could manipulate as well as grasp. It could maybe turn a knob, or hand a truss to an astronaut." He likened the possible robot-astronaut relationship to that of a 5-year-old child helping his father lay bricks.

For some, robots imitating humans is a bit frightening. But not to Li. "It's eerie for you, because you didn't program it. I programmed it; I know what it's supposed to do," he said. "I like to make things appear human, to give them a personality at demonstrations. It just amazes me how far robot technology has gone."

NASA News

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For Release

Kari Fluegel
Johnson Space Center
(Phone: 713/483-5111)

Oct. 28, 1988
3 p.m. CDT

Release No. 88-045

NASA, NORTHROP TO NEGOTIATE FINAL AIRCRAFT MAINTENANCE CONTRACT

The National Aeronautics and Space Administration recently selected Northrop Worldwide Aircraft Services Inc. (NWASI), a subsidiary of the Northrop Corporation of Lawton, Okla., with which to begin final contract negotiations for the Aircraft Maintenance and Modification Program (AMMP).

Total proposed cost of the five-year effort beginning March 1, 1989, is approximately $72 million. The award will be a continuation of the aircraft maintenance and modication support currently being performed by NWASI.

The contracted work will performed at the Lyndon B. Johnson Space Center facility at Ellington Field in Houston, Texas; Forward Operating Locations in El Paso, Texas; and Edwards Air Force Base, California.

The contractor will manage, direct, and perform organizational, intermediate and depot level maintenance. Contractor operations will include maintaining and servicing aircraft and engines, and providing engineering support, logistics support and quality control. The contractor also will provide the servicing of transient aircraft and maintenance of any additional aircraft assigned to JSC during the contract time.

The agreement provides for a one-year base performance period and four one-year options.

Also submitting proposals for the AMMP effort were Hawthorne Services Inc., Charleston, Calif.; Lear Siegler Management Services Corp., Oklahoma City, Okla.; and Serv-Air, Inc., Greenville, Texas.

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NASA News

National Aeronautics and
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For Release

Pam Alloway
RELEASE No. 88-046

Nov. 4, 1988

NOTE TO EDITORS: GRAND OPENING OF NASA'S SPACE STATION FREEDOM MOCKUP AND TRAINER FACILITY, BUILDING 9B.

NASA's Johnson Space Center will open its newly constructed Space Station Mockup and Trainer Facility during a grand opening ceremony at 2:30 p.m. Wednesday, Nov. 9.

Clarke Covington, manager of the Space Station Projects Office, and astronauts who are working with the project will be available for media interviews in the new building from 10 a.m. to noon Wednesday. News media also may walk through the mockups during that time.

News media planning to attend either the interview session or the grand opening ceremony must have NASA media badges which can be obtained in the JSC news center, Building 2.

The grand opening ceremony will begin at 2:30 p.m. with remarks from JSC Director Aaron Cohen, Dr. Carolyn Huntoon, director of Space and Life Sciences, Covington, and Akira Kubozono, executive director of the National Space Development Agency of Japan.

News media attending the opening ceremony should be in place by 2 p.m. There will be designated seating and camera spaces for media.

Following a ribbon cutting, guests may tour the mockups and trainers until 5 p.m. Contractors also will have exhibits on display. Ceremony organizers have invited all NASA and contract employees and expect more than 300 other invited guests to attend the ceremony.

Signs directing visitors and guests to building 9A/9B, located on the north end of the center, will be along the main entrance road off NASA Road 1.

Media should park in designated spots located on the north side of the building. Security officers will be at the building to direct traffic and answer questions. All guests and visitors should enter the building through the east door.

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NASA News

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For Release

James Hartsfield
Release No. 88-047

Nov. 14, 1988

JSC TEAM BATTLES EFFECTS OF WEIGHTLESSNESS WITH EXERCISE

A bicycle that can think for itself. Four healthy people confined to bed for more than four months. A group of six who run on a treadmill inside an airplane flying a stomach-churning trajectory. And a group of 10 that exercises to music or selected videos, supervised by a computer.

All are soldiers, soldiers in a war declared by NASA against what historically has been one of man's most valuable assets--his natural, marvelous but troubling ability to adapt.

A team of scientists, doctors and engineers from a variety of areas at the Johnson Space Center (JSC) in Houston is confident it will win that war, and that victory will allow humans living in space to remain as physically fit, or even better so, than they are on Earth.

"Man adapts in space. It's something that occurs naturally," explained Dr. Bernard Harris, a member of JSC's Space Biomedical Research Institute. "If we didn't want to come back to Earth, adaptation probably wouldn't be a problem. Our goal is to retard or prevent that adaptive process."

Harris heads a team of workers from various disciplines that is developing the Exercise Countermeasure Project. Exercise, Harris said, has already proven itself to be the most powerful weapon in the arsenal used to battle the effects of weightlessness on the body.

In weightlessness, muscles lose their strength, the cardiovascular system becomes lazy, bones can degenerate. That process must be stopped if Americans are going to construct a space station in orbit, if they're going to live in zero-gravity and if Shuttle pilots are going to be fully fit to land their crafts after extended stays in space.

"We have to maintain the pilots' health so they're capable of flying down," he said. "Flying in the Shuttle is much more strenuous than Apollo; the crew is sitting up, not lying down. And they must have the strength to use the flight controls to

(more)

successfully land." Also, there is no room for dizziness, a problem that could occur when gravity is first felt during a Shuttle descent.

Two main products are to result from the work now under way: an Exercise Countermeasure Facility for Space Station Freedom, a permanently manned station to be built in orbit during the 1990s, and an Exercise Countermeasure System for an extended duration version of the Space Shuttle. The Shuttle's exercise system will be different from the space station's facility mainly because of a lack of room, Harris explained.

For America's space station, the exercise facility may have to be one of the first things in orbit. Astronauts involved in construction of the station will have to remain in good physical condition to perform their work.

Harris is confident that the right amount of the right exercise can do the job--keep astronauts nearly as fit as they were when they left Earth. "We'd like to maintain their preflight level of fitness, and it could be possible that some people could actually improve," he said. "But, in reality, we'll probably just maintain their fitness, and we may see some loss, but not a significant one."

But how much exercise is required to meet these goals? What muscles need to be exercised? And how can you do that? Those are the questions the team has to answer.

Those answers don't come easily, especially for people involved in current studies relating to the Exercise Countermeasure Project. Four different JSC laboratories are working on the project: the Exercise Development Lab, the Exercise Physiology Lab, the Artificial Intelligence Lab and the Anthropometry and Biomechanical Lab. Each lab is now involved with various studies of test subjects.

In a study under way by the exercise development and exercise physiology labs, four subjects were confined to bed for 17 weeks at Hermann and Methodist Hospitals in Houston. Strict bed rest can simulate the effects of prolonged weightlessness, Harris said.

The subjects are now going through a six-week reconditioning period, working out one hour a day on a strict exercise prescription. The study, headed by Dr. Victor Schneider, will determine if the exercise can bring the subjects back up to their previous level of fitness.

"The theme is to see if we can do what we need to do with just one hour of exercise a day," Harris explained. "Can exercise be effectively done in that short period of time? Can we build up

(more)

muscle in an hour? Can we help the cardiovascular system in an hour?"

A second study under way, overseen by Dr. Mike Greenisen of the biomechanical lab, is researching the fine points of running on a treadmill in zero gravity. Six people have been running on a treadmill in normal gravity with electrodes attached to their leg muscles, an attempt to determine the exact movements of muscles during the exercise.

Next, the six will run on a treadmill aboard NASA's KC 135 aircraft as it flies a parabolic path that simulates weightlessness for about 30 seconds during each arch. The runners will be filmed as well as have their leg muscle movements recorded electronically in a "locomotion study." The results will help in designing the restraint system needed for a space treadmill, determining how much simulated weight must be put on the body as it runs in zero-G to get the same results as a normal terrestrial workout, Harris said.

A third study has 10 subjects exercising three times a week on prototypes of equipment that may eventually be part of the Exercise Countermeasure Facility. The equipment includes a stationary bicycle, a treadmill, a rowing machine and a resistive exercise device, essentially a machine that simulates weightlifting.

But these machines are far from the run-of-the-mill versions found in health clubs. They are being trained to think for themselves, to decide for themselves when their users aren't working hard enough--and, based on that decision, to increase or decrease the workload.

The study is helping Project Engineer Laurie Webster and Software Engineer Wanda Pratt design what will basically be the brain of the Exercise Countermeasure Facility in the Artificial Intelligence Lab. Exercise prescriptions have been written for the 10 test subjects by Exercise Physiologist Dr. Steve Siconolfi, himself one of the subjects. Those prescriptions have been fed into the computers that control the exercise devices, and the test subjects work out on their choice of the bike or treadmill three times a week.

Basically, Webster and Pratt are building a computerized fitness instructor. "We're trying to capture the decision-making techniques of the expert," Webster explained. "We want to design a machine that would behave in a way similiar to the way an expert would behave in the same situation."

The artificial intelligence will allow the computer to rewrite the exercise prescription needed to keep a crewmember in shape, compensating for the continuing effects of zero-G. "It

(more)

changes the prescription day to day," Webster said. "If it didn't change it, the person would still just decondition--there would be no compensation for the deconditioning effects of weightlessness on his body."

The bike and treadmill can keep the person's heart rate within a specified target zone. For instance, if the heart rate is too low, the bike will automatically make it more difficult to push the pedals. The treadmill can speed up and create a 5-degree slope to make the runner work harder.

What will eventually be aboard Space Station Freedom will probably be a product of those devices now being tested, Webster said. A combination bicycle and rowing machine and a combination treadmill and simulated weightlifting device are two possibilities, and the lab may receive such combination prototypes in the near future, he added. And day after day, the devices would track the condition of the crew and adjust the amount of exercise they need accordingly. The facility also would be able to transmit that log of data on each crew member's physical condition to Earth.

The devices also may include a voice synthesizer so they can tell exercisers when to begin working out, when to stop, and other information. Motivational items are already being studied as part of the prototype machines. Subjects in the study group can exercise to either music or video of their choice, including scenes that give the appearance of an actual bike ride or jog down a country road.

"Eventually, we may try a video game as motivation, a game situation," Siconolfi said. "They could play the game as part of their exercise."

Exercise in space is more than just staying in condition to return to Earth's gravity, it is a key to good health over a prolonged period of weightlessness, Harris said. "Exercise can keep the muscles toned and the cardiovascular system in shape," he said. "And we think that by keeping the right muscles toned, we can affect the bones. The astronauts must have some way up there of maintaining their physical condition, and, in turn, their health."

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November 09, 1988

Jeffrey Carr
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VETERAN ASTRONAUT BOBKO TO RETIRE FROM NASA

Col. Karol J. "Bo" Bobko (USAF) has announced plans to retire from NASA and the U.S. Air Force on January 1, 1989 after a career which includes three space shuttle missions.

In April 1983, Bobko served as pilot on Shuttle mission STS-6, the maiden voyage of the Space Shuttle Challenger during which the first Tracking and Data Relay Satellite was deployed, and which featured the first spacewalk of the Shuttle era.

In April of '85, Bobko served as commander of his second mission, STS 51-D, which featured the deployment of two communications satellites and a dramatic attempt to revisit and activate one of those satellites which had malfunctioned. He also commanded STS 51-J, the first flight of the Space Shuttle Atlantis and the second Department of Defense STS mission, in October of 1985.

Bobko, an astronaut since 1970, was a member of the Skylab Medical Experiments Altitude Test (SMEAT) in 1972. He also served on astronaut support crews for the Apollo-Soyuz Test Project in 1975 and for the Space Shuttle Approach and Landing Tests conducted at Edwards Air Force Base in California.

Bobko will be joining the Space Systems Division of Booz, Allen & Hamilton Inc. He will be directing their activities in the Houston/Johnson Space Center area with initial emphasis on Space Station program support. Bobko's last day at JSC will be November 30.

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NASA News

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November 30, 1988
12:30 p.m. CST

Jeffrey Carr
RELEASE NO. 88-049

FOUR NEW SHUTTLE CREWS NAMED (STS-32, STS-33, STS-34, STS-35)

Astronaut flight crews have been named to four shuttle missions which are scheduled to fly in late 1989 and early 1990, bringing the total number of crews in training to nine.

Col. Frederick D. Gregory (USAF) will command STS-33, a Department of Defense mission aboard Discovery set for August 10, 1989. Gregory's five member crew will consist of pilot S. David Griggs and mission specialists F. Story Musgrave, M.D., Kathryn C. Thornton, Ph.D., and Capt. Manley L. "Sonny" Carter, Jr., M.D. (USN).

The Space Shuttle Atlantis will fly under the command of Capt. Donald E. Williams (USN) October 12, 1989 on mission STS-34. Williams and crew will deploy the planetary probe Galileo, sending it on its way to Jupiter. The pilot for the mission is Cmdr. Michael J. McCulley (USN). Shannon W. Lucid, Ph.D., Ellen S. Baker, M.D., and Franklin R. Chang-Diaz, Ph.D., have been named as mission specialists.

Capt. Daniel C. Brandenstein (USN) will command the STS-32 crew aboard Columbia. The mission, scheduled for November 13, 1989, will feature deployment of the Syncom IV-5 satellite and retrieval of the Long Duration Exposure Facility. Lt. Cmdr. James D. Wetherbee (USN) will serve as pilot. Bonnie J. Dunbar, Ph.D., G. David Low, and Marsha S. Ivins have been named as mission specialists.

Shuttle mission STS-35 will feature the ASTRO-1 astronomy laboratory and is scheduled to fly March 1, 1990. Commanding the mission aboard Columbia is Capt. Jon A. McBride (USN). Col. Guy S. Gardner (USAF) has been named as pilot. Mission specialists are John M. "Mike" Lounge, Jeffrey A. Hoffman, Ph.D., and Robert A.R. Parker, Ph.D.

Payload specialists named to the ASTRO-1 mission are Ronald A. Parise, Ph.D. and Samuel T. Durrance, Ph.D. Durrance and Parise were assigned previously to fly with ASTRO-1 in March 1986 on mission STS 61-E.

STS-32

Brandenstein, currently Chief of the Astronaut Office, has flown twice before on missions STS-8 as pilot and STS 51-G as commander. Brandenstein was born January 17, 1943 in Watertown, WI.

Wetherbee, making his first space flight, was born November 27, 1952 in Flushing, NY.

Dunbar will make her second flight as a mission specialist. Her first was on STS 61-A in October of 1985. She was born March 3, 1949 in Sunnyside, WA.

Low, born February 19, 1956 in Cleveland, OH, will also make his first flight in space.

Ivins, also making her first flight, was born April 15, 1951 in Baltimore, MD.

STS-33

Gregory flew previously as pilot on mission STS 51-B in May of 1985. He was born January 7, 1941 in Washington, D.C.

Griggs flew as a mission specialist on STS 51-D in April of 1985. He was born September 7, 1939 in Portland, OR.

Carter, born August 15, 1947 in Macon, GA, will make his first space flight. Carter considers Warner Robbins, GA to be his hometown.

Musgrave has flown twice before as a mission specialist on STS-6 in April of 1983 and again on STS 51-F in July of 1985. He was born August 19, 1935 in Boston, MA, but considers Lexington, KY to be his hometown.

Thornton was born August 17, 1952 in Montgomery, AL. She will be making her first flight in space.

STS-34

Williams was pilot on STS 51-D, the fourth flight of Discovery, in April 1985. He was born February 13, 1942 in Lafayette, IN.

McCulley will be making his first Space Shuttle flight. He was born August 4, 1943 in San Diego, CA, but considers Livingston, TN, to be his hometown.

Baker, born April 27, 1953 in Fayetteville, NC, will be making her first Shuttle flight.

Chang-Diaz, a mission specialist on STS 61-C in January 1986 aboard Columbia, was born April 6, 1950 in San Jose, Costa Rica.

Lucid flew as a mission specialist on the fifth flight of Discovery, STS 51-G, in June 1985. She was born in Shanghai, China, on January 14, 1943, and considers Bethany, OK, to be her hometown.

STS-35

McBride previously flew as the pilot of STS 41-G aboard Challenger in October 1984. He was born August 14, 1943 in Charleston, WV, but considers Beckley, WV, to be his hometown.

Gardner, currently preparing for the STS-27 mission aboard Atlantis, will be making his second flight. He was born January 6, 1948 in Altavista, VA, but considers Alexandria, VA, to be his hometown.

Hoffman, making his second Shuttle flight, previously served as a mission specialist on STS 51-D aboard Discovery in April 1985. He was born November 2, 1944 in Brooklyn, NY, but considers Scarsdale, NY, to be his hometown.

Lounge will be making his third spaceflight as a mission specialist. He previously flew on Orbiter Discovery missions STS 51-I launched in August 1985 and STS-26 launched in September 1988. Lounge was born June 28, 1946 in Denver, CO, but considers Burlington, CO, to be his hometown.

Parker, making his second Shuttle flight, served as a mission specialist on the first Spacelab mission, STS-9, launched in November 1983. He was born in New York City on December 14, 1936, but grew up in Shrewsbury, MA.

Durrance will be making his first Space Shuttle flight. He was born September 17, 1943 in Tallahassee, FL.

Parise will also be making his first Shuttle flight. He was born in Warren, OH, on May 24, 1951.

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NASA News

National Aeronautics and
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For Release:

Brian Welch
December 16, 1988
Release No. 88-051

TWO DECADES LATER: THE FLIGHT OF APOLLO 8

In the course of a frightful year, one unparalleled in the American experience for the impact and compression of truly historic events, it was, in the end, a voyage of exploration that became the most significant news story of 1968.

To categorize the year as merely "turbulent" would be a historic understatement. It was the year when Bobby Kennedy and Martin Luther King fell to assassins' bullets; the year when a sitting President announced he would neither seek nor accept the office again; it was the year of renewed race riots in virtually every major American city; the year of sit-ins, draft card burnings and the year when the first airliner was hijacked to Cuba.

In the halls of the National Aeronautics and Space Administration, within the confines of a technical world where the absolutes of mathematics and science might have been expected to lend a certain stability, there was also tension and uncertainty.

The space agency was still struggling to recover from its worst nightmare and most harrowing accident--the loss of the Apollo 1 crew in a spacecraft fire on the launch pad in January 1967 (the accident is also known as "Apollo 204," after the serial number of the spacecraft). The deaths of Grissom, White and Chaffee had shaken the country the year before and had revealed widespread problems within the lunar landing program. The recovery had not been easy, either technically or politically, and criticism had been harsh.

As the recovery continued and the weeks passed, there was a keenly felt, inexorable erosion in the margin for meeting

-more-

President Kennedy's goal of landing men on the Moon before the end of the decade. "The probability of landing on the Moon before 1970 is not high," wrote Robert Gilruth, the first director of the Manned Spacecraft Center (later renamed in honor of Lyndon Johnson) in a September 1967 memo.

For a time, the flight of Apollo 4 in August 1967 had lifted NASA's spirits. The unmanned launch, the first of a flight-ready Saturn V, went perfectly and seemed to sweep away many of the doubts still lingering from the accident eight months before. There was elation in Huntsville, at the Cape and in Houston. And in Washington, George Mueller, the associate administrator for space flight, called the test of the AS-501 vehicle "the most significant single milestone of the Apollo-Saturn program."

Then came April 1968.

On April 4, NASA launched AS-502, also known as Apollo 6. If this unmanned test flight of the Saturn V went well, the following mission would carry a crew into Earth orbit. It did not go well.

The chief designer of the rocket, Dr. Wehrner von Braun, remembered the launch in starker terms. "For two minutes everything looked like a repeat of the first Saturn V's textbook performance. Then a feeling of apprehension rolled through the launch control center when, around the 125th second, telemetered signals ... indicated an apparently mild Pogo vibration."

After the first stage dropped away, having performed nominally, the observers felt better. The five J-2 engines on the S-II second stage burned perfectly for more than four minutes. Then the number two engine began to sputter and it shut down. The number three engine shut down a split second later. After the faulty S-II stage fell away, the third stage, the S-IVB, fired and placed the test hardware into a lopsided Earth parking orbit. Two revolutions later, the spacecraft received a command for the third stage to re-ignite.

It didn't. Despite repeated efforts, the J-2 engine would not start. Exasperated ground controllers succeeded in separating the Command and Service Module (CSM), firing the Service Propulsion System engine to send the spacecraft to the required altitude, and then bringing the Command Module through an atmospheric reentry sequence to at least conduct a heat shield test.

"... the flight," von Braun wrote, "clearly left a lot to be desired. With three engines out, we just cannot go to the Moon."

Although a significant problem for the Apollo program, the AS-502 launch didn't get major play in the nation's newspapers. April 4 was the day Martin Luther King was shot in Memphis.

As the month of April came to a close, events were converging within the space program, events which usually converged around one man, George M. Low; events that would culminate eight months later in the voyage of Apollo 8.

By April 1968, Low had been on the job for one year as the manager of the Apollo Spacecraft Program, responsible for the CSM and the Lunar Module (LM). He had been working six and seven days a week, 10 and 12 hours a day in what former JSC Director Dr. Christopher C. Kraft Jr. described as "a tenacious effort" to turn the program around following the Apollo 1 fire.

Low once described the demands of his new job in those first months: "These were the Apollo spacecraft: two machines, 17 tons of aluminum, steel, copper, titanium, and synthetic materials; 33 tons of propellant; 4 million parts, 40 miles of wire, 100,000 drawings, 26 subsystems, 678 switches, 410 circuit breakers. To look after them there was a brand new program manager who would have to leap upon this fast-moving train, learn all about it, decide what was good enough and what wasn't, what to accept, and what to change. In the meanwhile, the clock ticked away, bringing the end of the decade ever closer."

In the spring of 1968, Low was confronted with good news and bad news. Progress in the redesign of the CSM was going better than expected, which meant that the manned Apollo 7 Earth orbit test flight of the spacecraft could probably take place on schedule in the fall. But problems with the LM were mounting and the Apollo 8 mission, intended to be a manned Earth orbit test of both the CSM and the lunar lander in late 1968, seemed certain to fall behind schedule. The LM was, in fact, to borrow the laconic vernacular of NASA's operational world, the great hitch in Apollo's get-along.

By July, Kraft remembers, the hitch was a major headache. "George Low expressed great consternation at the problems with the LM," he recalls. "They had leaks in the fluid systems, wiring problems, and they were really struggling like hell to get the damn thing to hang together." It was at about that time that Kraft, with responsibility for flight operations and spacecraft software, was called to Gilruth's office. Also present were Donald K. "Deke" Slayton, responsible for the astronaut crews, and George Low.

"George has a proposition for you," Gilruth said.

The proposition was bold, highly secret, startling, and elegant in its simplicity. Low proposed that they bypass the lunar module, for the time being, and press on to the Moon. He suggested that with recent progress in the CSM program, there was reason to consider sending the spacecraft to the Moon, if Apollo 7 went well. If so, then Apollo 8 could reenergize the program, add critical knowledge necessary for lunar landings and make possible the goal that everyone had been working on since 1961. Low wanted to know if his idea was technically feasible.

"We were taken aback," Kraft remembers.

Kraft and Slayton consulted their experts, Low consulted his. Kraft met with a small cadre of his operational troops; Arnold Aldrich, now director of the Space Shuttle program, Eugene F. Kranz, now Director of Mission Operations at JSC, Clifford Charlesworth, recently retired from JSC after serving as the director of Space Operations, and Jerry Bostick, now an executive with the Grumman Corp. Kraft gave his team two days to respond to the idea.

The plan was surprising, but not shocking for Kranz or for JSC Director Aaron Cohen, then working under Low on development of the CSM.

"I got a call from Kenny Kleinknecht, who was the Apollo Command and Service Module project manager, saying I needed to meet with George Low," Cohen remembered. "Low explained the mission to me and asked me to verify that the Command and Service Modules could do that mission. My role at the time was to validate the hardware. Was it certified? Was it of the integrity that would allow us to do that part of the lunar mission?"

Cohen ended up writing the memo for Low's signature that certified the vehicle as ready to make the voyage. The framed letter is today among his most prized mementos of the Apollo era.

Low's plan to leapfrog the flight sequence and strike out for the Moon was not a "shock" at the time, Cohen recalls, "but it was a very bold maneuver, a bold step from where we were. I don't think I was really shocked--more enthusiastic and excited. That was the mood of the center. Everyone thought it was great; they thought it was exciting, they took on the challenge."

According to Kranz, "By the time we got into early Apollo, the space program had moved to a point of confidence in leadership, and confidence that our leaders had a good sense of timing and

direction. This meeting was not unlike other meetings we had in the Gemini program, where all of a sudden the managers came in and said, 'Hey, let's do an EVA on Gemini 4.'" It was, Kranz recalls, "good, quality, gutsy decision making."

But there was a catch. From the perspective of the operational community, a great deal of the risk would have already been taken as soon as the Saturn V, with a crew aboard, left the launch pad. A second level of risk would be taken when the CSM struck out for the Moon. Low's original plan had called for looping around the Moon and coming back to Earth. But Kraft's men thought they should go into lunar orbit. That maneuver, after all, was integral to the eventual goal of landing men on the surface. It would also raise the stakes considerably.

"That's a lot different than just going around the Moon, believe me," Kraft said. "I remember when I told Frank Borman that we were pressing for a lunar orbit insertion, he didn't speak to me for two or three minutes. He just stared."

At the time, the U.S. didn't even have a precise gravitational model of the Moon. A NASA probe called Lunar Orbiter was circling the Moon, photographing the surface and mapping potential landing sites. But its path didn't coincide with orbital predictions."We were looking at that data and saying, we've got the same problem," Kraft remembers.

Later, after Apollo 8, researchers realized that objects orbiting the Moon would always encounter minor--yet critical--perturbations in their trajectories due to the presence of large mass concentrations, the result of millions of years of bombardment by rocky objects.

"It was data derived from Apollo 8 which gave us an empirical method--get that, empirical--for calculating trajectories on later flights," Kraft noted.

But neither the knowledge nor the method were in hand in July 1968. By the end of the month, the teams investigating Low's proposal had all said it was possible. Kraft, Slayton and Low reconvened in Gilruth's office. It was, Kraft would later say, "a very profound day.

"At this point," Kraft remembers, "Gilruth also thought it was a good idea. He picked up the phone and called von Braun in Huntsville. This was at 11 a.m. 'What are you doing this afternoon?' he asked him. 'Can we see you about 2 o'clock this afternoon?' Of course, the answer was yes, and we got on the

Gulfstream and flew to Huntsville. Before we left, Gilruth found out that Sam Phillips was at the Cape. He asked Phillips to meet us that afternoon in Huntsville."

Phillips, the Apollo Program director, later wrote that a quickly scheduled meeting of the Apollo management team was held in Huntsville that afternoon. "The three-hour conference didn't turn up any 'show stoppers.' Quite the opposite; while there were many details to be reexamined, it indeed looked as if we could do it. The gloom that had permeated our previous program review was replaced by excitement."

All was now dependent on the success of Apollo 7. On Oct. 11, 1968, the new Block II CSM, carrying Walter M. Schirra, Donn Eisele and Walter Cunningham, lifted off from the Cape atop a Saturn 1B. "During the 163 orbits of Apollo 7 the ghost of Apollo 204 was effectively exorcised," Phillips wrote.

The stage was set for the next step. Debriefings were held with the Apollo 7 crew. Management teams met in lengthy meetings. Data was reduced, flight plans were put forth, excitement began to grow. Finally, on Nov. 11, Thomas O. Paine, the new acting administrator of NASA, conducted a go/no-go review of the lunar orbit plan.

"By this time," Phillips wrote, "nearly all the skeptics had become converts. At the end of this climactic meeting Mueller put a recommendation for lunar orbit into writing, and Paine approved it. He telephoned the decision to the White House, and the message was laid on President Johnson's desk while he was conferring with Richard M. Nixon, elected his successor six days earlier."

The decision to go ahead, Kraft says, "was the boldest decision of the space program. But the gains were worth the risks." And then Kraft ticked off the risks: "It was the first manned launch of a Saturn V. It was the first burn of an S-IVB into a lunar trajectory. It was the first time men had left the gravitational influence of the Earth. It was the first time we had tried to navigate with onboard systems to the Moon. It was the first time we went into orbit around another planet. It was the first time men had looked down on the Moon from a distance of 60 miles. It was the first time we came out of orbit around another planet. And it was the first time we did a 36,000 foot-per-second reentry, the same as you would encounter in returning to the Earth from any planet."

Shortly thereafter, elaborate invitations were sent out for the launch with the inscription, "You are cordially invited to attend the departure of the United States Spaceship Apollo VIII on its voyage around the moon departing from Launch Complex 39A, Kennedy Space Center, with the launch window commencing at 7 a.m. on December 21, 1968."

At 7:51 a.m. CST Dec. 21, the world watched for the first time as a manned Saturn V, majestic yet ponderous, arose from the coastal wetlands of central Florida, the grandeur of the spectacle made even more prounounced by the presence of humans, by the purpose of their mission. Frank Borman, James Lovell and William Anders were on their way.

Two hours, 27 minutes into the flight, Capsule Communicator Michael Collins told the crew, "You are go for TLI." The obtuse acronym had never before been uttered during a space mission. It meant, that Mission Control had given the go-ahead to perform the trans-lunar injection burn. Humans were about to leave the cradle.

The burn lasted five minutes, 19 seconds. Apollo 8 reached a velocity of 24,200 miles per hour and left the bonds of Earth. From the back row of consoles in Mission Control, Chris Kraft was overheard to say, "You are on your way. You are <u>really</u> on your way."

On Christmas Eve, Apollo 8 went around the far side of the Moon and then began the longest loss of signal anyone ever remembers in Mission Control. It lasted for 34 minutes. During that time, unobserved by Earth, the critical burn of the Service Propulsion System engine took place and Apollo 8 went into lunar orbit. At the appointed time, CapCom Gerald Carr began trying to establish voice contact with the spacecraft. "Apollo 8, Apollo 8, Apollo 8 ..." The tension, all present there that day agree, was unbearable.

"Go ahead Houston," Lovell said at last, and Mission Control, as is tradition, went momentarily wild before calm returned and the operators continued to monitor their data.
As the day progressed, those operators, and the world, listened in rapt attention as the astronauts described the "vast desolation" of the Moon. That evening, one out of every four people in the world, nearly 1 billion people in 64 countries, heard the special message from the crew of Apollo 8 to their fellow sojourners back home on "the good Earth."

"In the beginning, God created the Heaven and the Earth ...."

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