CHAPTER 2

Blight Farm

Discovery

Discovery SS20

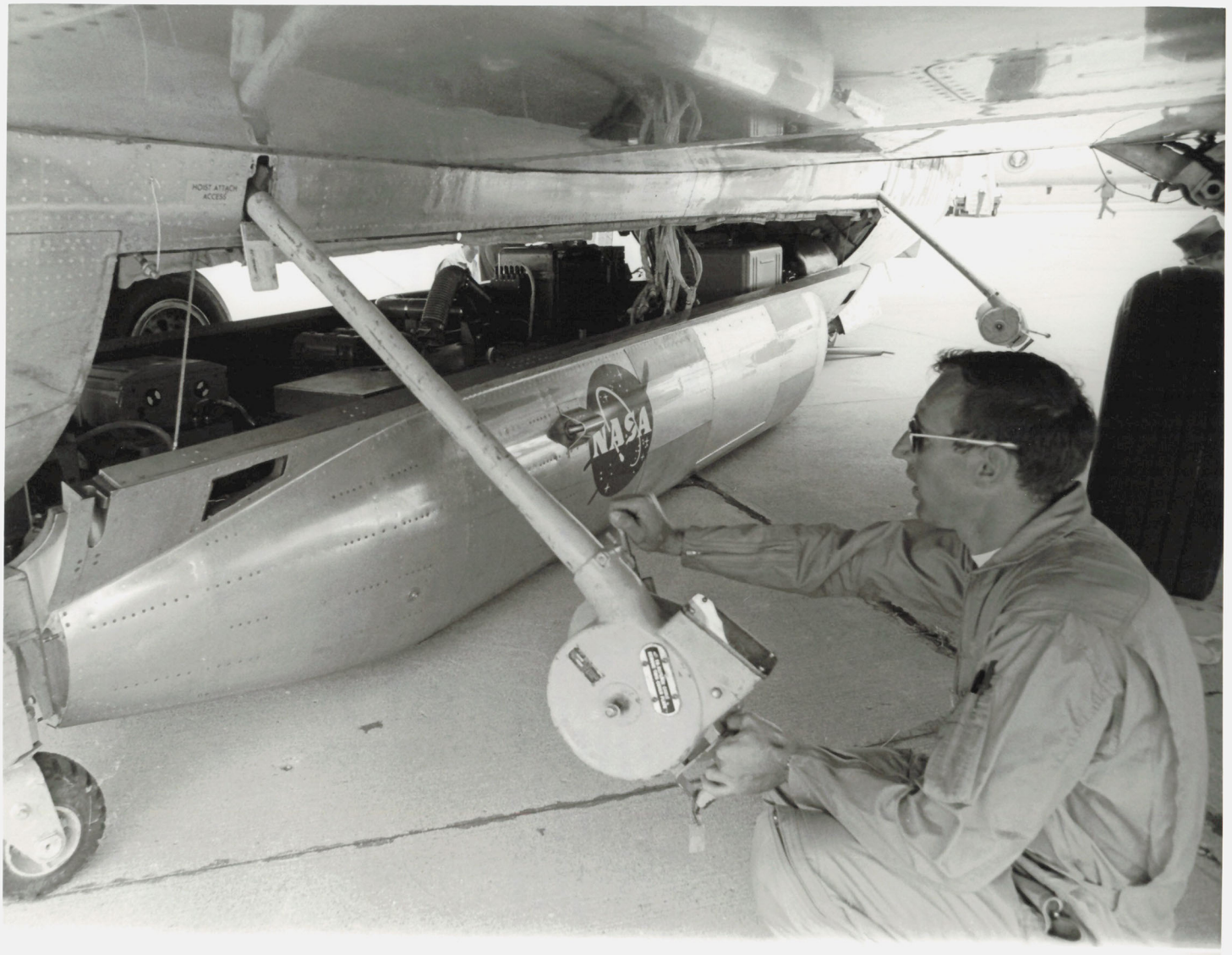
Satellite Dish

Echo

Endeavour

Enterprise

ERTS


NASA

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FOR RELEASE:

Filed: July 14, 1971

PHOTO NO.

71-H-1081

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92

INDIANAPOLIS, IND. -- The RB-57F's instrument pallet is being installed. The specially designed pallet is used for quick attachment and removal for service, modification, or storage. From as high as 60,000 feet, the four-engined aircraft has been repetitively photographing about 45,000 square miles in seven states of the Corn Belt in part of Phase III of the "Corn Blight Watch Experiment." The watch is being conducted by the U.S. Department of Agriculture, the National Aeronautics and Space Administraion, and Agricultural Experiment Stations and Extension Services of the seven states, in cooperation with Purdue University's Laboratory for Applications of Remote Sensing (LARS), LaFayette, Ind., and the University of Michigan's Institute for Science and Technology (IST), Ann Arbor.

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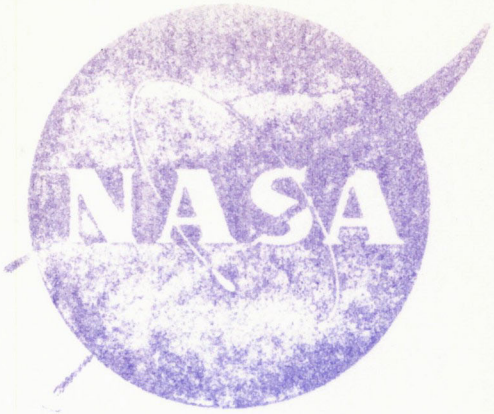

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FOR RELEASE: July 20, 1971 PM's

PHOTO NO. 71-H-1083
71-HC-873

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PURDUE UNIVERSITY, LAFAYETTE, IND. -- Ken Anderson, ASCS - Wis., and Larry Schultze, University of Nebraska, analyzing color infrared photography for Southern Corn Leaf Blight. Six 2-man teams of photo interpreters will interprete high altitude photography from 210 segments every 2 weeks through the growing season. The teams will use the ground data collected by Extension Agents and interprete the condition of each corn field in a segment. Each segment contains 1 x 8 square miles. The Corn Blight Watch Experiment is being conducted by the U.S. Department of Agriculture, the National Aeronautics and Space Administration, and Agricultural Experiment Stations and Extension Services of the seven states, in cooperation with Purdue University's Laboratory for Applications of Remote Sensing (LARS), LaFayette, Ind., and the University of Michigan's Institute for Science and Technology (IST), Ann Arbor.

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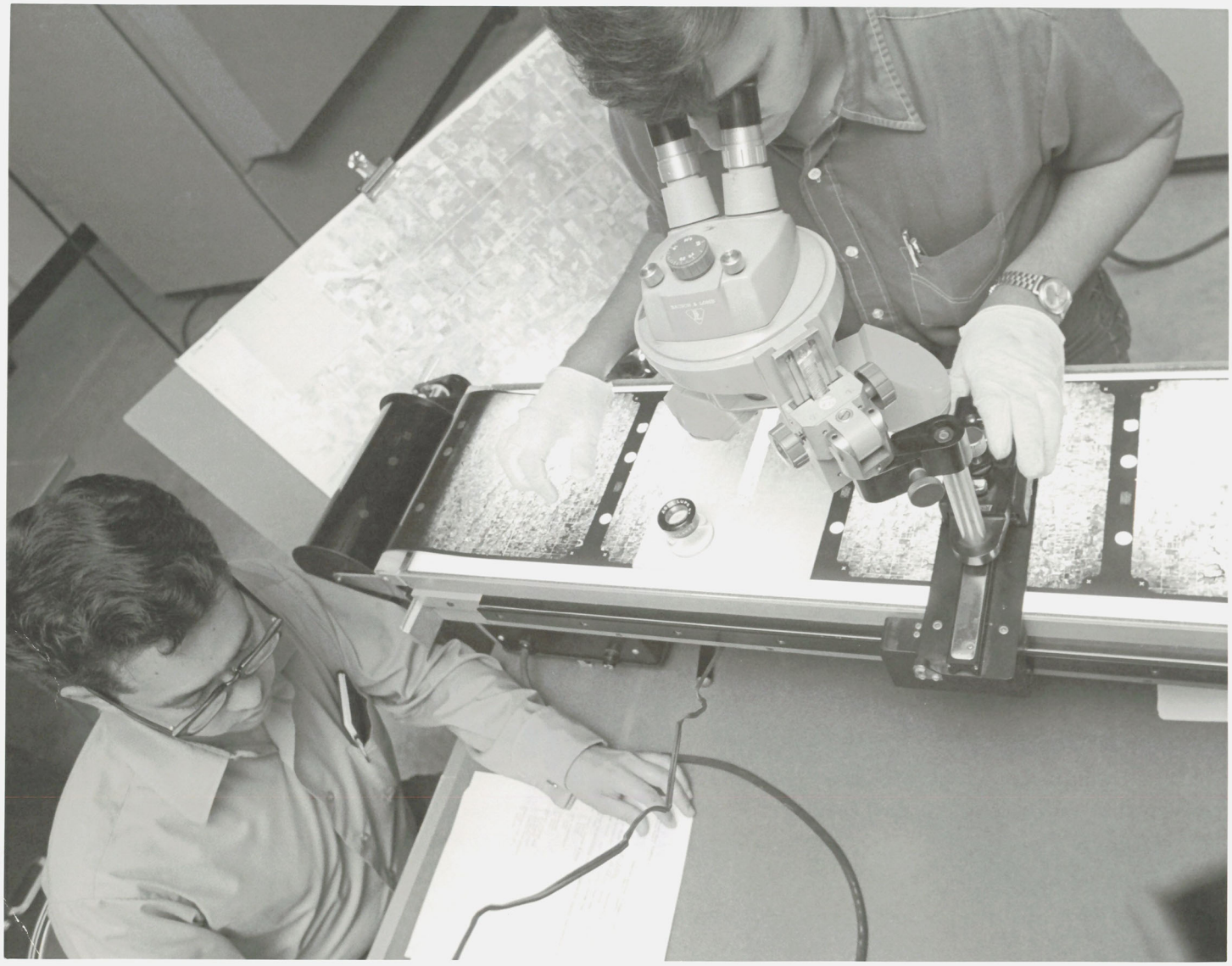

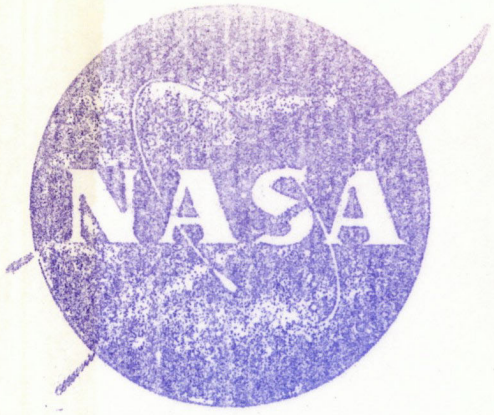

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PURDUE UNIVERSITY, LAFAYETTE, IND. -- Jeri Ooka, University of Minn. and Thomas H. Pieper ASCS-Iowa examing color infrared photography with a zoom 90 stereoscope to verify field locations in a test segment. The Corn Blight Watch Experiment is being conducted by the U.S. Department of Agriculture, the National Aeronautics and Space Administration and Agricultural Experiment Stations and Extension Services of the seven states, in cooperation with Purdue University's Laboratory for Applications of Remote Sensing (LARS), LaFayette, Ind., and the University of Michigan's Institute for Science and Technology (IST), Ann Arbor.

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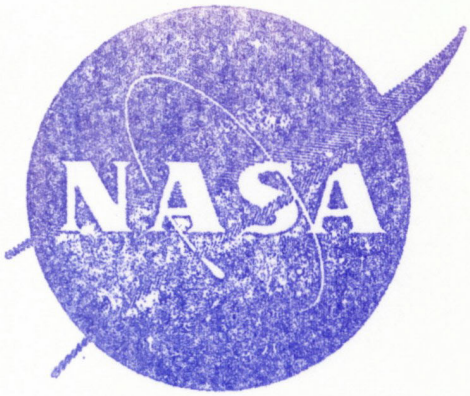

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FOR RELEASE: September 22, 1971
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PURDUE UNIVERSITY'S LABORATORY FOR APPLICATIONS OF REMOTE SENSING, LAFAYETTE, IND.--Examples of the southern corn blight during the 1971 Corn Blight Watch Experiment. When a leaf reaches the stage of showing lesions, it serves a very low function to the plant as far as providing the food storage that is needed in order to help form the ear. Over 1,500 fields were observed every two weeks throughout the summer for the blight. The Corn Blight Watch Experiment was conducted by the U.S. Department of Agriculture, the National Aeronautics and Space Administration, and Agriculture Experiment Stations and Extension Services of the seven states, in cooperation with Purdue University's Laboratory for Application of Remote Sensing (LARS), Lafayette, Ind. and the University of Michigan's Institute for Science and Technology (IST), Ann Arbor.

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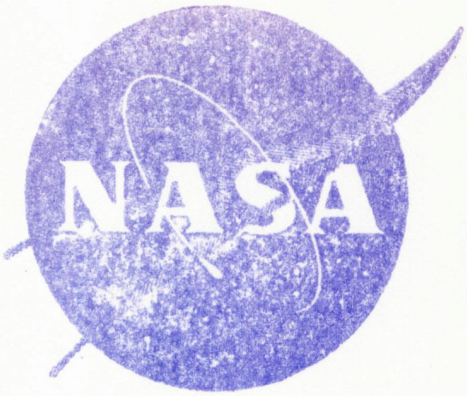

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PURDUE UNIVERSITY'S LABORATORY FOR APPLICATIONS OF REMOTE SENSING, LAFAYETTE, IND.--Examples of the southern corn blight during the 1971 Corn Blight Watch Experiment. When a leaf reaches the stage of showing lesions, it serves a very low function to the plant as far as providing the food storage that is needed in order to help form the ear. Over 1,500 fields were observed every two weeks throughout the summer for the blight. The Corn Blight Watch Experiment was conducted by the U.S. Department of Agriculture, the National Aeronautics and Space Administration, and Agriculture Experiment Stations and Extension Services of the seven states, in cooperation with Purdue University's Laboratory for Application of Remote Sensing (LARS), Lafayette, Ind. and the University of Michigan's Institute for Science and Technology (IST), Ann Arbor.

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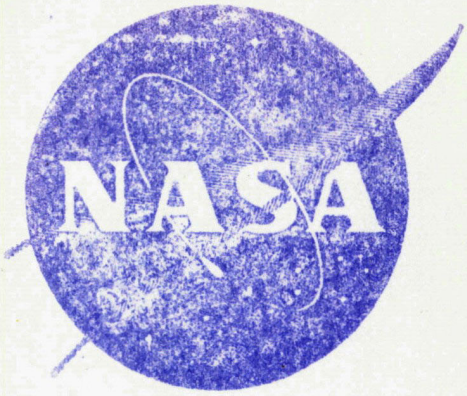

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38

FOR RELE[illegible] Filed: Sept. 22, 1971

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PURDUE UNIVERSITY'S LABORATORY FOR APPLICATIONS OF REMOTE SENSING, LAFAYETTE, IND.--Examples of the southern corn blight during the 1971 Corn Blight Watch Experiment. When a leaf reaches the stage of showing lesions, it serves a very low function to the plant as far as providing the food storage that is needed in order to help form the ear. Over 1,500 fields were observed every two weeks throughout the summer for the blight. The Corn Blight Watch Experiment was conducted by the U.S. Department of Agriculture, the National Aeronautics and Space Administration, and Agriculture Experiment Stations and Extension Services of the seven states, in cooperation with Purdue University's Laboratory for Application of Remote Sensing (LARS), Lafayette, Inc. and the University of Michigan's Institute for Science and Technology (IST), Ann Arbor.

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1971
CORN LEAF BLIGHT WATCH
EXPERIMENT
Automatic Identification of
Corn Leaf Blight
Leaf Blight Severity Class
1 2 3 4 5 other

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WASHINGTON, D.C. 20546

FOR RELEASE: Filed: July 14, 1971

PHOTO NO. 71-H-1079
71-HC-869

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INDIANAPOLIS, IND. -- Corn Blight Watch Experiment display with the RB-57F in background. The display was setup at the Indianapolis Airport June 24, 1971 for a report on the corn blight situation to President Nixon and Agriculture Secretary Hardin. The watch is being conducted by the U.S. Department of Agriculture, the National Aeronautics and Space Administration, and Agricultural Experiment Stations and Extension Services of the seven states, in cooperation with Purdue University's Laboratory for Applications of Remote Sensing (LARS), LaFayette, Ind., and the University of Michigan's Institute for Science and Technology (IST), Ann Arbor.

88

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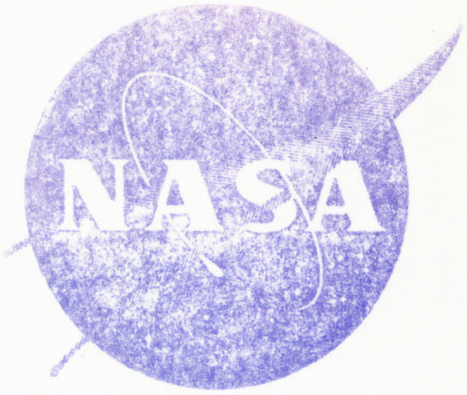

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PURDUE UNIVERSITY'S LABORATORY FOR APPLICATIONS OF REMOTE SENSING, LAFAYETTE, IND.--Examples of the southern corn blight during the 1971 Corn Blight Watch Experiment. When a leaf reaches the stage of showing lesions, it serves a very low function to the plant as far as providing the food storage that is needed in order to help form the ear. Over 1,500 fields were observed every two weeks throughout the summer for the blight. The Corn Blight Watch Experiment was conducted by the U.S. Department of Agriculture, the National Aeronautics and Space Administration, and Agriculture Experiment Stations and Extension Services of the seven states, in cooperation with Purdue University's Laboratory for Application of Remote Sensing (LARS), Lafayette, Ind. and the University of Michigan's Institute for Science and Technology (IST), Ann Arbor.

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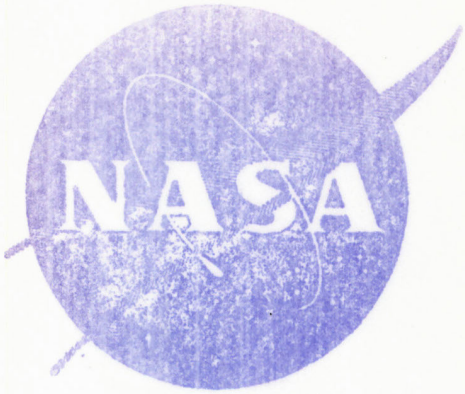

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PURDUE UNIVERSITY'S LABORATORY FOR APPLICATIONS OF REMOTE SENSING, LAFAYETTE, IND.---Examples of the southern corn blight during the 1971 Corn Blight Watch Experiment. When a leaf reaches the stage of showing lesions, it serves a very low function to the plant as far as providing the food storage that is needed in order to help form the ear. Over 1,500 fields were observed every two weeks throughout the summer for the blight. The Corn Blight Watch Experiment was conducted by the U.S. Department of Agriculture, the National Aeronautics and Space Administration, and Agriculture Experiment Stations and Extension Services of the seven states, in cooperation with Purdue University's Laboratory for Application of Remote Sensing (LARS), Lafayette, Ind. and the University of Michigan's Institute for Science and Technology (IST), Ann Arbor.

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Lyndon B. Johnson Space Center
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S23-9056

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COLOR

15 APRIL 1985 s23-9056

JOHNSON SPACE CENTER, HOUSTON, TEXAS
51-D TV SCENE---U.S. Sentor E.J. (Jake) Garn lets go of a paper airplane aboard the Earth orbiting Space Shuttle Discovery in this scene transmitted to Earth as the 51-D crew begins its fourth day in Space. Sen. Garn s demonstration came during a series of scenes of various crewmembers showing the effects of weightlessness on simple toys. The scene was transmitted to Earth at 6:31:36 a.m. (CST), April 15, 1985.

National Aeronautics and Space Administration

51G-41-018

Lyndon B. Johnson Space Center
Houston, Texas 77058

Space Shuttle

XVIII

FRIDAY AUG 16 1985

51-G-41-018 The atmospheric glow of Earth, clouds and ocean form the backdrop for this scene taken shortly after the pictured Arabsat communications satellite was deployed from the cargo bay of the Earth-orbiting Discovery. Arabsat was the second of three communications satellites to be placed into space on this week-long mission.

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Aeronautics and
Space
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Washington, DC 20546

FOR RELEASE: September 6, 1984
PHOTO NO. 84-H-476
84-HC-419
S14-33-71

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ONBOARD SCENE---A Collection of ice that developed around an external nozzle on Discovery's port side mid fuselage sails by the manned spacecraft on Sept. 4 following a successful attempt to remove the troublesome buildup using the remote manipulator system (RMS) arm. A crewmember on the flight deck alertly grabbed a 70mm camera and recorded a final look at the chunk.

kab 971

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NASA National Aeronautics and Space Administration

Orbiter Discovery on Launch Pad

NASA
National Aeronautics and Space Administration

MAY 21 1991

Orbiter Discovery on Launch Pad

Orbiter Discovery is poised on Launch Pad 39A as the sun sets the evening prior to its maiden launch on Aug. 30, 1984. The Space Shuttle will return to flight when Discovery begins its seventh journey into space with the launch of STS-26.

NASA

National Aeronautics and
Space Administration

51-D-04-025

Lyndon B. Johnson Space Center
Houston, Texas 77058

National Aeronautics and
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Houston [illegible]

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COLOR

16 APRIL 1985 51D-04-025

JOHNSON SPACE CENTER, HOUSTON, TEXAS

51-D ONBOARD SCENE---Bearing a maze of interesting reflections, this aquarium-like scene came during one of the lighter moments of emergency extravehicular activity (EVA) aboard the Earth-orbiting Space Shuttle Discovery. Astronaut S. David Griggs, waving from the cargo bay into the flight deck, earlier participated with Astronaut Jeffrey A. Hoffman in the successful attachment of two special tools to the end of the Canadian-built remote manipulator system (RMS) arm. The Earth's horizon appears both in the background of the scene and in the reflection in Griggs' helmet visor.

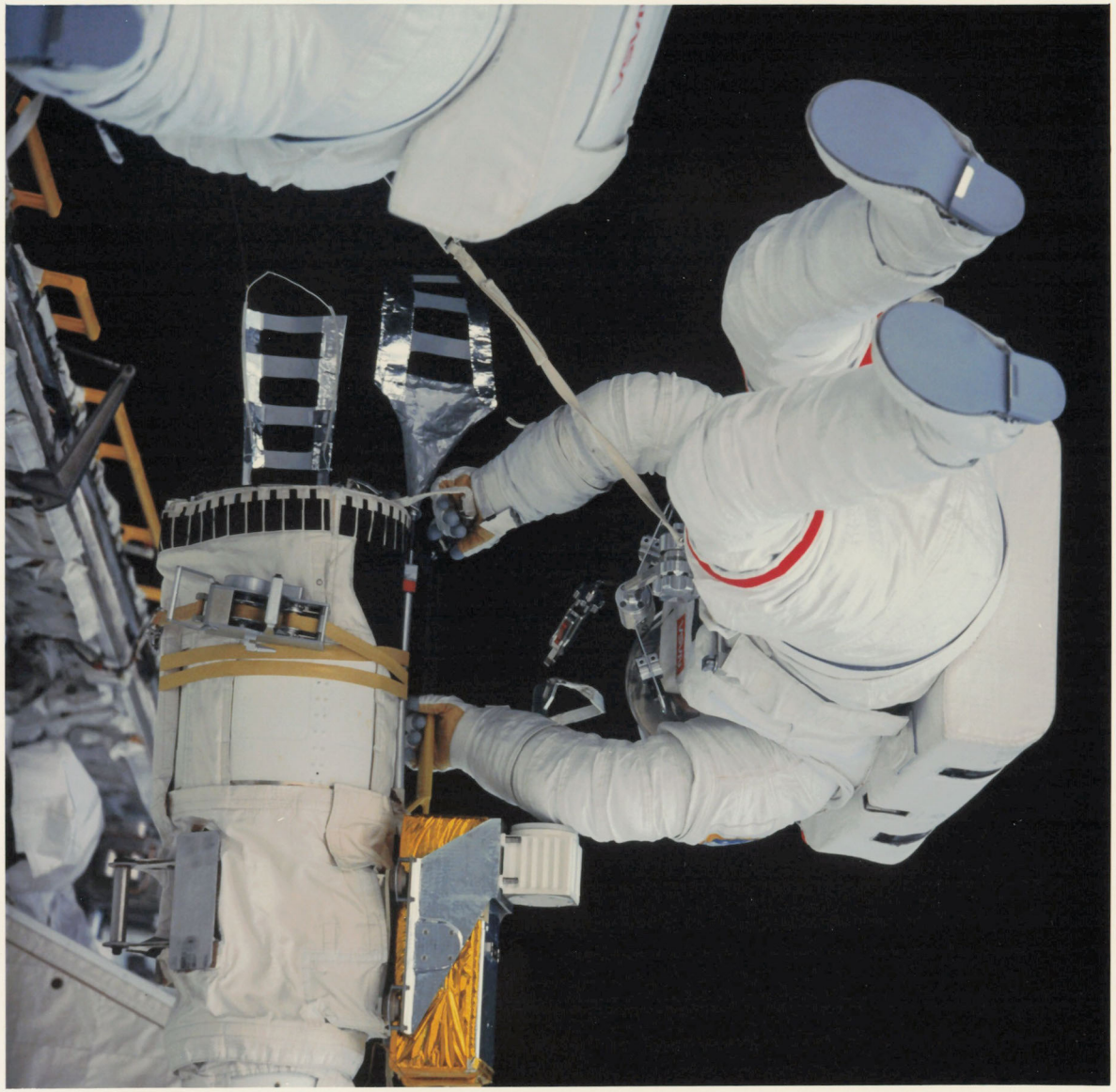
pg.45

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA National Aeronautics and Space Administration

51-D-42-58

Lyndon B. Johnson Space Center
Houston, Texas 77058



National Aeronautics and Space Administration

Houston, Texas 77508

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16 APRIL 1985 51D-42-005S

JOHNSON SPACE CENTER, HOUSTON, TEXAS

51-D ONBOARD SCENE---Astronaut Jeffrey A. Hoffman, 51-D mission specialist, checks the security of a flyswatter-like tool on the end of Discovery's remote manipulator system (RMS) arm during an extravehicular activity in Earth orbit. Below it is a LaCrosse-like tool. The two devices, extensions to the Canadian-built RMS arm, were fashioned in space from onboard supplies as an emergency measure to revive a troubled satellite deployed on Day Two of NASA's STS 51-D mission. Astronaut S. David Griggs, partially visible at left edge of frame, also participated in the EVA and both mission specialists joined other crewmembers in the construction of the tools and plans for their usage. A rendezvous effort the following day achieved physical contact with a targeted lever, but the Syncom IV (LEASAT) failed to respond as had been hoped.

pg.20

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA National Aeronautics and Space Administration

S87-26822

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NASA - SPACE SHUTTLE - STS-26

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HOUSTON, TEXAS 77058

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COLOR

11 FEBRUARY 1987

S-87-26822

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS 26 TRAINING --- The five veteran astronauts recently named to man the Discovery for the STS 26 mission are pictured prior to a training session in the nearby motion base Shuttle mission simulator. Astronaut Frederick H. Hauck, right, is mission commander. He is standing by Astronaut Richard O. Covey, pilot. Mission specialists on the front row are (l.-r.) Astronauts George D. Nelson, David C. Hilmers and John M. (Mike) Lounge.

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058

STS063-006-004

National Aeronautics and Space Administration

Houston, Texas 77058

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COLOR

3 - 11 FEBRUARY 1995 STS063-006-004

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-63 ONBOARD VIEW --- This is the traditional inflight crew portrait, on the aft flight deck, of the Space Shuttle Discovery. Front row (left to right) astronauts Eileen M. Collins, pilot; James D. Wetherbee, mission commander; and Bernard A. Harris Jr., payload commander. Back row (left to right) cosmonaut Vladimir G. Titov, mission specialist; C. Michael Foale, mission specialist; and Janice E. Voss, mission specialist. This is one of 16 still photographs released by the NASA Johnson Space Center (JSC) Public Affairs Office (PAO) on February 14, 1995.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration.

NASA National Aeronautics and Space Administration

51-D-04-015

Lyndon B. Johnson Space Center
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COLOR

15 APRIL 1985

51D-04-015

JOHNSON SPACE CENTER, HOUSTON, TEXAS

51-D ONBOARD SCENE---Astronaut Rhea Seddon and Karol J. Bobko continue work on snag-type extension for the remote manipulator system (RMS) as part of an effort to activate a lever on a troubled communications satellite. Since the crew learned soon after deployment of the Syncom w (LEASAT) spacecraft that it was not functioning properly plans were formulated for a rendezvous in space between the Discovery and the satellite. A flyswatter-like extension and another resembling a LaCrosse stick were fashioned from onboard supplies and furnishings. Stowage lockers nearby serve as a work bench for the two. At various times during the seven-day mission, the majority of the seven-member crew participated in the tool-making and preparations for an extravehicular activity (EVA) by ther flights other two mission specialists--Jeffrey A. Hoffman and S. David Griggs--to connect the two tools to the RMS. Bobko is mission commander and Dr. Seddon, a mission specialist.

pg.41

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

National Aeronautics and Space Administration

51-D-07--026

Lyndon B. Johnson Space Center
Houston, Texas 77058

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COLOR

12-19 APRIL 1985 51D-07-026

JOHNSON SPACE CENTER, HOUSTON, TEXAS

51-D ONBOARD SCENE--U.S. Senator E.J. (Jake) Garn prepares one of the medical experiments to which he devoted a great deal of time during the seven-day mission aboard the Earth-orbiting Space Shuttle Discovery. Tests on Sen. Garn during the flight sought to detect and record changes which the body undergoes in weightlessness, an ongoing program that began with astronauts on the fourth Shuttle flight. About half of the scheduled medical test were performed for the first time in the American space program, havig been deferred from previous missions because of limited crewmember time or moved to 51-D from later flights because of the availability of a test subject.

pg.A6

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

National Aeronautics and
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S93-48405

Lyndon B. Johnson Space Center
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National Aeronautics and Space Administration

Houston, Texas 77058

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COLOR

File:

Jan. 1995
Discovery
Mir Rendezvous
Pilot Eileen Collins

11 NOVEMBER 1993 S93-48405

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-63 TRAINING VIEW --- Astronaut Eileen M. Collins, pilot for the STS-63 mission, participates in STS-63 training at the Johnson Space Center's (JSC) Shuttle mockup and integration laboratory. Collins looks out the aft flight deck window in the Shuttle mockup trainer. The flight is scheduled aboard the Space Shuttle Discovery in the early part of 1995.

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SUN FEB 12 1995

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

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Lyndon B. Johnson Space Center
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STS060 (S) 002

National Aeronautics and Space Administration

Houston, Texas 77058

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COLOR

DECEMBER 1993 STS060(S)002

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-60 CREW PORTRAIT --- Five NASA astronauts and a Russian cosmonaut take a break from training for their scheduled flight in space to pose for the traditional crew portrait. In the front (left to right) are astronauts Kenneth S. Reightler Jr. and Charles F. Bolden Jr., pilot and commander, respectively. On middle row are astronauts Franklin R. Chang-Diaz and N. Jan Davis, mission specialists. On back row are astronaut Ronald M. Sega (left) and Russia's Sergei K. Krikalev, both mission specialists.

NASA - SPACE SHUTTLE - STS 60
11
DISCOVERY

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S84-40082

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COLOR (PORTRAIT)

AUGUST 1984 S84-40082

JOHNSON SPACE CENTER, HOUSTON, TEXAS

51-A CREW---These five astronauts are scheduled to fly aboard the Space Shuttle Discovery on STS Mission 51-A for the National Aeronautics and Space Administration. The mission is scheduled for early November 1984. Astronaut Frederick H. (Rick) Hauck, seated, is crew commander. Astronaut David M. Walker, pilot, stands next to the Eagle, 51-A mascot. Others on the back row, l.-r., are Astronauts Dale A. Gardner, Anna L. Fisher and Joseph P. Allen IV, all mission specialists.

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COLOR (PORTRAIT)

AUGUST 1984 S84-40082

JOHNSON SPACE CENTER, HOUSTON, TEXAS

51-A CREW---These five astronauts are scheduled to fly aboard the Space Shuttle Discovery on STS Mission 51-A for the National Aeronautics and Space Administration. The mission is scheduled for early November 1984. Astronaut Frederick H. (Rick) Hauck, seated, is crew commander. Astronaut David M. Walker, pilot, stands next to the Eagle, 51-A mascot. Others on the back row, l.-r., are Astronauts Dale A. Gardner, Anna L. Fisher and Joseph P. Allen IV, all mission specialists.

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S26(S)-010

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COLOR

SEPTEMBER 29, 1988 S88(S)-010

JOHNSON SPACE CENTER, HOUSTON, TEXAS

TELEVISION - A view of the Tracking Data and Relay Satellite (TDRS) in the payload bay of the earth orbiting Discovery on mission STS-26, Thursday, September 29, 1988. This view was recorded at 19:39:02:04 GMT. The TDRS is to be deployed on orbit five, at approximately 21:51:00:00 GMT.

RR. 88-*

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA - SPACE SHUTTLE - DISCOVERY STS 26

National Aeronautics and
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John F. Kennedy Space Center
Kennedy Space Center, Florida 32899
AC 305 867-2468

FOR RELEASE: September 29, 1988

PHOTO NO. KSC-88P-998

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KENNEDY SPACE CENTER, FL.-- Crew members for Space Shuttle mission STS-26 are seated for their traditional breakfast in the Operations and Checkout Building the morning of the launch of the orbiter Discovery. From left to right are: Mission Specialist George "Pinky" Nelson; Pilot Richard Covey; Commander Rick Hauck; and Mission Specialists Dave Hilmers and Mike Lounge.

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National Aeronautics and
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John F. Kennedy Space Center
Kennedy Space Center, Florida 32899
AC 305 867-2468

FOR RELEASE: September 29, 1988

PHOTO NO. KSC-88P-997

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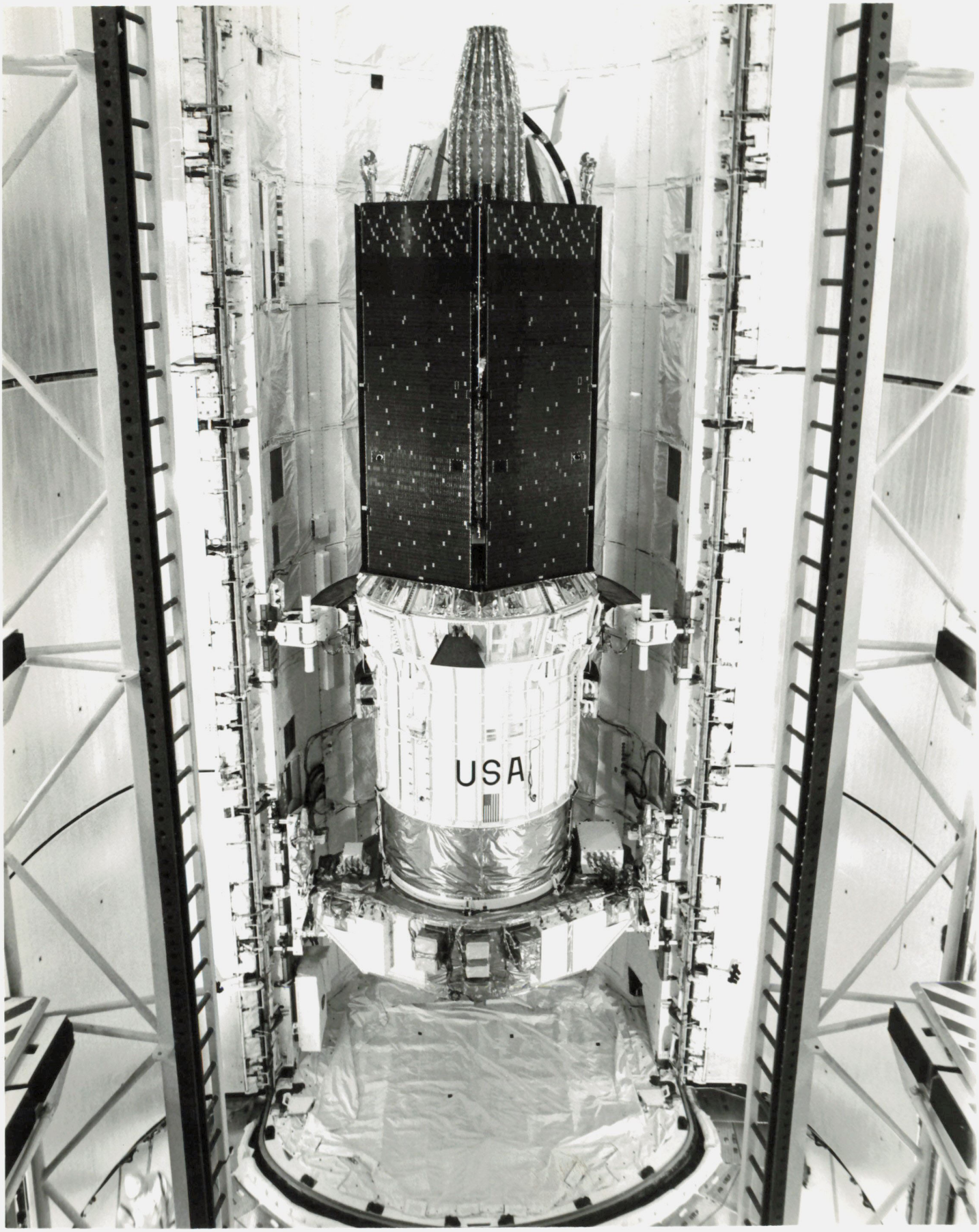
KENNEDY SPACE CENTER, FL.--- The Space Shuttle mission STS-26 crew walk out of the Operations and Checkout Building on their way to Pad 39-B where they are scheduled to be launched aboard the orbiter Discovery for a four day mission. From front to back are: Commander Rick Hauck; Pilot Richard Covey; and Mission Specialists Mike Lounge, Dave Hilmers, and George "Pinky" Nelson.

PHOTO CREDIT -- NASA OR NATIONAL AERONAUTICS AND SPACE ADMINISTRATION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FOR RELEASE: September 26, 1988

PHOTO NO. KSC-88P-977

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KENNEDY SPACE CENTER, Fla.-- At pad 39-B, the primary payload for Space Shuttle mission STS-26, the Tracking and Data Relay Satellite (TDRS-C), and the Inertial Upper Stage (IUS) is shown just prior to the closing of the orbiter Discovery's payload bay doors. TDRS-C will relay data from low earth orbiting spacecraft, and air to ground voice communications and television from Space Shuttle orbiters during missions. The IUS will boost the TDRS-C spacecraft to a geosynchronous altitude from low Earth orbit. Discovery is set for liftoff from Kennedy Space Center September 29, 1988 at 9:59 a.m.

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VEHICLE
POWERED
STOP
ALL PERSONNEL
CHECK IN HERE
BEFORE PROCEEDING
TO WORK AREA
OPERATIONS DESK
Lockheed

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8-3-87

FOR RELEASE: August 3, 1987

PHOTO NO. KSC-87P-718

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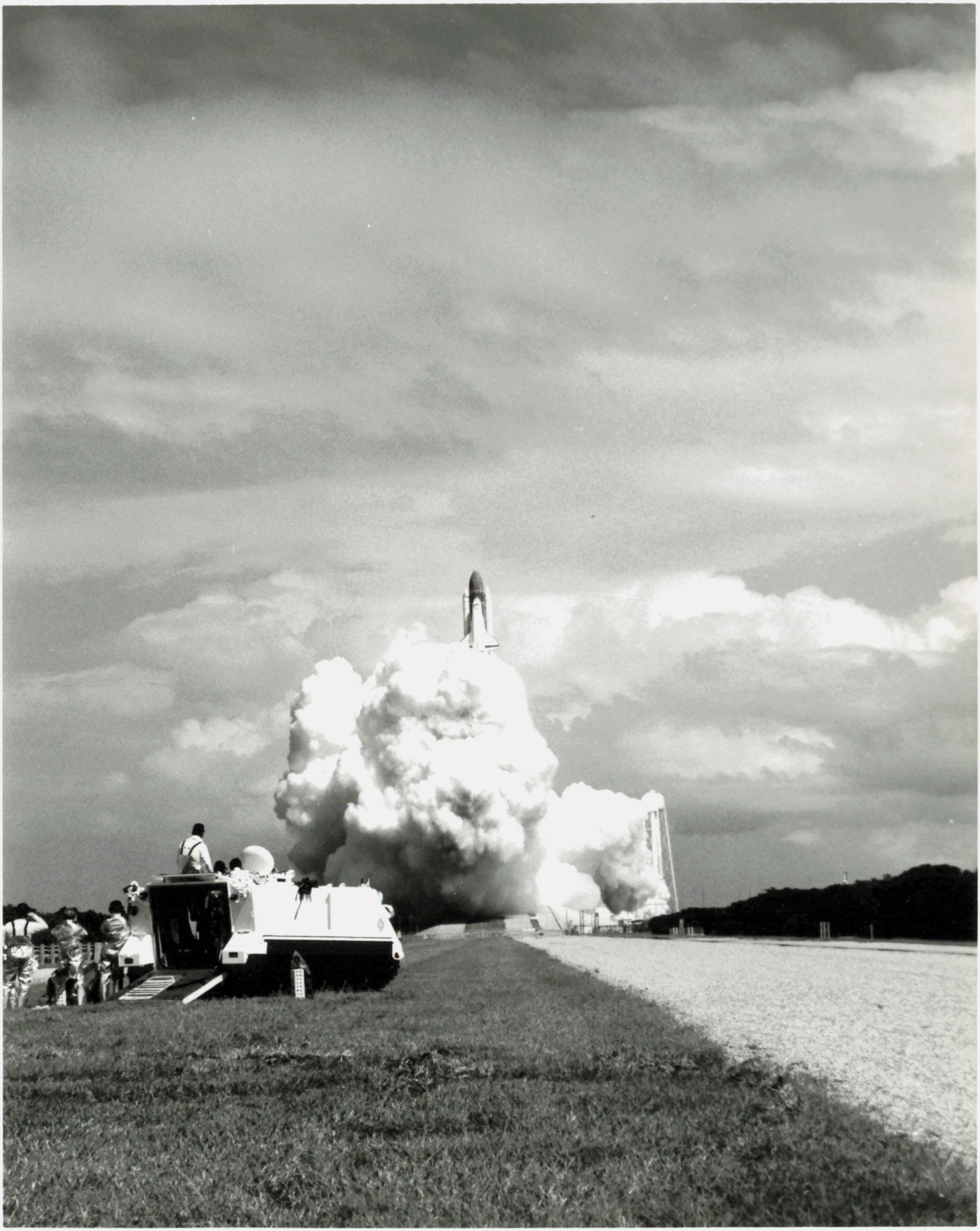
Discovery

KENNEDY SPACE CENTER, FL.-- Smiles and applause emanate from the Orbiter Processing Facility as Discovery is powered up to support processing for launch in June 1988. Faces glow with joy and the once-dark "vehicle powered" sign glows with energy.

PHOTO CREDIT — NASA OR NATIONAL AERONAUTICS AND SPACE ADMINISTRATION



National Aeronautics and
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John F. Kennedy Space Center
Kennedy Space Center, Florida 32899
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FOR RELEASE: September 29, 1988

PHOTO NO. KSC-88P-1031

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KENNEDY SPACE CENTER, FL.-- The Space Shuttle Discovery and its five man crew is launched from pad 39-B at 11:37 a.m. as STS-26 embarks on a four day mission, marking America's return to space. On the first day of orbit, the crew will deploy from the orbiter's payload bay, the primary payload, the Tracking and Data Relay Satellite (TDRS-C). The Inertial Upper Stage (IUS) will boost the satellite to a geosynchronous altitude from low Earth orbit. When in place, TDRS-C will relay data from low Earth orbiting spacecraft, and air-to-ground voice communications and television from Space Shuttle orbiters during missions. The crew members of STS-26 are: Commander Rick Hauck; Pilot Richard Covey; and Mission Specialists Dave Hilmers, Mike Lounge, and George "Pinky" Nelson.

PHOTO CREDIT — NASA OR NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

National Aeronautics and
Space Administration

Crew of Space Shuttle
Mission STS-91

National Aeronautics and Space Administration

Astronauts
MAY 1998

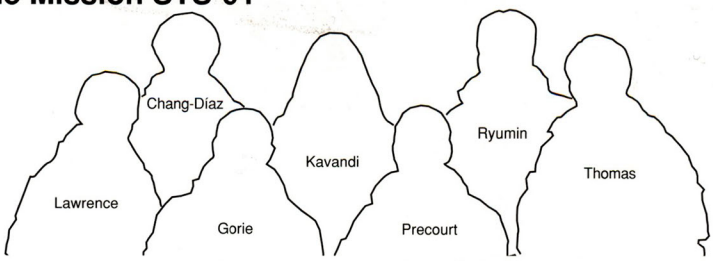
JSCCL-163

The Crew of Space Shuttle Mission STS-91

Commander
Charles J. Precourt (Colonel, USAF)
Charles Precourt was born in Waltham, Massachusetts, and grew up in Hudson, Massachusetts. He received a B.S. degree in aeronautical engineering from the USAF Academy, an M.S. degree in engineering management from Golden Gate University, and an M.A. degree in national security affairs and strategic studies from the U.S. Naval War College. He also studied as an exchange student at the French Air Force Academy. Precourt flew the F-15 while based at Bitburg Air Base in Germany. As a test pilot at Edwards Air Force Base, California, Precourt flew the F-15E, F-4, A-7, and A-37 aircraft. His flight experience includes more than 6,500 hours in over 50 types of civil and military aircraft. Precourt was selected as an astronaut in 1990 and flew as a mission specialist on STS-55 in 1993 and as a pilot aboard STS-71 (the first Space Shuttle mission to dock with the Russian Space Station Mir and exchange crews) in 1995. As commander of STS-84, Precourt was in charge of the sixth Shuttle mission scheduled to rendezvous and dock with Mir. He has already logged more than 29 days in space.

Pilot
Dominic L. Pudwill Gorie (Commander, USN)
Dominic Gorie was born in Lake Charles, Louisiana. He received a B.S. degree in ocean engineering from the U.S. Naval Academy and an M.S. degree in aviation systems from the University of Tennessee. He was designated a Naval Aviator and flew the A-7E Corsair with Attack Squadron 46 aboard the USS America. He transitioned to Strike Fighter Squadron 132 and flew the F/A-18 Hornet aboard the USS Coral Sea. He subsequently attended the U.S. Naval Test Pilot School and served as a test pilot at the Naval Air Test Center. He was assigned to Strike Fighter Squadron 87, flying the F/A-18 aboard the USS Roosevelt and participated in Operation Desert Storm, flying 38 combat missions. He then served with U.S. Space Command in Colorado Springs for two years. Gorie was en route to his command tour of an F/A-18 squadron when he was selected as an astronaut candidate in 1994. He has served as a spacecraft communicator (capcom) in Mission Control for numerous Space Shuttle flights. Gorie has accrued over 3,800 hours in more than 30 aircraft and has over 600 carrier landings. STS-91 is his first Space Shuttle flight.

Mission Specialist
Franklin R. Chang-Díaz, Ph.D.
Born in San Jose, Costa Rica, Franklin R. Chang-Díaz received a B.S. degree in mechanical engineering from the University of Connecticut and a doctorate in applied plasma physics from the Massachusetts Institute of Technology (MIT). He has been developing a new concept in rocket propulsion based on high-temperature plasma and, as Visiting Scientist with the MIT Plasma Fusion Center, he led the plasma propulsion program there 1981-1993 to develop this technology for future human missions to Mars. In 1994, he was appointed Director of the Advanced Space Propulsion Laboratory at the Johnson Space Center where he continues his research on plasma rockets. Dr. Chang-Díaz is also an adjunct professor of physics at the University of Houston. He has logged over 1,033 hours on five Space Shuttle flights. This is his sixth mission into space.



Mission Specialist
Janet Lynn Kavandi, Ph.D.
Dr. Kavandi was born in Springfield, Missouri. Valedictorian of her high school class, she received a B.S. degree in chemistry from Missouri Southern State College, Joplin, and an M.S degree in chemistry from the University of Missouri, Rolla. She later earned a Ph.D. in analytical chemistry from the University of Washington, Seattle. After she received the M.S. degree, Dr. Kavandi accepted a position at Eagle-Picher Industries in Joplin, Missouri, as an engineer in new battery development for defense applications. Later, she became an engineer in the Power Systems Technology Department of the Boeing Aerospace Company. While at Boeing, Kavandi supported numerous programs and proposals, including Space Station, Lunar and Mars Bases, the Inertial Upper Stage (IUS), NASA Get-Away Specials, Air Launched Cruise Missile, Short Range Attack Missile 11, Sea Lance, Minuteman, and Peacekeeper. While working for Boeing, she accepted a graduate school appointment at the University of Washington where she began working toward her doctorate in analytical chemistry. Her doctoral thesis focused on the development of a pressure-indicating paint used on aerodynamic models in wind tunnels to produce continuous real-time surface pressure measurements. Her work has resulted in two patents to date. She was selected as an astronaut in 1994 and has worked in the payload integration area for the International Space Station. STS-91 is Dr. Kavandi's first Space Shuttle mission.

Mission Specialist
Wendy B. Lawrence (Commander, USN)
Wendy Lawrence was born in Jacksonville, Florida. She earned a B.S. degree in ocean engineering from the U.S. Naval Academy and an M.S. in ocean engineering from the Massachusetts Institute of Technology (MIT) and the Woods Hole Oceanographic Institution. Lawrence was a distinguished flight school graduate and was designated a Naval Aviator in 1982. She has logged more than 1,500 hours of flight time in 6 types of helicopters and has made more than 800 shipboard landings. After graduating from MIT, Lawrence served as officer-in-charge of the Helicopter Anti-Submarine Squadron Light THIRTY Detachment Alfa. Later, she was assigned to the U.S. Naval Academy as a physics instructor and the novice women's crew coach. Lawrence was selected to be an astronaut in 1992. She flew on STS-67, the second flight of the ASTRO observatory and aboard STS-86, the seventh mission to rendezvous and dock with the Russian Space Station Mir. She has logged more than 27 days in space.

Mission Specialist
Russian Cosmonaut
Valery Victorovitch Ryumin
Born August 16, 1939, in the city of Komsomolsk-on-Amur in the Russian Far East, in 1958 he was graduated from the Kaliningrad Mechanical Engineering Technical College with the specialty "Cold Working of Metal." In 1966, he was graduated from the Department of Electronics and Computing Technology of the Moscow Forestry Engineering Institute with the specialty "Spacecraft Control Systems." From 1958 to 1961, Ryumin served in the army as a tank commander. From 1966 to the present, he has been employed at the Rocket Space Corporation Energia, holding the positions of: Ground Electrical Test Engineer, Deputy Lead Designer for Orbital Stations, Department Head, and Deputy General Designer for Testing. He helped develop and prepare all orbital stations, beginning with Salyut-1. In 1973, he joined the RSC Energia cosmonaut corps. A veteran of three space flights, Ryumin has logged a total of 362 days in space. In 1977, he spent 2 days aboard Soyuz-25; in 1979, he spent 175 days aboard Soyuz vehicles and the Salyut-6 Space Station; and in 1980, he spent 185 days aboard Soyuz vehicles and the Salyut-6 Space Station. From 1981 to 1989, Ryumin was flight director for the Salyut-7 Space Station and the Mir Space Station. Since 1992, he has been the Director of the Russian portion of the Shuttle-Mir and NASA-Mir Program. In January 1998, NASA announced Ryumin's selection to the crew of STS-91, the final scheduled Shuttle-Mir docking mission, concluding the joint U.S.-Russian Phase I Program. STS-91 is his first Space Shuttle flight.

Mission Specialist
NASA-Mir 7
Andrew S. W. Thomas, Ph.D.
Dr. Andrew Thomas was born in Adelaide, South Australia. He received a B.E. degree in mechanical engineering with First Class Honors and a Ph.D. in mechanical engineering from the University of Adelaide, South Australia. He then joined the Lockheed Aeronautical Systems Company, Marietta, Georgia, as a research scientist and was responsible for experimental investigations into the control of fluid dynamic instabilities and their consequences to aircraft drag. He also served as head of the Advanced Flight Sciences Department and manager of the research laboratory, the wind tunnels, and the test facilities used in studies of various problems in advanced aerodynamics and aircraft flight tests. Dr. Thomas was later appointed manager of Lockheed's Flight Sciences Division and directed the technical efforts in vehicle aerodynamics, flight controls, and propulsion systems that support the company's fleet of production aircraft. This organization also provided technical and design support to the advanced aerospace vehicle development programs sponsored within the company by the United States Air Force and NASA. In 1989, he joined the Jet Propulsion Laboratory (JPL) and was appointed leader of the JPL program for microgravity materials processing in space. Dr. Thomas was selected to be an astronaut by NASA in March 1992. He previously flew on STS-77 and STS-89. Thomas will return with the STS-91 crew after spending approximately 120 days aboard the Mir Space Station, the final scheduled Shuttle-Mir docking mission, concluding the joint U.S.-Russian Phase I Program.

STS-91 Patch Description

STS-91 is the ninth flight of the Shuttle-Mir Phase One docking missions. The crew will bring back Andrew Thomas, the last long-duration American crew member flown on the Russian Space Station Mir. This mission marks the end of the Shuttle-Mir Phase One Program and will open the way for Phase Two: construction of the International Space Station. The crew patch depicts the rendezvous of the Space Shuttle Discovery with the Space Station Mir. The flags of the United States and Russia are displayed at the top of the patch and both countries are visible on the Earth behind the two spacecraft. The names of the American crew members surround the insignia on the outer areas, with the name of Cosmonaut Valery Ryumin in Cyrillic at the lower right.

The Alpha Magnetic Spectrometer (AMS) is an international payload planned to fly in the payload bay of Discovery. Two thin golden streams flowing into the AMS represent charged elementary particles. The detection of antimatter in space will help scientists better understand the physics and origins of the universe.

NASA
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Lyndon B. Johnson Space Center
Houston, Texas 77058

S89 45737

COLOR (PORTRAIT)

19 SEPTEMBER 1989 S-89-45737

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-33 CREW PORTRAIT --- These five astronauts will be aboard Discovery for a scheduled November 1989 space mission for the Department of Defense. Frederick D. Gregory (center, front) is mission commander. He is flanked by Kathryn C. Thornton and F. Story Musgrave, mission specialists. At rear are Manley L. Carter Jr., mission specialist, and John E. Blaha, pilot.

NASA - SPACE SHUTTLE - Discovery
STS-33

NASA National Aeronautics and Space Administration

S88-30050

Lyndon B. Johnson Space Center
Houston, Texas 77058

NASA - Space Shuttle - Discovery STS-26

Crew left
to R

DISCOVERY (STS-26) CREW
L - R:
DAVID HILMERS
FREDERICK HAUCK (commander)
RICHARD COVEY (co-pilot)
JOHN "MIKE" LOUNGE
GEORGE "PINKY" NELSON

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SEP 25 1988
HOUSTON, TEXAS

THIS PAPER MANUFACTURED BY KODAK

NASA National Aeronautics and Space Administration

S 89-25082

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Houston, Texas 77058

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HOUSTON, TEXAS 77058

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JANUARY 1989 S-89-25082

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-29 CREW PORTRAIT --- Discovery will be manned by these five astronauts when it makes it second flight within a five-month period next month. The STS-29 crewmembers are (front row), Michael L. Coats (right), commander; and John E. Blaha, pilot; (left to right back row) James P. Bagian, Robert C. Springer and James F. Buchli, mission specialists.

NASA - SPACE SHUTTLE - DISCOVERY

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S41(S) 002

NASA - SPACE SHUTTLE - Discovery STS 41

National Aeronautics and Space Administration

Houston, Texas 77058

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7 MAY 1990 S41 (8) 002

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS 41 CREWMEMBERS --- These five astronauts have been assigned to fly the STS 41 mission for the National Aeronautics and Space Administration. Pictured near the flight line at Ellington Field prior to an early morning flight in NASA T-38s are (kneeling, from the left) Robert D. Cabana, pilot; and Richard N. Richards, mission commander; and (standing, from left) Bruce E. Melnick, Thomas D. [redacted] and William M. Shepherd, all mission specialists. Primary payload for Discovery on the STS 41 mission is Ulysses.

pg.2

NASA

Discovery's crew: Co-pilot Robert Cabana, left front, and commander Richard Richards; Bruce Melnick, rear left, Thomas Akers and William Shepherd.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058

S26-(S) 1118

NASA - SPACE SHUTTLE - STS 26

DISCOVERY

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JOHNSON SPACE CENTER, HOUSTON, TEXAS

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pg. 7

NASA - SPACE SHUTTLE - DISCOVERY

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COLOR (PORTRAIT)

7 MAY 1990 S41 (S) 002

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pr.2

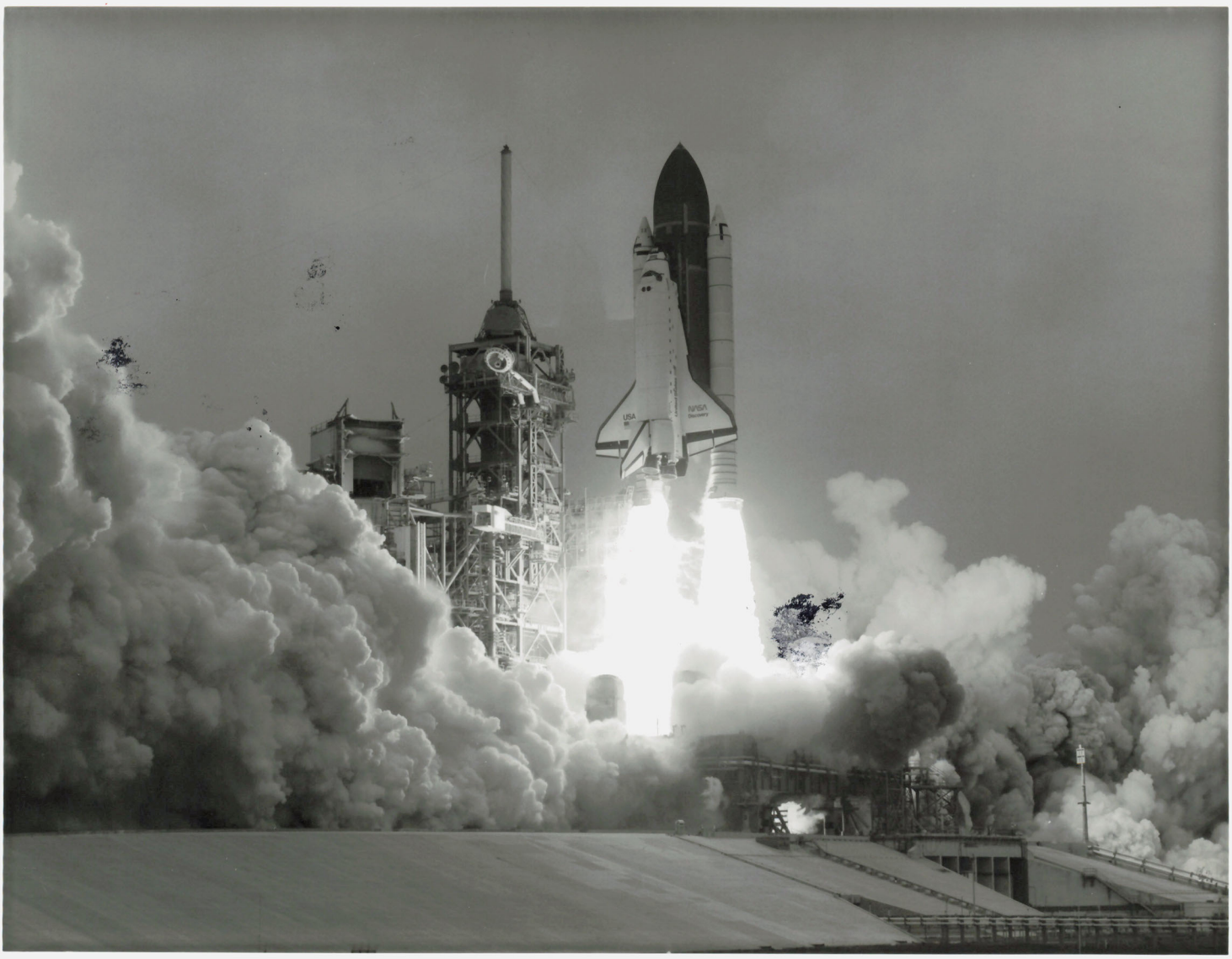
NASA - SPACE SHUTTLE - STS-41

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA National Aeronautics and Space Administration

S23- 9094

Lyndon B. Johnson Space Center
Houston, Texas 77058



File: Space Shuttle

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12 APRIL 1985 S23-909 & 909

JOHNSON SPACE CENTER, HOUSTON, TEXAS

51-D LAUNCH--- A 70mm frame of the Space Shuttle Discovery's 51-D launch at 8:59 a.m. (EST), April 12, 1985. Onboard are seven crewmembers and two communications satellites and a variety of medical and other experiments.

pg.21

JOHNSON SPACE CENTER LIBRARY

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S26 09 09

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NASA - SPACE SHUTTLE - DISCOVERY - STS 26

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NASA - Space Shuttle - Discovery - STS 41

National Aeronautics and Space Administration

Houston, Texas 77058

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6 OCTOBER 1990 S41 (S) 101

KENNEDY SPACE CENTER, FLORIDA

STS 41 LAUNCH --- Discovery lifts off from Launch Complex 39 at the Kennedy Space Center to begin a four-day mission in space for its five-man crew. Onboard the spacecraft are Astronauts Richard N. Richards, Robert D. Cabana, William M. Shepherd, Bruce E. Melnick and Thomas D. Akers. Discovery lifted off at 7:47 a.m. EDT on Oct. 6, 1990. A few hours after this photo was made, the crewmembers released the Ulysses spacecraft on its way to a long-awaited mission.

pg.57

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MAR 18 1991
HOUSTON, TEXAS

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

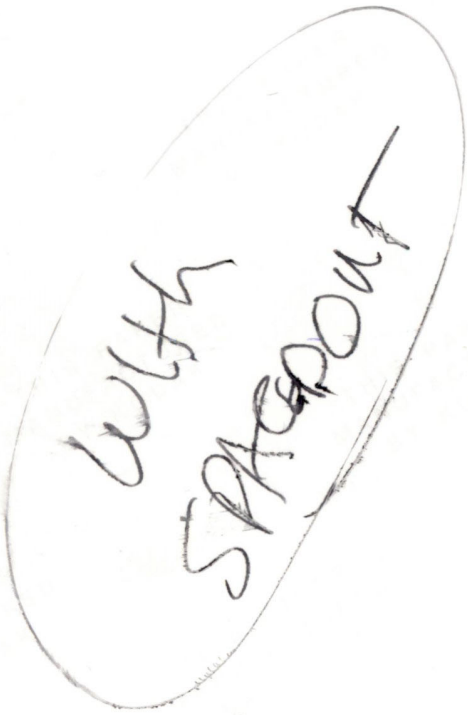
NASA National Aeronautics and Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058

51-I-33-027

SATELLITES - COMMUNICATION

LEASAT 4 SPINS OUT OF THE DISCOVERY'S CARGO BAY ON 8-29-85



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National Aeronautics and
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Lyndon B. Johnson Space Center
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S91-(S)-1089 1-A

NASA - Space Shuttle - Discovery - STS 31

182 x 117
80%
191 x 128

Successful deployment of the Hubble Space Telescope isn't the shuttle crew's only accomplishment. Astronaut Steven Hawley displays a wristwatch belonging to Manley L. Carter that was lost on board Discovery during the shuttle's last space flight.

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NASA National Aeronautics and Space Administration

S26-(S)-018

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NASA - SPACE SHUTTLE DISCOVERY - STS-26

108Y 7/0
50
115X100

OCT 2 1988
HOUSTON, TEXAS

COLOR

~~STS~~ S26(S) 018

30 SEPT 1988

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS 26 TELEVISION SCENE --- Three members of the STS 26 flight crew busy themselves with a variety of chores on the flight deck as they begin their second day in space aboard the Earth orbiting Space Shuttle Discovery. Left to right are Astronauts John M. (Mike) Lounge, aiming camera out overhead window toward Earth; Richard O. Covey, and Frederick H. (Rick) Hauck, leaning back from his commander's station on the forward deck. The scene was recorded from a live unscheduled television transmission at 14:22:25:02 GMT, Sept. 30, 1988.

NASA National Aeronautics and Space Administration

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S87 46304

NASA - SPACE SHUTTLE - DISCOVERY - STS 26

SHUTTLE ASTRONAUTS BEGIN SIMULATED MISSION 10/20/87.

Left: Frederick H. Hauck, commander

R: Richard O. Covey, pilot

R foreground: mission specialist David C. Hilmers

JOHNSON SPACE CENTER TEXAS
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51-D-09-034

NASA - SPACE SHUTTLE - DISCOVERY

april 1985

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88

COLOR

85%

55X55

12-19 APRIL 1985 51D-09-03A

JOHNSON SPACE CENTER, HOUSTON, TEXAS

51-D ONBOARD SCENE---The seven crewmembers of 51-D take time during a busy full week in space to pose for a "star-burst" type in-space portrait. HOLD PICTURE WITH ASTRONAUT RHEA SEDDON AT BOTTOM CENTER. Counter-clockwise from the bottom left are Jeffrey A. Hoffman, mission specialist; Dr. Seddon, mission specialist; Charles D. Walker, payload specialist; U.S. Senator E.J. 'Jake' Garn, payload specialist; S. David Griggs, mission specialist;Karol J. Bobko, mission commander; and Donald E. Williams, pilot. A pre-set 35mm camera exposed the frame in the mid deck of the Earth-orbiting Space Shuttle Discovery. The crew launched at 8:59 a.m. (EST), April 12 and landed at 8:54 a.m. (EST), April 19, spending five minutes less than a full week on the busy mission.

pg.40

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Lyndon B. Johnson Space Center
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S31(S)002

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Houston, Texas 77058

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COLOR (PORTRAIT)

FEBRUARY 1990 S31-(S)-002

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-31 CREW PORTRAIT --- The five astronaut crewmembers for the STS-31 mission have chosen a busy night sky scene as a background for their portrait. Astronaut Loren J. Shriver (center front) is mission commander. Other crewmembers are (left to right), Astronauts Charles F. Bolden Jr., pilot; Steven A. Hawley, Bruce McCandless II, and Kathryn D. Sullivan, all mission specialists. The Hubble Space Telescope (HST), depicted in upper left of the background scene, is scheduled to be deployed by the Discovery's crew.

pg.21

LIBRARY APR 10 1990 HOUSTON, TEXAS

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA - SPACE SHUTTLE-STS 31

NASA National Aeronautics and Space Administration

S41 (S) 100

Lyndon B. Johnson Space Center
Houston, Texas 77058

NASA - Space Shuttle - Discovery - STS 41

National Aeronautics and Space Administration

Houston, Texas 77058

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COLOR

6 OCTOBER 1990 S41 (S) 100

KENNEDY SPACE CENTER, FLORIDA

STS 41 LAUNCH --- Discovery lifts off from Launch Complex 39 at the Kennedy Space Center to begin a four-day mission in space for its five-man crew. Onboard the spacecraft are Astronauts Richard N. Richards, Robert D. Cabana, William M. Shepherd, Bruce E. Melnick and Thomas D. Akers. Discovery lifted off at 7:47 a.m. EDT on Oct. 6, 1990. A few hours after this photo was made, the crewmembers released the Ulysses spacecraft on its way to a long-awaited mission.

pg.3-2

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S26-32-064

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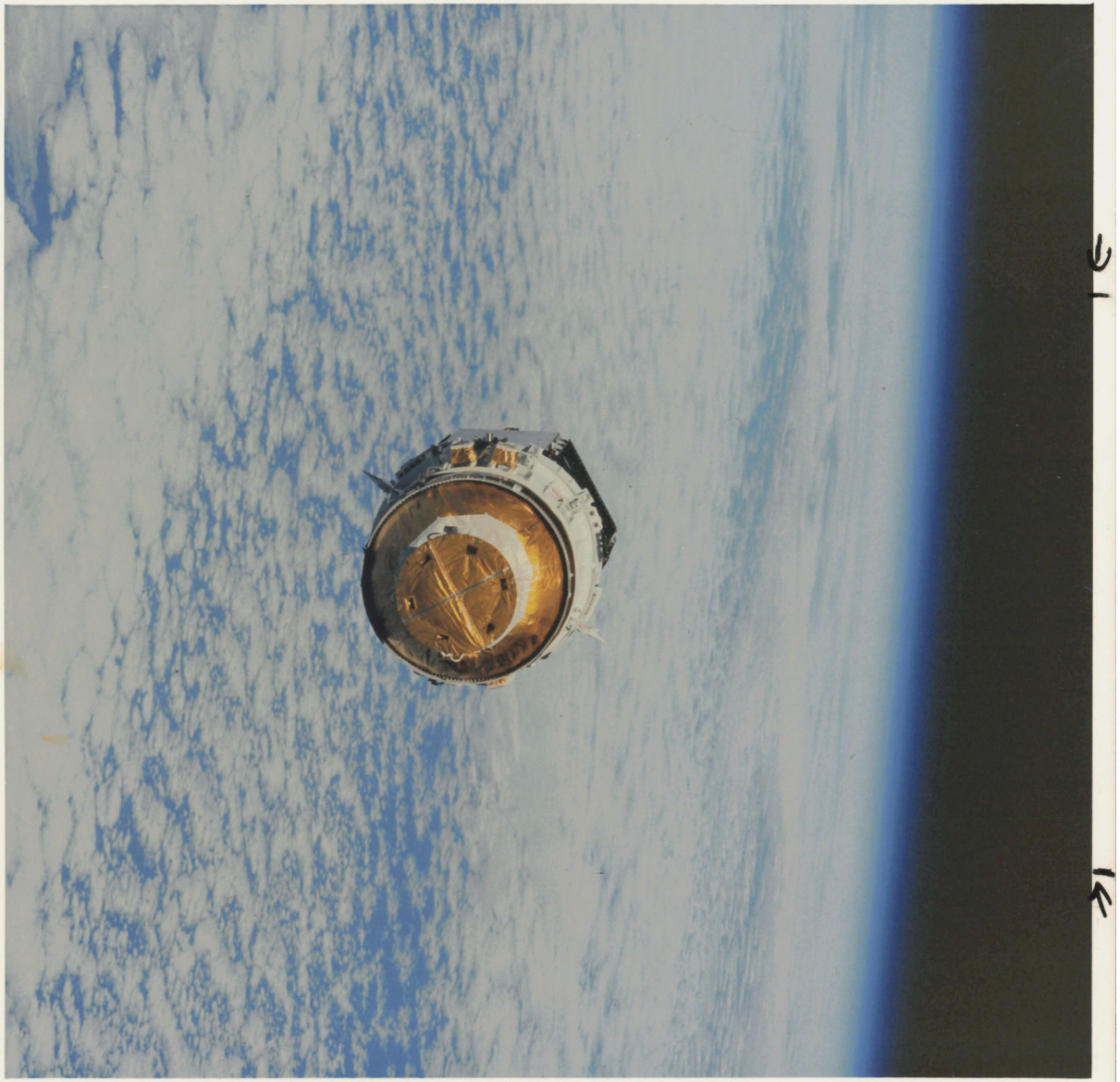

NASA - SPACE SHUTTLE - DISCOVERY STS 26

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National Aeronautics and
Space Administration

S94-41844

Lyndon B. Johnson Space Center
Houston, Texas 77058

File: Space Shuttle LXXIII

WED FEB 22 1995
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COLOR

Jan. 1995
Shuttle Discovery
Mir Rendezvous

NOVEMBER 1994 S94-41844

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-63 TRAINING VIEW --- Three members of the STS-63 crew prepare for a training exercise in the Johnson Space Center's (JSC) Shuttle mockup and integration laboratory. Left to right are astronauts James D. Wetherbee, commander; Eileen M. Collins, pilot; and Bernard A. Harris Jr., payload commander. The six-member STS-63 crew will support the third Spacehab mission in February of next year. They will also deploy and retrieve Spartan 204 and rendezvous with Russia's Mir Space Station.

left - Discovery Commander
Jim Wetherbee

rt. Discovery pilot
Eileen Collins

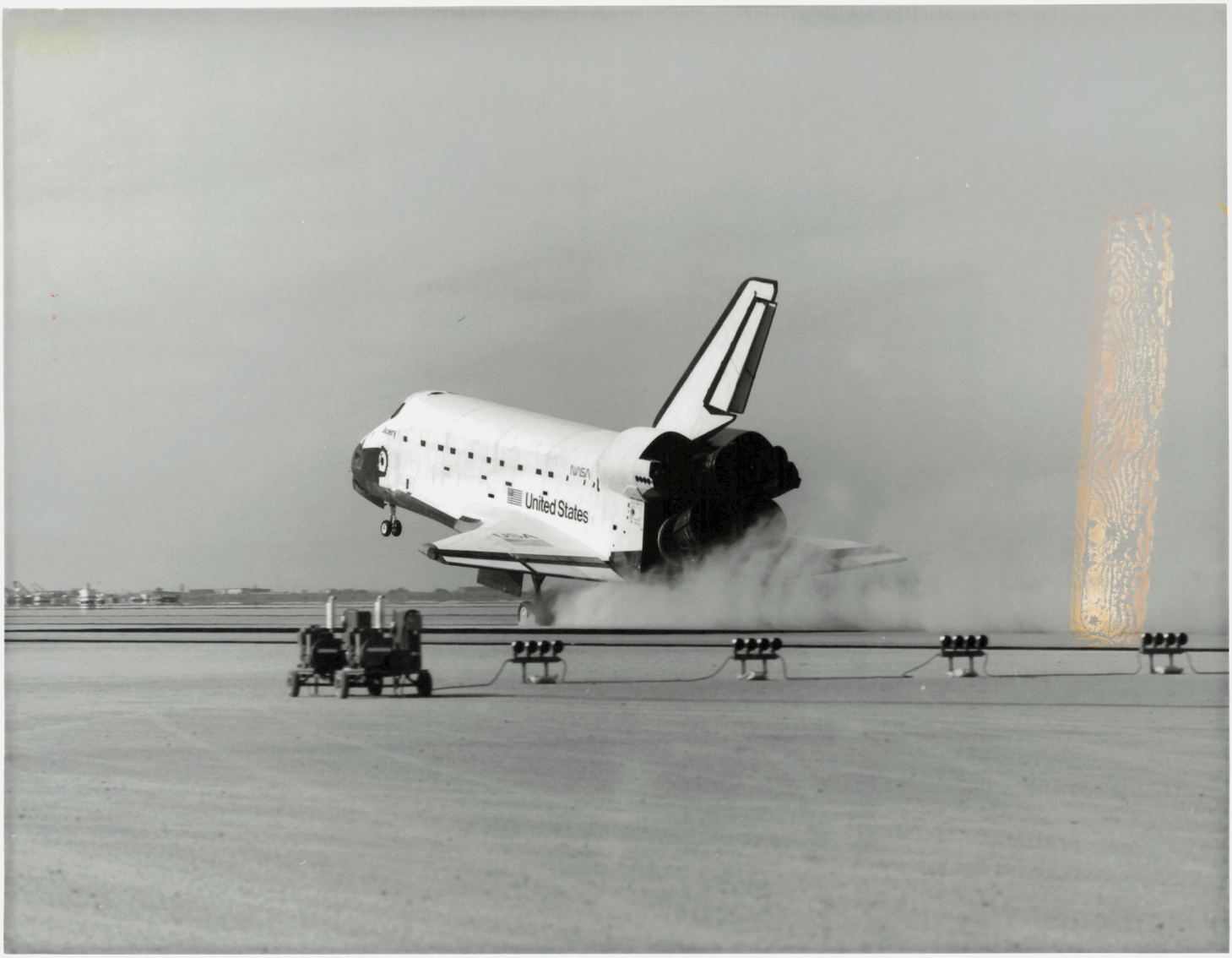
Collins is the first woman
to pilot a space shuttle

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA National Aeronautics and Space Administration

S-26-(S)122

Lyndon B. Johnson Space Center
Houston, Texas 77058



Space Shuttle XXVI
1988

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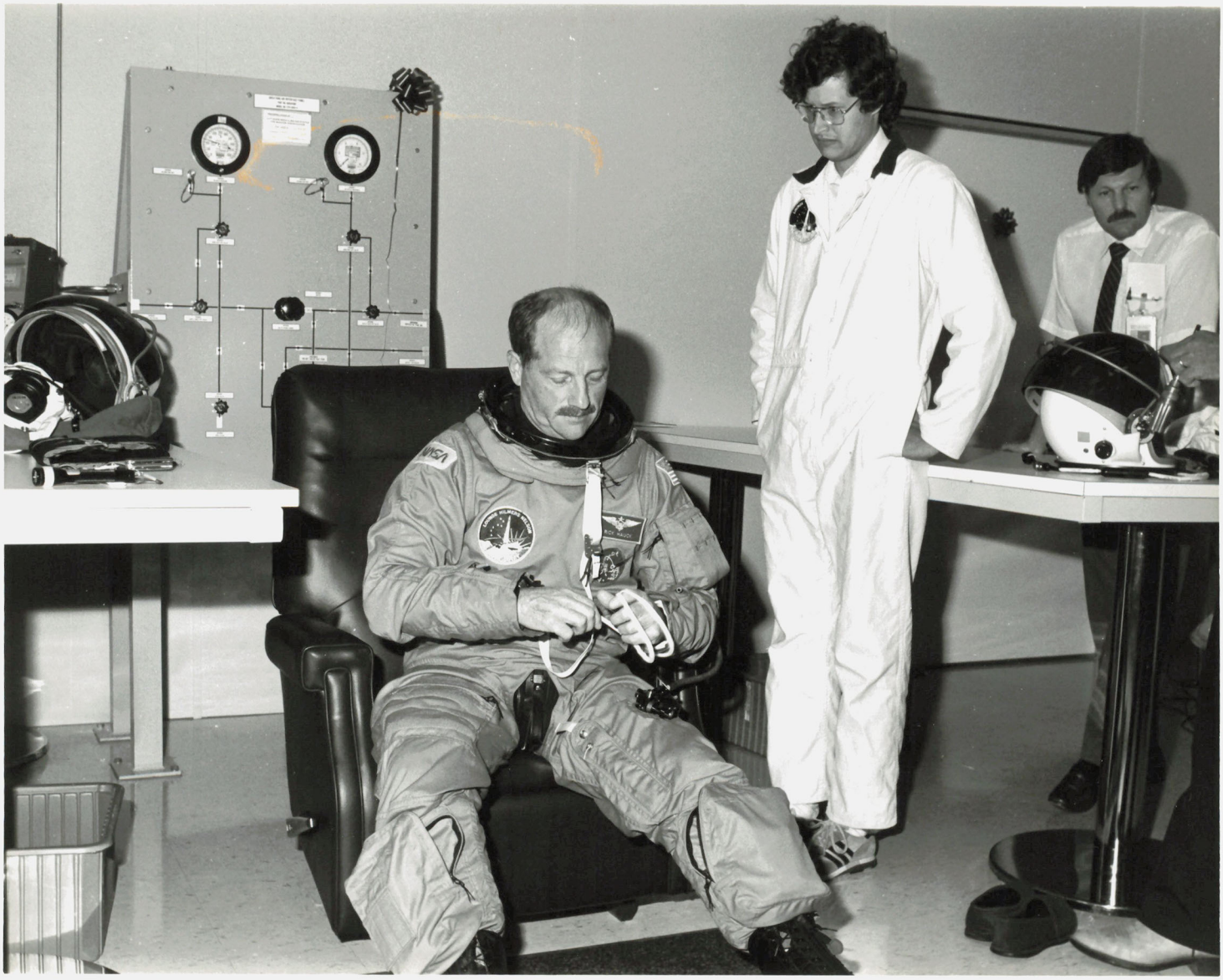
THU OCT 06 1988

COLOR

3 OCTOBER 1988 S26-(S)-122

DRYDEN FLIGHT RESEARCH FACILITY, CALIFORNIA

STS 26 LANDING --- The Space Shuttle Discovery touches down on a dry Mojave Desert lake bed to complete a four-day mission. Onboard the spacecraft were Astronauts Frederick H. (Rick) Hauck, commander; Richard O. Covey, pilot; and John M. (Mike) Lounge, David C. Hilmers and George D. Nelson.



National Aeronautics and
Space Administration

John F. Kennedy Space Center
Kennedy Space Center, Florida 32899
AC 305 867-2468

FOR RELEASE: September 29, 1988

PHOTO NO. KSC-88P-996

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KENNEDY SPACE CENTER, FL.-- In preparation for Space Shuttle mission STS-26, Commander Rick Hauck suits up in his partially pressurized flight suit the morning of the launch of the orbiter Discovery.

PHOTO CREDIT -- NASA OR NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Discovery

MAR 1984

National Aeronautics and
Space Administration

John F. Kennedy Space Center
Kennedy Space Center, Florida 32899
AC 305 867-2468

FOR RELEASE: May 12, 1984

PHOTO NO. 108-KSC-84PC-254

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26

Discovery.

KENNEDY SPACE CENTER, Fla.-- In the VAB the Orbiter Discovery (OV-103) has been attached to its lifting sling and is being readied by technicians for rotation to a vertical position. It will then be hoisted for mating to the other Space Shuttle components.

PHOTO CREDIT — NASA OR NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NASA

National Aeronautics and
Space Administration

S26-31-065

Lyndon B. Johnson Space Center
Houston, Texas 77058

Space Shuttle XXVI
1988

COLOR

SEPTEMBER 29, 1988 S26-31-065

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-26 ONBOARD SCENE - A close-up scene during deployment showing the Inertial Upper Stage (IUS), the solid rocket motor that will insert the Tracking Data and Relay Satellite (TDRS) into orbit. The photograph was made with a handheld Hasselblad 70mm camera aimed through Discovery's aft flight deck windows. The event happened around 21:23 GMT, Thursday, September 29, 1988.

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NASA National Aeronautics and Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058

51-G-04-010

Space Shuttle
XVIII

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FRIDAY AUG 16 1985

51-G-04-010 Payload Specialist Sultan Salman Abdelazize Al-Saud assumes a posture common to the weightlessness environment of space as he logs notes in Discovery's mid deck area.

NASA National Aeronautics and Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058

51G-21-011

Space Shuttle

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FRIDAY AUG 16 1985
FRIDAY AUG 16 1985

51G-21-011 Group portrait on flight deck of all seven crewmembers. L.-r. (front) are John O. Creighton, Shannon W.Lucid, Daniel C. Brandenstein; and (back row)) are Sultan Salamn Abdelazize Al-Saud, Steven R. Nagel, John M. Fabian and Patrick Baudry.

NASA National Aeronautics and Space Administration

51-G-08-021

Lyndon B. Johnson Space Center
Houston, Texas 77058

Space Shuttle
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FRIDAY AUG 16 1985

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National Aeronautics and Space Administration

51G008021

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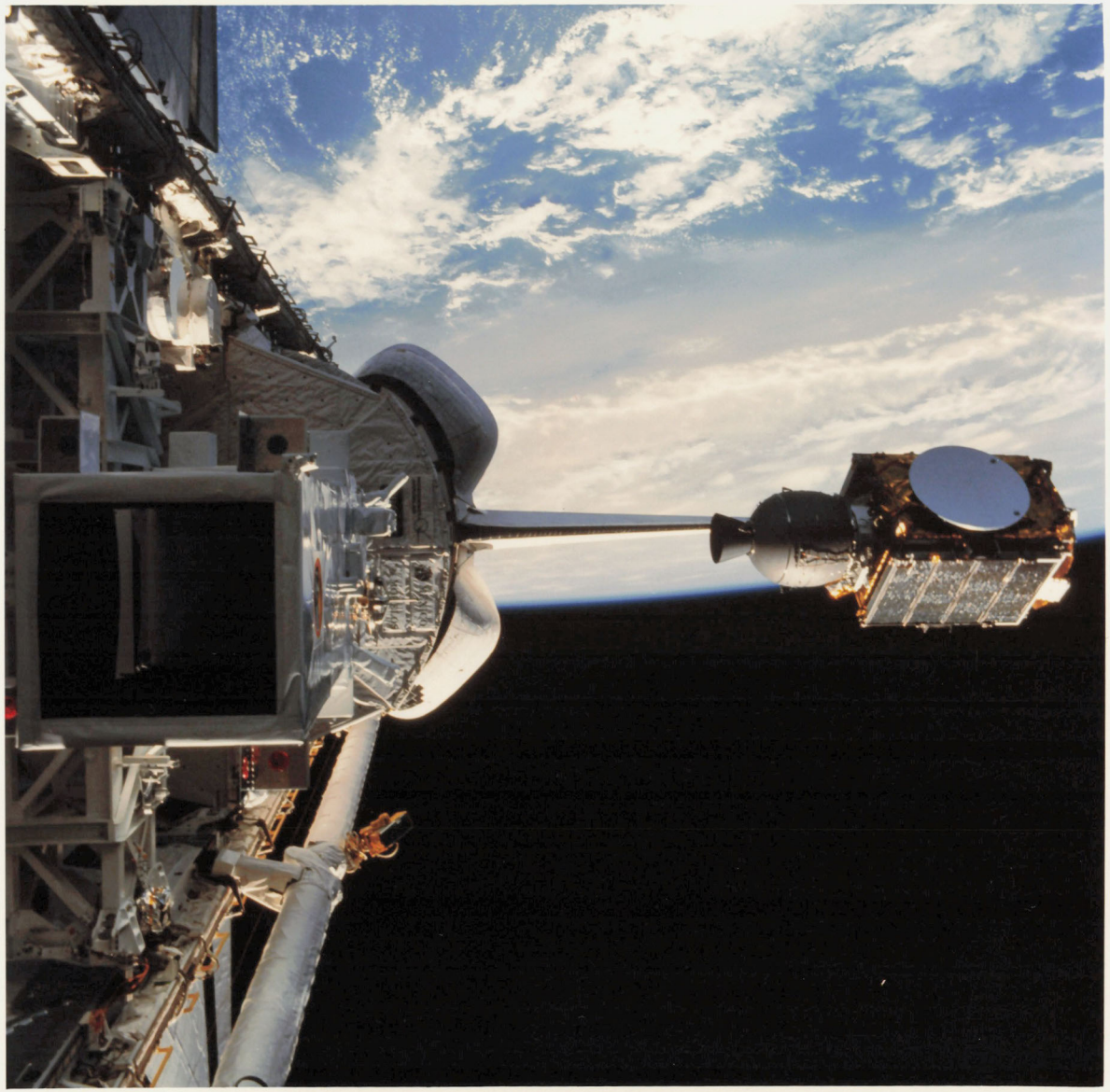
FRIDAY AUG 16 1985

51G-08-021 Patrick Baudry, payload specialist representing the Centre National d'Etudes Spatiales of France, prepares to open a can of French food. The bag attached to a nearby locker door appears to contain several other French snacks.

NASA National Aeronautics and Space Administration

51G-34-045

Lyndon B. Johnson Space Center
Houston, Texas 77058



Space Shuttle
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THE FOLLOWING SIX DESCRIPTIONS ACCOMPANY 70MM FRAMES MAKING UP NASA'S SECOND STILL PHOTO RELEASE FROM ITS STS51-G MISSION.

51G-34-045 Arabsat communications satellite rises from cargo bay of Earth-orbiting Discovery. Background shared by blue and white Earth and blackness of space.

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Lyndon B. Johnson Space Center
Houston, Texas 77058

51G-22-029

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FRIDAY AUG 16 1985

51-G-22-029 A smiling John O. Creighton poses for a picture with the onboard GRID computer, which displays a likeness of Mr. Spock of Star Trek fame.

The two payload

Space Shuttle
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S90 38573

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COLOR

MAY 1990 S-90-38573

File: FRANK L. CULBERTSON
Pilot Astronaut 1984 Group

p.16

July 1993
Discovery
Mission commander
Frank Culbertson
Navy Captain

HOUSTON CHRONICLE LIBRARY
TUE JUL 20 1993

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

CAUTION
TURN OFF STROBE LIGHT
WHEN TAXIING NEAR OTHER
AIRCRAFT OR WHEN FLYING
IN FOG OR CLOUDS. STANDARD
POSITION LIGHTS MUST BE
USED FOR ALL NIGHT
OPERATIONS
ELECTRIC
SWITCHES
EXTERIOR LIGHTS
LANDING LT
FLOOD LT
OVER-RIDE
PASS
L AIR START
ON
OFF
SIMULATION AUTOPILOT

National Aeronautics and
Space Administration

John F. Kennedy Space Center
Kennedy Space Center, Florida 32899
AC 305 867-2468

FOR RELEASE: September 27, 1988

PHOTO NO. KSC-88P-986

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KENNEDY SPACE CENTER, Fla.-- Suited in his shuttle flight suit, STS-26 Commander Rick Hauck is in the cock pit of the Shuttle Training Aircraft (STS) at KSC's shuttle landing facility. The STA, a modified Grumman G-2, closely simulates the final approach the orbiter Discovery will make as it lands at Edwards Air Force Base, Calif. upon completion of the STS-26 mission. Hauck, Pilot Richard Covey and Mission Specialists, Dave Hilmers, Mike Lounge and George "Pinky" Nelson, will be launched from Kennedy Space Center September 29, 1988.

PHOTO CREDIT – NASA OR NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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FOR RELEASE: September 27, 1988

PHOTO NO. KSC-88P-979

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KENNEDY SPACE CENTER, Fla. -- Suited in his shuttle flight suit, STS-26 Commander Rick Hauck boards the Shuttle Training Aircraft (STS) to practice landing approaches at KSC's shuttle landing facility. The STA, a modified Grumman G-2, closely simulates the final approach the orbiter Discovery will make as it lands at Edwards Air Force Base, Calif. upon completion of mission STS-26. Hauck, Pilot Richard Covey and three Mission Specialists, Dave Hilmers, Mike Lounge and George "Pinky" Nelson, will be launched from Kennedy Space Center September 29, 1988.

PHOTO CREDIT – NASA OR NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Discovery

National Aeronautics and
Space Administration

John F. Kennedy Space Center
Kennedy Space Center, Florida 32899
AC 305 867-2468

FOR RELEASE: May 12, 1984

PHOTO NO. 108-KSC-84PC-252

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KENNEDY SPACE CENTER, Fla.-- In the VAB the Orbiter Discovery (OV-103) has been attached to its lifting sling and is being readied for rotation to the vertical position. It will then be hoisted for mating to the other Space Shuttle components.

Discovery

81

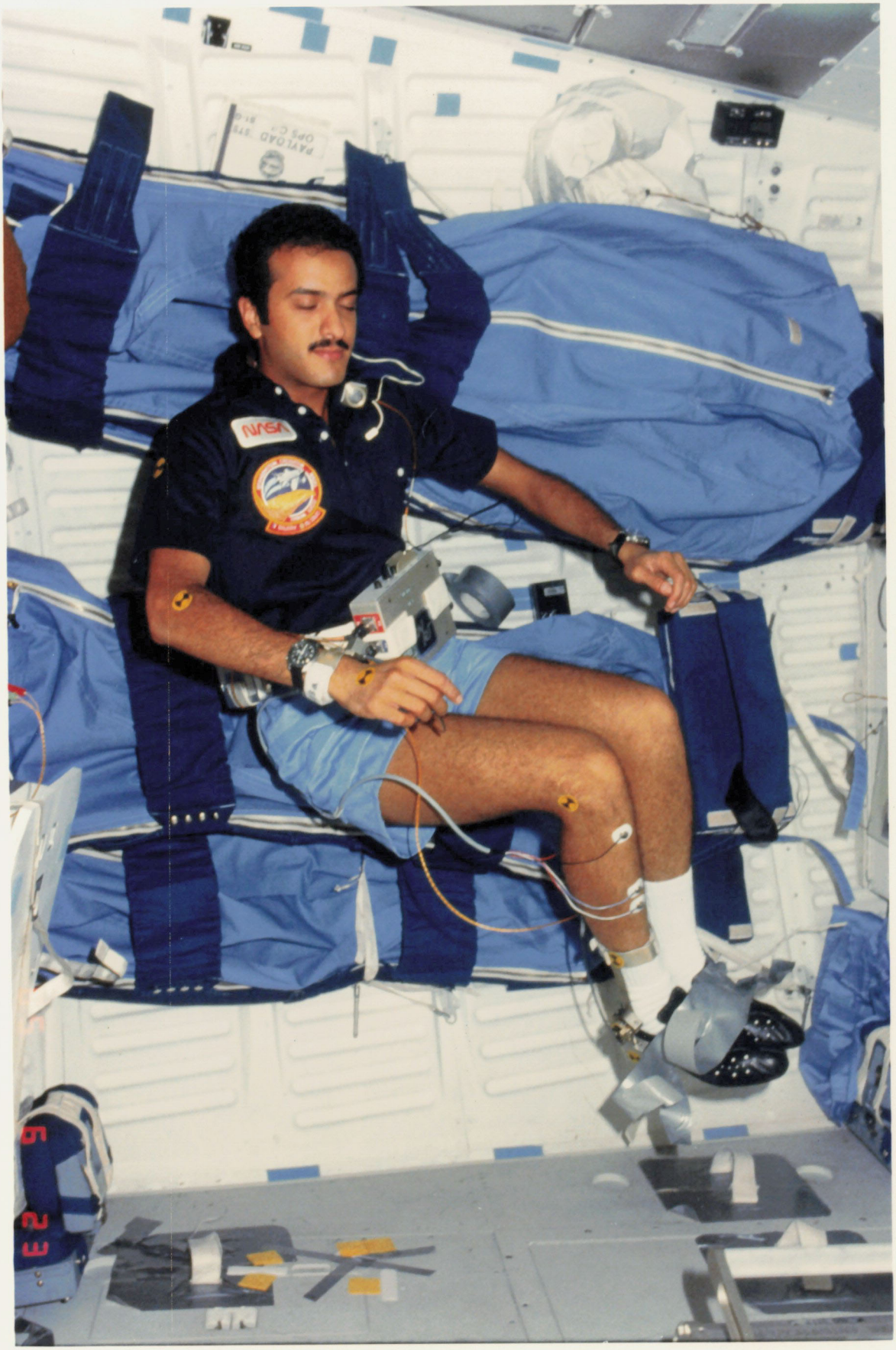
PHOTO CREDIT — NASA OR NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

MAR 1988

National Aeronautics and Space Administration

51G-105-030

Lyndon B. Johnson Space Center
Houston, Texas 77058



Space Shuttle

XVIII

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51G-105-030 Payload Specialist Sultan Salman Abdelazize Al-Saud, participates in the French Postural Experiment (FPE) on mid deck of Earth-orbiting Discovery.

FRIDAY AUG 16 86

NASA National Aeronautics and Space Administration

51G-102-035

Lyndon B. Johnson Space Center
Houston, Texas 77058

Space Shuttle XVIII

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51G-102-035 The two payload specialists for the week-long flight share a mid deck scene on the Earth-orbiting Discovery. Sultan Salman Abdelazize Al-Saud (left) is in the midst of a meal while Patrick Baudry conducts a phase of the French Postural Experiment (FPE) on h imself. Sleep restraints are in the background.

FRIDAY AUG 16 1985

NASA National Aeronautics and Space Administration

51G104033

Lyndon B. Johnson Space Center
Houston Texas 77058

Space Shuttle

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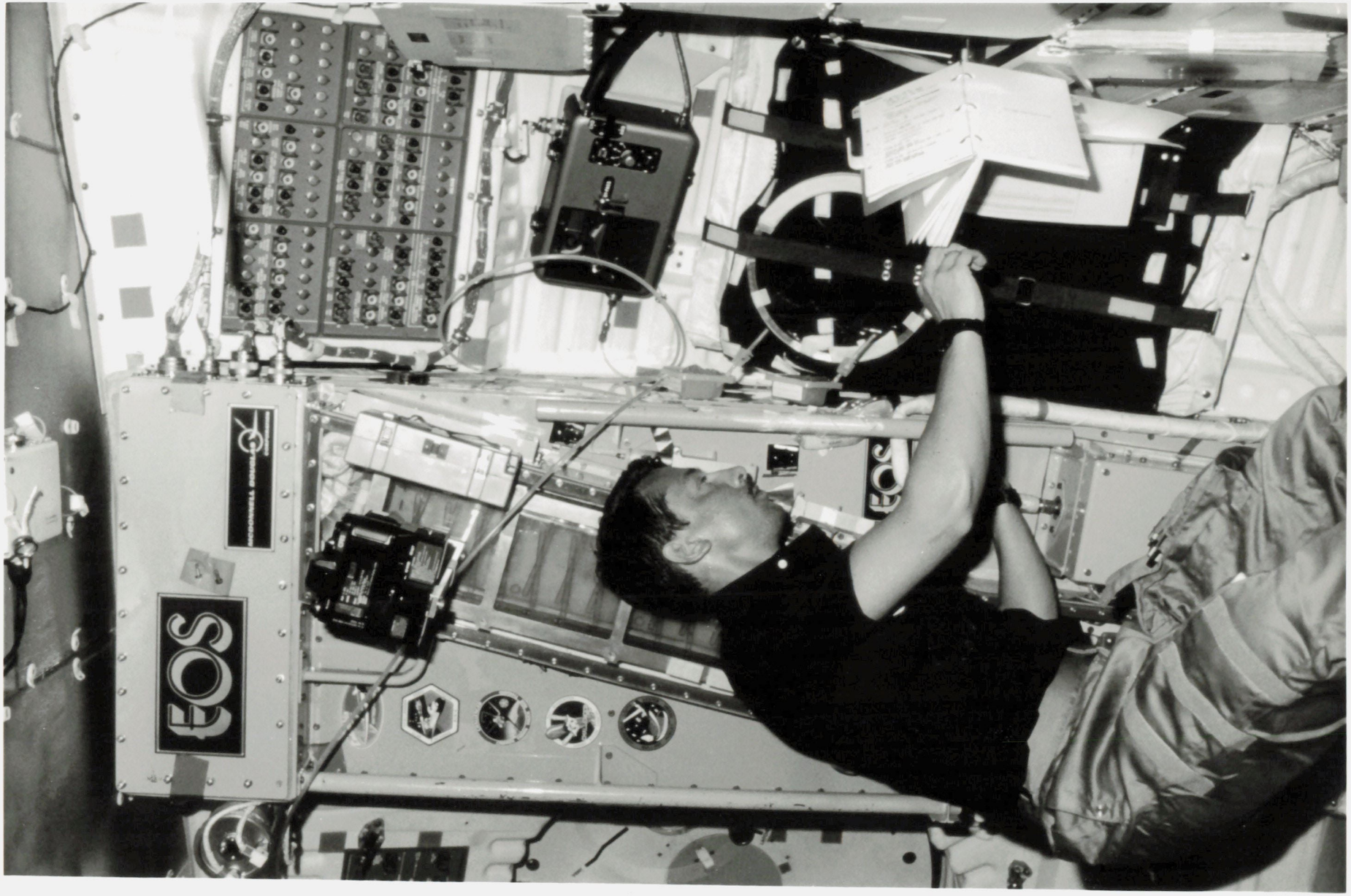
FRIDAY AUG 16 1985

51G-104-33 Payload Specialists Patrick Baudry (left) and Sultan Salman Abdelazize Al-Saud team up to conduct a French postural experiment (FPE) on the mid deck of the Earth orbiting Space Shuttle Discovery.

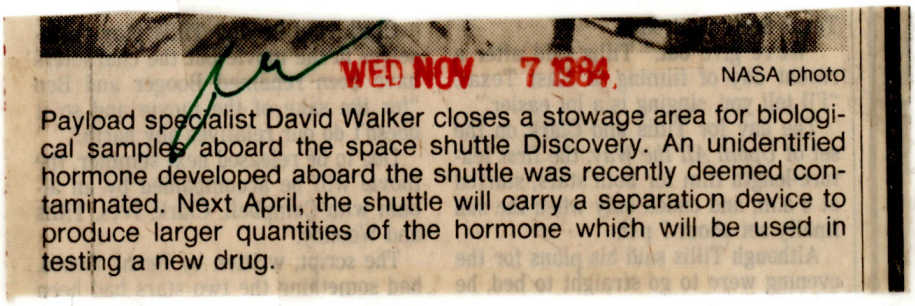
NASA National Aeronautics and Space Administration

S14-06-11

Lyndon B. Johnson Space Center
Houston, Texas 77058



Space Shuttle XII



WED NOV 7 1984

NASA photo

Payload specialist David Walker closes a stowage area for biological samples aboard the space shuttle Discovery. An unidentified hormone developed aboard the shuttle was recently deemed contaminated. Next April, the shuttle will carry a separation device to produce larger quantities of the hormone which will be used in testing a new drug.

COLOR

SEPT 6, 1984 s14-06-11

JOHNSON SPACE CENTER, HOUSTON, TEXAS

ONBOARD SCENE---Charles D. Walker, 41-D payload specialist, closes a stowage area for biological samples supporting the continuous flow electrophoresis systems (CFES) experiment in the mid deck of the Earth-orbiting Discovery. The McDonnell-Douglas engineer conducted a televised "tour" of the refrigerator-sized processing facility for an audience on Earth. Just beyond Walker's shoulder is the see-through upward flowing processing canal for the biological samples. An affixed 35mm camera records the flow, during which a separation/purification process occurs. The samples are removed at the top. They were later returned to Earth for follow-up studies.

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NASA National Aeronautics and Space Administration

51-G-104-33

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space shuttle

XVIII

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FRIDAY AUG 16 1985

NASA National Aeronautics and Space Administration

51-G-103-09

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Space Shuttle

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FRIDAY AUG 16 1985

NASA National Aeronautics and Space Administration

51G-09-035

Lyndon B. Johnson Space Center
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Space Shuttle

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FRIDAY AUG 16 1985

51G-09-035 Payload Specialist Patrick Baudry, using shades to shield his eyes from a bright sun beaming through overhead flight deck windows, takes notes.

NASA National Aeronautics and Space Administration

51G103009

Lyndon B. Johnson Space Center
Houston Texas 77058

Space Shuttle XVIII

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FRIDAY AUG 16

51G-103-09 Four STS 51G crew members huddle in a corner of the Discovery's mid deck area. Daniel C. Brandenstein, mission commander, assists Steven R. Nagel with the treadmill device while John O. Creighton and Shannon W. Lucid look on.

NASA National Aeronautics and Space Administration

51-D-05-006

Lyndon B. Johnson Space Center
Houston, Texas 77058

National Aeronautics and Space Administration

astronauts
Houston, Texas 7750

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COLOR

APRIL 12-19 1985 51D-05-006

JOHNSON SPACE CENTER, HOUSTON, TEXAS
51D ONBOARD SCENE----Charles D. Walker of McDonnell Douglas looks at a log book during the operation of the continuous flow electrophoresis system (CFES) experiment making its sixth spaceflight on 51-D. Walker marked his second spaceflight as he collected a quantitiy of separated protein materials and evaluated contamination control and sample stream dynamcis. The CFES unit is the refrigerator-size facility at left center background. Some CFES paraphernalia is seen amidst food and other essentials temporarily stowed on locker door in the mid deck. 35mm frame.
pg.29-3

MONDAY AUG 18 1986
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National Aeronautics and
Space Administration

S14-36-34

Lyndon B. Johnson Space Center
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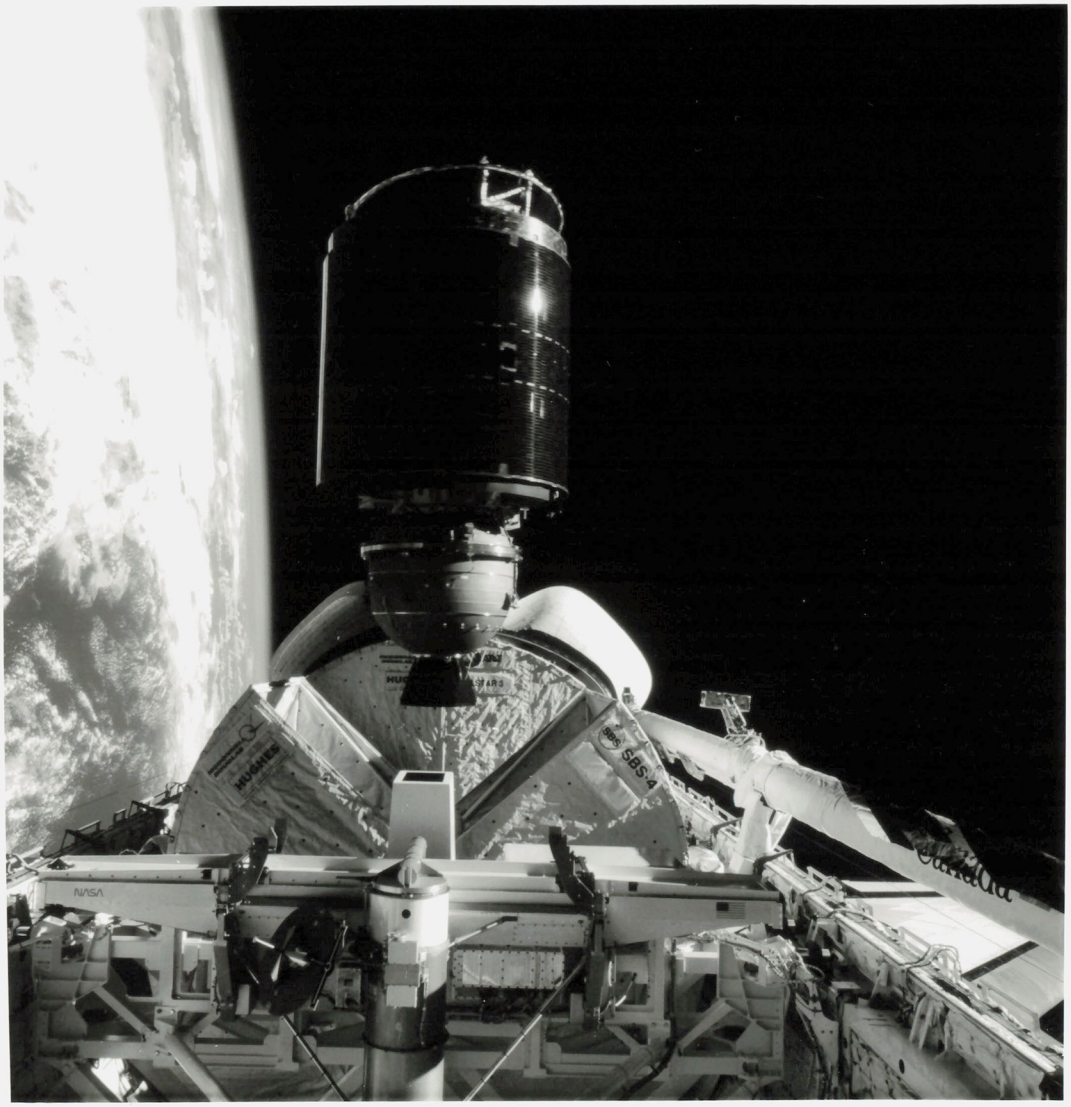

Space Shuttle XII

FIRST PHOTO RELEASE OF NASA MISSION 41-D ONBOARD
PHOTOGRAPHIC MATERIALS. FIVE FRAMES

S14-36-34 Less than nine hours after launch of the Discovery, the astronaut crewmembers photographed deployment of the SBS-4 communications satellite. The cylindrical spacecraft spins and rises from its cradle-like protective shield to begin life in space. A number of maneuvers will place it in its desited orbit. Aug. 30, 1984 70mm.

TUESDAY OCT 9 1984
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S14-32-67

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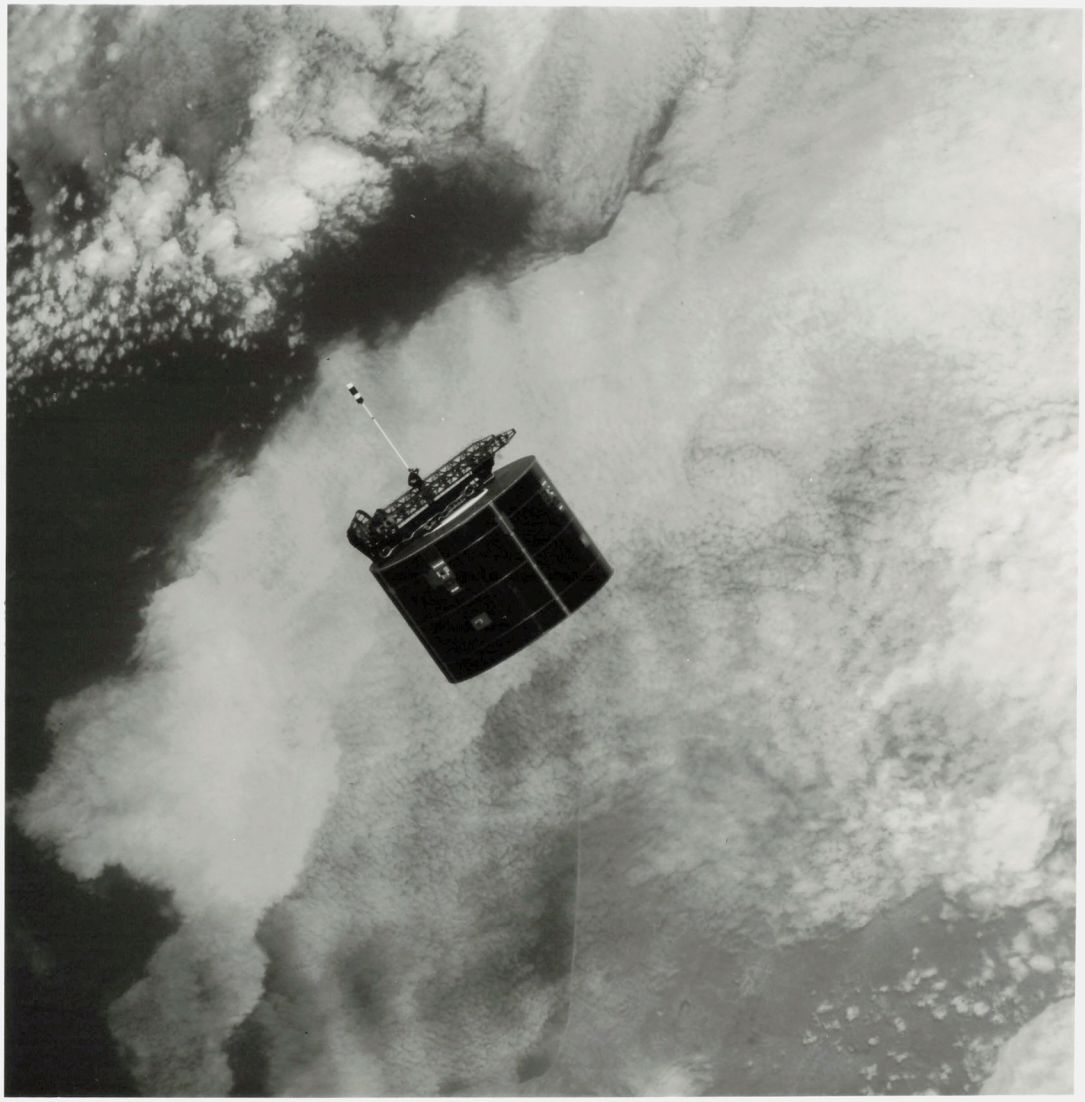
Houston Texas 77058



Space Shuttle
XII

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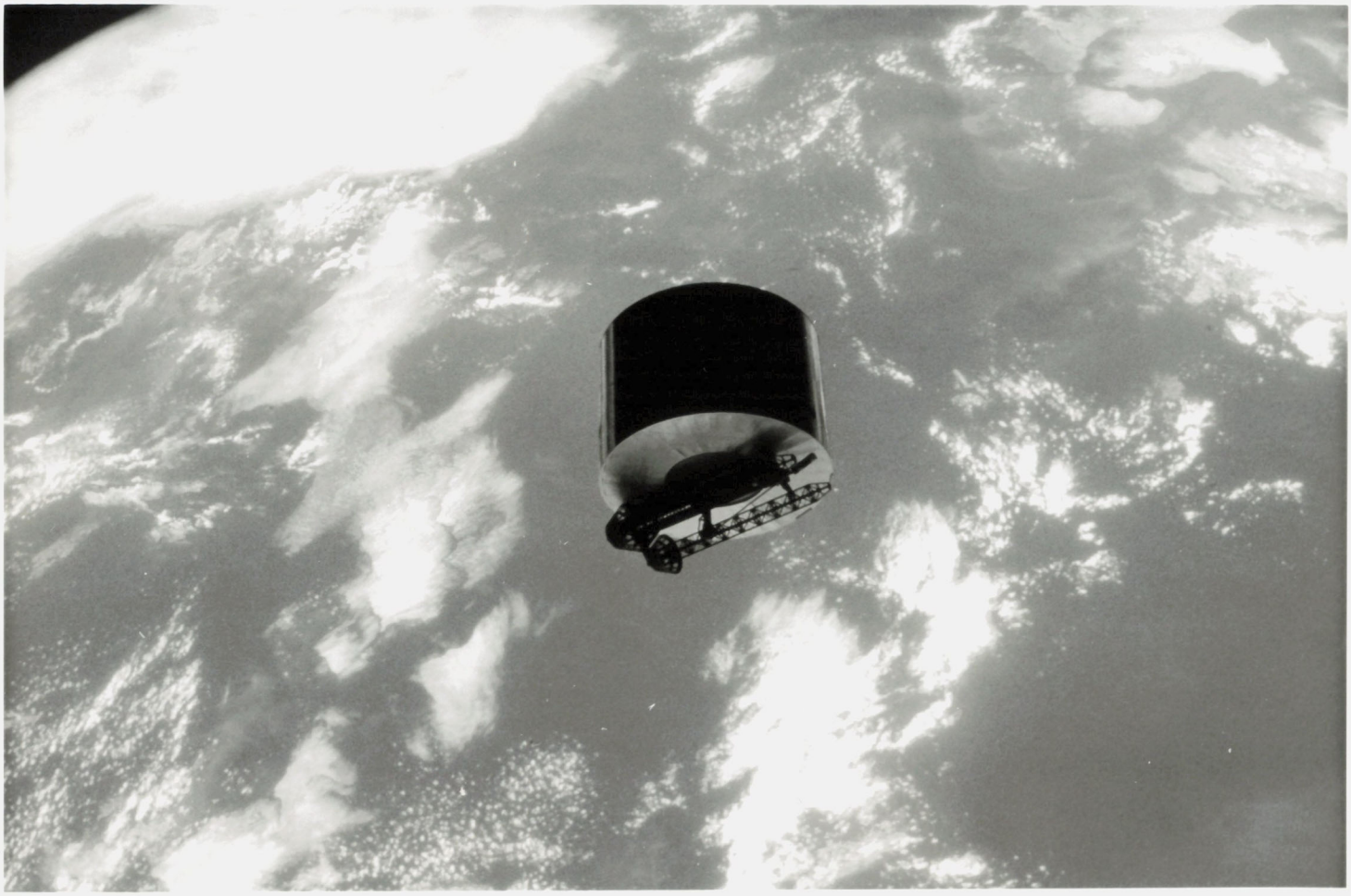

Space Shuttle XII

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Space Shuttle XII

COLOR

SEPT 6, 1984

s14-33-71

ONBOARD SCENE---A collection of ice that developed around an external nozzle on Discovery's port side mid fuselage sails by the manned spacecraft on Sept. 4 following a successful attempt to remove the troublesome buildup using the remote manipulator system (RMS) arm. A crewmember on the flight deck alertly grabbed a 70mm camera and recorded a final look at the chunk.

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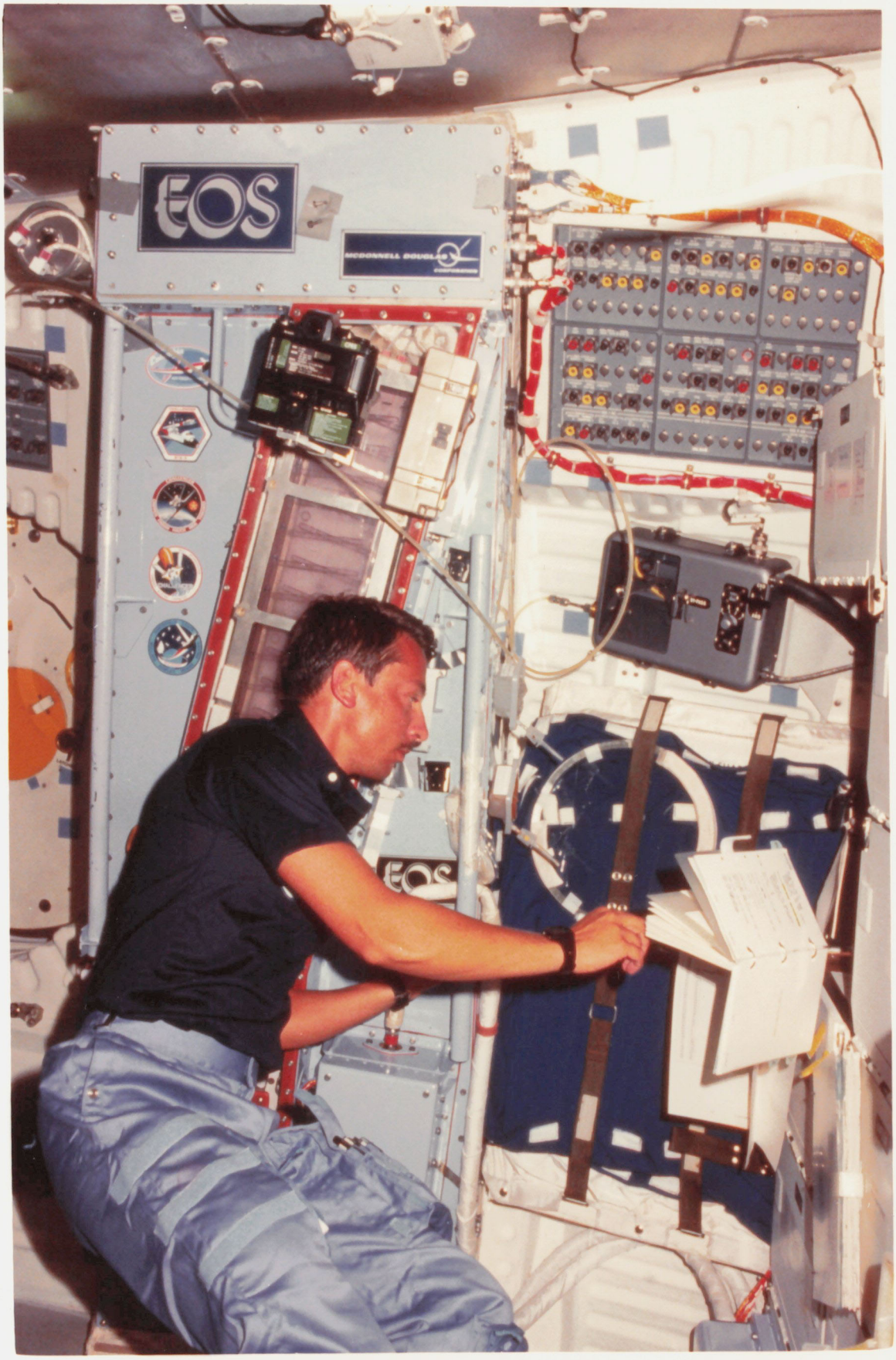
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Space Shuttle
XII

COLOR

SEPT 6, 1984 s14-06-11

JOHNSON SPACE CENTER, HOUSTON, TEXAS

ONBOARD SCENE---Charles D. Walker, 41-D payload specialist, closes a stowage area for biological samples supporting the continuous flow electrophoresis systems (CFES) experiment in the mid deck of the Earth-orbiting Discovery. The McDonnell-Douglas engineer conducted a televised "tour" of the refrigerator-sized processing facility for an audience on Earth. Just beyond Walker's shoulder is the see-through upward flowing processing canal for the biological samples. An affixed 35mm camera records the flow, during which a separation/purification process occurs. The samples are removed at the top. They were later returned to Earth for follow-up studies.

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Space Shuttle

XVIII

FRIDAY AUG 16 1985

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51G-35-066

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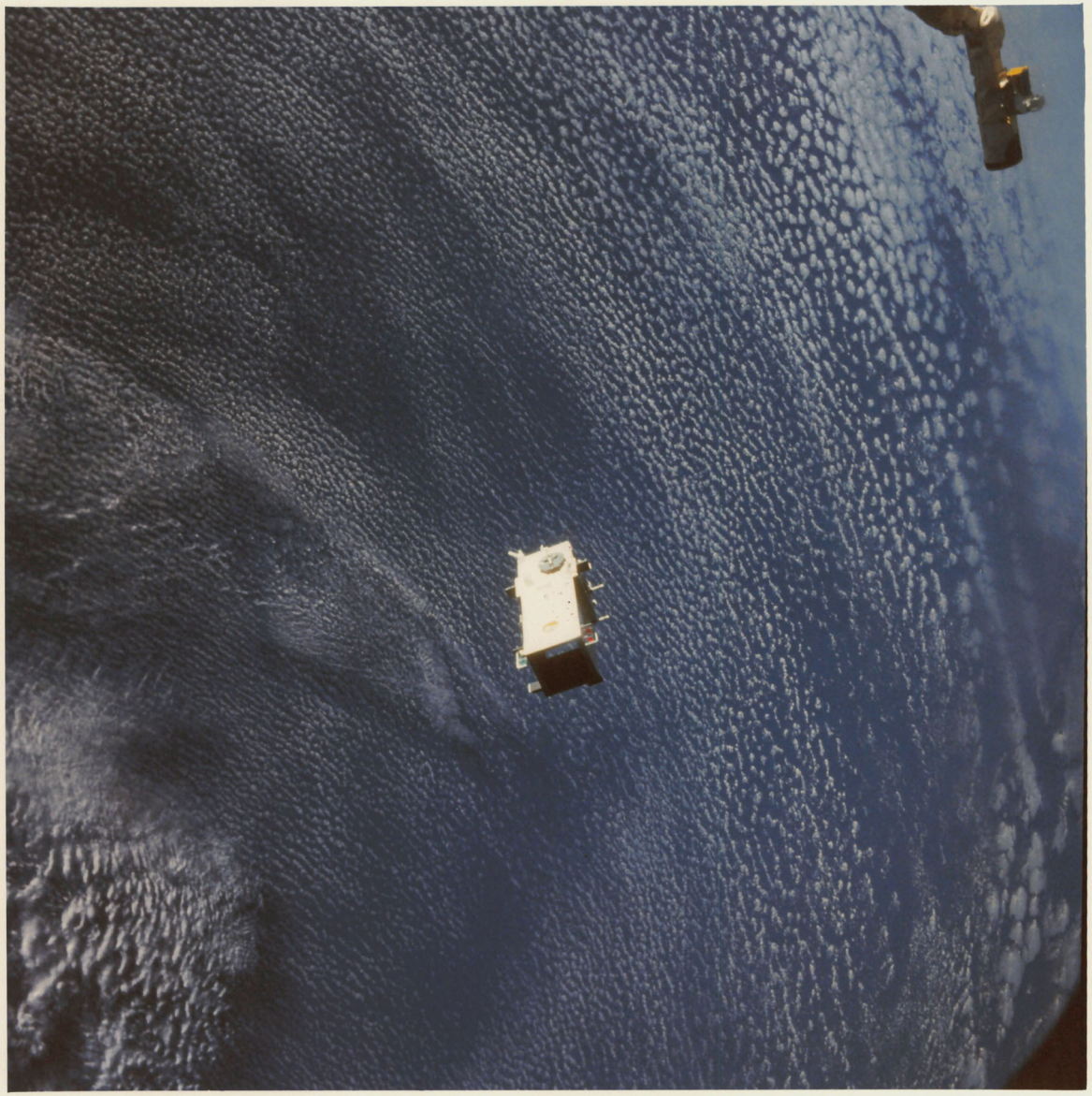

FRIDAY AUG 16 1985
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51G-35-066 Spartan 1 moves away from Discovery over ocean. Remote manipulator system (RMS) arm visible at frame's edge.

Space Shuttle
XVIII

NASA National Aeronautics and Space Administration

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Space Shuttle XXVI - 1988

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NASA National Aeronautics and Space Administration

S26 05 22

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Space Shuttle XXVI 1988

S26-05-22 Hauck rehearses the donning of the orange partial pressure suit which he and the other four crewmembers will put on just prior to the entry phase of the flight. The suit made its debut for the launch phase three days earlier; however the crew had the advantage of a one-G environment for the chore on that occasion.
(35mm)

WEDNESDAY OCT 5 1988
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S48(S) 002

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File: Space Shuttle 46

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COLOR (PORTRAIT)

AUGUST 1991 S48-(S)-002

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS 48 CREW PORTRAIT ---- These five astronauts have been assigned to NASA's STS-48 mission, scheduled for September. Astronaut John O. Creighton, center, is mission commander. Astronaut Kenneth S. Reightler Jr. (right front) will be pilot for the flight aboard Discovery. Mission specialists are Mark N. Brown (left, front row) and (left to right, back row) Charles D. (Sam) Gemar and James F. Buchli.

pg.5

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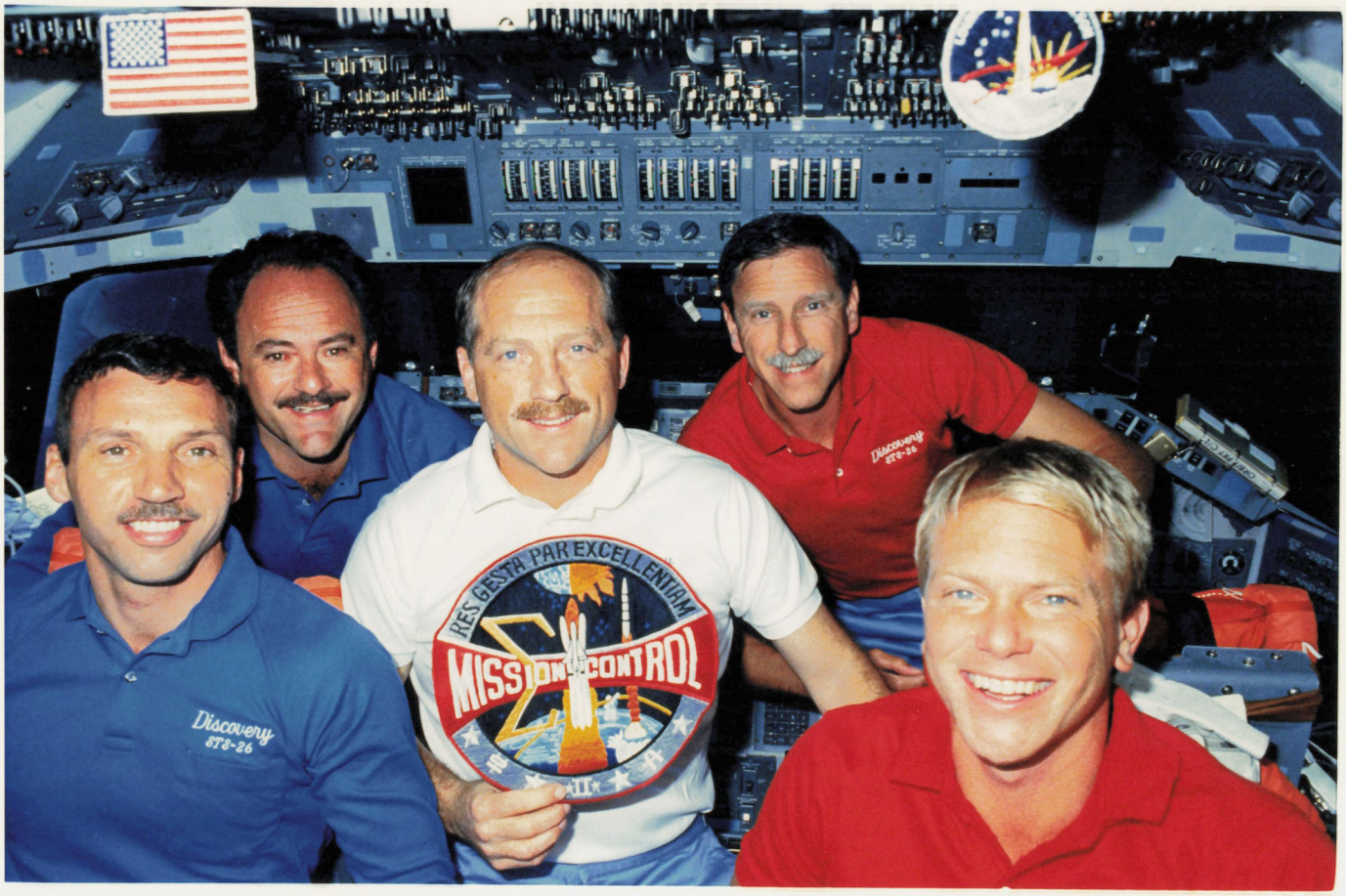

Space Shuttle XXVI 1988

S26-08-031 The crew, all of whom have served one capacity or another in mission control center, paid tribute to flight controllers by displaying this insignia during a television downlink. L.-r. in the 35mm frame are Hilmers, Lounge, Hauck, Covey and Nelson. They pose on the flight deck.

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Space Shuttle XXVI 1988

S26-10-016 Nelson, his feet strapped to the floor for security in the weightlessness of space, handles some beverage containers for the crew on the mid deck.

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Space Shuttle XXVI 1988

S26-09-24 L.-r. on the flight deck Covey, Nelson and Hauck. Covey and Hauck each holds a 70mm camera for Earth photography.

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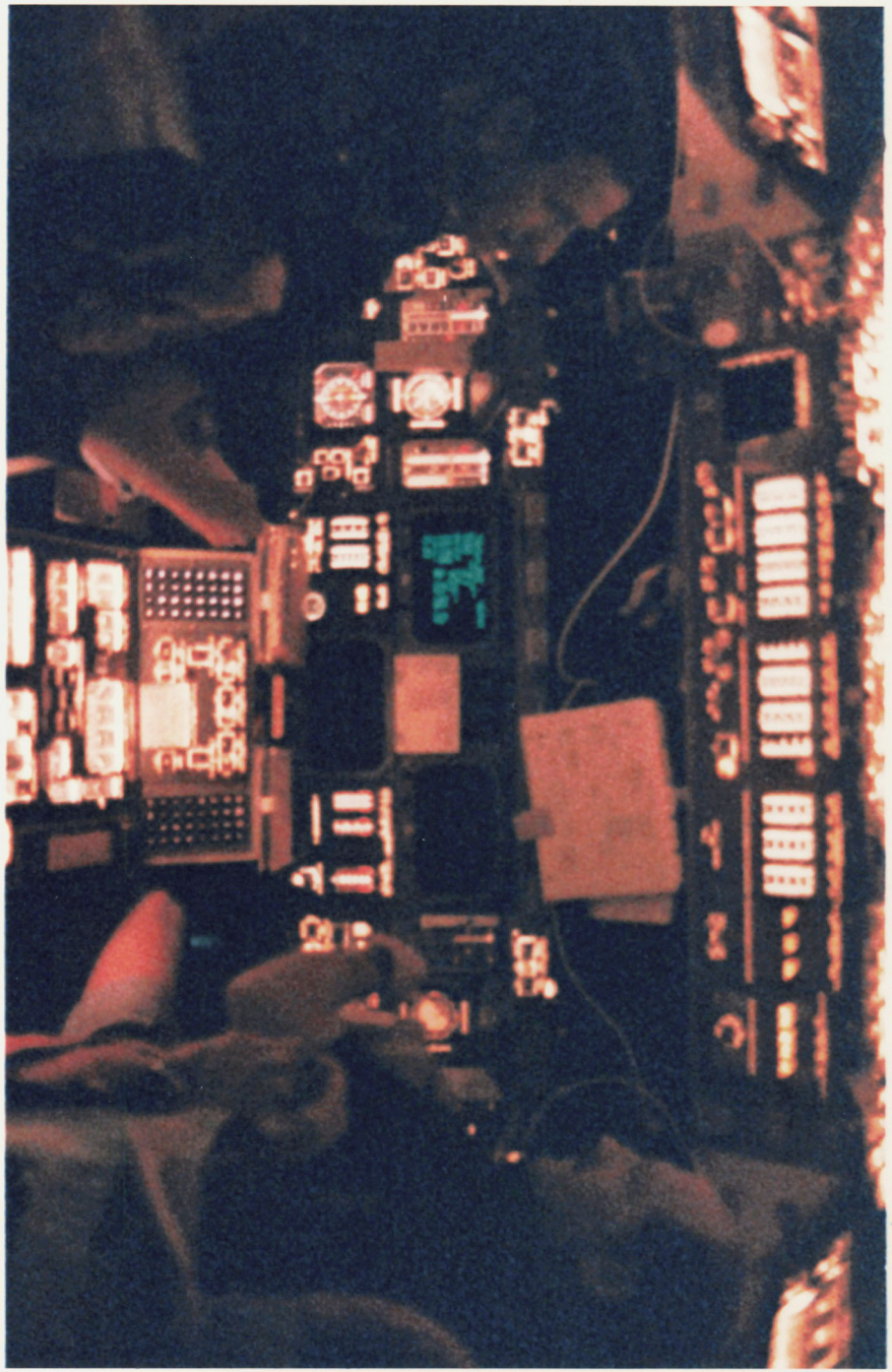

Space Shuttle XXVI 1988

S26-26-010 The flight deck's displays furnish the light for this 35mm frame. Hauck and Covey have traded places with Covey manning the commander's station and Hauck, the pilot's.

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Space Shuttle XXVI 1988

S26-06-033 Hilmers reads teleprinted message which has been clipped to stowage locker doors on the mid deck. Food, a galley and various experiments surround the mission specialist.

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Space Shuttle XXVI 1988

S26-05-003 Nelson (left) and Hilmers with student Richard Cavoli's experiment on the mid deck. The experiment deals with utilizing a semipermeable membrane to direct crystal growth in zero gravity. Cavoli, now a student of medicine at SUNY-Buffalo, New York, was a pupil at Marlboro (NY) Central High School when he first proposed his experiment to NASA in the Shuttle student involvement project. The experiment was sponsored by Union College in Schenectady, NY.

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S-26-47-13

Space Shuttle XXVI 1988

S26-47-013 Hauck uses a 70mm camera on the flight deck to record some new images of Earth. (70mm)

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S26 05 029

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Space Shuttle XXVI 1988

S26-05-029 Hilmers, as Hauck approaches nearby, participates in one of the flight's detailed supplementary objectives on the middeck. Title of the medical test is the otolith tilt-transition reinterpretation experiment.
(35mm)

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S-26-06-18

Lyndon B. Johnson Space Center
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Space Shuttle XXVI 1988

S26-06-18 Lounge chases down a bubble of strawberry drink which he had released with a plastic straw during mealtime on the middeck. Others seen are Hauck (left) and Hilmers.
(35mm)

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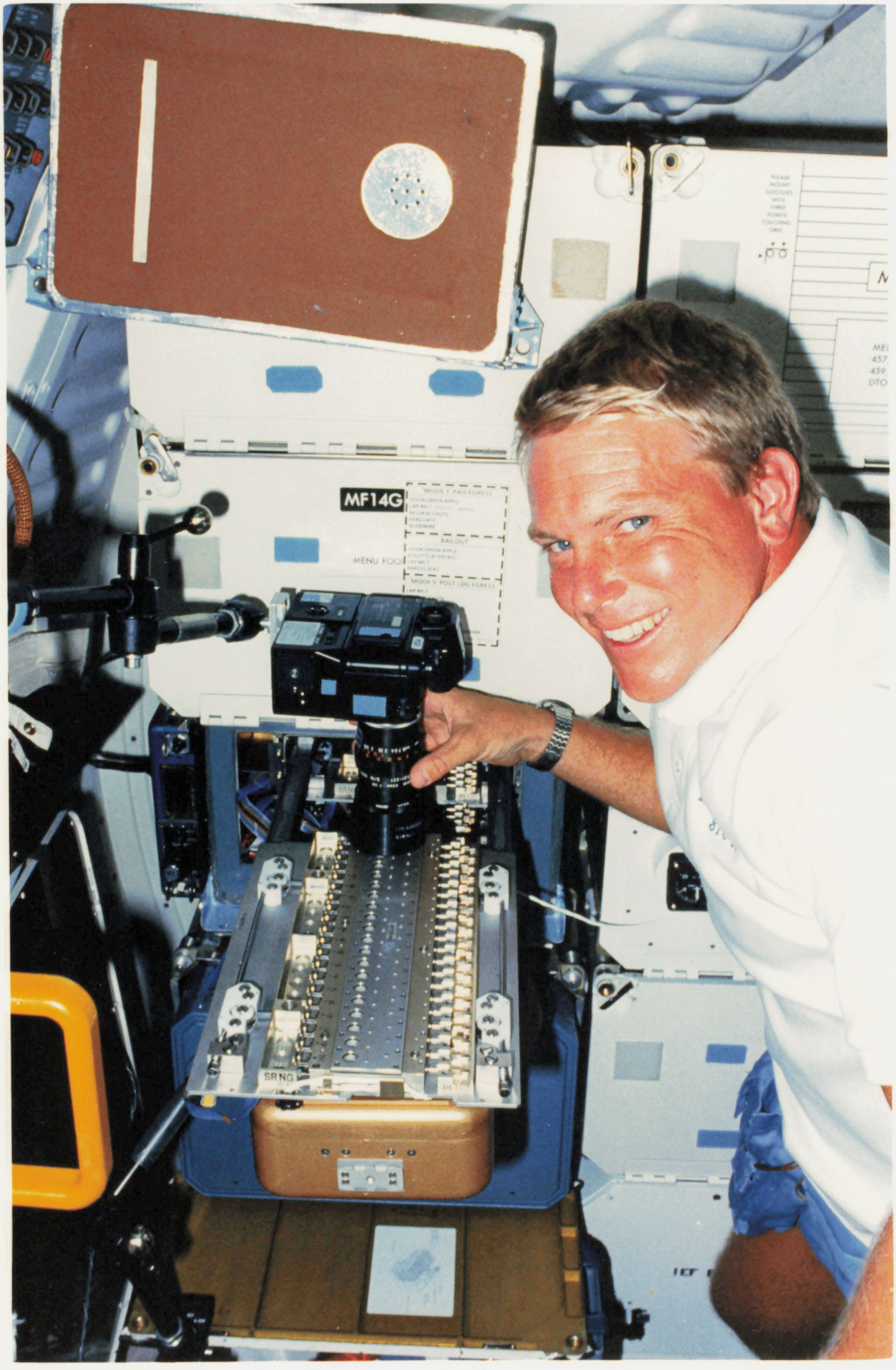

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S26-02-007 Nelson uses a 35mm camera to photograph one of the STS 26 protein crystal growth experiments.

Space Shuttle XXVI 1988

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Space Shuttle 48

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COLOR

22 -30 JANUARY 1992 S42-201-009

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-42 ONBOARD SCENE --- Canadian payload specialist Roberta L. Bondar works at the International Microgravity Laboratory's (IML-1) biorack while astronaut Stephen S. Oswald, pilot, changes a film magazine on the IMAX camera. The two were joined by five fellow crewmembers for eight-days of scientific research aboard Discovery in Earth-orbit. Most of their on-duty time was spent in this IML-1 science module, positioned in the cargo bay and attached via a tunnel to Discovery's airlock.

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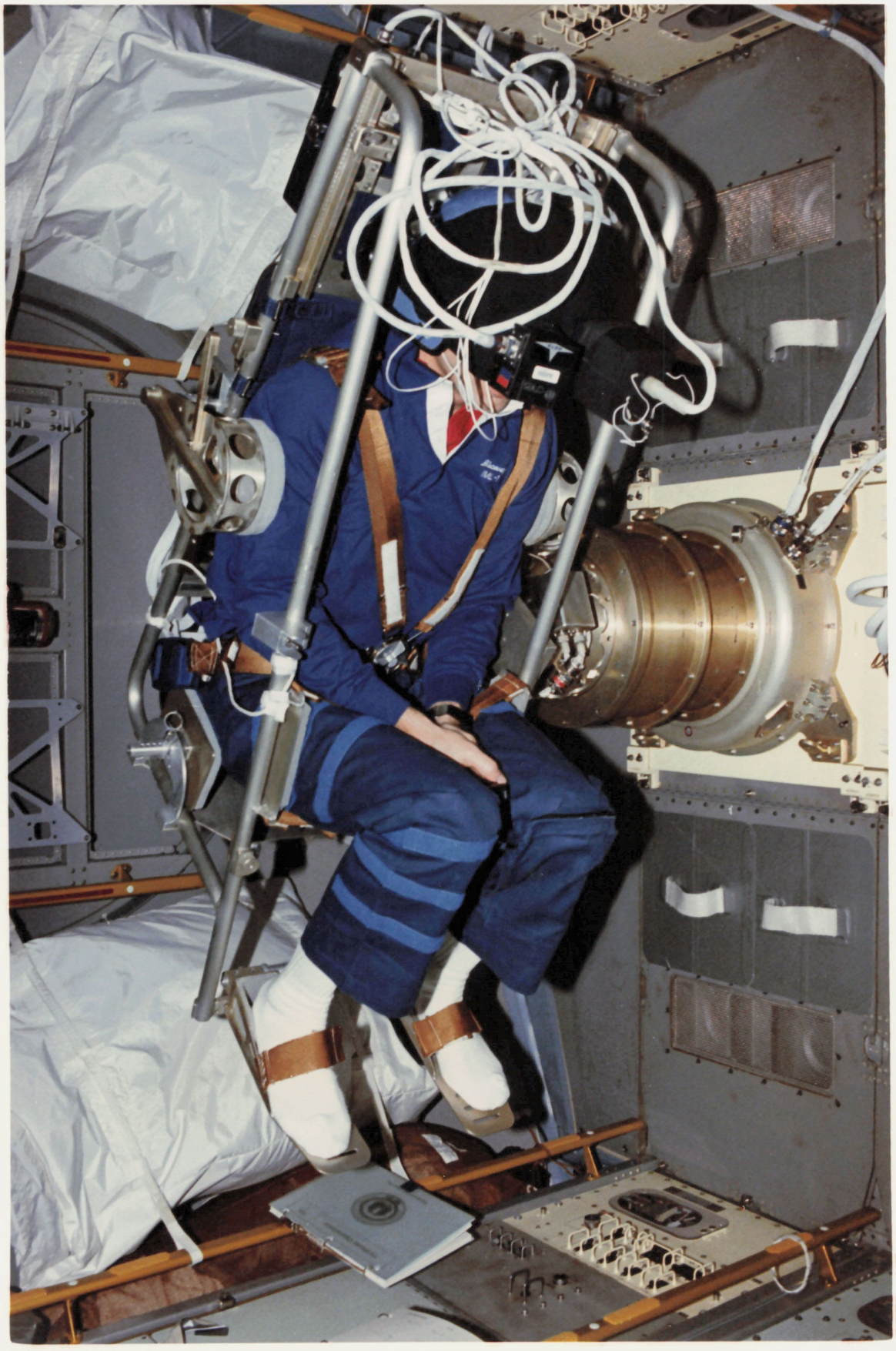

Space Shuttle 48

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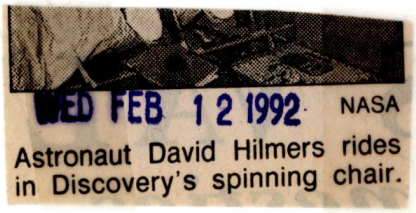
COLOR

22 - 30 JANUARY 1992 S42-27-037

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-42 ONBOARD SCENE --- Astronaut David C. Hilmers, wearing a helmet assembly, sits in the Microgravity Vestibular Investigation (MVI) rotating chair. The scene is in the International Microgravity Laboratory (IML-1) science module aboard Discovery. Hilmers, a mission specialist, and six other crewmembers spent more than eight days in Earth-orbit conducting experiments. Hilmer's helmet assembly is outfitted with accelerometers to measure head movements and visors that fit over each eye independently to provide visual stimuli. The chair system has three movement patterns: "sinusoidal" or traveling predictably back and forth over the same distance at a constant speed; "pseudorandom" or moving back and forth over the varying distances; and "stepped" or varying speeds beginning and stopping suddenly.



WED FEB 12 1992 NASA

Astronaut David Hilmers rides in Discovery's spinning chair.

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COLOR

22 - 30 JANUARY 1992 S42-210-023

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-42 ONBOARD SCENE --- Astronaut William F. Readdy measures the veins in his lower right leg on the middeck of the Earth-orbiting Space Shuttle Discovery. The mission specialist uses an electronic monitor and a pair of large blood pressure cuffs that encircle the thigh and calf. Changes in blood volume are determined by inflating the cuffs which then alters the blood pressure. The tone of the veins was monitored before and during the flight and will be measured following the eight-day mission.

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22 - 30 JANUARY 1992 S42-07-024

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-42 ONBOARD SCENE --- Astronaut Ronald J. Grabe, mission commander, works with the Mental Workload and Performance Experiment (MWPE) in the science module dedicated to the International Microgravity Laboratory (IML-1) mission. This test was designed as a result of difficulty experienced by crewmembers working at a computer station on a previous Space Shuttle mission. The problem was due to the workstation's design being based on Earth-bound conditions with the operator in a typical one-G standing position. For STS-42, the workstation was redesigned to evaluate the effects of microgravity on the ability of crewmembers to interact with a computer workstation. Information gained from this experiment will be used to design workstations for future Spacelab missions and Space Station Freedom.

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22 - 30 JANUARY 1992 S42-203-024

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-42 ONBOARD SCENE --- Astronaut David C. Hilmers (right), mission specialist, assists European Space Agency (ESA) payload specialist Ulf Merbold with the visual stimulator experiment on Discovery's middeck. This particular test is part of an ongoing study of the Space Adaptation Syndrome (SAS). Seated in a stationary mini-sled, Merbold (or any other subject for this test) stares at an umbrella-shaped rotating dome with a pattern of colored dots on its interior. While observing the rotating dome, the subject turns a knob to indicate his perception of body rotation. The strength of circularvection is calculated by comparing the signals from the dome and the knob. The greater the false sense of circularvection, the more the subject is relying on visual information instead of otolith information.

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22 - 30 JANUARY 1992 S42-43-13

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-42 ONBOARD SCENE --- Canadian payload specialist Roberta L. Bondar works with oat seedlings in a glovebox in the International Microgravity Laboratory (IML-1) science module aboard the Earth-orbiting Space Shuttle Discovery. The young plants are part of the Gravitational Plant Physiology Facility (GPPF) experiment. Five NASA astronauts and two payload specialists spent more than eight days conducting experiments in Earth orbit.

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Space Shuttle XXVI 1988

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COLOR

SEPTEMBER 29, 1988 S26-31-011

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-26 ONBOARD SCENE --- A close-up scene of the Tracking and Relay Satellite (TDRS) as it is about to be released into space. This view was photographed through Discovery's aft-flight deck windows with a 70mm handheld camera. It was recorded at 21:43 GMT, Thursday, September 29, 1988. The photograph was part of the first set of images released by NASA following the five-member crew's safe return to Earth.

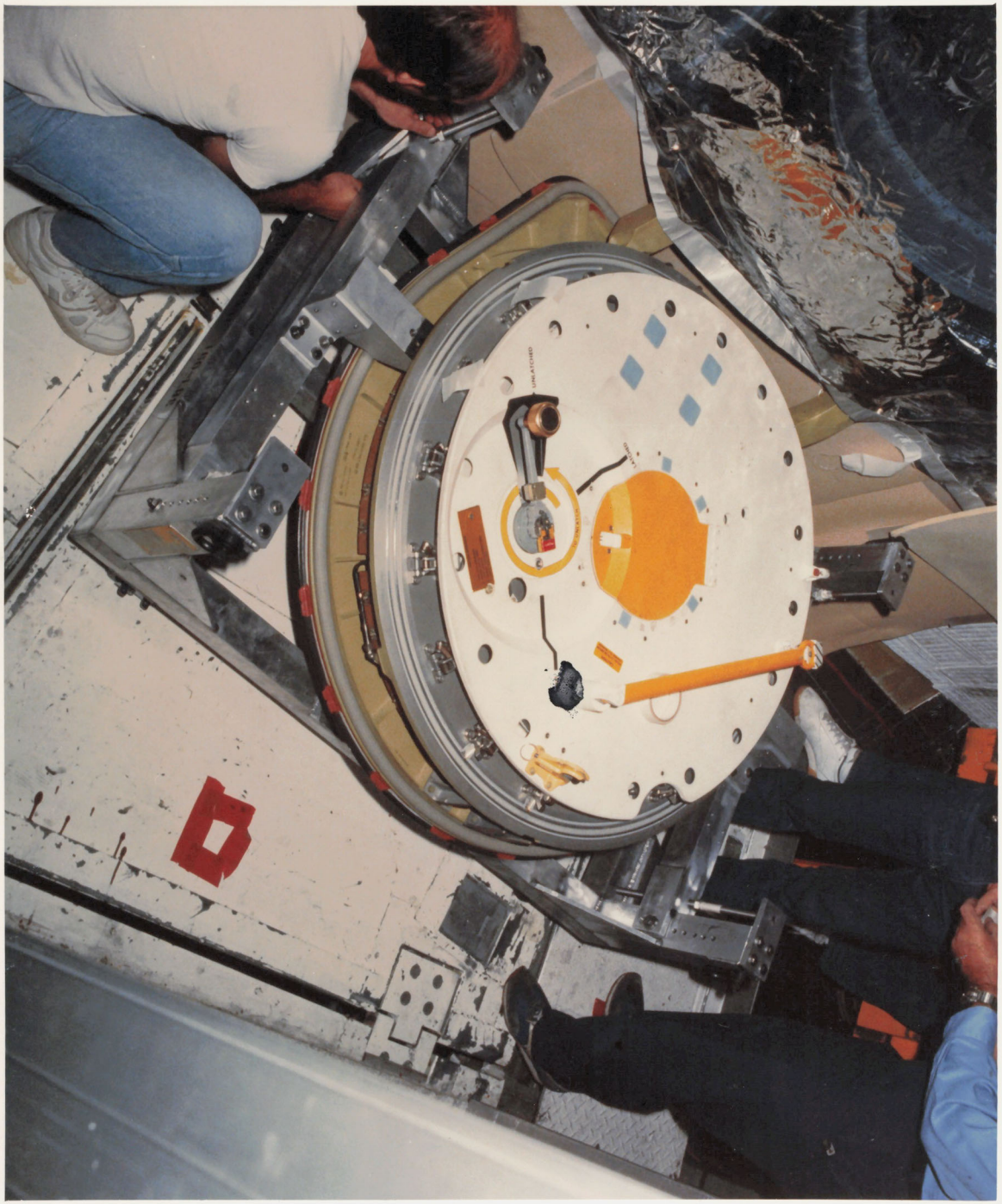
pg. 4-6

NASA
WED OCT 05 1988
The tracking and relay satellite is poised to be released into space from the space shuttle Discovery Sept. 29. This photograph was made with a 70mm camera aimed through Discovery's aft flight deck windows.
OCT 5 1988

NASA National Aeronautics and Space Administration

S87-32836

Lyndon B. Johnson Space Center
Houston, Texas 77058



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APRIL 2, 1987

KENNEDY SPACE CENTER, FLA.

DISCOVERY PREPARATION---The crew module hatch is removed from the orbiter Discovery in preparation for it to be shipped out to Rockwell International's Downey, California plant to support the option to implement a hatch jettison modification for the next space shuttle flight, STS 26. Discovery is in the Orbiter Processing Facility Bay 1 and is slated for mission STS 26.

pg.16

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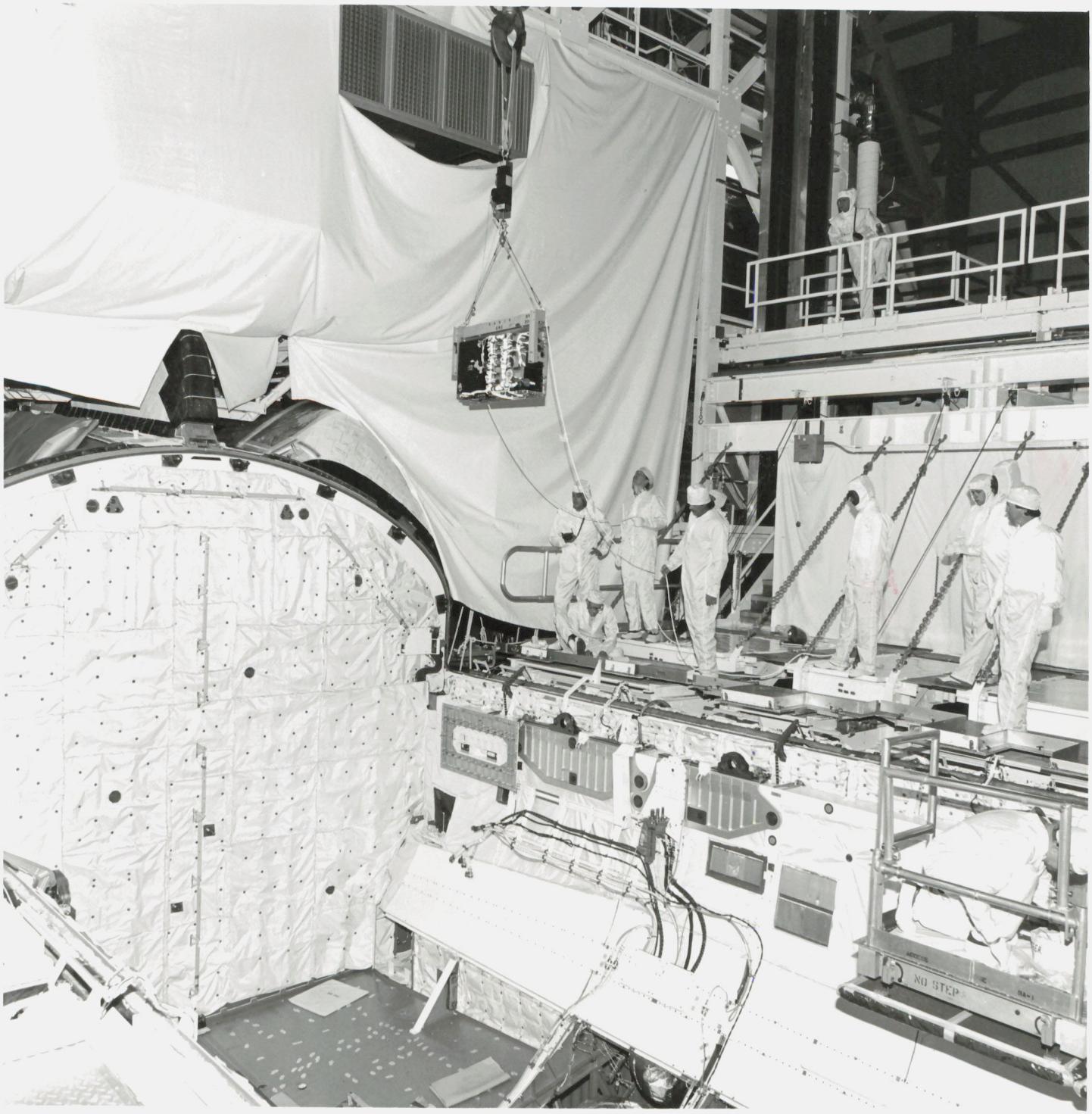
NO STEP

File: Space Shuttle XXVI - 1988

National Aeronautics and
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John F. Kennedy Space Center
Kennedy Space Center, Florida 32899
AC 305 867-2468

FOR RELEASE: April 18, 1988

PHOTO NO. KSC-88P-302

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KENNEDY SPACE CENTER, FL.-- OASIS, instrumentation which will record the environment experienced by Discovery during the STS-26 Space Shuttle mission, is lowered into position for attachment to the orbiter's aft port sill. Instrumentation sensors in the payload bay which are connected to the tape recorder module will document a variety of environmental measurements during various phases of the flight including temperature, pressure, vibration, sound acce[illegible]tion, stress, and strain. OASIS will also record data during the F[illegible]adiness Firing. NASA is flying OASIS aboard Discovery in su[illegible]he Inertial Upper Stage (IUS) program office of the Air Fo[illegible]vision. The system was developed by Lockheed unde[illegible]t, funded by the Air Force.

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1st JUN 7 1988

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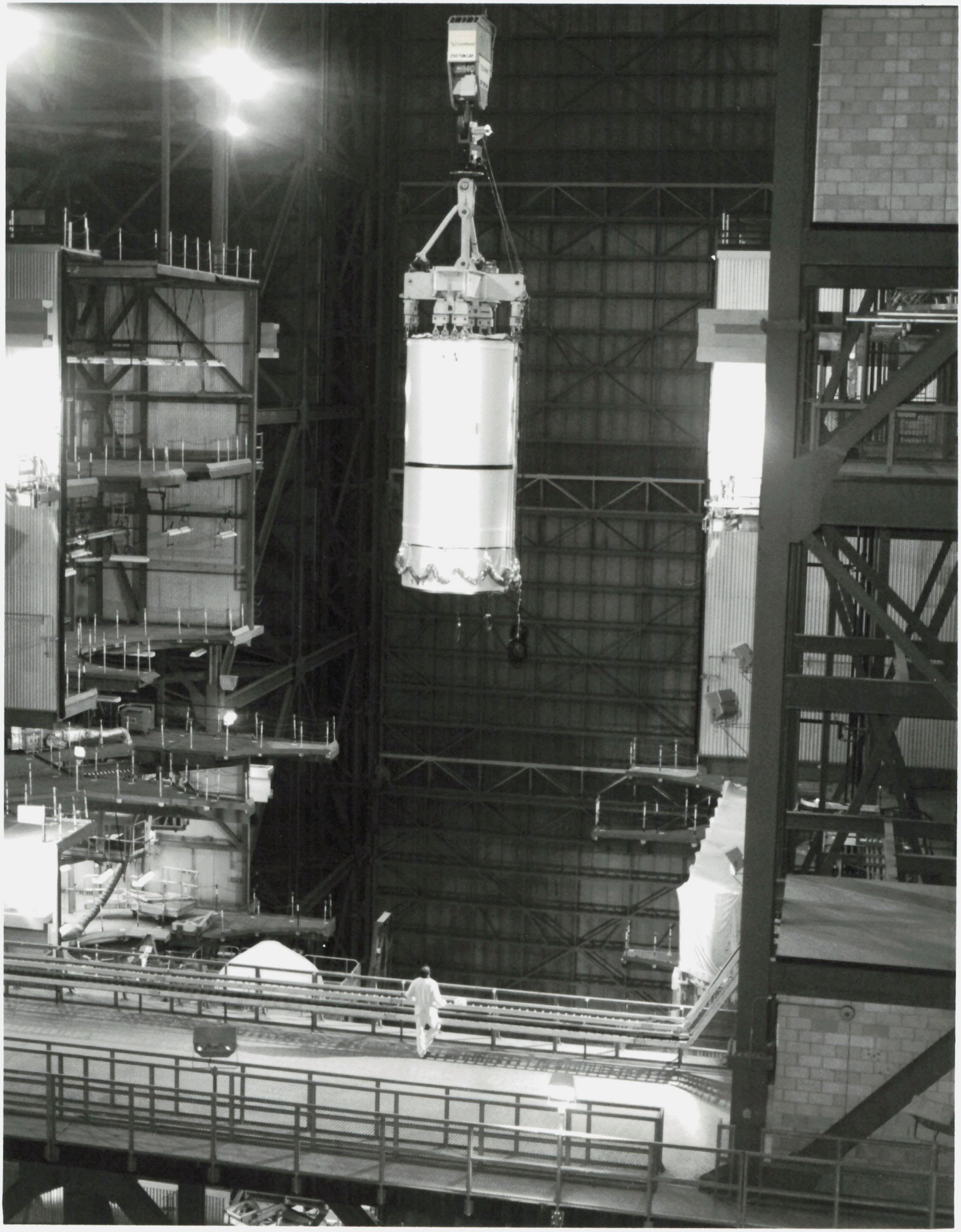

File: Space Shuttle XXVI - 1988

National Aeronautics and
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John F. Kennedy Space Center
Kennedy Space Center, Florida 32899
AC 305 867-2468

FOR RELEASE: May 11, 1988

PHOTO NO. KSC-88PC-351

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KENNEDY SPACE CENTER, Fla. -- The right hand solid rocket booster aft center segment is lifted in the Vehicle Assembly Building as stacking operations continue for the next space shuttle mission, STS-26. The redesigned twin boosters will stand 149 feet high when stacking is completed and weigh 1,300,000 pounds each. The boosters produce approximately 80 percent of the Shuttle vehicle's thrust during the early ascent phase of launch.

TUE JUN 7 1988
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NASA National Aeronautics and Space Administration

Crew of Space Shuttle Mission STS-26

NASA
National Aeronautics and
Space Administration

File: Space Shuttle
XXVI 1988

Crew of Space Shuttle Mission STS-26

The STS-26 crewmembers are astronauts Frederick H. (Rick) Hauck (right front), mission commander; Richard O. Covey (left front), pilot; and mission specialists (left to right) David C. Hilmers, George D. (Pinky) Nelson and John M. (Mike) Lounge.

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THU AUG 25 1988

NASA National Aeronautics and Space Administration

S87-29834

Lyndon B. Johnson Space Center
Houston, Texas 77058

Space Shuttle XXVI

1988

HOUSTON, TEXAS 77058

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COLOR

FEBRUARY 3, 1987 S87-29834

KENNEDY SPACE CENTER, FLORIDA

DISCOVERY THERMAL BARRIER --- Technicians work on installation of a new thermal barrier around the nose landing gear door on the orbiter Discovery. The modification is one of a number of orbiter enhancements that are being performed on the Discovery, which is to fly the next Space Shuttle mission, STS-26. Launch of Discovery and a five-member astronaut crew is presently targeted for February 10, 1988.

pg.25

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NASA National Aeronautics and Space Administration

S87-30146

Lyndon B. Johnson Space Center
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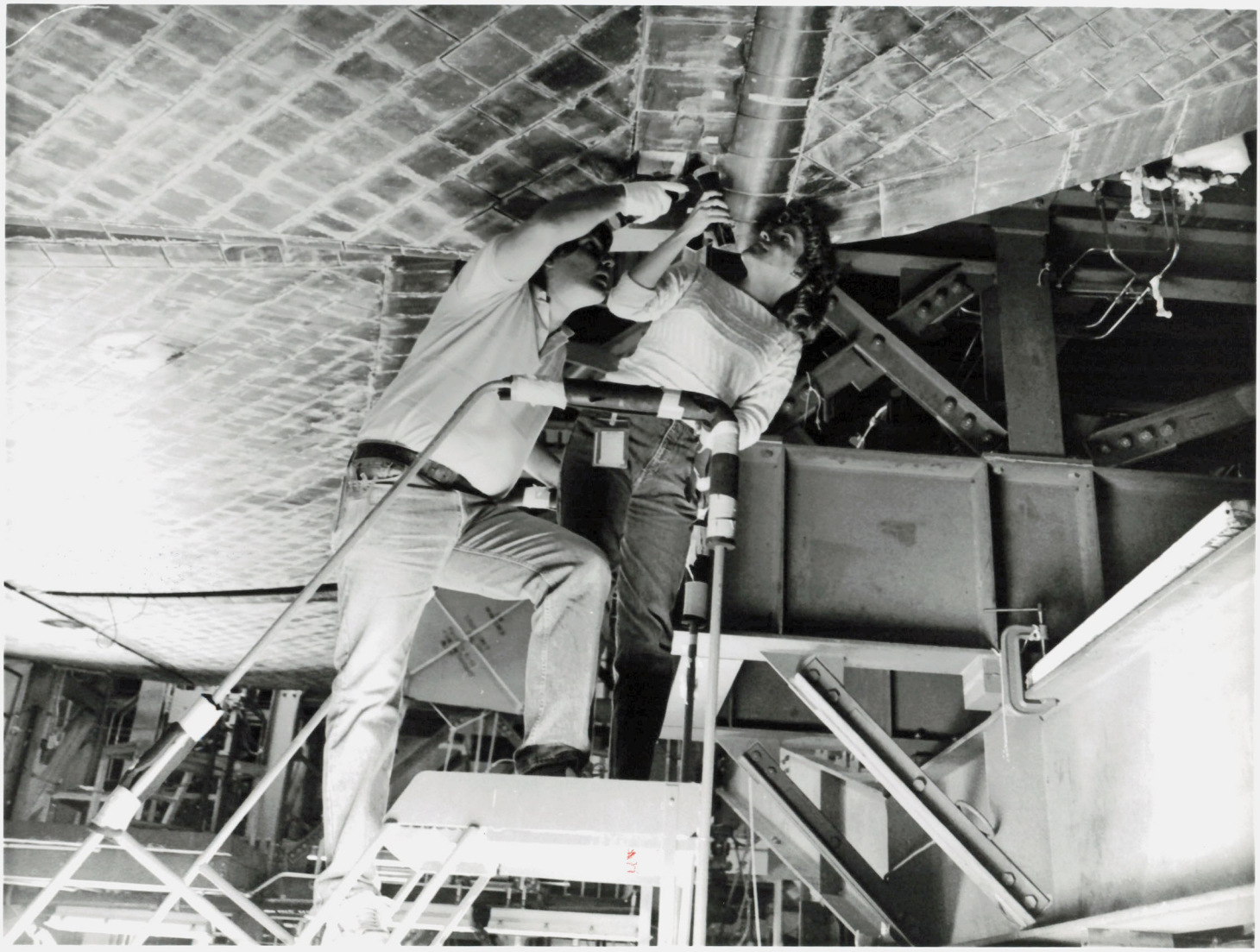

Space Shuttle XXVI - 1988

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COLOR

FEBRUARY 3, 1987 S87-30146

KENNEDY SPACE CENTER, FLORIDA

DISCOVERY INSPECTIONS --- Workers examine the area where the body flap meets the aft fuselage structural inspections continue on the Discovery in High Bay 1 of the Orbiter Processing Facility. Discovery is scheduled to fly the next Space Shuttle mission, STS-26. Launch is presently targeted for February 18, 1988.

ps.26

WED FEB 24 1988
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S87-32835

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File: Space Shuttle XXVI 1988

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S87-32835

APRIL 2, 1987

KENNEDY SPACE CENTER, FLA.

DISCOVERY PREPARATION---The crew module hatch is removed from the orbiter Discovery in preparation for it to be shipped out to Rockwell International's Downey, California plant to support the option to implement a hatch jettison modification for the next space shuttle flight, STS 26. Discovery is in the Orbiter Processing Facility Bay 1 and is slated for mission STS 26.

pg.14

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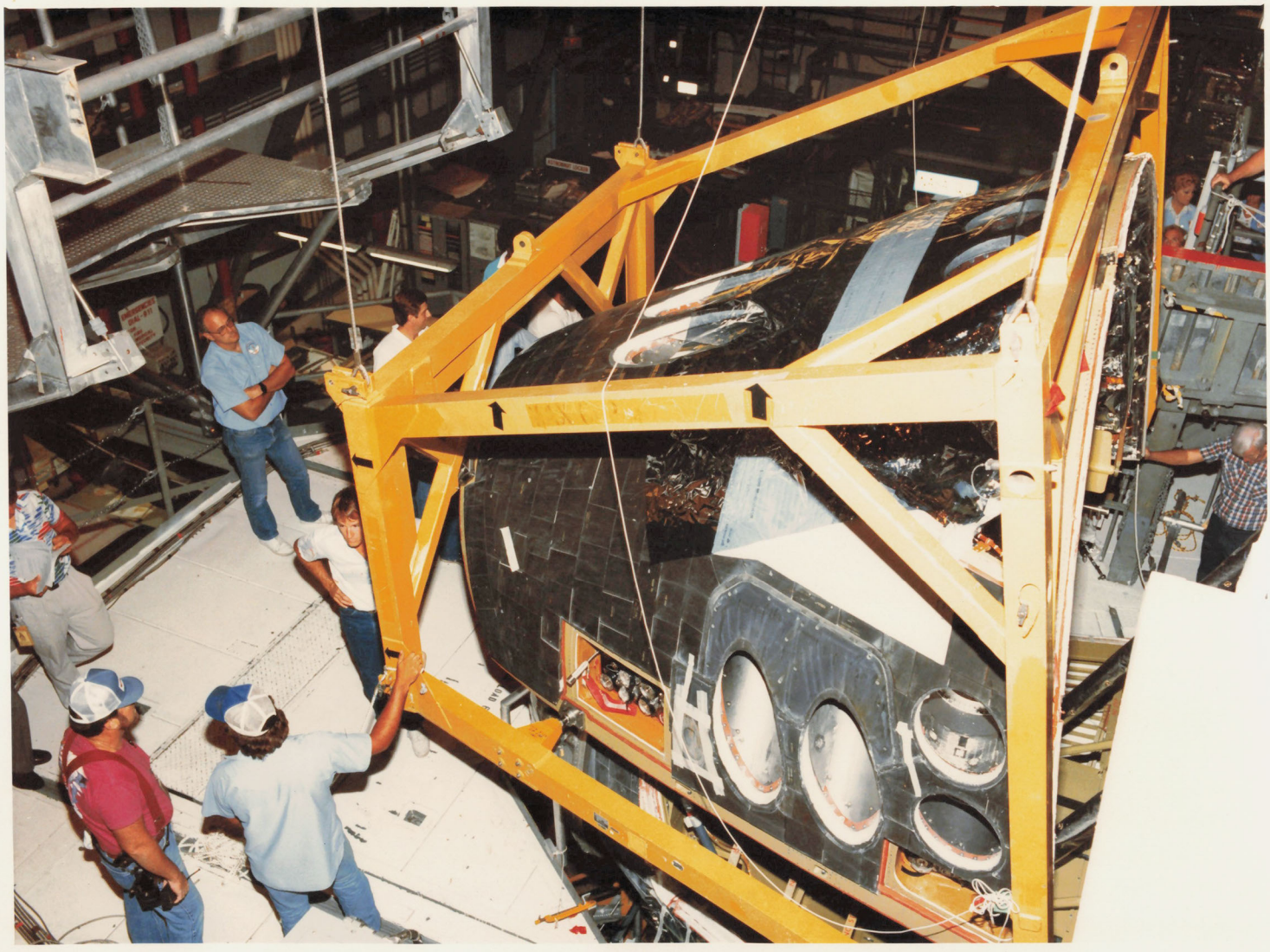

File: Space Shuttle XXVI 1988

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COLOR

JUNE 26, 1987 S87-30362

KENNEDY SPACE CENTER, FLORIDA

DISCOVERY PREPARATION --- In the Orbiter Processing Facility High Bay 1, the orbiter Discovery's FRCS (Forward Reaction Control System) is removed for transport to the HMF (Hypergolic Maintenance Facility) where modifications, inspections and maintenance will be performed in preparation for STS-26.

pg.34

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S87-32806

Space Shuttle XXVI
1988
- simulation -

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Space Shuttle XXVI - 1988
- Simulation -

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Space Shuttle XXVI
1988
- Simulation -

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1988

— Simulation —

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Space Shuttle XXVI - 1988

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Space luau

THU OCT 6 1988

The crew of space shuttle Discovery salutes a Hawaiian tracking station by donning flower-pattern shirts and sunglasses during the recent untroubled mission. The crew, from left, are John Lounge, David Hilmers, Frederick "Rick" Hauck, George "Pinky" Nelson and Richard Covey. Discovery will make a two-hour stop in San Antonio Saturday as it is ferried to Florida: **Page 21A.**

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Space Shuttle XXII

NASA National Aeronautics and Space Administration

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Space Shuttle XXVI -1988

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Space Shuttle VXUT 1988

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M175021

3 OCTOBER 1988 S26-(S)-120

DRYDEN FLIGHT RESEARCH FACILITY, CALIFORNIA

STS 26 LANDING --- The Space Shuttle Discovery touches down on a dry Mojave Desert lake bed to complete a four-day mission. Onboard the spacecraft were Astronauts Frederick H. (Rick) Hauck, commander; Richard O. Covey, pilot; and John M. (Mike) Lounge, David C. Hilmers and George D. Nelson.

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Space Shuttle XXVI 1988

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M175021

3 OCTOBER 1988 S26-(S)-121

DRYDEN FLIGHT RESEARCH CENTER, CALIFORNIA

STS 26 LANDING --- The Space Shuttle Discovery prepares to touch down on a Mojave Desert lake bed to complete a four-day mission. Onboard the spacecraft were Astronauts Frederick H. (Rick) Hauck, commander; Richard O. Covey, pilot; and John M. (Mike) Lounge, David C. Hilmers and George D. Nelson.

National Aeronautics and Space Administration

Lyndon B. Johnson Space Center
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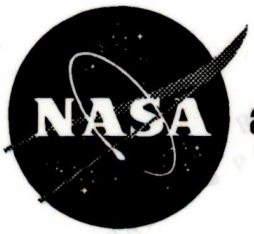
STS082-S-002

Space Shuttle LXXXVIII
- Discovery



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COLOR

DECEMBER 1996 STS082(S)002

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-82 CREW PORTRAIT --- These seven astronauts are prime crew members for NASA's STS-82 mission. They are, on the front row, from the left, Kenneth D. Bowersox, Steven A. Hawley and Scott J. Horowitz. On the back row are Joseph R. Tanner, Gregory J. Harbaugh; Mark C. Lee and Steven L. Smith. Bowersox and Horowitz are commander and pilot, respectively, with Lee assigned as payload commander. Hawley, Harbaugh, Smith and Tanner are mission specialists. The seven are pictured with a small model of the Hubble Space Telescope (HST), which they will be paying a visit representing the second HST maintenance mission. Bowersox was pilot for the STS-61 mission, which performed the first maintenance on HST. Hawley was a mission specialist on STS-31, the mission whose astronauts deployed the telescope.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration.

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Space Administration
STS091(S)002
Lyndon B. Johnson Space Center
Houston, Texas 77058
ELLIOTT
JOHN BORN
JAMES SAVINAS
CHARLIE PRECOURT
ANDY THOMAS

Space Shuttle XCVI
-Discovery-

National Aeronautics and Space Administration
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COLOR (PORTRAIT)

JANUARY 1998 STS091(S)002

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-91 CREW PORTRAIT --- The final crew members scheduled to visit Russia's Mir Space Station pose for a crew portrait during training at the Johnson Space Center (JSC). Pictured with their helmets in front are astronauts Dominic C. Gorie (left) and Charles J. Precourt. Others, from the left, are Wendy B. Lawrence, Franklin R. Chang-Diaz, Janet L. Kavandi, Valery V. Ryumin and Andrew S. W. Thomas. Precourt is mission commander, and Gorie, pilot, for Discovery's summer 1998 mission to Mir. Thomas, who will have been serving as a guest researcher on Mir since late January, will return to Earth with the crew members. Lawrence, Chang-Diaz, Kavandi and Ryumin are all mission specialists. Ryumin represents the Russian Space Agency (RSA). Discovery will carry the single module version of Spacehab for the scheduled nine-day mission.

May/June 1998
Discovery -
Valery Ryumin
Russia Cosmonaut
top row
second from right
gray hair

M

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WALZ
CULBERTSON
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Space Shuttle (Discovery) STS-051 (S) 002

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Houston, Texas 77058

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COLOR

JUNE 1993 STS051-(S)-002

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-51 CREW PORTRAIT --- These five NASA astronauts have been assigned to fly aboard the Space Shuttle Discovery for the STS-51 mission, scheduled for July. Left to right are astronauts Frank L. Culbertson Jr., mission commander; Daniel W. Bursch and Carl E. Walz, mission specialists; William F. Readdy, pilot; and James H. Newman, mission specialist.

SAT JUL 17 1993
The astronauts manning the space shuttle Discovery on the STS-51 mission, scheduled for liftoff at 8:22 this morning, are, from left, Frank Culbertson, the mission commander; Dan Bursch, flight engineer; Carl Walz, mission specialist; Bill Readdy, pilot; and James Newman, mission specialist.

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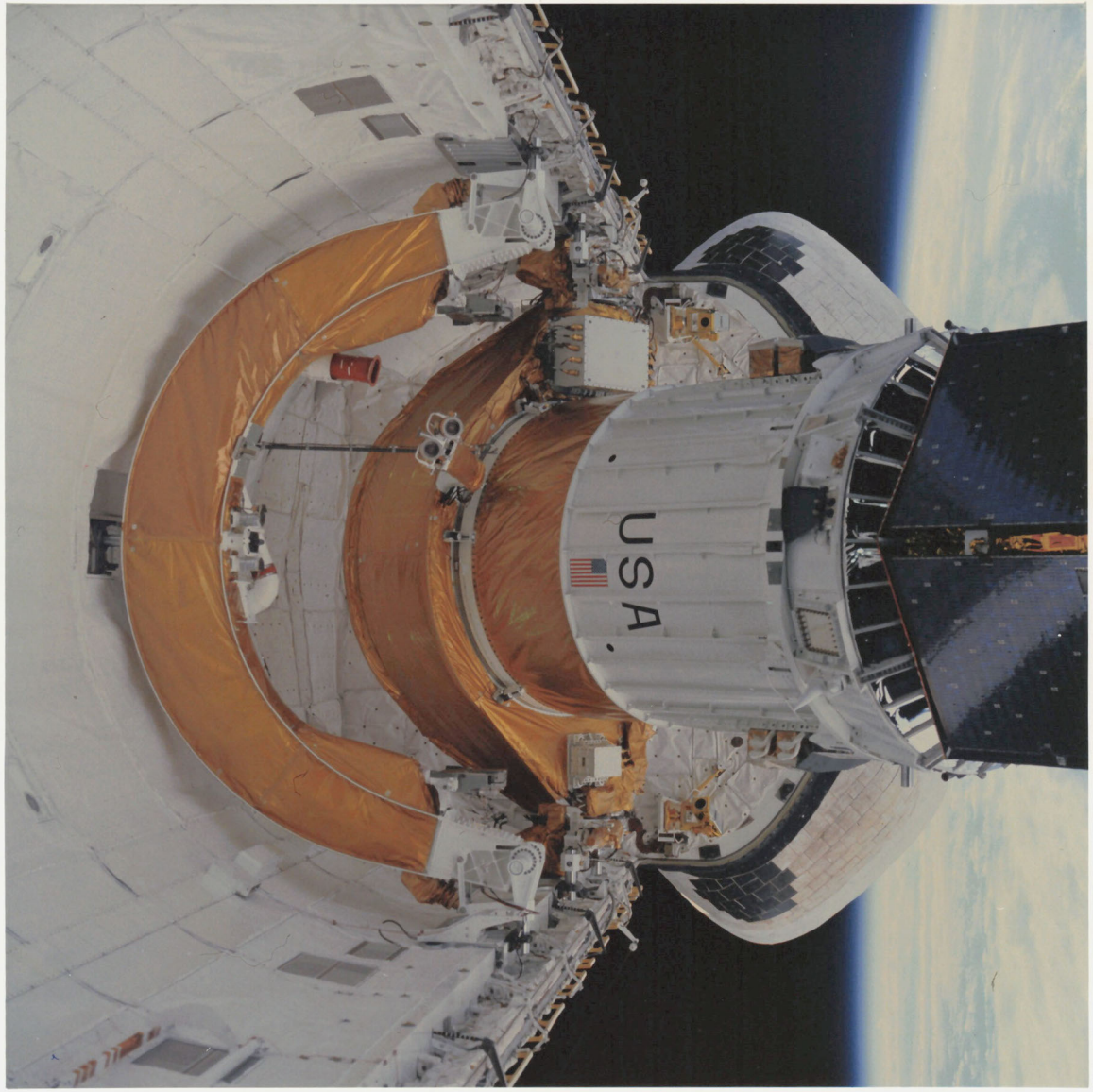

Space Shuttle XXVI
1988

COLOR

SEPTEMBER 29, 1988 S26-31-036

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-26 ONBOARD SCENE - A close-up scene during deployment showing the Inertial Upper Stage (IUS), and part of the Tracking Data and Relay Satellite (TDRS). The photograph was made with a handheld Hasselblad 70mm camera aimed through Discovery's aft flight deck windows. The event happened on the mission's first day, September 29, 1988.

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THU OCT 06 1988

NASA National Aeronautics and Space Administration

51-G-02-009

Lyndon B. Johnson Space Center
Houston, Texas 77058

Space Shuttle
XVIII

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FRIDAY AUG 16 1985

51-G-02-0009 Payload Specialist Sultan Salman Abdelazize Al-Saud floats above the pilot's station on Discovery's forward flight deck. Through overhead windows beyond him are visible reflections of Earth's horizon.

NASA National Aeronautics and Space Administration

S-26-(S)119

Lyndon B. Johnson Space Center
Houston Texas 77058

Space Shuttle XXVI
1988

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3 OCTOBER 1988 S26-(S)-119

DRYDEN FLIGHT RESEARCH CENTER, CALIFORNIA

STS 26 LANDING --- The Space Shuttle Discovery touches down gently on a dry Mojave Desert lake bed to complete a four-day mission. Onboard the spacecraft were Astronauts Frederick H. (Rick) Hauck, commander; Richard O. Covey, pilot; and John M. (Mike) Lounge, David C. Hilmers and George D. Nelson.

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S26 (S)-118

Space Shuttle XXUT 1988

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THU OCT 06 1988

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3 OCTOBER 1988 S26-(S)-118

DRYDEN FLIGHT RESEARCH CENTER, CALIFORNIA

STS 26 LANDING --- The Space Shuttle Discovery prepares to touch down on a Mojave Desert lake bed to complete a four-day mission. Onboard the spacecraft were Astronauts Frederick H. (Rick) Hauck, commander; Richard O. Covey, pilot; and John M. (Mike) Lounge, David C. Hilmers and George D. Nelson.

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3 OCTOBER 1988 S26-(S)-119

DRYDEN FLIGHT RESEARCH CENTER, CALIFORNIA

STS 26 LANDING --- The Space Shuttle Discovery touches down gently on a dry Mojave Desert lake bed to complete a four-day mission. Onboard the spacecraft were Astronauts Frederick H. (Rick) Hauck, commander; Richard O. Covey, pilot; and John M. (Mike) Lounge, David C. Hilmers and George D. Nelson.

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Lyndon B. Johnson Space Center
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SPACE SHUTTLE XXVI
1988

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29 SEPTEMBER 1988 S26-31-071

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-26 ONBOARD SCENE - A scene during deployment showing the Tracking and Data Relay Satellite attached to its Inertial Upper Stage (IUS). The photograph was made with a handheld Hasselblad 70mm camera aimed through Discovery's aft flight deck windows. The event happened on the mission's first day, September 29, 1988.

pg.

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Space Shuttle XXVI 1988

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3 OCTOBER 1988 S26-(S)-118

DRYDEN FLIGHT RESEARCH CENTER, CALIFORNIA

STS 26 LANDING --- The Space Shuttle Discovery prepares to touch down on a Mojave Desert lake bed to complete a four-day mission. Onboard the spacecraft were Astronauts Frederick H. (Rick) Hauck, commander; Richard O. Covey, pilot; and John M. (Mike) Lounge, David C. Hilmers and George D. Nelson.

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3 OCTOBER 1988 S26-(S)-121

DRYDEN FLIGHT RESEARCH CENTER, CALIFORNIA

STS 26 LANDING --- The Space Shuttle Discovery prepares to touch down on a Mojave Desert lake bed to complete a four-day mission. Onboard the spacecraft were Astronauts Frederick H. (Rick) Hauck, commander; Richard O. Covey, pilot; and John M. (Mike) Lounge, David C. Hilmers and George D. Nelson.

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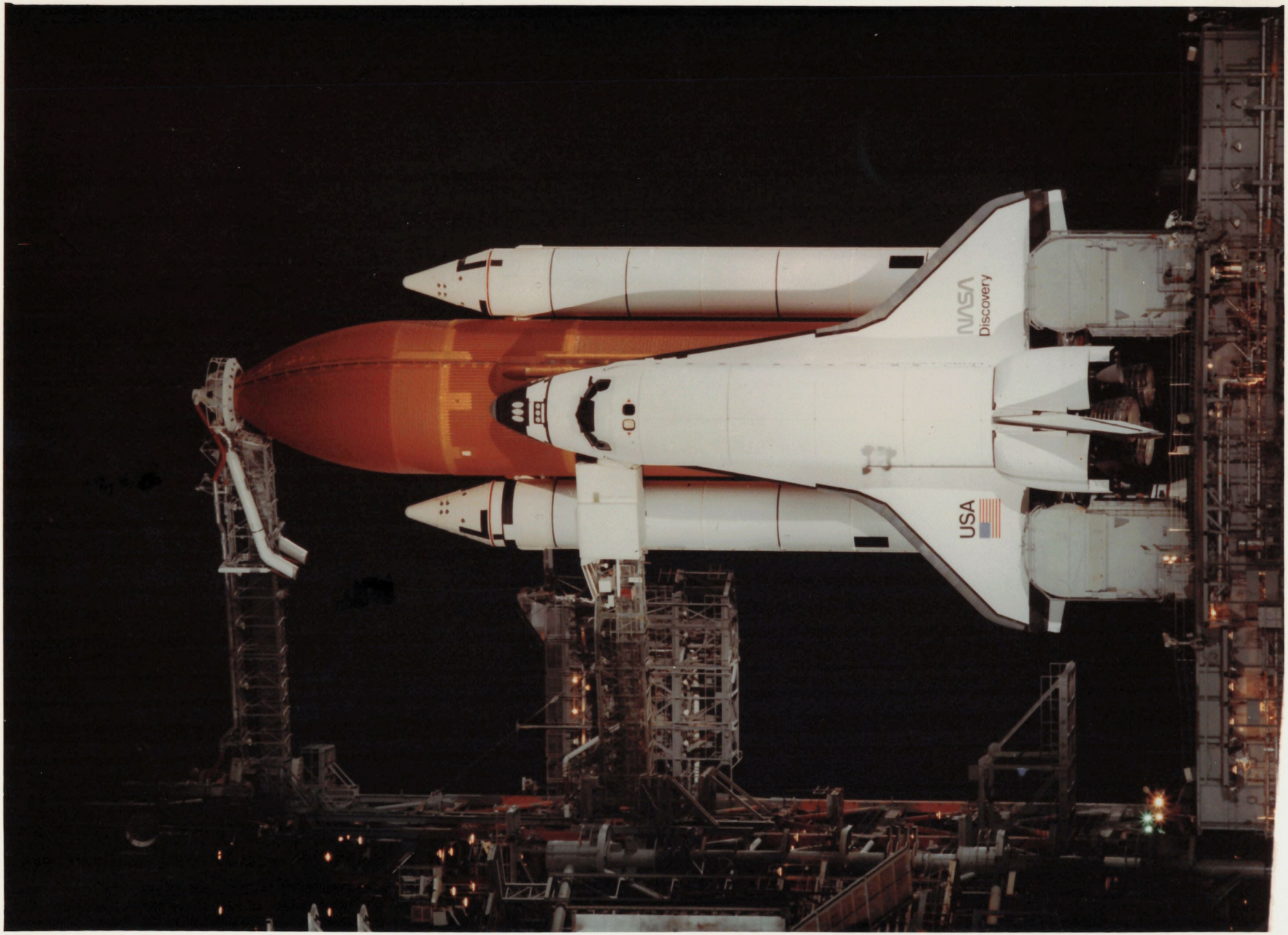

Space Shuttle

DISCOVERY
41-D
Flew Aug 30-Sept 5, 1984

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S14-12-33

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Space Shuttle XII

S14-12-33 Following the completion of their six-day mission in space, the six crewmembers of NASA's 41-D mission mentioned that a great deal of work was accomplished but that there were "fun" moments too. From all appearance, this group shot was one of the lighter moments aboard the Discovery. Crewmembers are (counter-clockwise from center) Henry W. Hartsfield Jr., crew commander; Michael L. Coats, pilot; Steven A. Hawley and Judith A. REsnik, both mission specialists; Charles D. Walker, payload specialist; and Richard M. (Mike) Mullane, mission specialist. A pre-set 35mm camera was used to expose the frame. Walker stands near the experiment that occupied the majority of his time onboard-- the continuous flow electrophoresis systems (CFES) experiment.

TUESDAY OCT 9 1984
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astronauts

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COLOR

12-19 APRIL 1985 51D-09-034

JOHNSON SPACE CENTER, HOUSTON, TEXAS

51-D ONBOARD SCENE---The seven crewmembers of 51-D take time during a busy full week in space to pose for a "star-burst" type in-space portrait. HOLD PICTURE WITH ASTRONAUT RHEA SEDDON AT BOTTOM CENTER. Counter-clockwise from the bottom left are Jeffrey A. Hoffman, mission specialist; Dr. Seddon, mission specialist; Charles D. Walker, payload specialist; U.S. Senator E.J. 'Jake' Garn, payload specialist; S. David Griggs, mission specialist; Karol J. Bobko, mission commander; and Donald E. Williams, pilot. A pre-set 35mm camera exposed the frame in the mid deck of the Earth-orbiting Space Shuttle Discovery. The crew launched at 8:59 a.m. (EST), April 12 and landed at 8:5A a.m. (EST), April 19, spending five minutes less than a full week on the busy mission.

pg.40

MONDAY AUG 18 1986

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STS085-722-087

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COLOR

7 - 19 AUGUST 1997 STS085-722-087

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-85 ONBOARD VIEW --- The CRISTA-SPAS-2 having just been grappled by the Space Shuttle Discovery's Remote Manipulator System (RMS), is backdropped against Puget Sound and the Seattle, Washington area. A short while later, the satellite was re-berthed in the cargo bay, silhouetted in this 70mm frame. This image was exposed through the aft flight deck windows of Discovery.

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Space Shuttle
XII

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SEPT 6, 1984 s14-12-19

JOHNSON SPACE CENTER, HOUSTON, TEXAS

ONBOARD SCENE---Astronaut Judith A. Resnik, 41-D mission specialist, anchors herself on the flight deck (out of frame) to take a peek at mid deck activity aboard the Earth-orbiting Space Shuttle Discovery. Among the many stationary and portable cameras onboard for the flight are (l.-r.) TV camera, a data acquisition motion picture camera and the IMAX.

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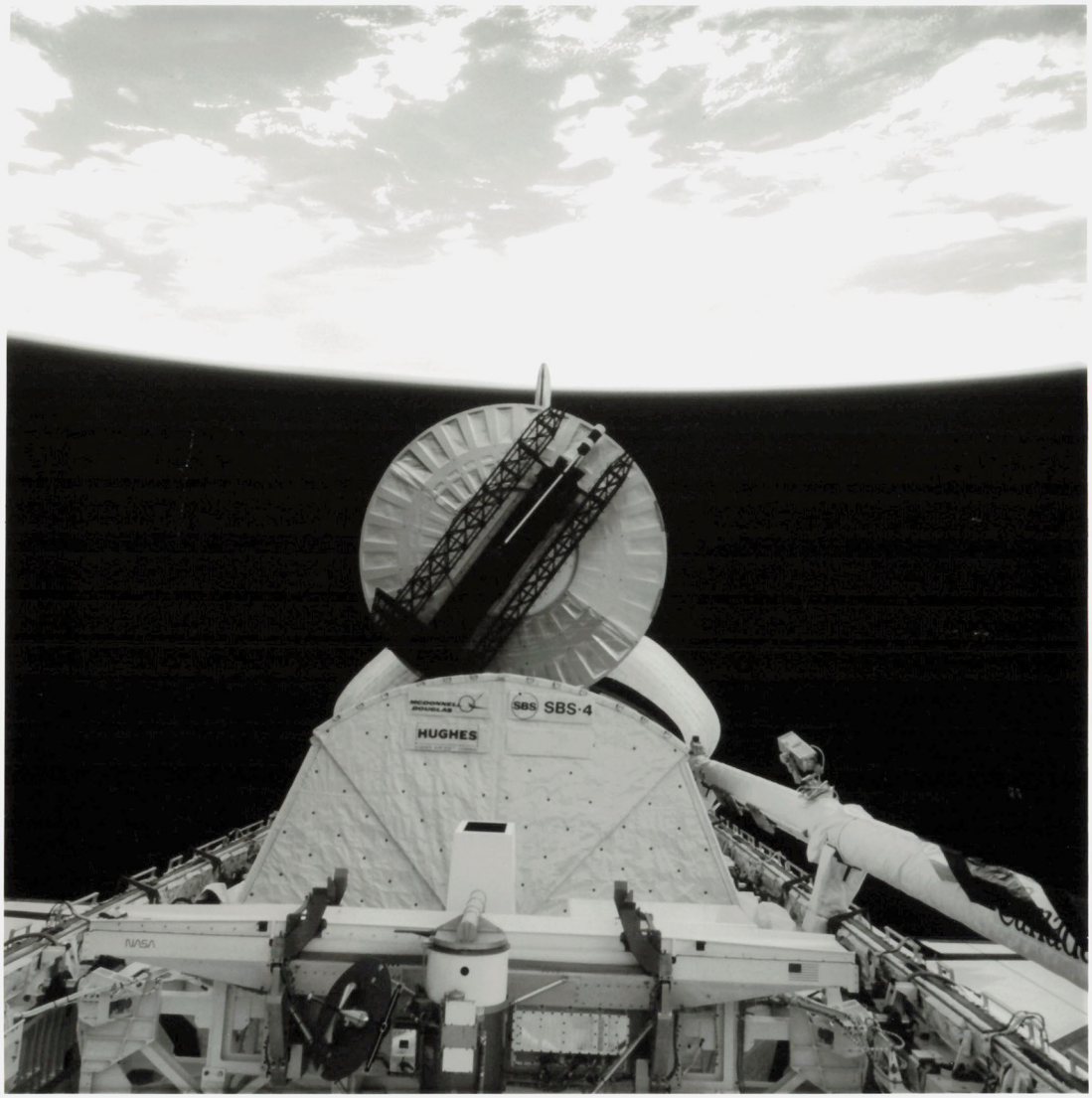

Space Shuttle XII

COLOR

SEPT 6, 1984

s14-36-111

JOHNSON SPACE CENTER, HOUSTON, TEXAS

ONBOARD SCENE---From the extreme aft portion of Discovery's cargo bay the Syncom IV (Leasat-2) satellite begins to separate, a la frisbee, from the Earth-orbiting spacecraft. HOLD FRAME WITH EARTH AT TOP. The scene was exposed with a handheld 70mm camera aimed through the aft flight deck windows. Other payloads and/or their support hardware (foreground to aft) are the OAST-1 package (before its extended deployment), the cradle-like protective shield for the now vacated SBS-4 satellite and (completely obscured between SBS and Syncom positions) the Telstar 3. The Canadian-built remote manipulator system (RMS) arm "rests" at right.

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S14 36111

Space Shuttle

XII

SEPT 6, 1984 s14-36-111

JOHNSON SPACE CENTER, HOUSTON, TEXAS

ONBOARD SCENE---From the extreme aft portion of Discovery's cargo bay the Syncom IV (Leasat-2) satellite begins to separate, a la frisbee, from the Earth-orbiting spacecraft. HOLD FRAME WITH EARTH AT TOP. The scene was exposed with a handheld 70mm camera aimed through the aft flight deck windows. Other payloads and/or their support hardware (foreground to aft) are the OAST-1 package (before its extended deployment), the cradle-like protective shield for the now vacated SBS-4 satellite and (completely obscured between SBS and Syncom positions) the Telstar 3. The Canadian-built remote manipulator system (RMS) arm "rests" at right.

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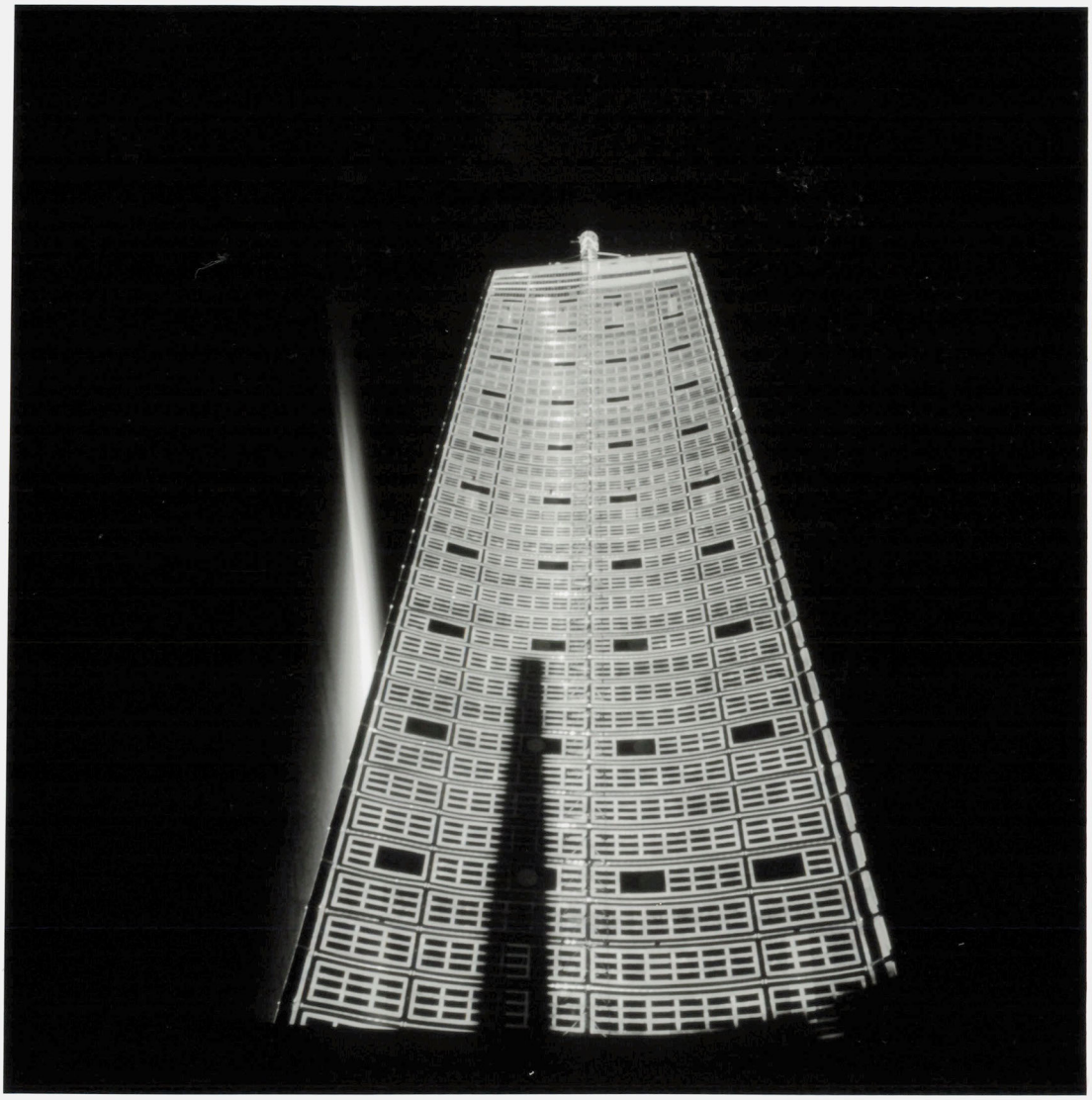

Space Shuttle XII

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TUESDAY OCT 9 1984

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SEPT 6, 1984 s14-35-070

JOHNSON SPACE CENTER, HOUSTON, TEXAS

ONBOARD SCENE---The gold colored solar array experiment (SAE) panel for the OAST-1 payload on Discovery stands out against the darkness of space as the debuting spacecraft heads toward a sunrise scene. The vertical stabilizer of Discovery is silhouetted against the accordion-like array. The frame was exposed through aft flight deck windows with a 70mm camera.

NASA National Aeronautics and Space Administration

51G017005

Lyndon B. Johnson Space Center
Houston Texas 77058

Space Shuttle XVIII

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FRIDAY AUG 16 1985

51-G-17-005 Shannon W.Lucid monitors cargo bay activities with one of the satellite payloads aboard.

NASA National Aeronautics and Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058

51-G (8) 224

Space Shuttle
XVIII

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FRIDAY AUG 16 1985

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bile: Space Shuttle

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National Aeronautics and Space Administration

51G-46-030

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FRIDAY AUG 16 1985

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THE FOLLOWING LISTING IS FOR NASA'S THIRD PHOTOGRAPHIC RELEASE FOR ITS STS 51-G MISSION.

51-G-46-030 Telstar 3-D rises from the cargo bay of Earth-orbiting Discovery. The communications satellite was the third of three to be put into space on this week-long mission.

Space Shuttle XVIII

NASA National Aeronautics and Space Administration

51G-32-082

Lyndon B. Johnson Space Center
Houston, Texas 77058

Space Shuttle XVIII

FRIDAY AUG 16 1985

51G-032-082 Mexico's Morelos satellite rises from Discovery's cargo bay to begin its life in space.

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S91-48559

Lyndon B. Johnson Space Center
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File: Wake Shield Facility - Satellite

National Aeronautics and Space Administration

Houston, Texas 77058

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COLOR

DECEMBER 1991 S91-48559

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-60 EXPERIMENT VIEW --- Pictured on a test stand at the Johnson Space Center (JSC) is the Wake Shield Facility (WSF) scheduled to fly on STS-60. The free-flying device will be grappled by the Space Shuttle Discovery's Remote Manipulator System (RMS) arm and deployed in space. Following a 50-hour separation from Discovery at distances of up to 40 miles, the satellite will be retrieved with the aid of the RMS for return to Earth.

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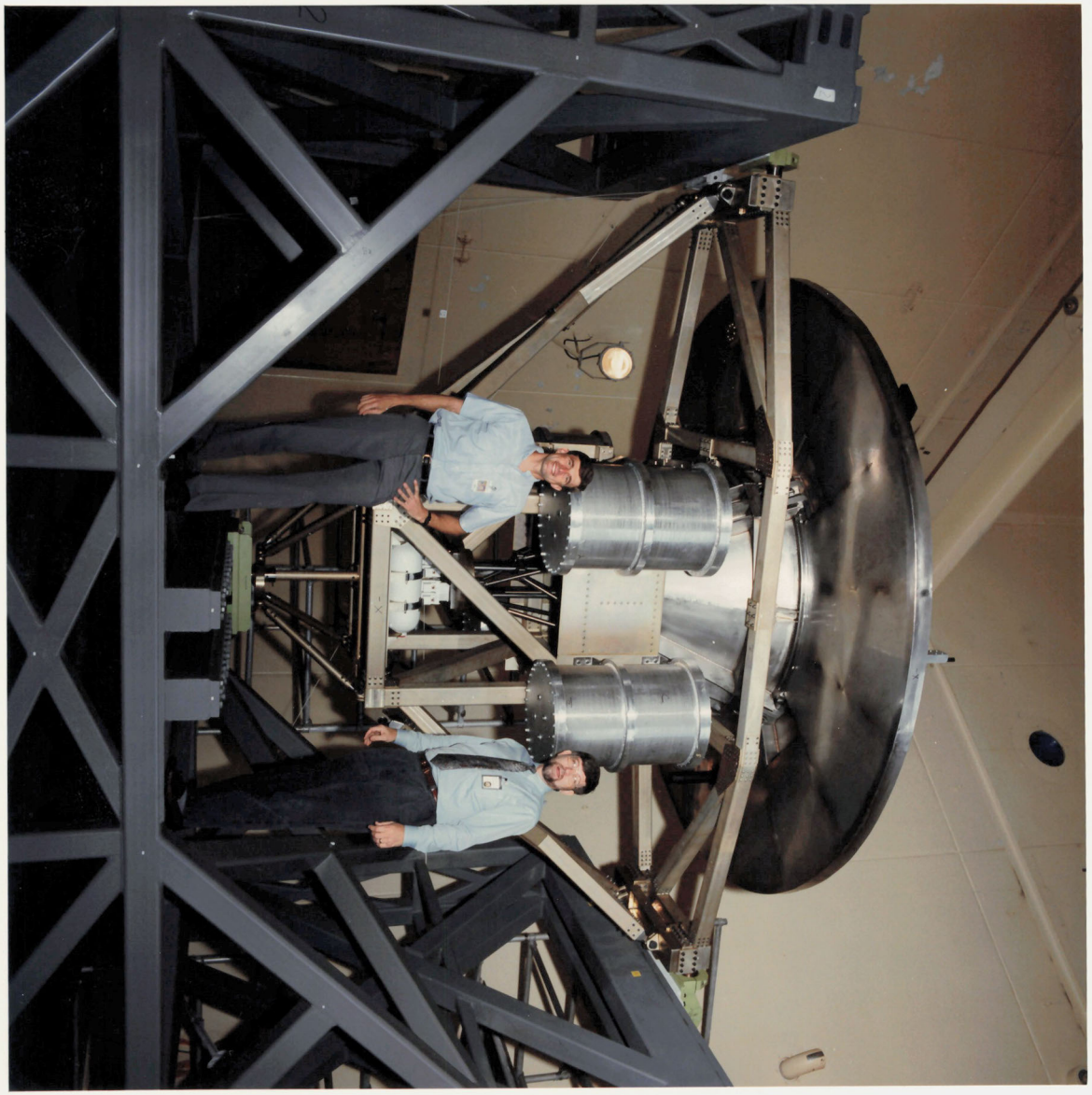

File: Wake Shield Facility - Satellite -

National Aeronautics and Space Administration

Houston, Texas 77058

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DECEMBER 1991 S91-48557

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-60 EXPERIMENT/CREW MEMBER --- The Wake Shield Facility (WSF) manifest to fly on STS-60 will be grappled by the Space Shuttle Discovery's Remote Manipulator System (RMS) arm and deployed in space. Following a 50-hour separation from Discovery at distances of up to 40 miles, the satellite will be retrieved with the aid of the RMS for return to Earth. Here, astronaut Ronald M. Sega, mission specialist for STS-60, is seen with the facility during a break in testing in the acoustic and vibration facility at the Johnson Space Center (JSC).

Sega on left is a NASA astronaut
on Right is Alex Ignatiev, director of the Space Vacuum Epitaxy Center University of Houston

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S99 01056

Lyndon B. Johnson Space Center
Houston, Texas 77058

Daniel T. Barry
-Mission specialist-

National Aeronautics and Space Administration

Houston, Texas 77058

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15 JANUARY 1999 S99-01056

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-96 TRAINING VIEW --- Astronaut Daniel T. Barry, mission specialist, wears a training version of the Extravehicular Mobility Unit (EMU) space suit during an underwater simulation of a Extravehicular Activity (EVA) scheduled for the mission. Barry was joined by astronaut Tamara E. Jernigan for the simulation, conducted in the Neutral Buoyancy Laboratory (NBL) at Johnson Space Center's (JSC) Sonny Carter Training Facility (SCTF).

May 1999
Discovery
Daniel "Dan" Barry
Spacewalker
mission specialist

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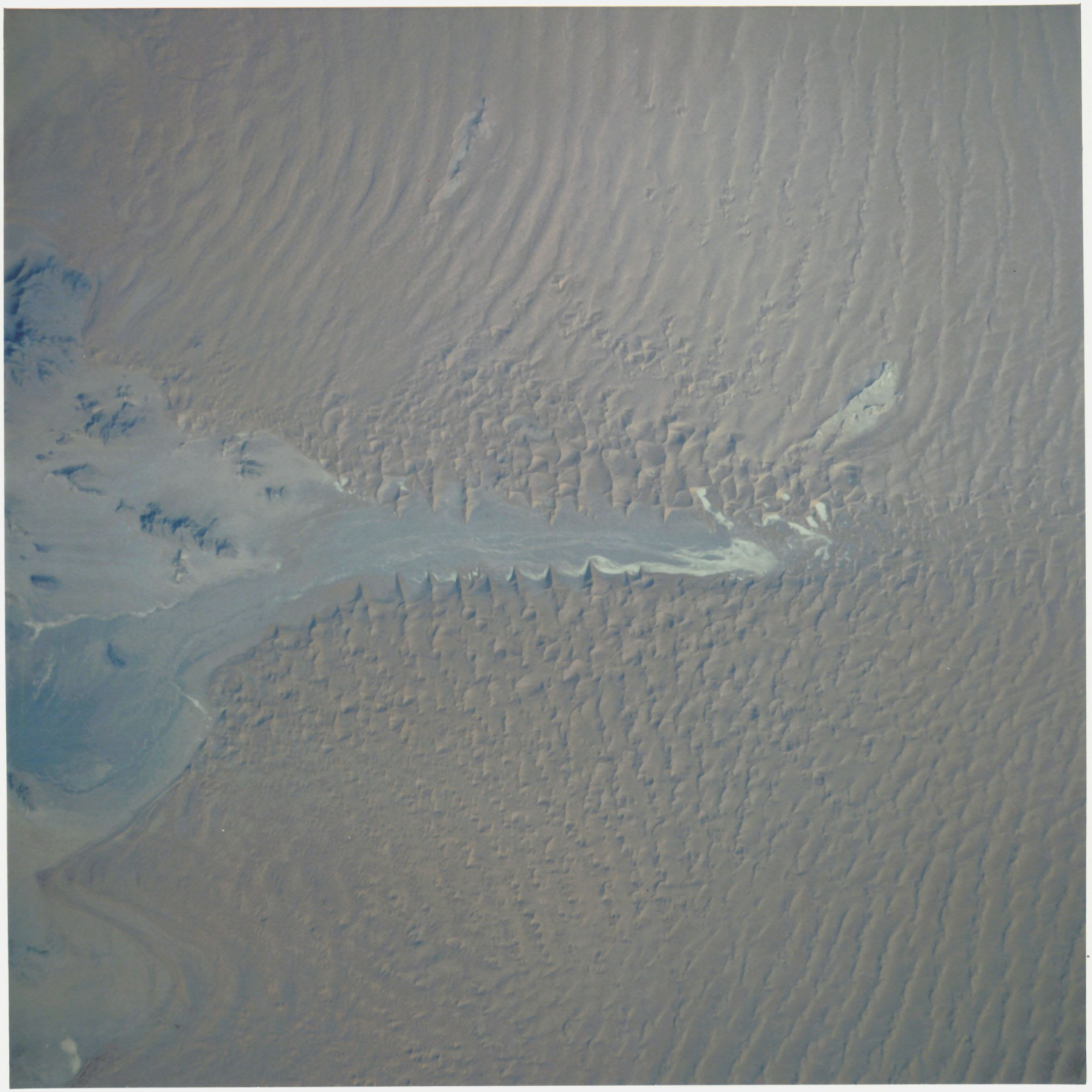

Space Shuttle XX

14) Sossus Vlei, Namib Desert, Namibia (51I-33-056V)

A disruption of the 300-meter-high crescentic sand dunes of the Namib Desert occurs at Sossus Vlei, an ephermeral streambed that occasionally carries flashflood waters from the adjacent highlands into the desert. To the north and south of the vlei, the local crescent-shaped sand dunes are transformed into longitudinal dunes with axes parallel to the Namibian coast.

TUE SEP 17 1985

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51-I-31-027

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Space Shuttle XX

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16) Western Tibetan Plateau, Cholpanglik Region of the Kunlun Mountains, China (51I-31-027)

The Roof of the World seen from Discovery demonstrates the long distance viewing possible from Earth orbit. The western Kunlun Mountains of Tibet in the center of the frame lie over 600 miles (950 kilometers) from the groundtrack of the orbiter. Produced by the collision of India with Eurasia, the Tibetan Plateau is the highest and, in many ways, the most remote region in the world. No point in this photograph has a surface elevation of less than 14,000 feet (4300 meters). The western half of Tibet is currently of intense scientific interest, as the Chinese permit extensive geological field research to be conducted by foreign scientists on the plateau for the first time in over fifty years. Of prime geological interest are the many closed lake basins with ancient shorelines, the glaciers of the Cholpanglik region and the fault systems that cross the plateau to accommodate the continuing impact of India into Eurasia.

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51-I-31-055

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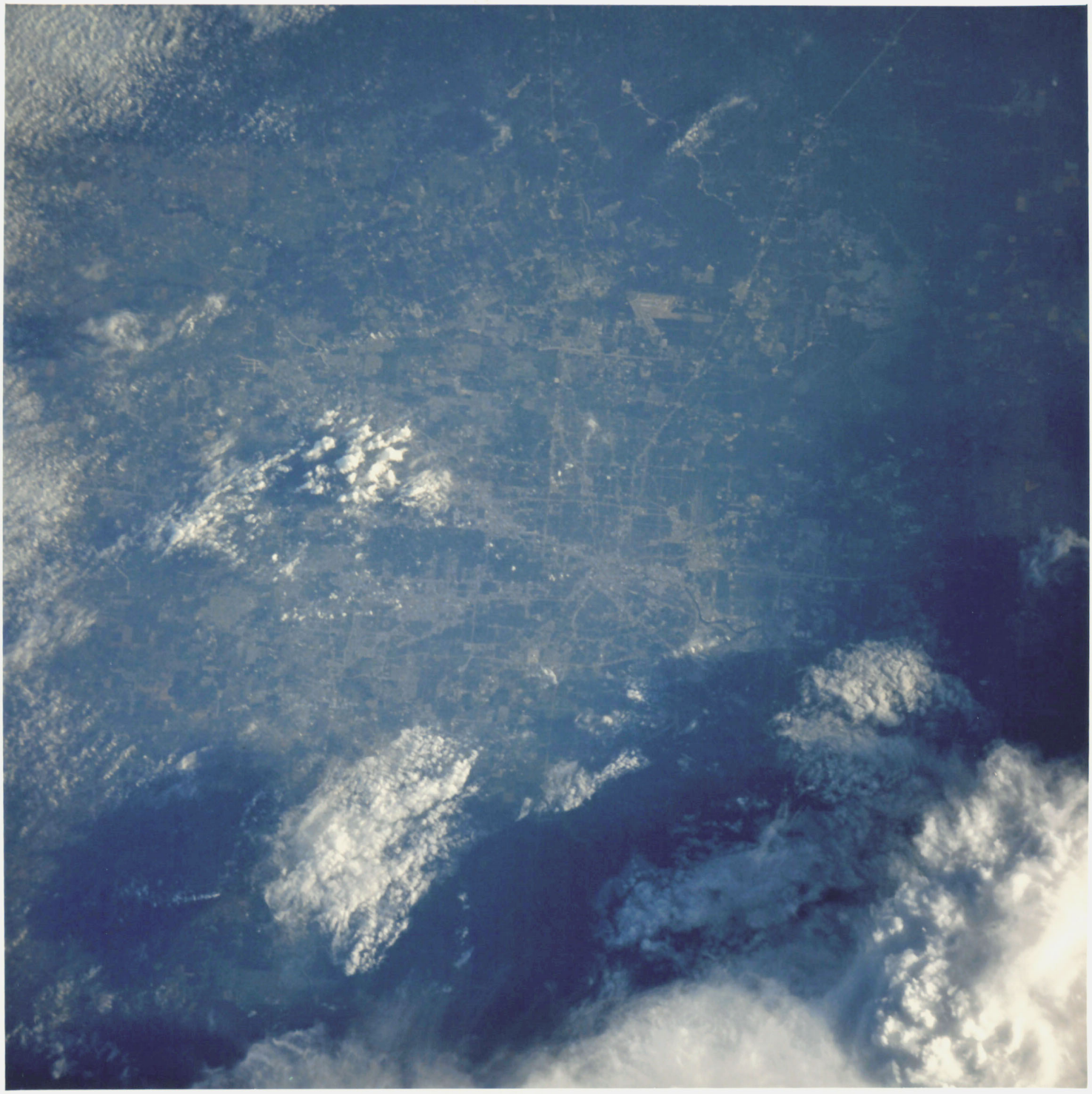

Space Shuttle
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10) Houston, Texas (51I-31-055)

With the Johnson Space Center under cloud at the bottom of the frame, the urban center and surrounding suburbs of Houston can be seen with the Astrodome near the center of the photograph. Freeways lead northward to Houston Intercontinental Airport and into the dense green stands of longleaf and loblolly pines of the East Texas forests.

NASA National Aeronautics and Space Administration

51-I-102-048

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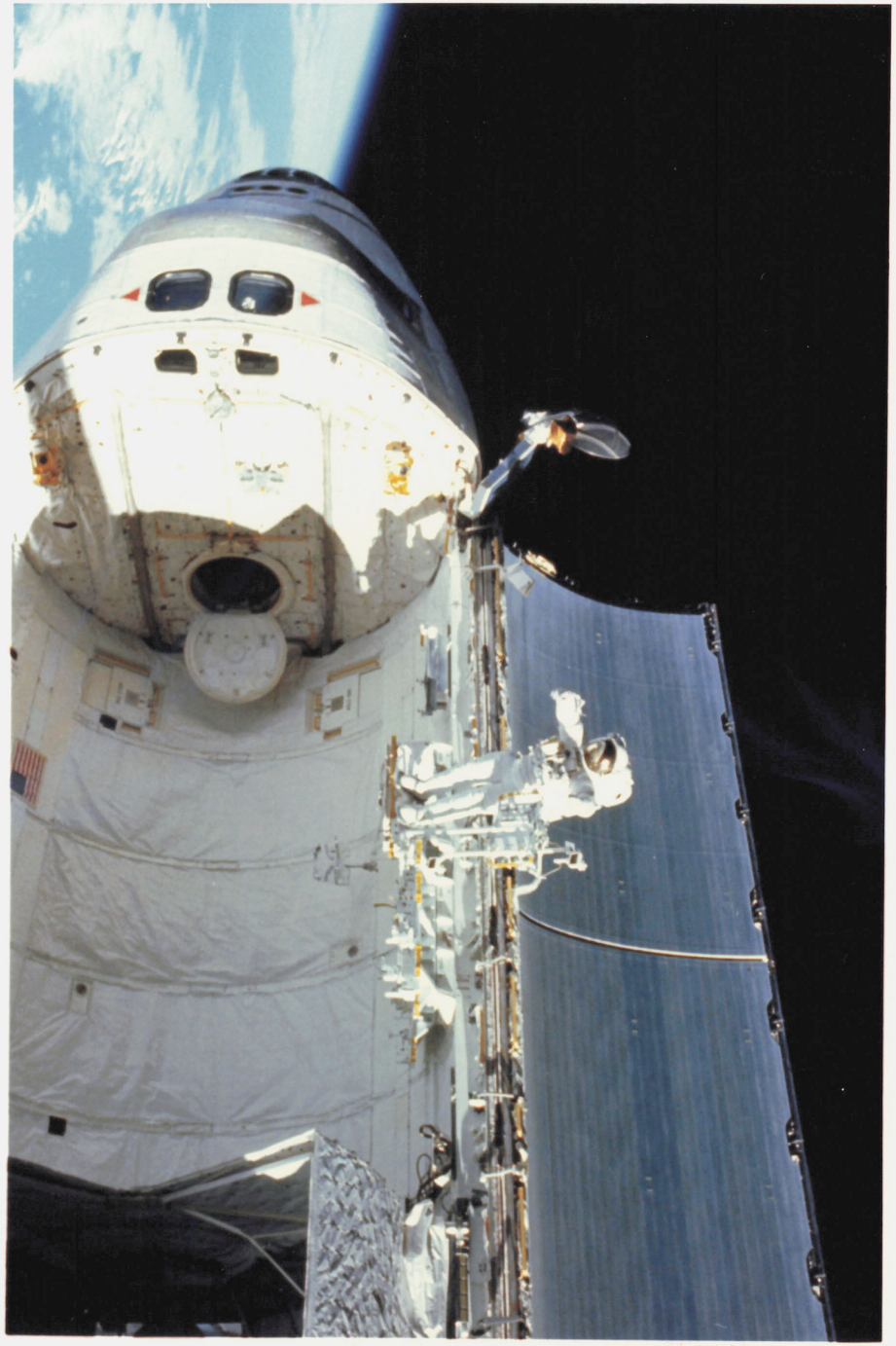
Houston, Texas 77058



Space Shuttle XX

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NASA National Aeronautics and Space Administration

51-I-34-039

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Houston, Texas 77058

Space Shuttle XX

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TUE SEP 17

12) Santiago del Estero on the Rio Dulce, Argentina (51I-34-039)

Located in the northwestern Pampas of Argentina, the city of Santiago del Estero and its surrounding farmlands illustrate the level of agricultural development in South American regions having rich loessic soils and adequate rainfall. Both cerial crops and cattle ranches provide export commodities in the area.

NASA National Aeronautics and Space Administration

51-I-42-040

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20) Current Shear across Ship-Bilged Oil in the Mozambique Channel (51I-42-040)

On occasions, the ecologically unfortunate practice of oil-bilging by passing ships can have scientifically useful results. The crew of Discovery recorded the boundary zone between two currents in the Mozambique Channel revealed by the shearing of an oil bilge pattern. Prevailing winds from the top of the frame toward the bottom are dispersing the oil slick.

NASA National Aeronautics and Space Administration

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19) Easter Island (51I-45-054)

Located over 2000 miles (3200 kilometers) from the Pacific coast of Chile, isolated Easter Island emerges from a volcanic rise along the East Pacific Ridge. The island is best known for its monolithic heads carved by natives and erected to stare enigmatically out to sea.

National Aeronautics and Space Administration

51-I-41-058

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15) Syncom IV-3 attached to the Remote Manipulator Arm over the Kalahari Desert, Namibia, South Africa and Botswana (51I-41-058)

The Syncom IV-3 satellite is held suspended in orbit over the Kalahari Desert of southern Africa. The southwestern Kalahari is crossed by vegetated sand ridges and covered by many pans (deflation basins) that are often aligned along the courses of ancient riverbeds.

National Aeronautics and Space Administration

51-I-02-022

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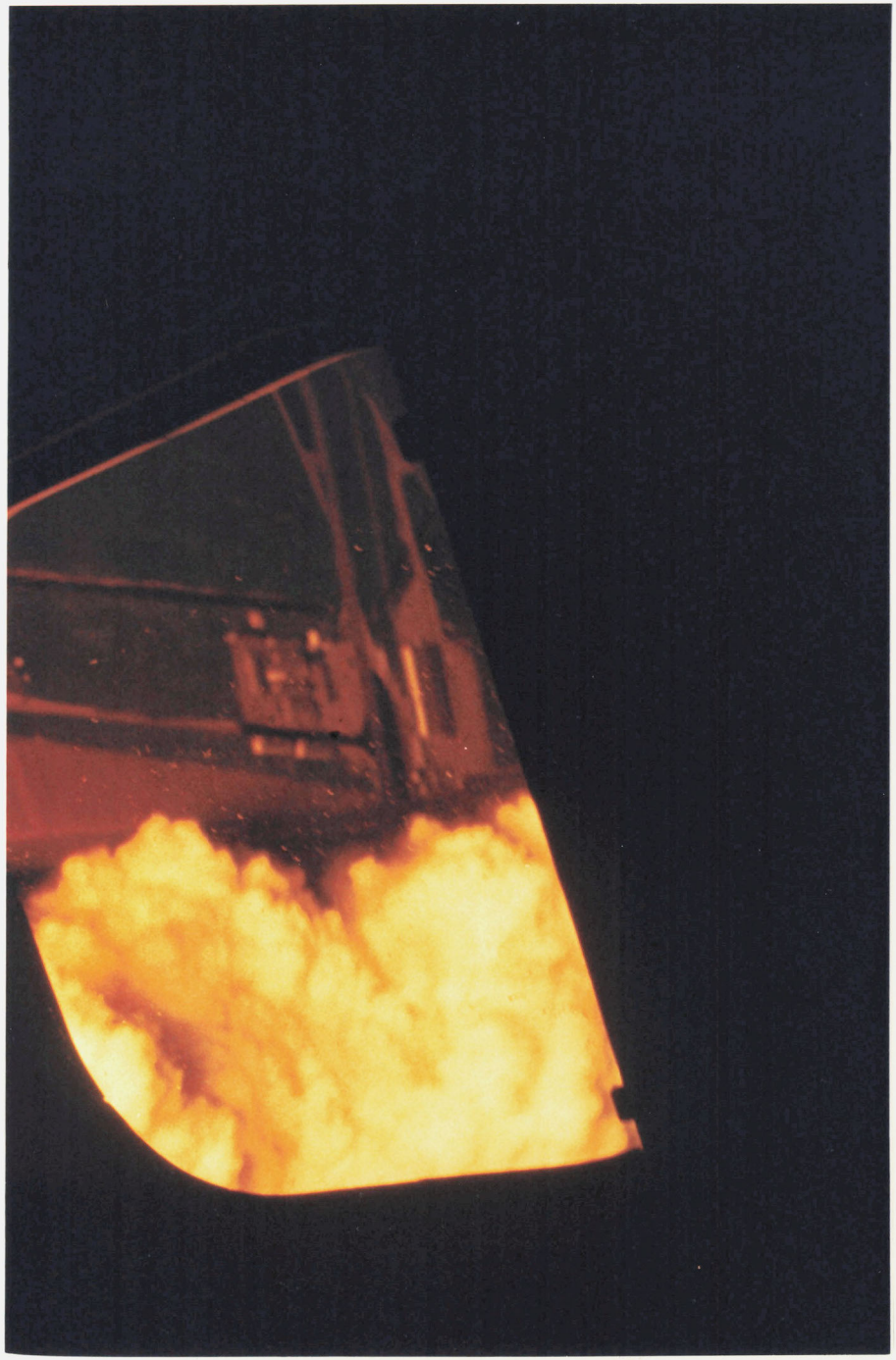

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51-I-51-192

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Space Shuttle XX

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17) Bora-Bora, Tahaa and Tupai, Society Islands (51I-51-192)

The fringing coral reefs of the Society Islands offer superb confirmation of Charles Darwin's theory of atoll development. The youngest volcanic island of Tahaa (right) under cloud has a narrow fringing reef, while the more ancient island of Bora-Bora (center) has a broad reef. The progressive sinking of the ancient volcanoes and growth to the surface of coral eventually produces an atoll, such as Tupai (left), the oldest island in in the chain.

National Aeronautics and Space Administration

51-I-34-027

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18) Maui and Kahoolawe, Hawaiian Islands (51I-34-027)

The Hawaiian Islands of Maui (center) and Kahoolawe were photographed during one of several orbital passes over Hawaii. Smoke from the burning of sugar cane residue can be seen near Kahului on central Maui, while cloud cover shrouds Haleakala Crater on the eastern tip of the island.

NASA National Aeronautics and Space Administration

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S85-36062

Space shuttle XX

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1 JULY 1985 S85-36062

JOHNSON SPACE CENTER, HOUSTON, TEXAS

51-I CREW PORTRAIT---These five NASA astronauts make up the crew for the STS 51-I mission, scheduled for launch in August of this year. Taking a break from rehearsals in the crew compartment trainer in the Shuttle mockup and integration laboratory at JSC are Astronauts Joe H. Engle (front left), crew commanders; Richard O. Covey (front right), pilot; and (back row, l.-r.) Astronauts James D. van Hoften, John M. (Mike) Lounge and William F. Fisher--all mission specialists.

pg.1

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51-I-41-070

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Space Shuttle XX

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GOLDSTONE, CALIF., -- The new 210 foot-in-diameter tracking and communication antenna of the world-wide National Aeronautics and Space Administration/JPL Deep Space Network, is stationed in the high desert near Goldstone, California. The massive dish and its pedestal weigh 8 thousand tons. The new dish, the world's most powerful space tracking and communication instrument, became operational June 1966.

DATES-ITEM
JUL 28 1966

THE GOLDSTONE TRACKING STATION, the newest addition to the tracking system of the National Aeronautics and Space Administration's deep space network, nestles in California's Mojave Desert. —NANA photos.

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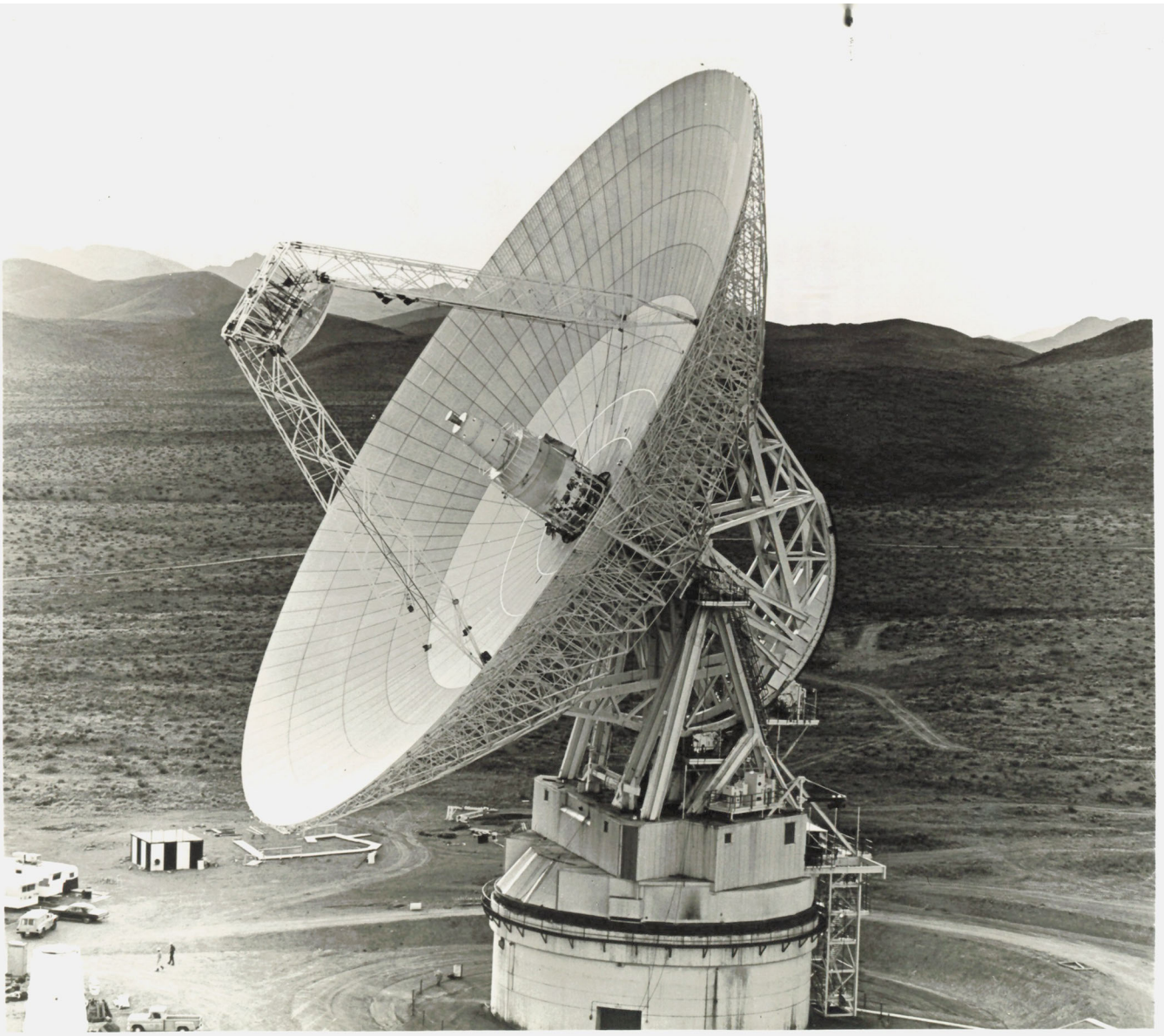

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FOR RELEASE: January 31, 1968
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BIG "DISH" - Tracking spacecraft as far as 200 million mi es away from earth is among the tasks of this giant dish, the United States' largest fully steerable space antenna. The 210 which gets its name from its 210-foot diameter, is at the National Aeronautics and Space Administration's trackin network complex in the Mohave Desert near Goldstone, Calif.

2 col Dish
mon wild

States MAR 4 1968

HUGE ELECTRONIC EAR at the National Aeronautics and Space Administration's tracking complex in the Mojave Desert near Goldstone, Calif., follows spacecraft as far away as 200 miles from the earth. It is 210 feet in diameter. NASA photo.

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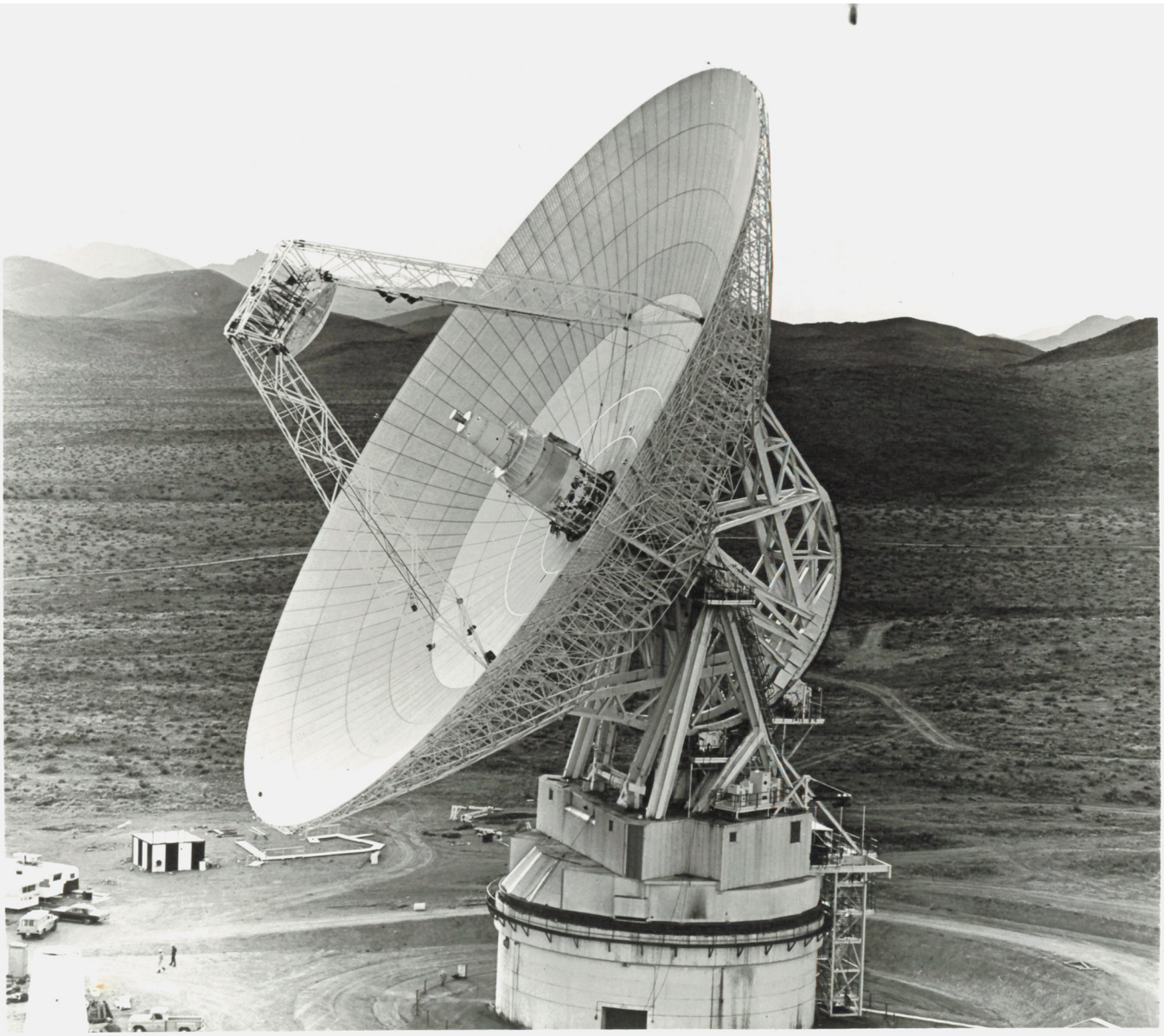

RADAR (SPACE ANTENNA)

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BIG "DISH" - Tracking spacecraft as far as 200 million miles away from earth is among the tasks of this giant dish, the United States' largest fully steerable space antenna. The 210 which gets its name from its 210-foot diameter, is at the National Aeronautics and Space Administration's tracking network complex in the Mohave Desert near Goldstone, Calif.

FEB 23 1968

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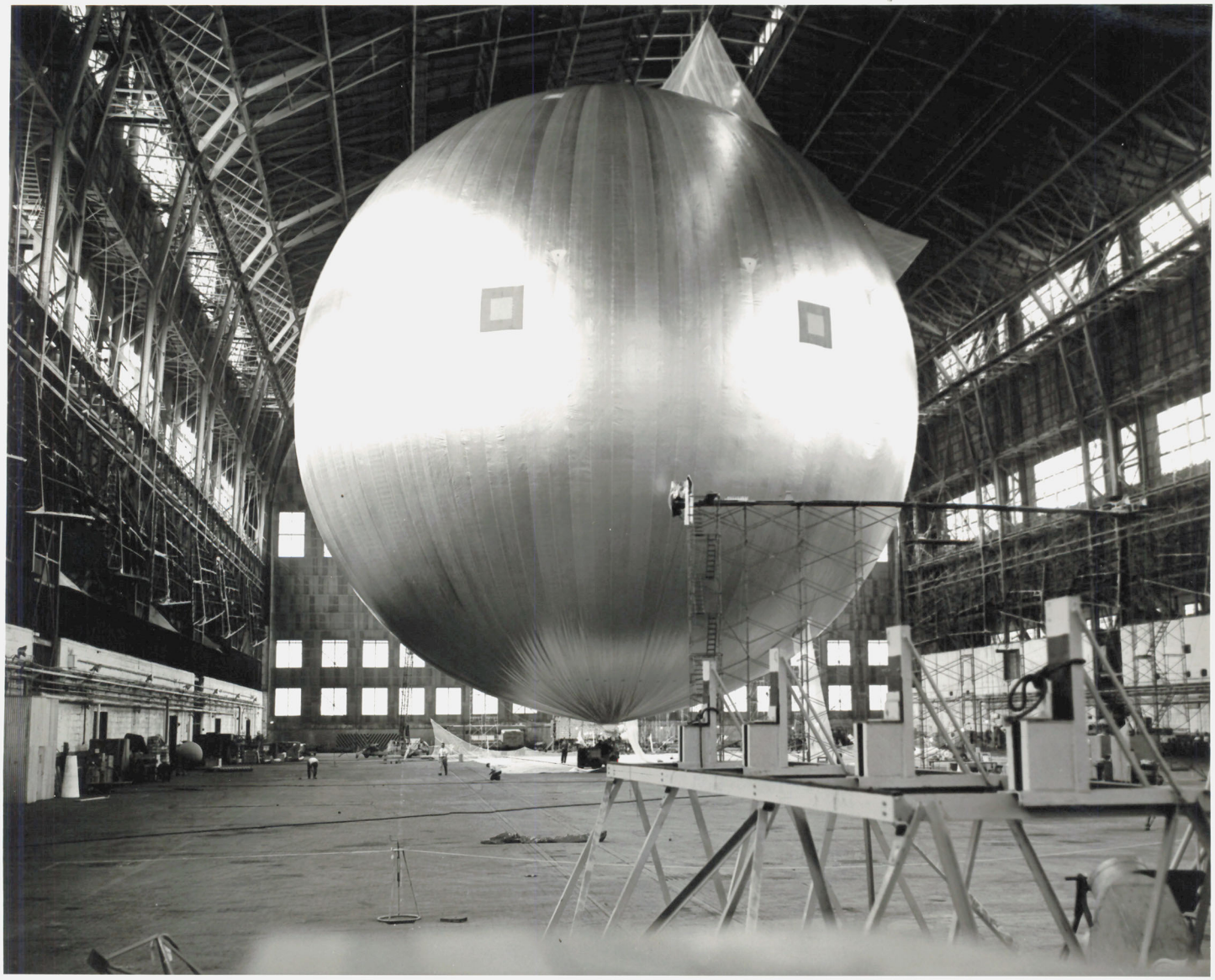

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FOR RELEASE: IMMEDIATE
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ECHO IS GETTING READY--NASA technicians conduct inflation test on Echo II which is expected to join Echo I in space orbit early this year. The new passive communications satellite will be bigger, will orbit lower, and will be easier to see than Echo I which, since its launching August 12, 1960, has been viewed by more people than any other man-made object in the skies.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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EMERGENCY RESCUE BLANKET --Made from a special plastic material coated with one-millionth of an inch of aluminum, this radar reflective rescue blanket is a derivative of that used for the ECHO satellite. The blanket can be used to supply an accident victim with warmth for protection against shock. Measuring 56x84 inches and weighing approximately three ounces, the blanket can be folded and carried in a shirt pocket.

AUG 20 1971

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NASA - Space Shuttle - Endeavor - STS 49

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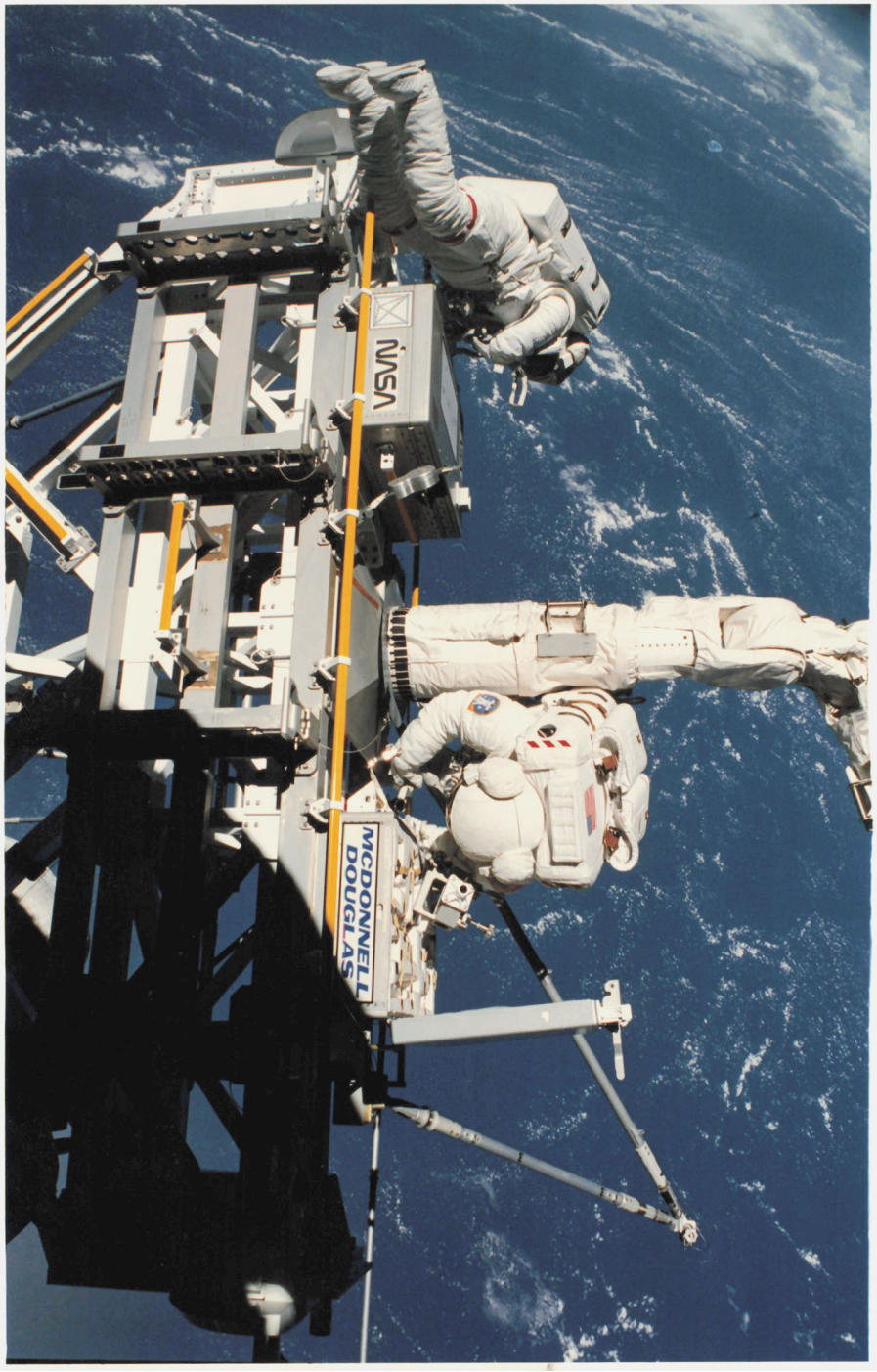

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NASA - SPACE SHUTTLE - ENDEAVOUR - STS 61

National Aeronautics and Space Administration

Houston, Texas 77058

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9 DECEMBER 1993 STS061-48-001

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-61 EVA VIEW --- Orbiting Earth at an altitude of 325 nautical miles perched atop a foot restraint on Endeavour's Remote Manipulator System (RMS) arm, astronauts F. Story Musgrave (top) and Jeffrey A. Hoffman wrap up the final of five STS-61 spacewalks. The west coast of Australia forms the backdrop for the 35mm frame.

6:15 P.M.

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232 x 321

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File: Space Shuttle LXVII

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OCTOBER 1993 S93-48551

JOHN F. KENNEDY SPACE CENTER, FLORIDA

STS-59 PAYLOAD SIR-C/X-SAR ANTENNA VIEW --- The Spaceborne Imaging Radar-C and X-Band Synthetic Aperture Radar (SIR-C/X-SAR) antenna, developed by the Jet Propulsion Laboratory (JPL) as part of NASA's Mission to Planet Earth (MTPE), will fly aboard the Space Shuttle Endeavour. The radar antenna uses microwave energy which gives it the ability to collect data over virtually any region at any time, regardless of weather or sunlight conditions. The radar waves can penetrate clouds, and under certain conditions the radar can also see through vegetation, ice and dry sand. In many cases, spaceborne radar is the only way scientists can explore large-scale and inaccessible regions of the Earth's surface. SIR-C/X-SAR uses three microwave wavelengths: L-Band (24 cm), C-Band (6 cm) and X-Ban (3 cm). The multi-frequency data will be used by the international scientific community to monitor global environmental processes with a focus on climate change. The MTPE spaceborne data, complemented by aircraft and ground studies, will give scientists clearer insights into those environmental changes which are caused by nature and those changes which are induced by human activity.

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P-6 A

File: Satellites

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13 MAY 1992 S49-91-029

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-49 ONBOARD SCENE OF EVA --- Following the successful capture of Intelsat VI, three astronauts continue their chores toward moving the 4.5 ton communications satellite into Endeavour's cargo bay. A fellow crewmember recorded this 70mm still frame from inside Endeavour's cabin. Left to right, astronauts Richard J. Hieb, Thomas D. Akers and Pierre J. Thuot, cooperate on the effort to attach a specially designed grapple bar underneath the satellite. Thuot stands on the end of the remote manipulator system's (RMS) arm while Hieb and Akers are on portable foot restraints affixed to Endeavour's portside and the multipurpose support structure (MPESS), respectively. The sections of Earth which form the backdrop for the scene are blanketed with thousands of square miles of clouds.

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STS047-45-003

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ASTRONAUT

1992

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STS088-365-004

Lyndon B. Johnson Space Center
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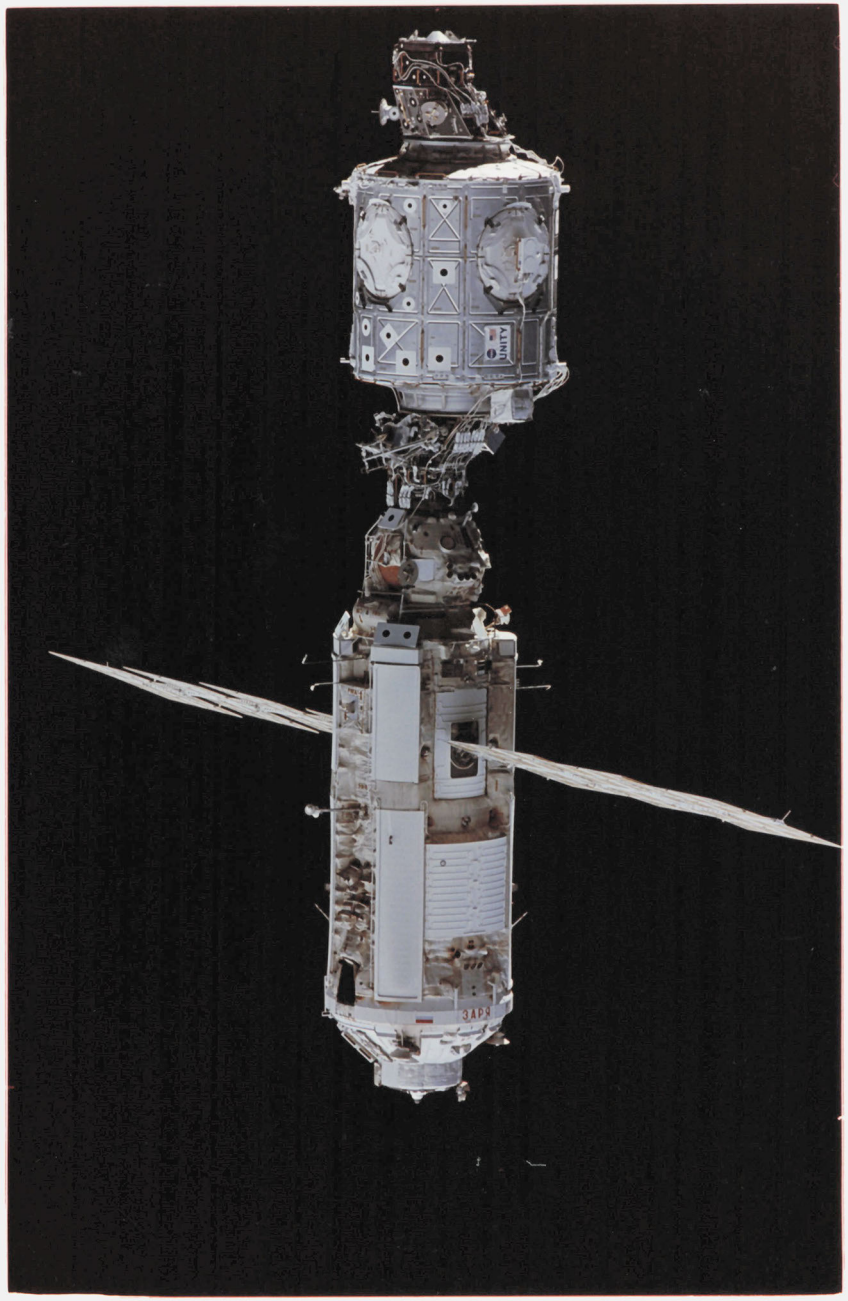

Space Station

National Aeronautics and Space Administration

Houston, Texas 77058

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4 - 15 DECEMBER 1998 STS088-365-004

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-88 ONBOARD VIEW --- The United States-built Unity Connecting Module and the Russian-built FGB (Zarya, with solar panels deployed) are backdropped against the blackness of space in this 35mm photograph taken from the Space Shuttle Endeavour. After devoting the major portion its mission time to various tasks to ready the two docked modules for their International Space Station (ISS) roles, the six-member crew released the tandem and performed a fly-around survey of the hardware.

May 1999

99/05/06
20:08:10

station_lines [edtmec@enati501]
/tmp/station_lines_10.1266.PRINT

{station_lines} 5/06/99 20:08:09 [edtmec@enati501]

As photographed by a shuttle assembly crew, the first two components of the U.S.-led international space station circle the Earth at nearly 250 miles altitude. Launched and assembled last November and December, the Unity (top or margin with NASA photo id and credit) and Zarya modules span 78 feet in length and 84 feet in width from the tips of the two solar arrays. The modules weigh a combined 68,000 pounds. The new station will not be ready to house its first resident crew until the year 2000.

cutline info compiled by mcarreau in may 1999.

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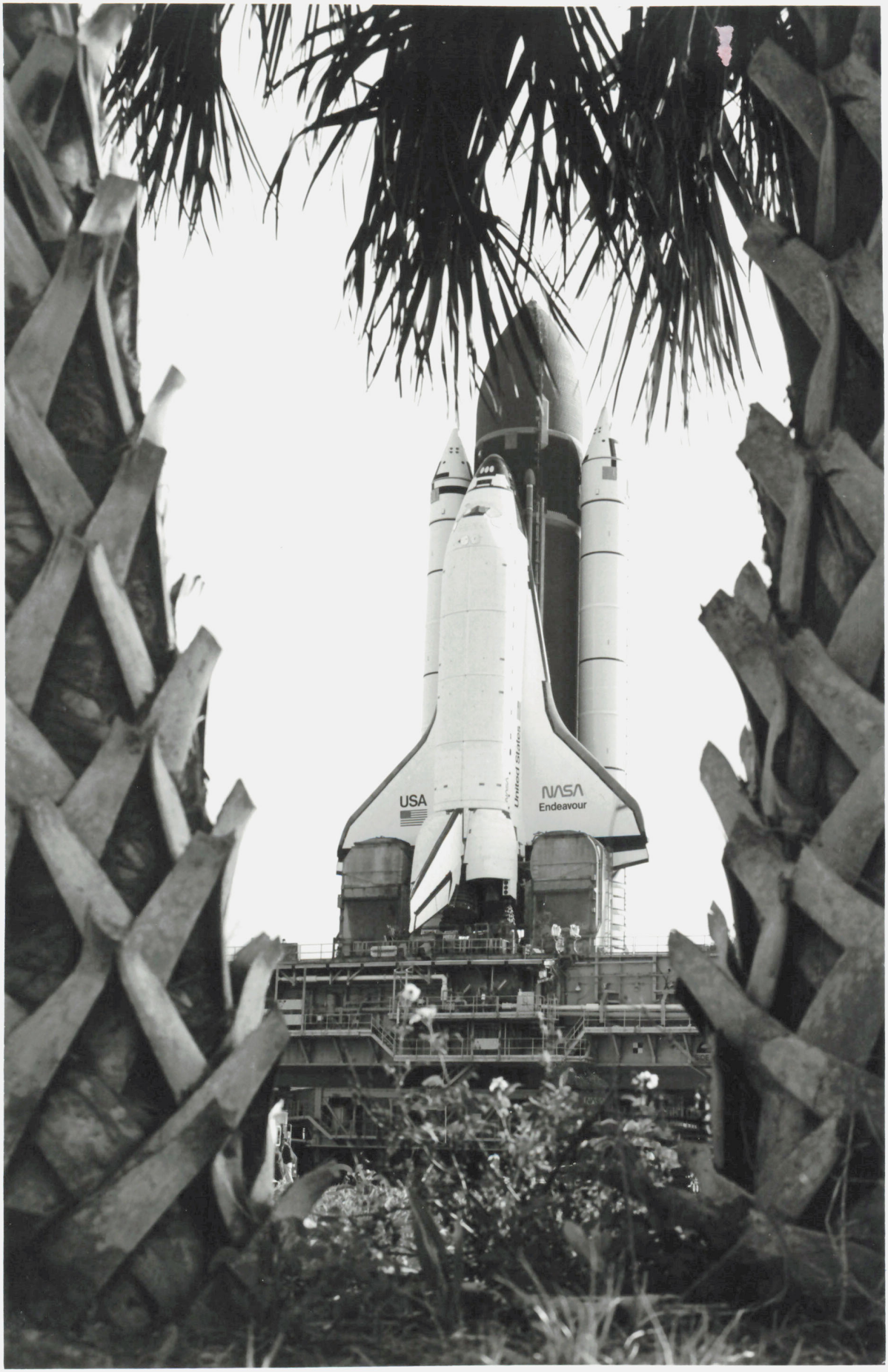
USA
NASA
Endeavour

File: Space Shuttle 50

National Aeronautics and
Space Administration

John F. Kennedy Space Center
Kennedy Space Center, Florida 32899
AC 407 867-7819

FOR RELEASE: March 13, 1992

PHOTO NO. KSC-92PC-554

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KENNEDY SPACE CENTER, FLA. -- Palms frame the Space Shuttle Endeavour as it heads for Launch Pad 39B. Still ahead for Endeavour is a Flight Readiness Firing of its three main engines, and the Terminal Countdown Demonstration Test with the flight crew. Endeavour's maiden voyage on Mission STS-49 is planned for late spring.

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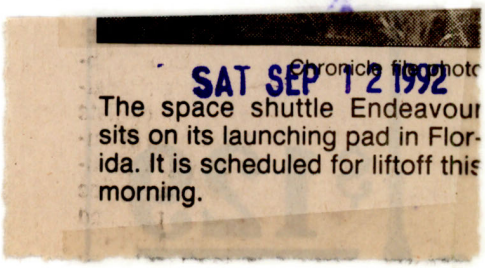


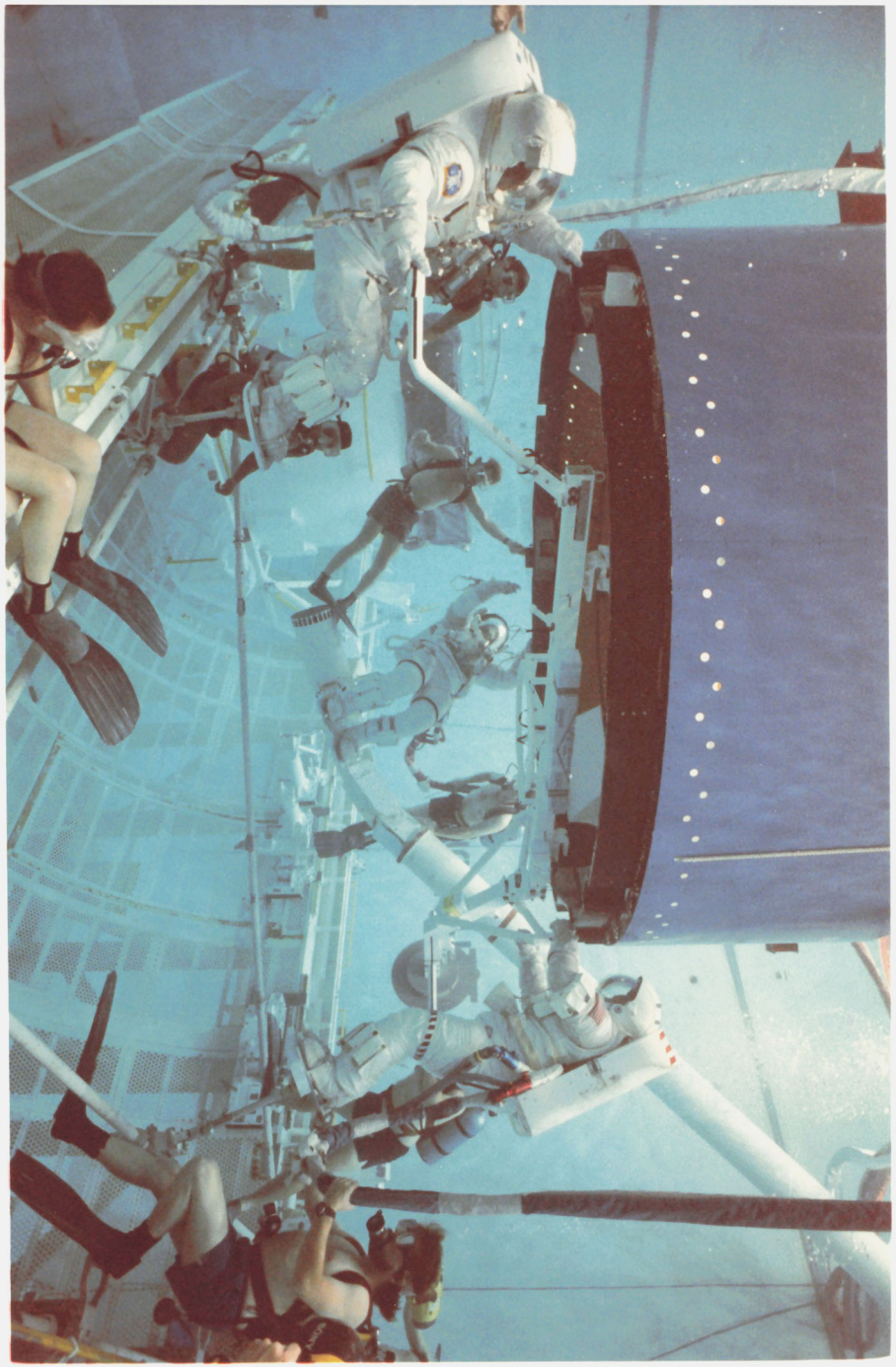
Chronicle file photo
SAT SEP 12 1992
The space shuttle Endeavour sits on its launching pad in Florida. It is scheduled for liftoff this morning.

PHOTO CREDIT - NASA OR NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NASA National Aeronautics and Space Administration

S92 35764

Lyndon B. Johnson Space Center
Houston, Texas 77058



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Houston, Texas 77058

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4-color

COLOR

12 MAY 1992 S92-35764

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-49 TROUBLE-SHOOTING --- Wearing extravehicular mobility units (EMU's) a
fitted with weights for neutral buoyancy are three trouble-shooting astronauts. T
astronauts practiced techniques for capturing Intelsat, and climbing into the airlo
mockup in the Weightless Environment Training Facility (WETF). No apparent problen
were identified in placing three astronauts in the airlock at one time. Left to right ar
Michael R. (Rich) Clifford, Story Musgrave, and James S. Voss. Three Endeavo
astronauts, Pierre J. Thuot, Richard J. Hieb and Thomas D. Akers, will attempt to captur
Intelsat again on May 13. Clifford played the role of Hieb, Musgrave for Thuot, and Voss
Akers.

Lyndon B. Johnson Space Center HST.

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PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA photo

SUN JUN 14 1992

Large water tanks, like the one at the Johnson Space Center in Houston, are NASA's primary training facilities for spacewalks. Last month, astronauts Rich Clifford, Story Musgrave and Jim Voss rehearsed the procedures for hand-catching a large communications satellite in the Johnson tank before three Endeavour astronauts did it successfully in space.

National Aeronautics and
Space Administration

STS069-S-002

Lyndon B. Johnson Space Center
Houston, Texas 77058

File: Space Shuttle LXXVII (Endeavour)

National Aeronautics and Space Administration
Houston, Texas 77058

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COLOR (PORTRAIT)

JUNE 1995 STS069(S)002

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-69 CREW PORTRAIT --- These five NASA astronauts have been named as crew members for the STS-69 mission, scheduled onboard the Space Shuttle Endeavour in late July of 1995. David M. Walker (right front) is mission commander; with Kenneth D. Cockrell (left front) scheduled to serve as pilot. On the back row are (left to right) Michael L. Gernhardt and James H. Newman, both mission specialists; and James S. Voss, payload commander.

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STS063-(S)-002

Lyndon B. Johnson Space Center
Houston, Texas 77058

File: Space Shuttle LXXIII

National Aeronautics and Space Administration
Houston, Texas 77058

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COLOR (PORTRAIT)

NOVEMBER 1994 STS063-(S)-002

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-63 CREW PORTRAIT --- With the U.S. and Russian flags in the background, five NASA astronauts and a Russian cosmonaut named to fly aboard the Space Shuttle Endeavour for the STS-63 mission pose for the flight crew portrait at the Johnson Space Center (JSC). Left to right (front row) are Janice E. Voss, mission specialist; Eileen M. Collins, pilot; James D. Wetherbee, mission commander; and Vladimir Titov of the Russian Space Agency, mission specialist. In the rear are Bernard A. Harris Jr., payload commander; and C. Michael Foale, mission specialist.

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S49 35 003

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COLOR

14 MAY 1992 S49-35-003

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-49 ONBOARD SCENE --- Astronaut Kathryn C. Thornton (left) and Thomas D. Akers are seen on the STS-49 mission's fourth period of extravehicular activity (EVA) as they work with components of the Assembly of Station by EVA Methods evaluation. The Multi-purpose Support Structure (MPESS) is held aloft by Endeavour's remote manipulator system (RMS).

This is one of the images on NASA's first release of color still photographs from the STS-49 mission. The nine-day mission accomplished the capture of the Intelsat VI, subsequent mating of the satellite to a booster and its eventual deployment, as well as a Space Station Freedom preview extravehicular activity (EVA) called Assembly of Station by EVA Methods. Endeavour's crewmembers were astronauts Daniel C. Brandenstein, mission commander; Kevin P. Chilton, pilot; and Thomas D. Akers, Richard J. Hieb, Bruce E. Melnick, Kathryn C. Thornton and Pierre J. Thuot, all mission specialists.

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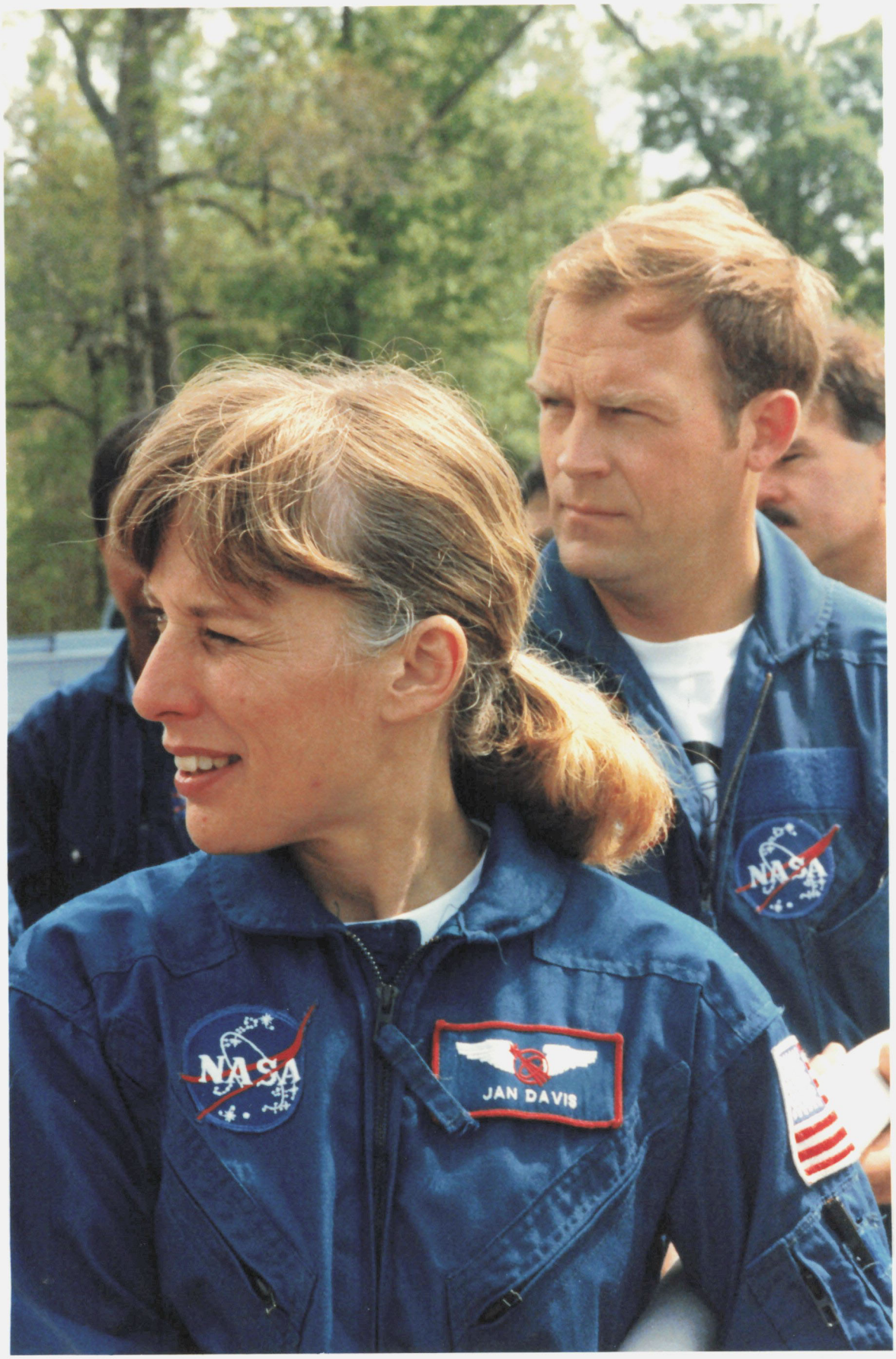

Jan Davis
Astronaut

Sept 1992

Endeavour Mission

Husband-and-wife NASA astronauts
first married couple in space

left mission specialist Jan Davis, mechanical engineer
rt. mission specialist & payload commander Mark Lee, Lt. Col US Air Force

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TUE SEP - 1 1992

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S49 99 002

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File: Astronauts

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COLOR

14 MAY 1992 S49-99-002

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-49 ONBOARD (EVA) SCENE --- Astronauts Kathryn C. Thornton (profile) and Thomas D. Akers prepare to collect struts to begin a structure build-up effort on the mission's fourth period of extravehicular activity. This EVA was devoted to the Assembly of Station by EVA Methods (ASEM), while the previous three involved attempts to capture Intelsat. The scene was recorded with a 70mm handheld Hasselblad camera from inside Endeavour's cabin.

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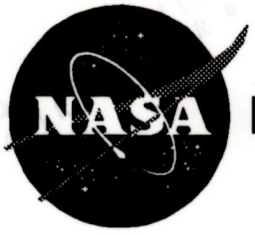
NASA
USA

File: Space Shuttle LXXIV



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Houston, Texas 77058

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COLOR (PORTRAIT)

DECEMBER 1994 STS067(S)002

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-67 CREW PORTRAIT --- Five NASA astronauts and two payload specialists from the private sector have been named to fly aboard the Space Shuttle Endeavour for the STS-67/ASTRO-2 mission, scheduled for March 1995. In front are astronauts (left to right) Stephen S. Oswald, mission commander; Tamara E. Jernigan, payload commander; and William G. Gregory, pilot. In the back are (left to right) Ronald A. Parise, payload specialist; astronauts Wendy B. Lawrence, and John M. Grunsfeld, both mission specialists; and Samuel T. Durrance, payload specialist. Dr. Durrance is a research scientist in the Department of Physics and Astronomy at Johns Hopkins University, Baltimore, Maryland. Dr. Parise is a senior scientist in the Space Observatories Department, Computer Sciences Corporation, Silver Spring, Maryland. Both payload specialist's flew aboard the Space Shuttle Columbia for the STS-35/ASTRO-1 mission in December 1990.

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THU MAR - 9

STS 67(S)002

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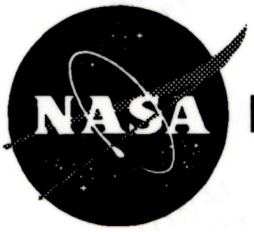
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058

STS072-S-002

File: Space Shuttle LXXX (Endeavour)



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Houston, Texas 77058

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COLOR (PORTRAIT)

AUGUST 1995 STS072(S)002

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-72 CREW PORTRAIT --- These six astronauts are in training for NASA's STS-72 mission scheduled aboard the Space Shuttle Endeavour later this year. Astronauts Brian Duffy (right front) and Brent W. Jett (left front) are mission commander and pilot, respectively. Mission specialists (back row, left to right) are Winston E. Scott, Leroy Chiao, Koichi Wakata and Daniel T. Barry. Wakata is an international mission specialist representing Japan's National Space Development Agency (NASDA) based at the Johnson Space Center (JSC).

MON JAN 22 1996
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NASA
DAN BURSCH
MARIO RUNCO
MARC GARNEAU
ANDY THOMAS
CURT BROWN
JOHN CASPER
CASPER
BROWN
THOMAS
BURSCH
RUNCO
GARNEAU

STS072S1002

Top Row, l to right Space Shuttle LXXXIII

ms Dan Bursch, ms mario Runco, ms Marc Garneau, ms Andy Thomas

Endeavour

Front Row, l to right

Pilot Curt Brown, Commander John Casper

The crew for the space shuttle Endeavour's 11th flight is, from left, top row, Daniel W. Bursch, mission specialist; Mario Runco Jr., a former New Jersey state trooper, mission specialist; Marc Garneau, a Canadian, mission specialist; Andrew S.W. Thomas, a native of Australia, mission specialist; from left, bottom row, Curtis L. Brown Jr., pilot; and John H. Casper, mission commander.

SAT MAY 18 1996 National Aeronautics and Space Administration

SAT MAY 18 1996
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Houston, Texas 77058

Space Shuttle 53

Sept. 1992
Endeavour
husband/wife astronauts

Jan Davis, left, mission specialist
Mark Lee, right, payload commander/mission specialist

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FRI SEP 18 1992

NASA

National Aeronautics and
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S47-(S)-002

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Space Shuttle 53

Houston, Texas 77058

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COLOR (PORTRAIT)

JUNE 1992 STS47-(S)-002

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-47 CREW PORTRAIT --- These seven crewmembers are currently in training for the STS-47/Spacelab J mission scheduled for later this year. Pictured are (left to right, front) Jerome (Jay) Apt and Curtis L. Brown; and (left to right, rear) N. Jan Davis, Mark C. Lee, Robert L. Gibson, Mae C. Jemison and Mamoru Mohri. Gibson is mission commander, and Brown is pilot for Endeavour's second scheduled mission. Dr. Mohri (far right) is payload specialist, representing the National Space Development Agency of Japan (NASDA). Lee is payload commander, and Jemison, Apt and Davis are mission specialists.

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NASA National Aeronautics and Space Administration

S49 (S) 002

Lyndon B. Johnson Space Center
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File: Space Shuttle 50

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Houston, Texas 77058

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COLOR (PORTRAIT)

16 JANUARY 1992 S49-(S)-002

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-49 CREW PORTRAIT --- These seven NASA astronauts are currently training for the first flight of the Space Shuttle Endeavour, seen in the background. Daniel C. Brandenstein, center, is mission commander; and Kevin P. Chilton, third from right, is pilot. Mission specialists are, left to right, Kathryn C. Thornton, Bruce E. Melnick, Pierre J. Thout, Thomas D. Akers and Richard J. Hieb.

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WED MAY 13 1992

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

Endeavour
United States
USA

Space Shuttle 5
(endeavour)

National Aeronautics and
Space Administration

John F. Kennedy Space Center
Kennedy Space Center, Florida 32899
AC 407 867-7819

FOR RELEASE: March 13, 1992

PHOTO NO. KSC-92PC-558

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KENNEDY SPACE CENTER, FLA. -- The Space Shuttle Endeavour arrives at Launch Pad 39B atop the Mobile Launcher Platform and Crawler-Transporter. Endeavour's maiden flight will be the first liftoff from Pad B since STS-40 in 1991. The pad was taken offline while about 50 modifications were made to pad structures and payload handling facilities. Endeavour, the newest orbiter in the Shuttle fleet, is targeted for liftoff on Mission STS-49 in late spring.

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The shuttle Endeavour

SUN MAY 03 1992

USES — As part of four-orbiter fleet, Endeavour is intended to fly through 2020 on missions supporting scientific research, space station assembly and operations.

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STS049 77 023

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File: Astronauts

National Aeronautics and Space Administration

Houston, Texas 77058

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COLOR

14 MAY 1992 S49-77-023

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-49 ONBOARD SCENE --- Astronaut Thomas D. Akers joins three struts together, as STS-49's fourth period of extravehicular activity (EVA) proceeds in Endeavour's cargo bay. The purpose of the final EVA on this nine-day mission was the evaluation of Assembly of Station by EVA Methods (ASEM). The scene was recorded on 70mm film by a fellow crewmember in the Space Shuttle's cabin. Astronaut Kathryn C. Thornton (out of frame) joined Akers on the 7 1/2 hour EVA.

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PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA National Aeronautics and Space Administration

S49-99-003

Lyndon B. Johnson Space Center
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File: Astronauts

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Houston, Texas 77058

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COLOR

14 MAY 1992 S49-99-008

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-49 ONBOARD SCENE --- Astronauts Thomas D. Akers (left) and Kathryn C. Thornton choreograph the build-up of struts, backdropped against scattered clouds and open ocean areas on Earth. The extravehicular activity (EVA) was designed to evaluate the Assembly of Station by EVA Methods (ASEM) and completed a record-setting four sessions of EVA on this nine-day mission.

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S49-77-028

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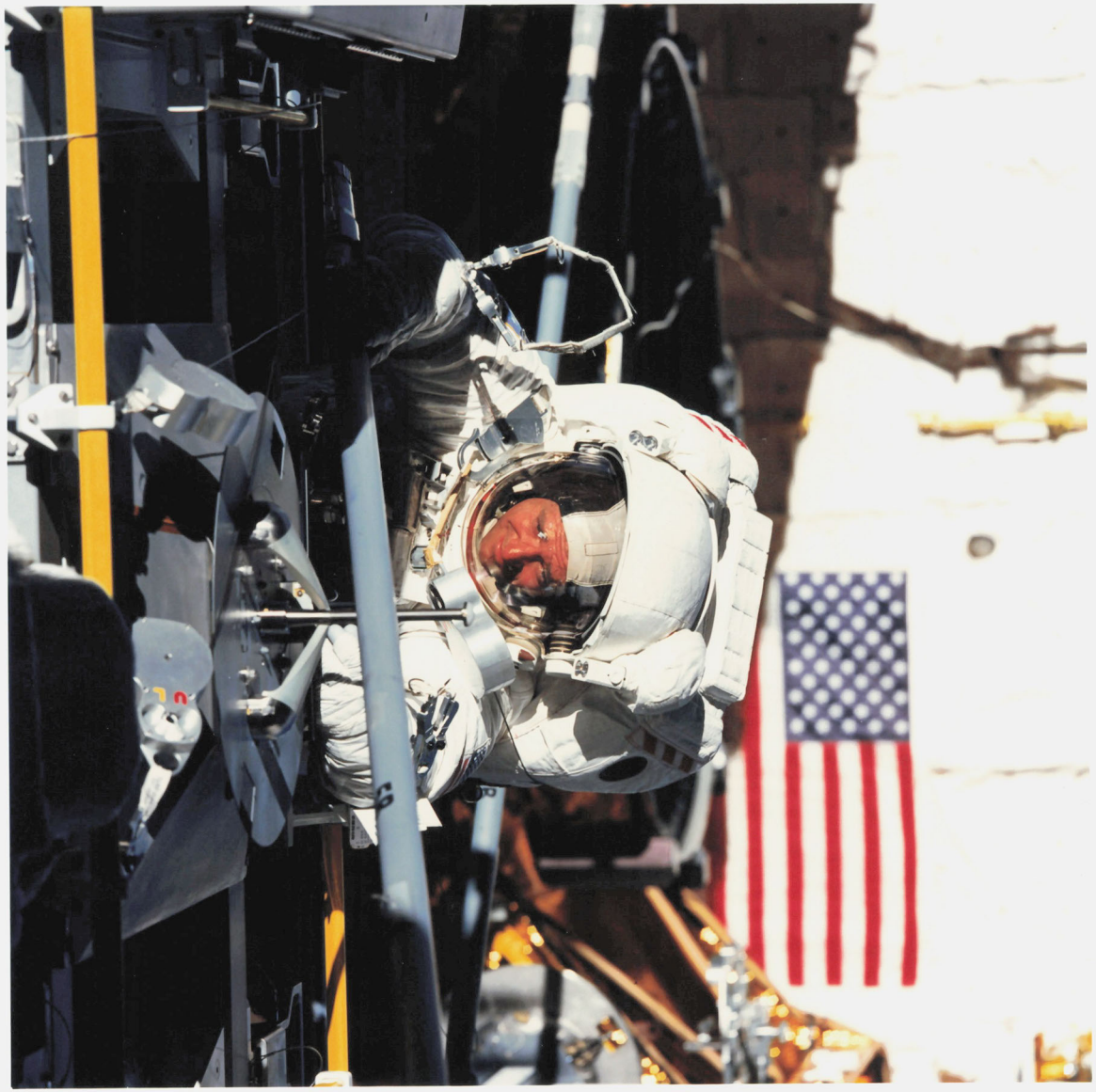

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File: Astronauts

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COLOR

14 MAY 1992 S49-77-028

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-49 ONBOARD SCENE --- Astronaut Thomas D. Akers grabs a strut device as STS-49's fourth period of extravehicular activity (EVA) gets underway in Endeavour's cargo bay. Akers is positioned near the Multi-purpose Support Structure (MPESS). The purpose of the final EVA on this nine-day mission was the evaluation of Assembly of Station by EVA Methods (ASEM). The scene was recorded on 70mm film by a fellow crewmember in the Space Shuttle's cabin. Astronaut Kathryn C. Thornton (out of frame) joined Akers on the 7 1/2 hour EVA.

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WED JUN 30 1993

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

National Aeronautics and Space Administration

S92 34860

Lyndon B. Johnson Space Center
Houston, Texas 77058

File: Space Shuttle

Houston, Texas 77058

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COLOR

13 MARCH 1992 S92-34860

KENNEDY SPACE CENTER, FLORIDA

ENDEAVOUR ROLL-OUT -- Palms frame the Space Shuttle Endeavour as it heads for Launch Pad 39B. Still ahead for Endeavour is a Flight Readiness Firing of its three main engines, and the Terminal Countdown Demonstration Test with the flight crew. Endeavour's maiden voyage on NASA's mission STS-49 is planned for late spring.

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TUE SEP 30 1997

NASA National Aeronautics and Space Administration

STS047 (S) 039

Lyndon B. Johnson Space Center
Houston, Texas 77058

File: Space Shuttle

National Aeronautics and Space Administration

Houston, Texas 77058

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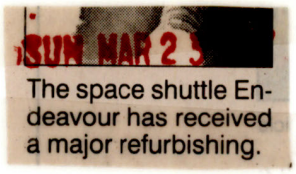
COLOR

12 SEPTEMBER 19 STS047-(S)-039

KENNEDY SPACE CENTER, FLORIDA

STS-47 LAUNCH --- A 35mm camera was used to record this low-angle view of the STS-47 launch. With a crew of six NASA astronauts and a Japanese payload specialist onboard, the Space Shuttle Endeavour was heading for its second trip into space. This mission will be devoted to support of the Spacelab-J mission, a joint effort between Japan and the United States. Launch occurred at 10:23:00:0680 a.m. (EDT), September 12, 1992. Onboard were astronauts Robert L. Gibson, mission commander; Curtis L. Brown Jr., pilot; Mark C. Lee, payload commander; and Jerome (Jay) Apt, Mae C. Jemison and N. Jan Davis, mission specialists; along with payload specialist Mamoru Mohri, representing the National Space Development Agency (NASDA) of Japan.



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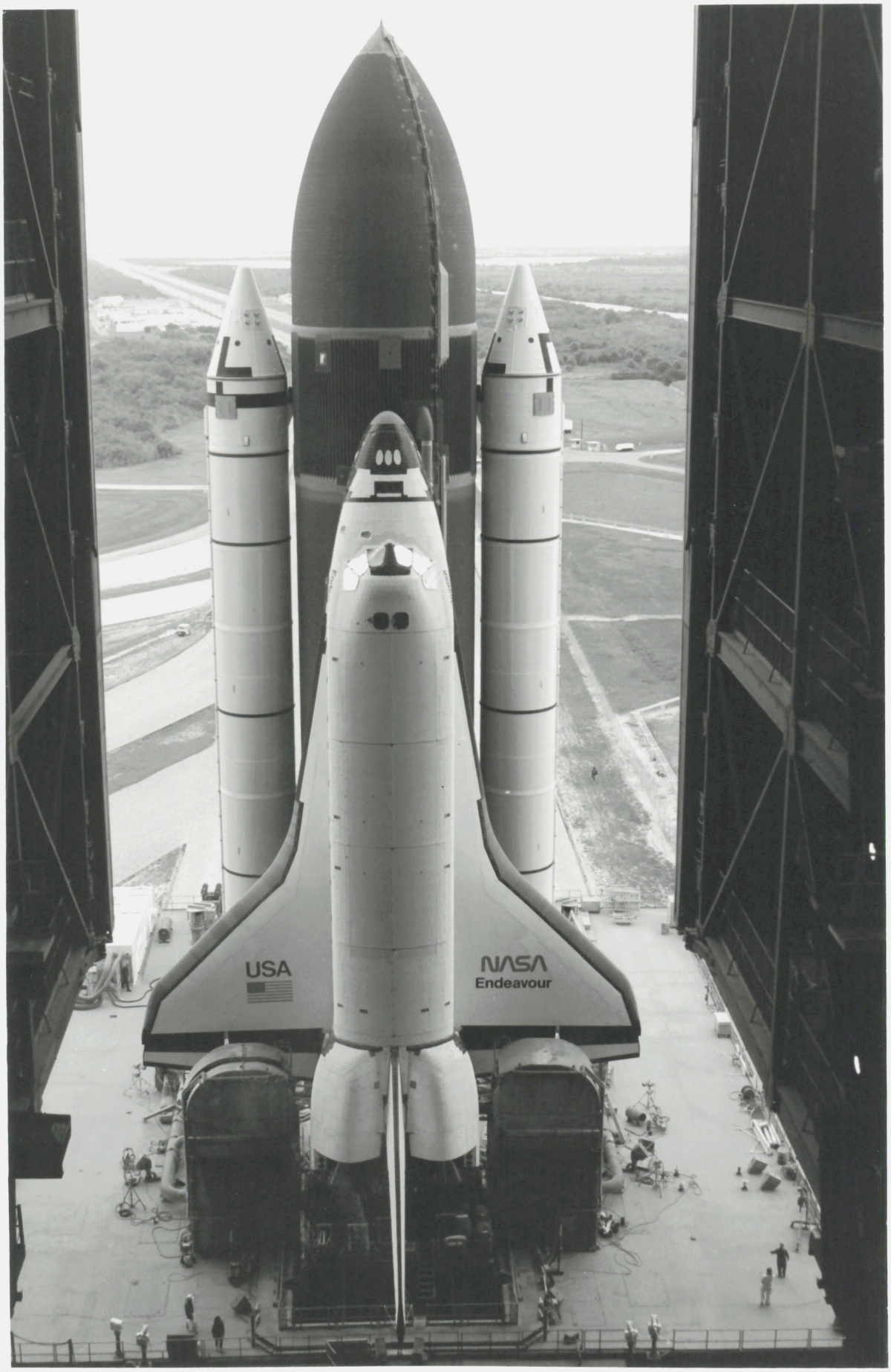
USA
NASA
Endeavour

Space Shuttle 50

National Aeronautics and
Space Administration

John F. Kennedy Space Center
Kennedy Space Center, Florida 32899
AC 407 867-7819

FOR RELEASE: March 13, 1992

PHOTO NO. KSC-92PC-550

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KENNEDY SPACE CENTER, FLA. -- The Space Shuttle Endeavour departs the Vehicle Assembly Building, headed for Launch Pad 39B and one step closer to its maiden voyage. Already at Pad 39A is the Space Shuttle Atlantis, undergoing preparations for launch on Mission STS-45. Still ahead for Endeavour is a Flight Readiness Firing of its three main engines, and the Terminal Countdown Demonstration Test with the flight crew. Endeavour is targeted for liftoff on Mission STS-49 in late spring.

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NASA National Aeronautics and Space Administration

STS047 (S) 020

Lyndon B. Johnson Space Center
Houston, Texas 77058

File: Space Shuttle

Houston, Texas 77058

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COLOR

12 SEPTEMBER 1992 STS047-(S)-020

KENNEDY SPACE CENTER, FLORIDA

STS-47 LAUNCH --- A 70mm camera recorded this wide view of the beginning moments of the STS-47 mission. With a crew of six NASA astronauts and a Japanese payload specialist onboard, the Space Shuttle Endeavour was heading for its second trip into space. This trip is devoted to support of the Spacelab-J mission, a joint effort between Japan and the United States. Launch occurred at 10:23:00:0680 a.m. (EDT), September 12, 1992. Onboard were astronauts Robert L. Gibson, mission commander; Curtis L. Brown Jr., pilot; Mark C. Lee, payload commander; and Jerome (Jay) Apt, Mae C. Jemison and N. Jan Davis, mission specialists; along with payload specialist Mamoru Mohri, representing the National Space Development Agency of Japan.

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PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA National Aeronautics and Space Administration

S49 81 093

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mm

File: Astronauts

National Aeronautics and Space Administration

Houston, Texas 77058

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COLOR

14 MAY 1992 S49-81-093

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-49 ONBOARD SCENE --- Astronaut Kathryn C. Thornton joins three struts together, as STS-49's fourth period of extravehicular activity (EVA) proceeds in Endeavour's cargo bay. The purpose of the final EVA on this nine-day mission was the evaluation of Assembly of Station by EVA Methods (ASEM). Clouds over the ocean share the background with part of Endeavour's remote manipulator system (RMS). The scene was recorded on 70mm film from the Space Shuttle's flight deck. Astronaut Thomas D. Akers (out of frame) joined Thornton on the 7 1/2 hour EVA.

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STS059 (S) 002

NASA - SPACE shuttle - ENDEAVOR - STS 59

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JANUARY 1994 STS059(S)002

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-59 CREW PORTRAIT --- These six NASA astronauts are in training for the STS-59 mission aboard Endeavour. Sidney M. Gutirrez, mission commander, is standing (right), along with Kevin P. Chilton, pilot. Others, left to right, are Linda M. Godwin, payload commander; and Thomas D. Jones, Jerome (Jay) Apt and Michael R. (Rich) Clifford, all mission specialists.

ERATUM: TYPOGRAPHICAL ERROR (CORRECTION, GUTIERREZ)

SUNDAY APR 04 1994

PHOTO CREDIT: NASA or National Aeronautics and Space Administration.

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STS061-11-04

A

NASA - SPACE SHUTTLE - ENDEAVOUR - STS 61

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COLOR

2 - 13 DECEMBER 1993 STS061-11-004

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-61 ONBOARD SCENE ---- Traditional inflight portrait for the crew of the Hubble Space Telescope (HST) servicing mission. On the front row are the three crew members who assisted from inside Endeavour's cabin throughout the five spacewalks. They are, left to right, Swiss scientist Claude Nicollier, mission specialist, along with astronauts Kenneth D. Bowersox, pilot; and Richard O. Covey, mission commander. Back row -- all space walkers on this flight -- are astronauts F. Story Musgrave, payload commander; Jeffrey A. Hoffman, Kathryn D. Thornton and Thomas D. Akers, all mission specialists.

5 3 x 8 d
37 %
6 7 x 100

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

RAN 12-19-93

National Aeronautics and
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STS069-391-034

Lyndon B. Johnson Space Center
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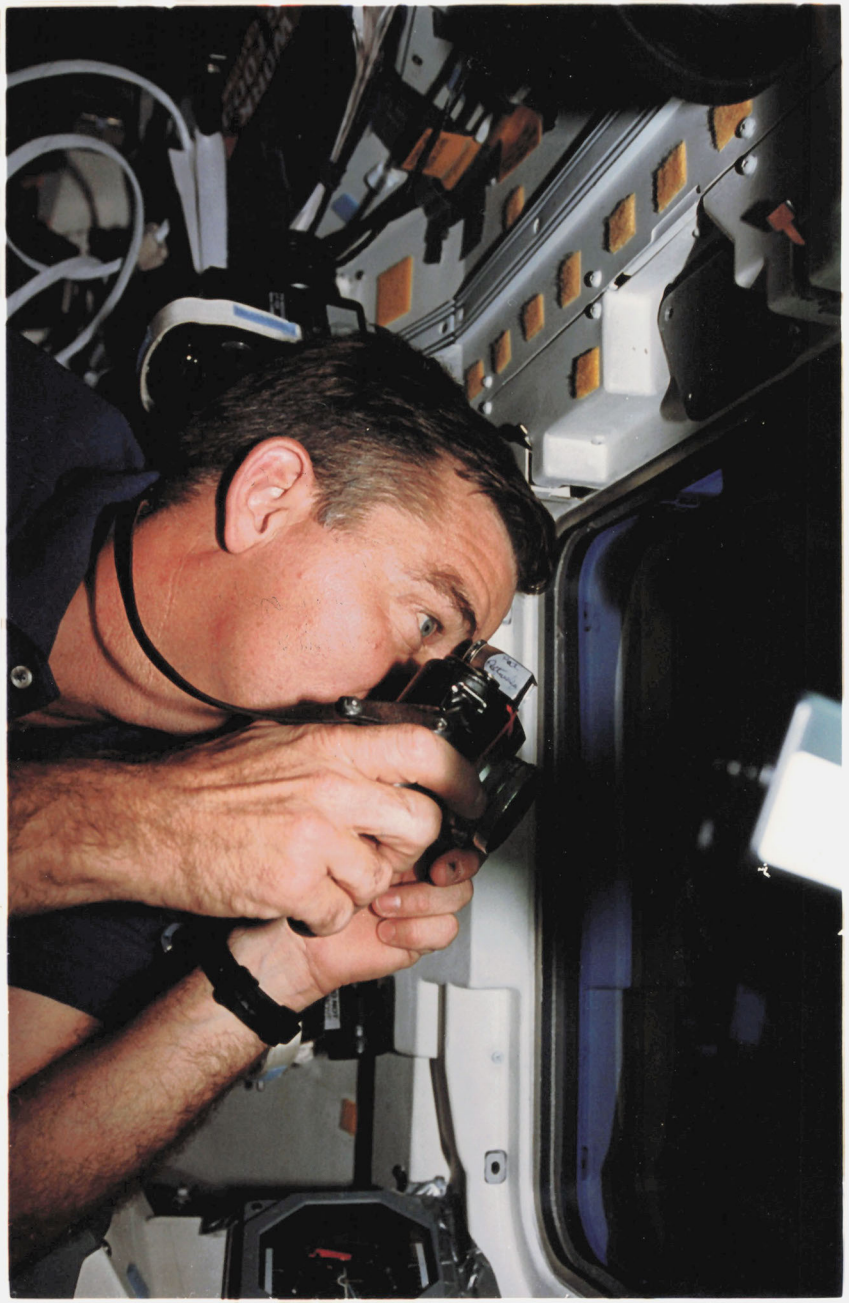

Shuttle astronaut
Jim Voss aims
Andrew "Pat" Patnesky's
Leica camera from the window
of the shuttle Endeavour
in September of 1995.

National Aeronautics and
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STS072-391-009

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space travel - US

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COLOR

15 JANUARY 1996 STS072-391-009

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-72 ONBOARD VIEW --- In the Space Shuttle Endeavour's airlock, a
Leroy Chiao (left) and Daniel T. Barry prepare for the first extravehicular act
scheduled on the mission. The two EVA's were scheduled to evaluate s
assembly techniques.

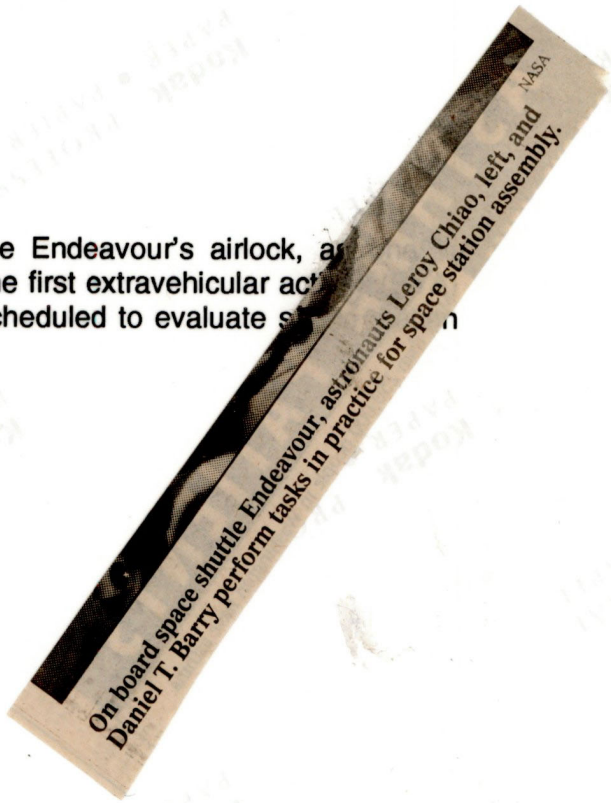

PHOTO CREDIT: NASA or National Aeronautics and Space Administration.

JUL 14 1997

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Space Administration
Lyndon B. Johnson Space Center
Houston, Texas 77058
STS061-(S)002
MUSGRAVE COVEY BOWERSOX AKERS
HOFFMAN NICOLLIER THORNTON

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COLOR

1 OCTOBER 1993 STS061(S)002

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-61 CREW PORTRAIT --- These seven NASA astronauts are currently in training for the Hubble Space Telescope (HST) servicing mission, scheduled for later this year. Astronaut Richard O. Covey, mission commander, is standing at left, with astronaut Kenneth D. Bowersox, pilot, seated at left. The five mission specialists for the mission are (left to right, seated) astronauts Kathryn C. Thornton and F. Story Musgrave, and Swiss scientist Claude Nicollier; and (left to right, standing), astronauts Jeffrey A. Hoffman and Thomas D. Akers. Musgrave, Akers, Thornton and Hoffman are all assigned to participate in five total sessions of extravehicular activity (EVA) for the servicing tasks.

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NASA - SPACE SHUTTLE - ENDEAVOUR - STS 61

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STS061 105 024

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NASA- SPACE SHUTTLE - ENDEAVOUR - STS 61

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COLOR

2 - 13 DECEMBER 1993 STS061-105-024

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-61 ONBOARD SCENE --- One of Endeavour's space walkers captured this view of Endeavour backdropped against the blackness of space, with the Sun displaying a rayed effect.

NASA National Aeronautics and Space Administration

STS057 (S) 002

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NASA - SPACE SHUTTLE - ENDEAVOR - STS 57

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COLOR (PORTRAIT)

FEBRUARY 1993 STS057-(S)-002

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-57 CREW PORTRAIT --- These seven astronauts are in training for NASA's STS-57 mission scheduled for spring of this year. In front are astronauts Brian Duffy (left) and Ronald J. Grabe, pilot and commander, respectively. In back are (left to right) astronauts Peter J. Wisoff, Nancy J. Sherlock, Janice E. Voss, all mission specialists; and G. David Low, payload commander.

100% 57x57 (55)

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STS061-74-046

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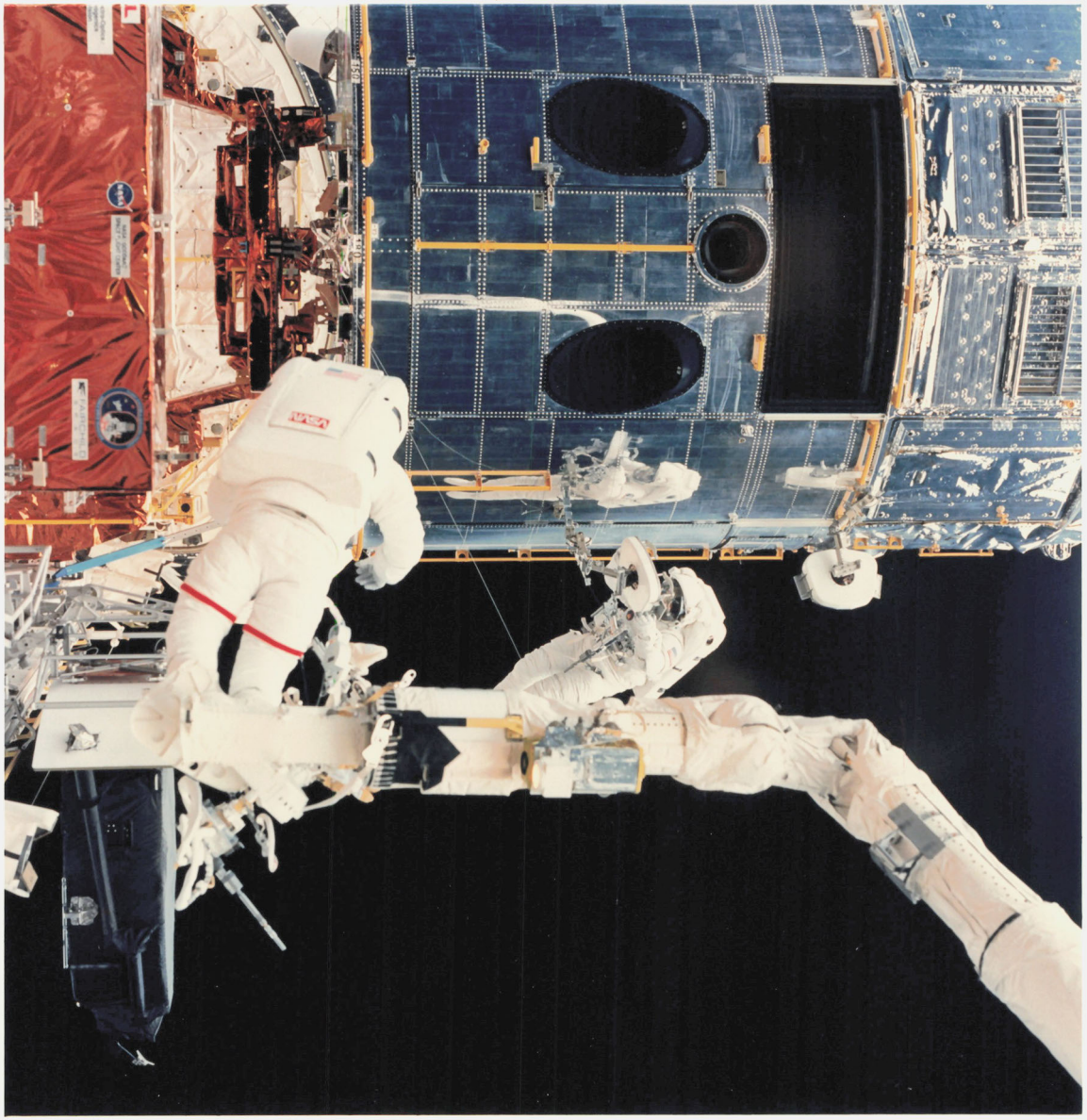

NASA - SPACE SHUTTLE ENDEAVOUR - STS 61

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COLOR

7 DECEMBER 1993 STS061-74-046

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-61 EVA VIEW --- Anchored on the end of Endeavour's Remote Manipulator System (RMS) arm, astronaut Jeffrey A. Hoffman (foreground) prepares to install the new Wide Field\Planetary Camera (WFPC-II) into the empty cavity (top left) on the Hubble Space Telescope (HST). WFPC-I is seen temporarily stowed at bottom right. Astronaut Story Musgrave works with a Portable Foot Restraint (PFR) at frame center, as his image is reflected in the shiny surface of the telescope. Hoffman and Musgrave shared chores on three of the five spacewalks during the STS-61 mission.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration.

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STS061 95 031

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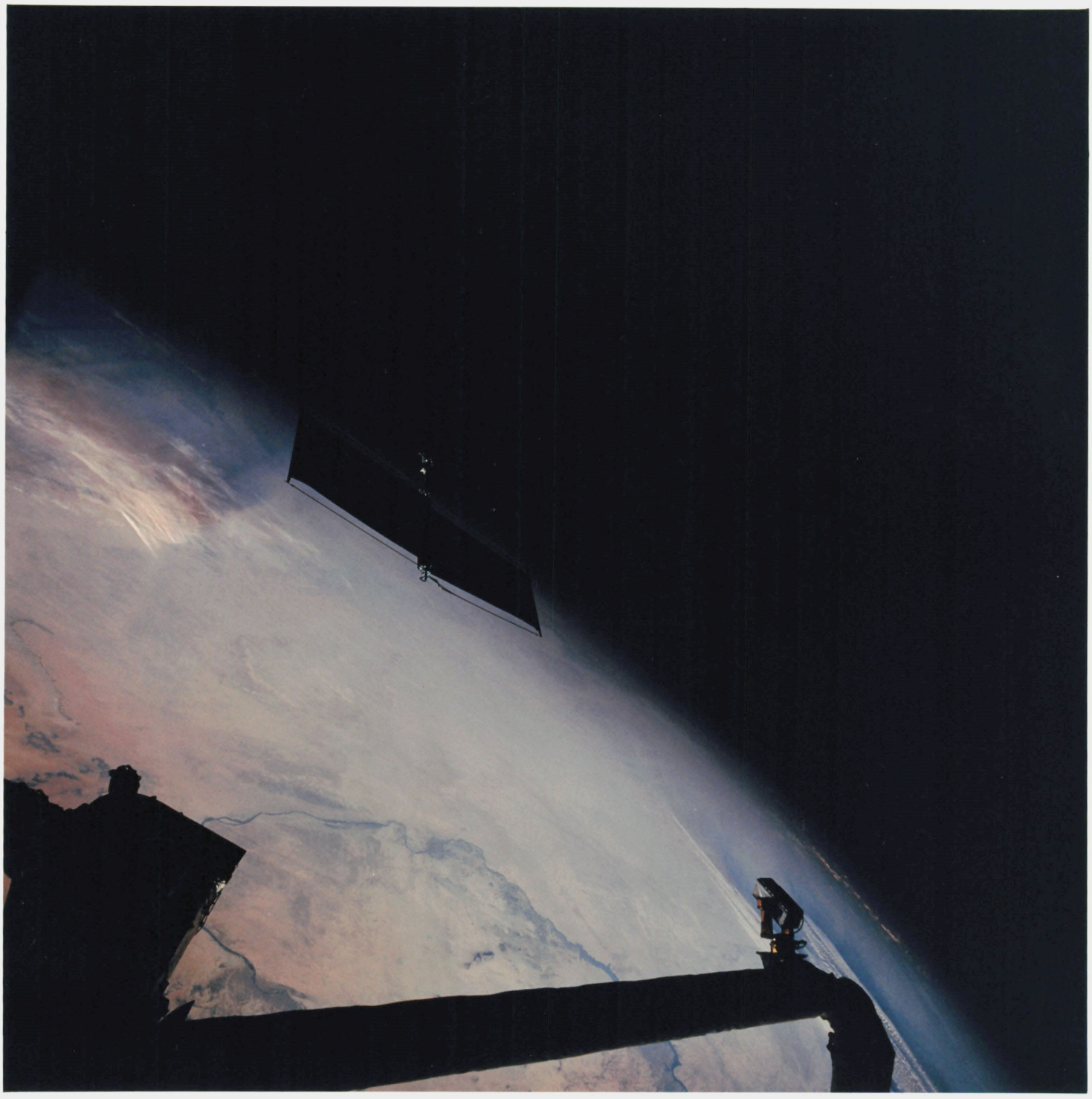

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COLOR

6 DECEMBER 1993 STS061-95-031

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-61 ONBOARD SCENE --- The damaged solar array panel removed from the Hubble Space Telescope (HST) is backdropped over northern Sudan. Astronaut Kathryn C. Thornton, just out of frame at top right, watched the panel after releasing it moments earlier.

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STS061 94 050

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8 DECEMBER 1993 STS061-94-050

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-61 EVA VIEW --- Astronaut Thomas D. Akers maneuvers inside the bay which will house the Corrective Optics Space Telescope Axial Replacement (COSTAR) while assisting astronaut Kathryn C. Thornton with the installation of the 640-pound instrument. Thornton, anchored on the end of the Remote Manipulator System (RMS) arm, is partially visible as she prepares to install the COSTAR.

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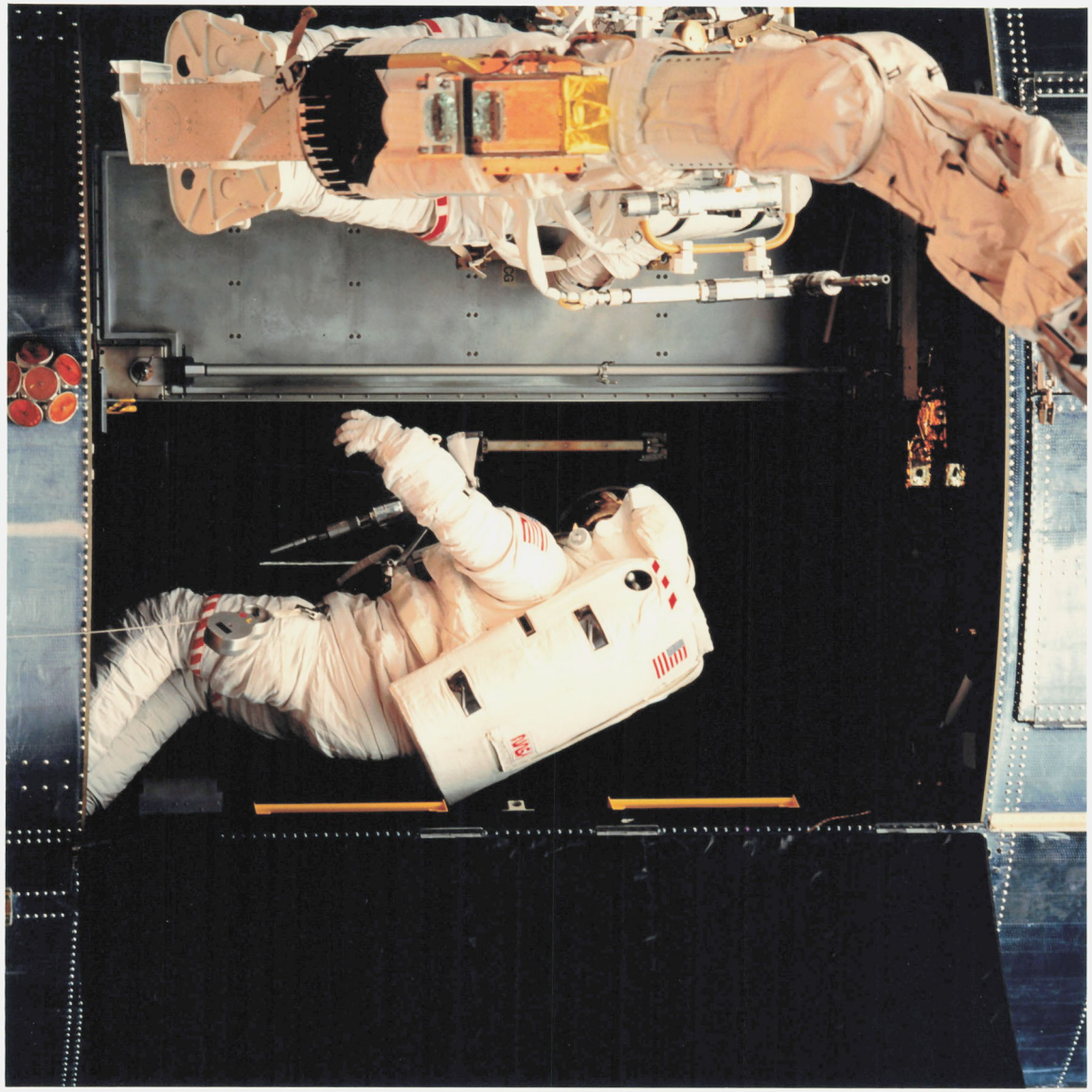

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COLOR

8 DECEMBER 1993 STS061-94-059

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-61 EVA VIEW --- Astronaut Thomas D. Akers maneuvers inside the bay which will house the corrective optics space telescope axial replacement (COSTAR) while assisting astronaut Kathryn C. Thornton with the installation of the 640-pound instrument. Thornton, anchored on the end of the remote manipulator system (RMS) arm, is partially visible as she prepares to install the COSTAR.

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STS061 104 007

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COLOR

5 DECEMBER 1993 STS061-104-007

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-61 ONBOARD SCENE --- Astronaut F. Story Musgrave, holding to one of many strategically placed handrails on the Hubble Space Telescope (HST), is photographed during the first of five space walks on the HST-servicing mission.

National Aeronautics and Space Administration

STS061-38-014

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COLOR

9 DECEMBER 1993 STS061-38-014

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-61 EVA PREP --- Astronaut F. Story Musgrave gets assistance from astronaut Thomas D. Akers while suiting up for the final space walk on the eleven-day, Hubble Space Telescope (HST) servicing mission. Musgrave joined astronaut Jeffrey A. Hoffman (out of frame) on three space walks, while Akers tearned with astronaut Kathryn D. Thornton for two.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

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STS061-37-011

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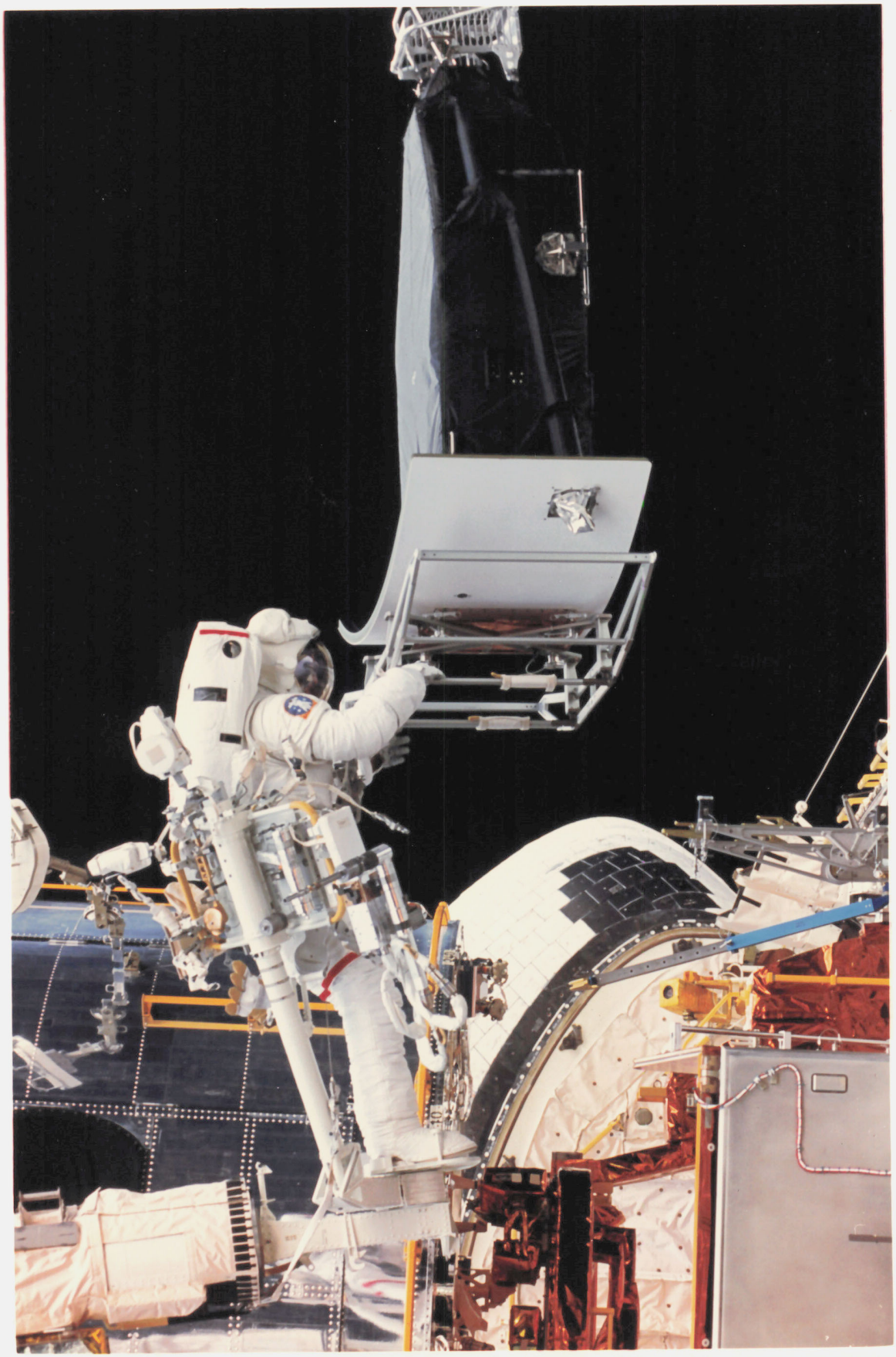

NASA - SPACE Shuttle - ENDEAVOR - STS 61

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COLOR

7 DECEMBER 1993 STS061-37-011

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-61 EVA --- Astronaut Jeffrey A. Hoffman with Wide Field/Planetary Camera (WF/PC I) during changeout operations. WF/PC has already been installed in cavity (out of frame).

70Y 95
47½
78Y 113
+21

PHOTO CREDIT: NASA or National Aeronautics and Space Adrninistration.

RAN 12-19-93

National Aeronautics and Space Administration

STS061-03-029

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COLOR

2 - 13 DECEMBER 1993 STS061-03-029

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-61 ONBOARD SCENE --- Astronaut Jeffrey A. Hoffman displays tools used in the five space walks on STS-61. Hoffman was one of four space walkers making use of the variegated gear.

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STS061 105 026

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COLOR

7 DECEMBER 1993 STS061-105-026

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-61 ONBOARD SCENE --- Astronaut Jeffrey A. Hoffman signals directions to Swiss astronaut Claude Nicollier, as the latter controls the Remote Manipulator System (RMS) arm during the third of five space walks on the Hubble Space Telescope (HST) servicing mission. Astronauts Hoffman and F. Story Musgrave earlier changed out the Wide Field\Planetary Camera (WF\PC).

NASA - SPACE SHUTTLE ENDEAVOR - STS 61

NASA National Aeronautics and Space Administration

STS061 77 078

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COLOR

7 DECEMBER 1993 STS061-77-078

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-61 EVA VIEW --- Astronaut Jeffrey A. Hoffman, anchored on the end of the Remote Manipulator System (RMS) arm, is pictured with the Wide Field/Planetary Camera (WF/PC I) during the third of five STS-61 space walks. Astronauts Hoffman and F. Story Musgrave, seen near the stowage area for the WF/PC, had earlier installed the new camera (note white rectangle) on lower portion of telescope.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration.

NASA - SPACE SHUTTLE ENDEAVOUR - STS 61

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Sp. Shuttle

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COLOR

20 SEPT 1992 STS047-39-034

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-47 ONBOARD VIEW --- Astronauts Robert L. Gibson (left), mission commander; and Curtis L. Brown Jr., pilot, are photographed powering down the Space Shuttle Endeavour at the conclusion of the eight-day Spacelab-J mission. Wearing the partial-pressure launch and entry suits, the two were in the midst of following a series of checklist procedures to complete the mission. The photograph was taken by astronaut Jerome (Jay) Apt, mission specialist, from his entry station behind the pilot and commander positions.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

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STS047-28-002

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20 SEPT 1992 STS047-28-002

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-47 ONBOARD VIEW --- Astronaut Curtis L. Brown Jr., STS-47 pilot, is photographed at the conclusion of the eight-day Spacelab-J mission. Wearing the partial-pressure launch and entry suit, Brown shared the forward cabin with astronaut Robert L. Gibson (out of frame at left), mission commander. Endeavour was completing its second mission in space, this one devoted to research supporting the Spacelab-J mission.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA - SPACE SHUTTLE - STS 47

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STS047-31-009

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12 - 20 SEPT 1992 STS047-31-009

JOHNSON SPACE CENTER, HOUSTON, TEXAS

NASA - SPACE SHUTTLE

STS-47 ONBOARD VIEW --- Two NASA astronauts prepare to try their hand at a new method of eating an in-space meal as chopsticks are called upon by a third crewmember. Pictured left to right, are Curtis L. Brown, pilot; payload specialist Mamoru Mohri representing Japan's National Space Development Agency (NASDA); and Robert L. Gibson, mission commander. Several months of training, as well as the eight-days of sharing research on the Spacelab-J mission, allowed the astronauts and payload specialist to learn a great deal about the two cultures.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

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SPACE SHUTTLE - STS47

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20 SEPT 1992 STS047-28-004

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-47 ONBOARD VIEW --- Astronaut Robert L. Gibson, STS-47 mission commander, is photographed at the conclusion of the eight-day Spacelab-J mission. Wearing the partial-pressure launch and entry suit, Gibson shared the forward cabin with astronaut Curtis L. Brown Jr. (out of frame at right), pilot. Endeavour was completing its second mission in space, this one devoted to support of the Spacelab-J mission.

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12 - 20 SEPT 1992 STS47-04-007

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-47 ONBOARD VIEW --- Six of the seven crewmembers supporting the Spacelab-J mission share this shift change scene in the science module. From the foreground, are astronauts Mae C. Jemison, Mark C. Lee, Robert L. Gibson, N. Jan Davis and Curtis L. Brown Jr.; and payload specialist Mamoru Mohri representing Japan's National Space Development Agency (NASDA). The photograph was taken by astronaut Jerome (Jay) Apt.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA - SPACE SHUTTLE - STS-47

NASA National Aeronautics and Space Administration

STS047 07 032

Lyndon B. Johnson Space Center
Houston, Texas 77058

National Aeronautics and
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Houston, Texas 77058

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12 - 20 SEPT 1992 STS47-07-032

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-47 ONBOARD VIEW --- Astronaut Mark C. Lee, payload commander, floats through the tunnel that connects Spacelab-J's science module to the Space Shuttle Endeavour's cabin. Lee was in the midst of a televised "tour" of the shuttle and its primary payload when he pointed to the Japanese sign overhead, which translates to, "EXIT-ENTRANCE." Lee was joined by five NASA astronauts and a Japanese payload specialist for eight-days of research in support of the Spacelab-J project.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA - SPACE SHUTTLE - STS-47

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12 -- 20 SEPT 1992 STS047-05-019

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-47 ONBOARD VIEW --- Astronaut Jerome (Jay) Apt, mission specialist, responds to a crewmate's query during a shift change in the Spacelab-J science module aboard the Earth-orbiting Space Shuttle Endeavour. Others pictured, left to right, are astronauts Mark C. Lee (immediate foreground, partially out of frame), payload commander; Mae C. Jemison and N. Jan Davis, mission specialists. The four joined two other NASA astronauts and a Japanese payload specialist for eight days aboard Endeavour in support of the joint Japanese-American effort.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA - SPACE SHUTTLE - STS47

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12 - 20 SEPTEMBER 1992 STS47-12-002

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-47 ONBOARD VIEW --- The STS-47 crewmembers assemble for their traditional in-flight portrait in this 35mm frame photographed in the science module aboard the Earth-orbiting Space Shuttle Endeavour. Left to right (front) are N. Jan Davis, Mark C. Lee and Mamoru Mohri; and (rear) Curtis L. Brown Jr., Jerome (Jay) Apt, Robert L. Gibson and Mae C. Jemison. The seven spent eight days in space in support of the Spacelab-J mission.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA - Space Shuttle - STS 47

NASA National Aeronautics and Space Administration

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12 -- 20 SEPT 1992 STS047-05-025

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-47 ONBOARD VIEW --- Payload specialist Mamoru Mohri, representing Japan's National Space Development Agency (NASDA), uses a microscope to produce photomicrographs of mammalian cells. The mammal cell structure experiment is one of a large number of tests that were performed during the eight-day Spacelab-J mission. On his back, Dr. Mohri totes a health monitoring experiment. The primary objective of the physiological monitoring system is to observe the health condition of the Japanese payload specialist so that good health can be maintained during and after the spaceflight.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA - SPACE SHUTTLE - STS 47

NASA National Aeronautics and Space Administration

STS047-02-018

Lyndon B. Johnson Space Center
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COLOR

12 - 20 SEPT 1992 STS047-02-018

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-47 ONBOARD VIEW --- Astronauts N. Jan Davis, mission specialist, and Curtis L. Brown Jr., pilot, oversee the progress of some of the 180 female Oriental Hornets onboard Endeavour. The insects are part of the Israeli Space Agency Investigation About Hornets (ISAIAH) experiment. The objective of this experiment is to examine the effects of microgravity on the orientation, reproductive capability and social activity of the hornets. Also, the direction of comb-building by hornet workers in microgravity, as well as the structural integrity of the combs, will be examined.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA - SPACE SHUTTLE - STS47

NASA
CK COVEY
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National Aeronautics and
Space Administration

John F. Kennedy Space Center
Kennedy Space Center, Florida 32899
AC 407 867-7819

FOR RELEASE: December 2, 1993

PHOTO NO.: KSC-93PC-1528

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KENNEDY SPACE CENTER, FLA. -- A suit technician helps STS-61 Mission Commander Richard O. Covey don his launch/entry suit in the Operations and Checkout Building. The seven astronauts assigned to Mission STS-61 will soon depart for Launch Pad 39B, where the Space Shuttle Endeavour awaits a second liftoff attempt at 4:27 a.m. EST.

Covey, Richard O. "Dick"
Astronaut

The Huntsville Times
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PHOTO CREDIT: NASA, OR NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

KEN BOWERSOX

National Aeronautics and
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John F. Kennedy Space Center
Kennedy Space Center, Florida 32899
AC 407 867-7819

FOR RELEASE: December 2, 1993

PHOTO NO.: KSC-93PC-1529

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KENNEDY SPACE CENTER, FLA. -- A suit technician helps STS-61 Pilot Kenneth D. Bowersox don his launch/entry suit in the Operations and Checkout Building. The seven astronauts assigned to Mission STS-61 will soon depart for Launch Pad 39B, where the Space Shuttle Endeavour awaits a second liftoff attempt at 4:27 a.m. EST.

Bowersox, Kenneth D.
Astronaut

The Huntsville Times
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PHOTO CREDIT: NASA, OR NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NASA

National Aeronautics and
Space Administration

STS061 105 026

Lyndon B. Johnson Space Center
Houston, Texas 77058

7 Dec. 93

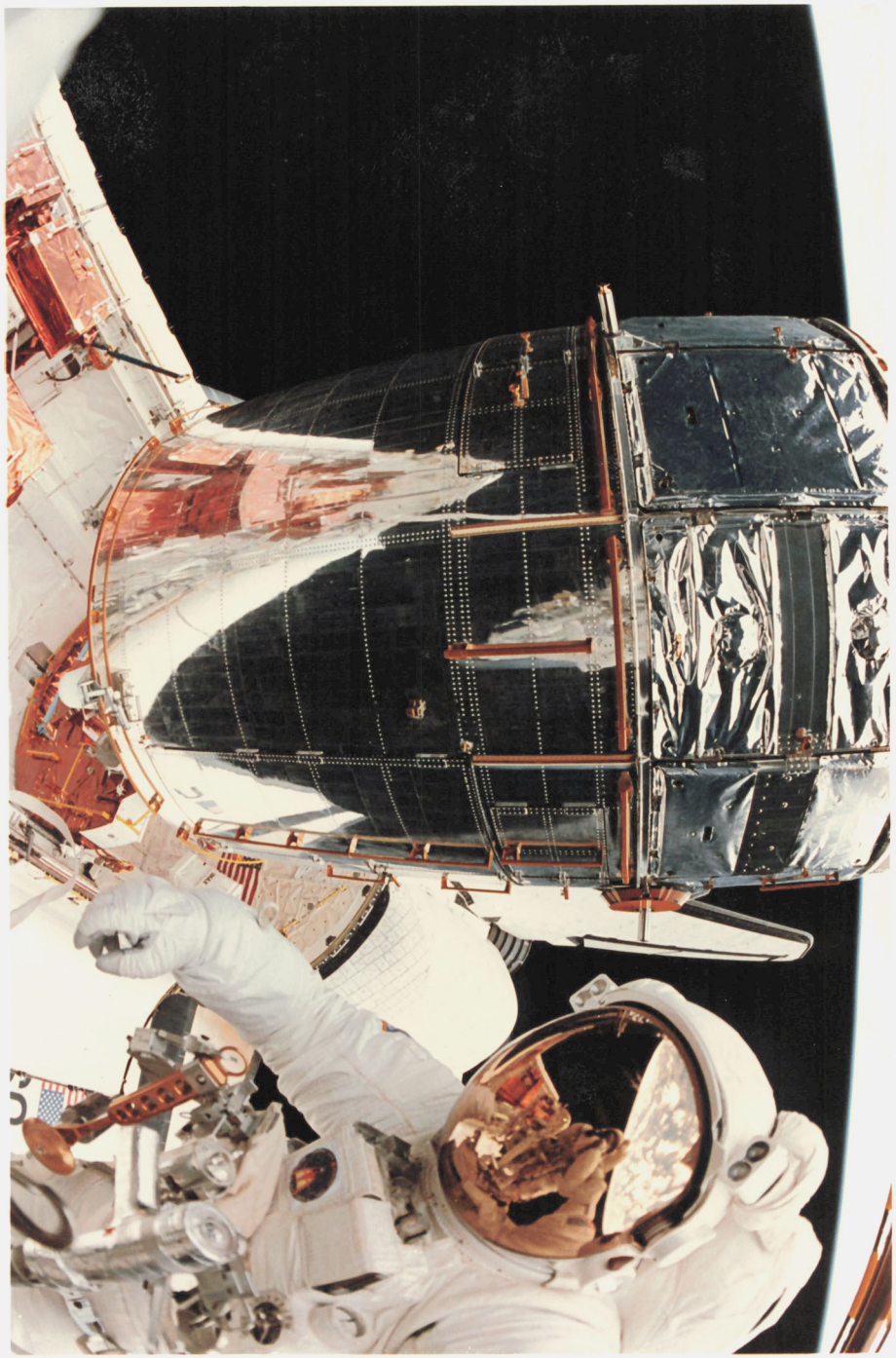
Endeavor: Astronaut Jeffry Hoffman
Hubble Repair Mission NASA

NASA - SPACE SHUTTLE ENDEAVOUR - STS 61

National Aeronautics and Space Administration

STS061-65-009

Lyndon B. Johnson Space Center
Houston, Texas 77058



NASA- SPACE SHUTTLE - ENDEAVOUR — STS 61

National Aeronautics and Space Administration

Houston, Texas 77058

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2 - 13 DECEMBER 1993 STS061-65-009

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-61 EVA VIEW --- Astronaut Jeffrey A. Hoffman is reflected in the helmet visor of F. Story Musgrave as he photographs the veteran astronaut during of the pair's three-shared spacewalk.

10 x 5
12 x 8

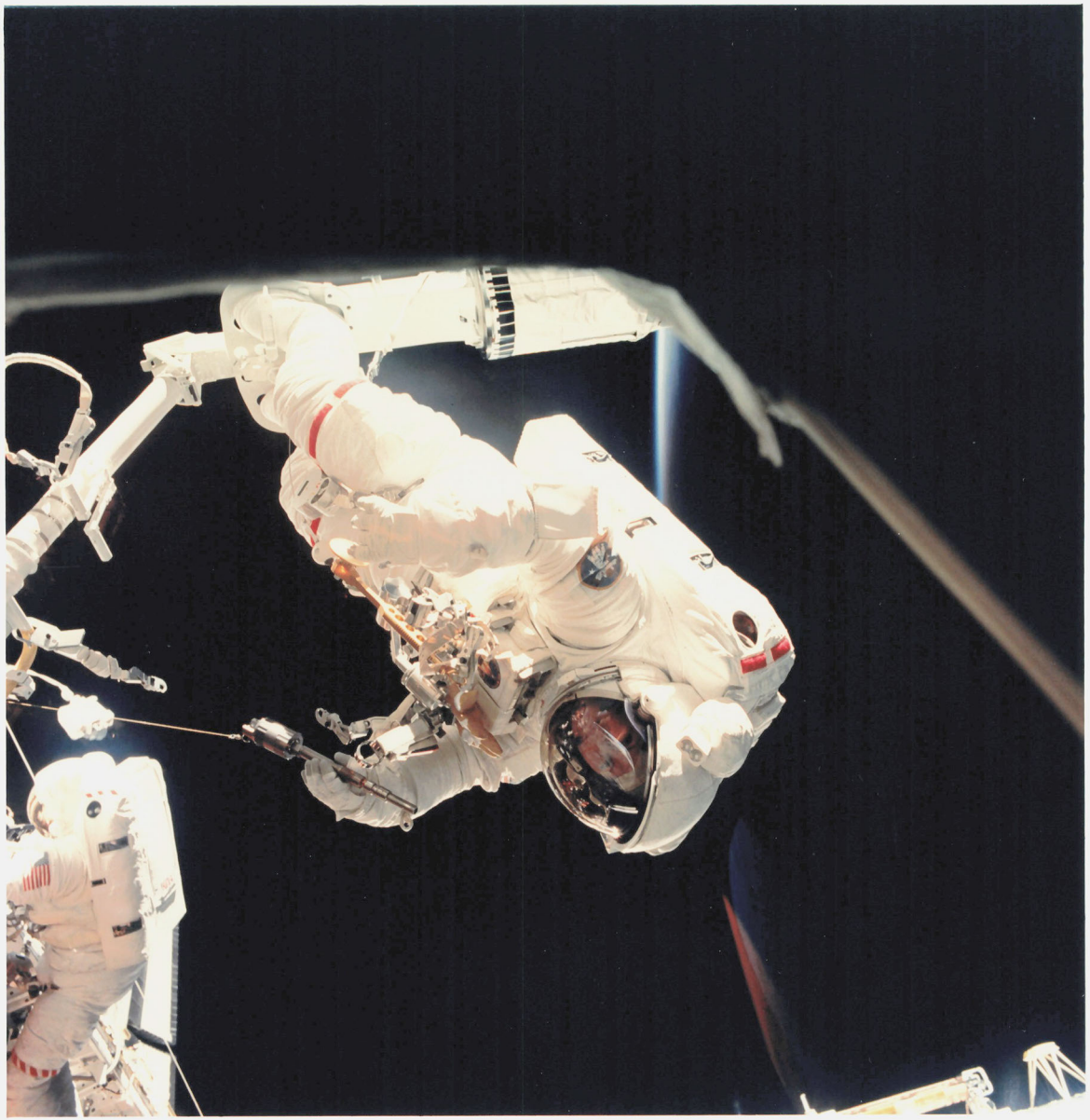
10 5 x 13

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA National Aeronautics and Space Administration

STS061-77-016

Lyndon B. Johnson Space Center
Houston, Texas 77058



NASA- SPACE SHUTTLE ENDEAVOUR STS 61

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Houston, Texas 77058

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COLOR

6 DECEMBER 1993 STS061-77-016

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-61 EVA VIEW --- During her first STS-61 extravehicular activity (EVA) session, astronaut Kathryn C. Thornton was captured on 70mm film by one of her crewmates inside the shirtsleeve environment of the Space Shuttle Endeavour. As astronauts Thornton and Thomas D. Akers (seen here in the background) approached the viewing area of their crewmates while performing servicing tasks on the Hubble Space Telescope (HST), they were frequently photographed with various cameras. This EVA was the second of five performed during the eleven-day mission.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

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STS047 46 027

Lyndon B. Johnson Space Center
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COLOR

12 - 20 SEPTEMBER 1992 STS47-46-027

JOHNSON SPACE CENTER, HOUSTON, TEXAS

STS-47 ONBOARD VIEW --- Astronauts N. Jan Davis (left) and Mae C. Jemison, mission specialists, prepare to deploy the lower body negative pressure (LBNP) apparatus in this 35mm frame photographed in the science module aboard the Earth-orbiting Space Shuttle Endeavour. Making their first flight in space, the two were joined by four other NASA astronauts and a Japanese payload specialist for eight days of research. The Spacelab-J mission is a joint effort between Japan and the USA.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA - SPACE SHUTTLE - STS47

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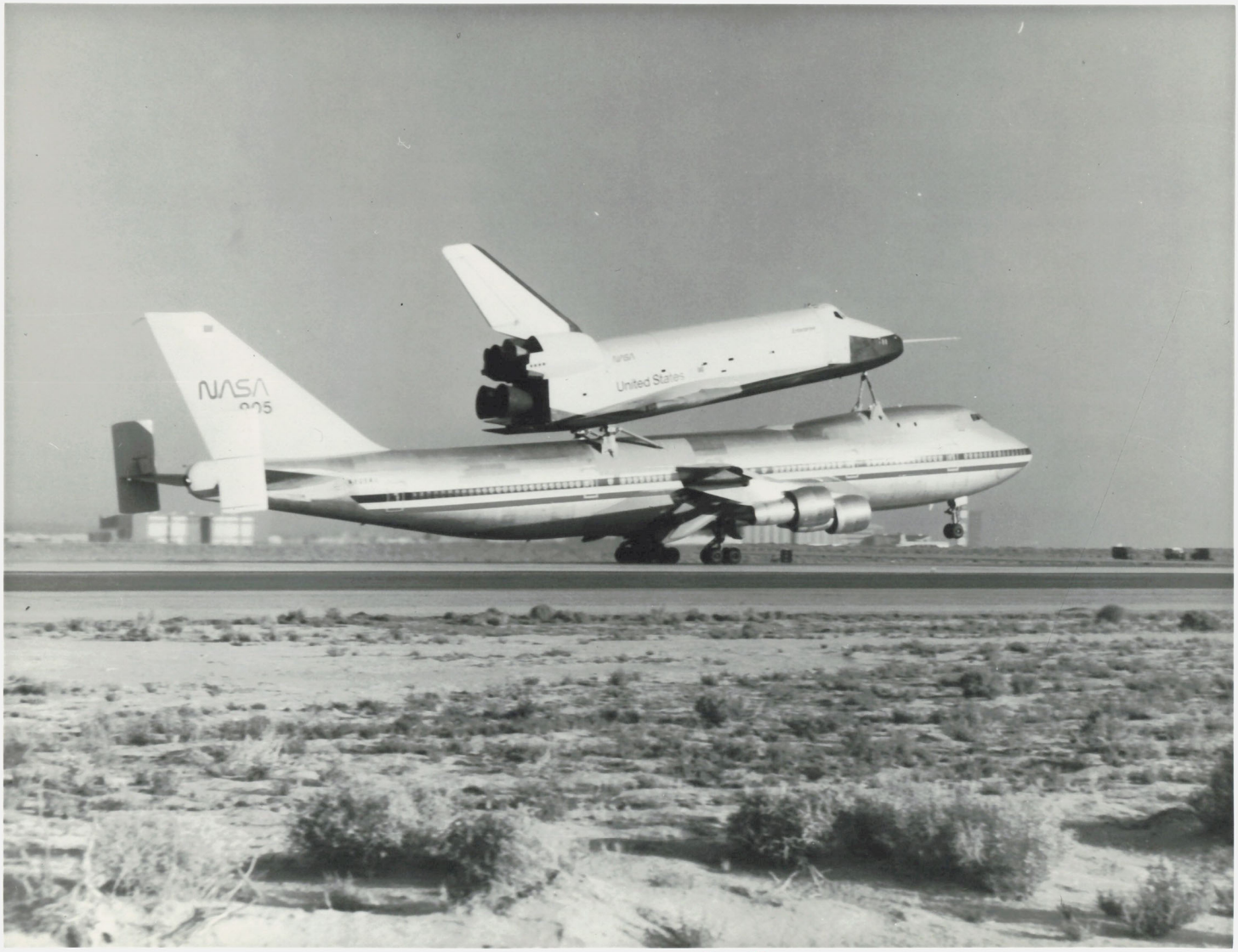
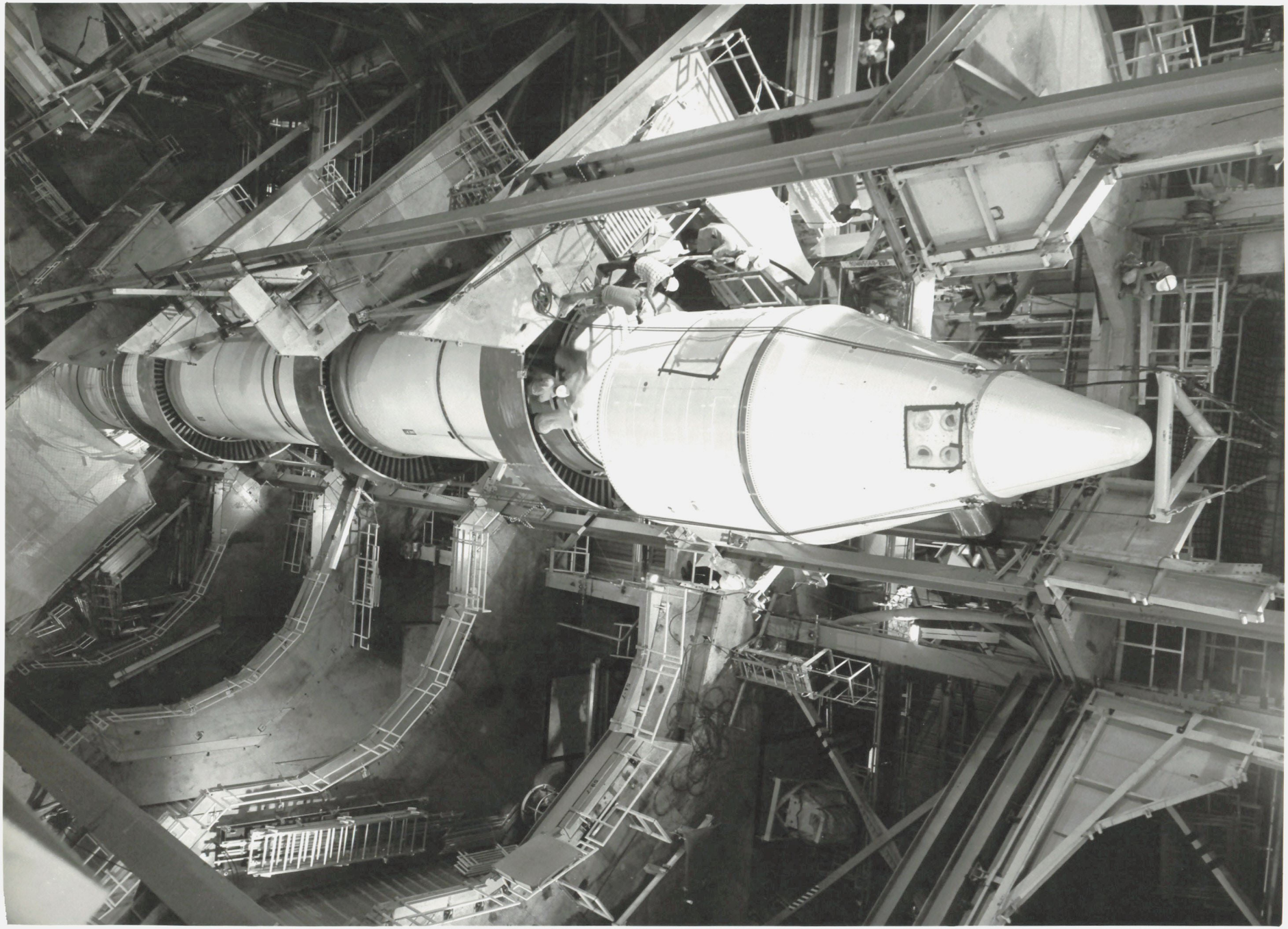


NASA - SPACE SHUTTLE



4 3/16 x 7

SHUTTLE

Circle Inked

P.S.

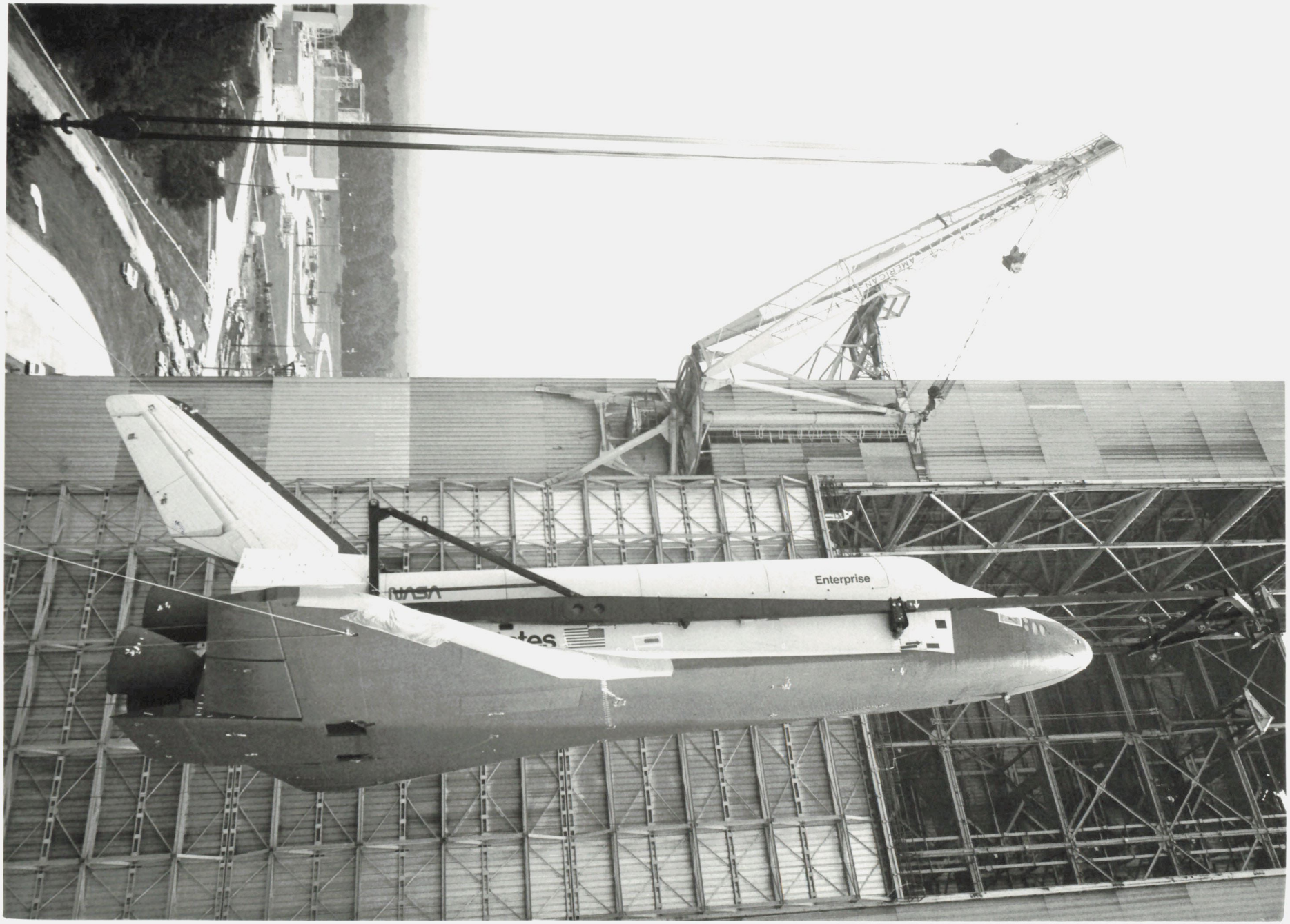
—NASA Photo

THE FORWARD ASSEMBLY of a Space Shuttle Solid Rocket Booster is lowered into place in the dynamics test stand at NASA's Marshall Space Flight Center in Huntsville, Ala. Two of these boosters are being stacked vertically in the stand in preparation for the assembly of all elements of the Space Shuttle. Following the operation shown here, an External Tank and Orbiter "Enterprise" will be added to complete the shuttle package. The external tank is manufactured in New Orleans.

OCT 11 1978

NASA National Aeronautics and Space Administration

George C. Marshall Space Flight Center
Huntsville, Alabama



SPACE TRAVEL - US - SPACE SHUTTLE (ORBITOR ENTERPRISE)

NASA
National
Aeronautics and
Space
Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center Alabama 35812
AC 205 453-0034

FOR RELEASE: Upon Receipt

PHOTO NO. 8-90842
78P-36

MARSHALL SPACE FLIGHT CENTER, Ala. -- The Space Shuttle Orbiter Enterprise is lowered down the north wall of a dynamics test stand at NASA's Marshall Space Flight Center in Huntsville, Ala. The Orbiter and its huge external fuel tank both had to be removed from the 400-foot tall building through a hatch near the top. They recently completed the first phase of a year-long series of preflight tests in the tall building. After modifications are made to the test stand, the Enterprise will be reinstalled inside together with its companion External Tank and Solid Rocket Boosters. This will be the first time an entire Space Shuttle is ever assembled.

-30-

July 31, 1978

AUG 6 1978

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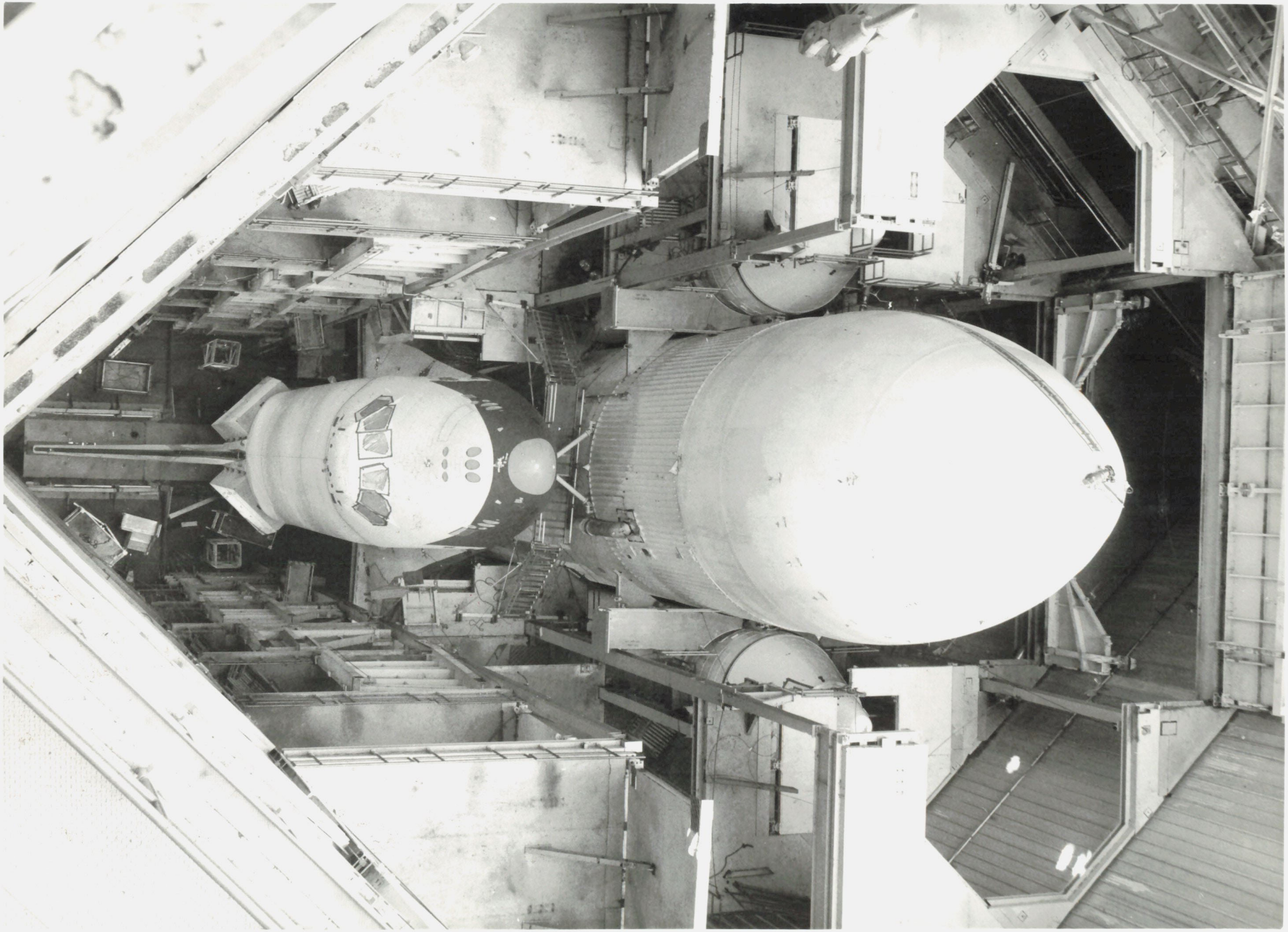
AMERICAN REVOLUTION BICENTENNIAL 1776-1976



XXX HUNTSVILLE, AL

MARSHALL SPACE CENTER

NASA

National
Aeronautics and
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Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812
AC 205 453-0034

FOR RELEASE: Upon Receipt

PHOTO NO. 9-92475

MARSHALL SPACE FLIGHT CENTER, Ala.-- A complete Space Shuttle was mated for the first time on the afternoon of Oct. 6, 1978, in the Dynamics Test Stand at NASA's Marshall Space Flight Center, Huntsville, Ala. The Shuttle elements were mated in preparation for the second phase ("liftoff" configuration) of Shuttle ground vibration testing. The External Tank (center) is mated between two Solid Rocket Boosters filled with inert propellants. The Orbiter Enterprise is mated to the External Tank.

-30-

APR 18 1979

October 6, 1978

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AMERICAN REVOLUTION BICENTENNIAL 1776-1976

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NASA
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Space Shuttle

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18 FEBRUARY 1977

DRYDEN FLIGHT RESEARCH CENTER, CALIFORNIA

SHUTTLE ALT CAPTIVE INERT FLIGHT---------The Shuttle Orbiter 101 "Enterprise" is seen riding "piggy-back" atop the NASA 747 during the first of six Approach and Landing Test unmanned, inert Orbiter flights made at the Dryden Flight Research Center in Southern California on February 18, 1977. This picture was taken by a photographer riding in a T-38 chase plane which was flying slightly below and to the left of the 747/Orbiter. Specially installed support struts hold the Orbiter onto the larger, carrier aircraft. The purpose of this flight was to obtain evaluation of low speed performance and handling qualities. The tailcone on the Orbiter is an aerodynamic fairing to reduce buffeting on the 747 tail surfaces. Note the trailing cone airspeed sensor. The 747/Orbiter is flying at about 16,000 feet altitude. This first captive, inert flight of the Orbiter was about 2 hours and 8 minutes in duration. Another T-38 chase plane flies above the 747/Orbiter.

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MON MAR 7 1977

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

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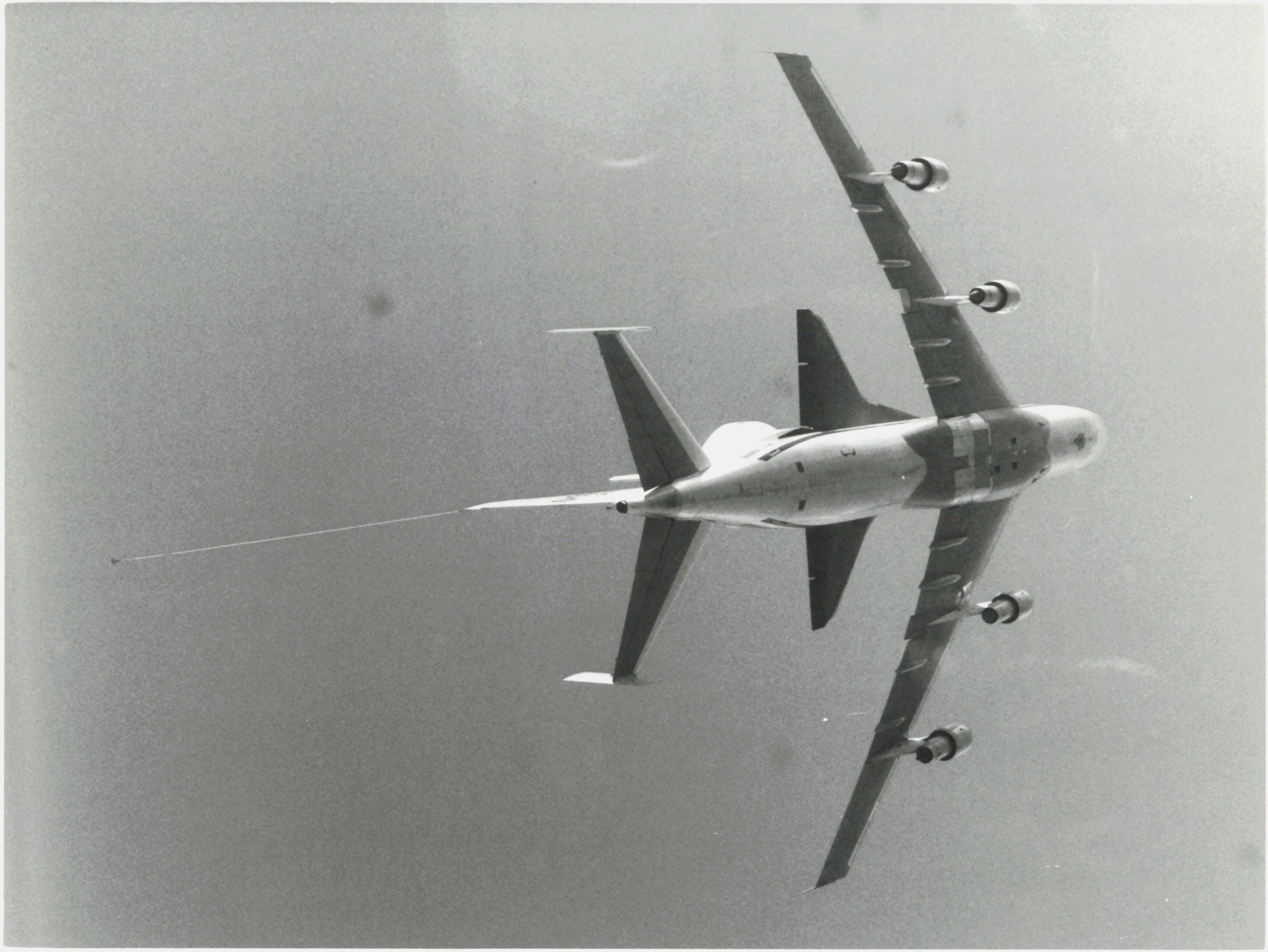

Space Shuttle

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13 FEBRUARY 1977

DRYDEN FLIGHT RESEARCH CENTER, CALIFORNIA

SHUTTLE ALT CAPTIVE INERT FLIGHT------The Shuttle Orbiter 101 "Enterprise" is seen riding "piggy-back" atop the NASA 747 during the first of six Approach and Landing Test unmanned, inert Orbiter flights made at the Dryden Flight Research Center in Southern California on February 13, 1977. This picture was taken by a photographer riding in a T-38 chase plane which was flying below and slightly aft of the 747/Orbiter. Specially installed support struts hold the Orbiter onto the larger, carrier aircraft. The purpose of this flight was to obtain evaluation of low speed performance and handling qualities. Note the trailing cone airspeed sensor. The 747/Orbiter is flying at about 16,000 feet altitude. This first captive, inert flight of the Orbiter was about 2 hours and 8 minutes in duration.

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NASA National Aeronautics and Space Administration

S77-28140

Lyndon B. Johnson Space Center
Houston, Texas 77058

Space Shuttle

THU NOV 6 1980

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Houston, Texas 77058

Thu NS Pg 2-1

7¼"x 4¼"

Space

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13 SEPTEMBER 1977

DRYDEN FLIGHT RESEARCH CENTER, EDWARDS, CALIFORNIA

SHUTTLE ALT FF-2 LANDING---The Shuttle Orbiter 101 "Enterprise" stirs up a cloud of desert sand and dust as it lands to conclude a five-minute, 20-second unpowered flight during the second free flight of the Shuttle Approach and Landing Tests (ALT) conducted on September 13, 1977 at the Dryden Flight Research Center in Southern California. The Orbiter 101 crew was Astronauts Joe H. Engle, commander, and Richard H. Truly, pilot. The ALT free flights are designed to verify Orbiter subsonic airworthiness, integrated system operations and pilot-guided approach and Landing

Chronicle photo

The Space Shuttle orbiter "Enterprise" — shown in this file photograph — stirs a cloud of dust as it glides to a landing in an early unpowered flight test. The flights tested subsonic airworthiness and landing capability. The first flight into space is scheduled for early next year.

THU NOV 6 1980

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Space Shuttle

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18 FEBRUARY 1977

DRYDEN FLIGHT RESEARCH CENTER, CALIFORNIA

SHUTTLE ALT CAPTIVE INERT FLIGHT----The Shuttle Orbiter 101 "Enterprise" is seen atop the NASA 747 during the first of six Approach and Landing Test unmanned, inert Orbiter flights made at the Dryden Flight Research Center in Southern California on February 18, 1977. Specially installed support struts aid the 150,000-lb. (68,000 kg.) Orbiter in riding "piggy-back" on the much larger 747 aircraft. The purpose of this flight was to obtain evaluation of low speed performance and handling qualities. The tailcone on the Orbiter is an aerodynamic fairing to reduce buffeting on the 747 tail surfaces. This picture was taken from a T-38 chase plane when the 747/Orbiter craft was about 16,000 feet altitude. The first captive, inert flight of Orbiter was about 2 hours and 8 minutes in duration. Another chase plane can be seen in the left background. Note the rugged mountainous terrain below.

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PHOTO CREDIT: NASA or National Aeronautics and Space Administration

NASA
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Space Shuttle

NASA
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18 FEBRUARY 1977

DRYDEN FLIGHT RESEARCH CENTER, CALIFORNIA

SHUTTLE ALT CAPTIVE INERT FLIGHT------The Shuttle Orbiter 101 "Enterprise" is seen riding "piggy-back" atop the NASA 747 during the first of six Approach and Landing Test unmanned, inert Orbiter flights made at the Dryden Flight Research Center in Southern California on February 18, 1977. Specially installed support struts hold the Orbiter onto the larger carrier aircraft. The purpose of this flight was to obtain evaluation of low speed performance and handling qualities. The tailcone on the Orbiter is an aerodynamic fairing to reduce buffeting on the 747 tail surfaces. This picture was taken from a T-38 chase plane when the 747/Orbiter was about 16,000 feet altitude. This first captive, inert flight of the Orbiter was about 2 hours and 8 minutes in duration. The photographer's chase plane was to the left and slightly to the rear of the 747/Orbiter. Two other chase planes can be seen in the background. Rugged terrain is in the background.

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MON MAR 7 1977

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S-77-22734

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National Aeronautics and
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Houston, Texas 77058

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25 FEBRUARY 1977

DRYDEN FLIGHT RESEARCH CENTER, EDWARDS, CALIFORNIA

SHUTTLE ALT CAPTIVE/INERT FLIGHT——The Shuttle Orbiter 101 "Enterprise" atop the NASA 747 carrier aircraft takes off to begin the third Approach and Landing Test unmanned, inert Orbiter flight conducted at the Dryden Flight Research Center. Specially installed support struts hold the Orbiter onto the larger, carrier aircraft. The purpose of this test was to complete basic flutter and stability testing, and explore minimum flying speed for heavy and light gross weight conditions at several 747 flap settings. The taileone on the Orbiter is an aerodynamic fairing to reduce buffeting on the 747 tail surfaces.

NASA - SPACE SHUTTLE

PHOTO CREDIT: NASA or National Aeronautics and Space Administration

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Lyndon B. Johnson Space Center
Houston, Texas 77058

Space Shuttle

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1 MAY 1979 S-79-32192

KENNEDY SPACE CENTER, FLORIDA

SPACE SHUTTLE ROLLOUT --- The Shuttle Orbiter 101 Enterprise is seen in this high angle view as it leaves the Vehicle Assembly Building (VAB) atop a mobile launcher powered by a transporter/crawler destined for the Kennedy Space Center's Launch Complex 39, where it will be placed in launch configuration on Pad A. Mated to its solid rocket boosters (SRB) and external tank (ET) in a normal rollout mode, the Enterprise will undergo several weeks of fit and function checks at the launch facility to help pave the way for its successor craft, OV102 Columbia. The later craft will be used in the orbital flight test (OFT) program, beginning with STS-1. A 3½-mile trip lies ahead for the cluster here as it leaves the VAB.

FRI JUL 11 1980

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NASA National Aeronautics and Space Administration

S- 79- 38278

Lyndon B. Johnson Space Center
Houston, Texas 77058

Space Shuttle

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1 NOVEMBER 1979 S-79-38278

DRYDEN FLIGHT RESEARCH CENTER, EDWARDS, CALIFORNIA

SHUTTLE ORBITER 101 MOVED BACK TO PALMDALE ----- Interested onlookers watch as a truck transports the Space Shuttle Orbiter 101 Enterprise down a roadway en route to the vehicle's Palmdale manufacturing facility, after a time away from the plant while undergoing a long series of variegated testing. This trip over land was about 35 miles long, from the Dryden Flight Research Center (DFRC) to the Palmdale facility. NASA 905, a 747 carrier aircraft, ferried the orbiter from Kennedy Space Center to DFRC. Testing of the Enterprise at both Marshall Space Flight Center (MSFC) and KSC, was done in preparation for upcoming Space Shuttle flights with the Orbiter 102 Columbia.

FRI JUL 11 1980

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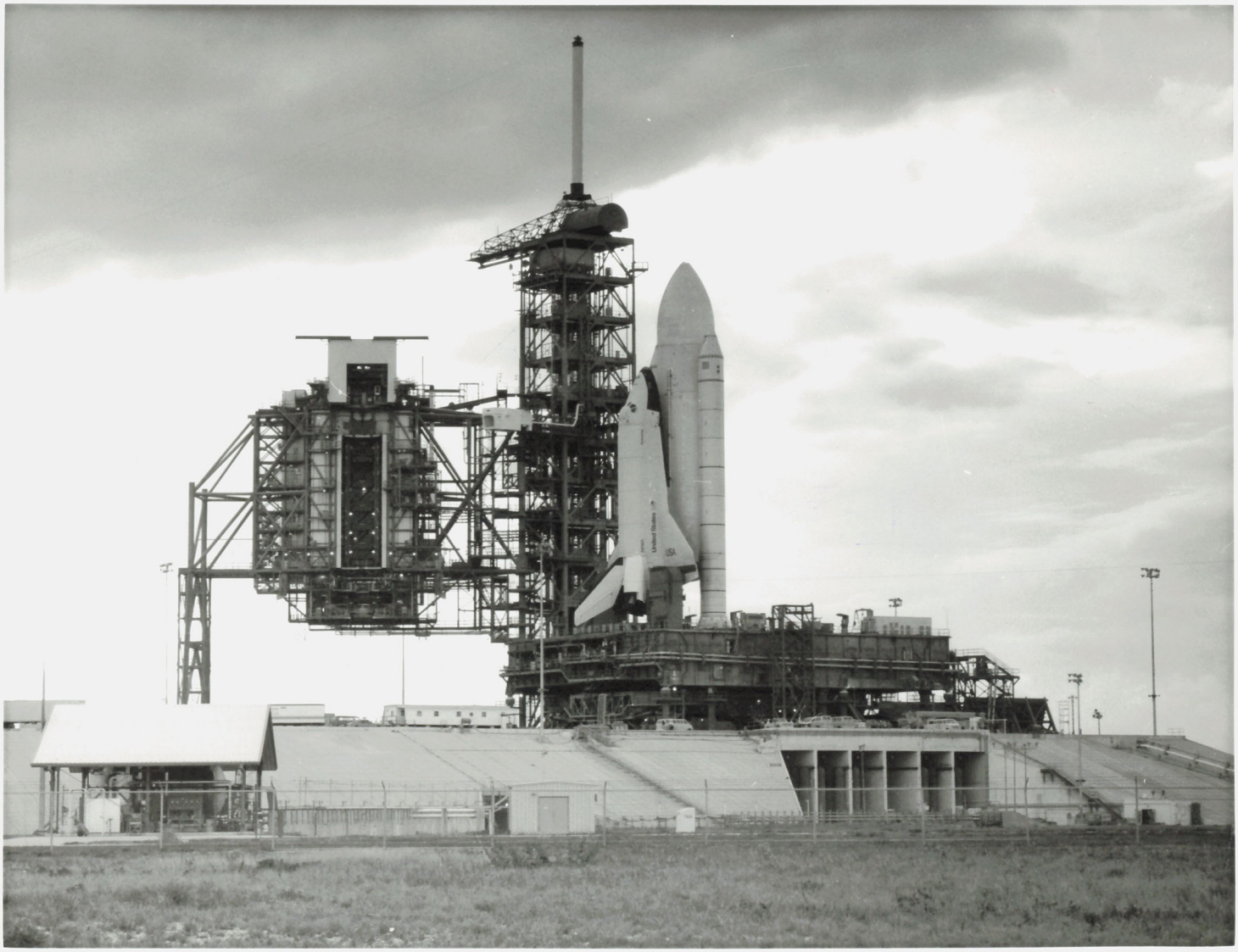

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1 MAY 1979

KENNEDY SPACE CENTER, FLORIDA

SPACE SHUTTLE ROLLOUT -- The Shuttle Orbiter 101 Enterprise at launch pad following a 3½-mile journey from the Vehicle Assembly Building. This scene culminated an eleven-hour effort. This trip marked the first time that the complete Space Shuttle configuration has been assembled in the VAB and moved to Launch Complex 39, Pad A. The Enterprise will remain at the pad for approximately five weeks for fit and function checks which will clear the way for the launch of its successor craft, Columbia, which will be used in the orbital flight test (OFT) program, beginning with OFT-1

JUL 11 1980

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George C. Marshall Space Flight Center
Huntsville, Alabama

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George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812
AC 205 453-0034

FOR RELEASE: Upon Receipt
PHOTO NO. 9-92404

ENTERPRISE TAKES A HIGH RIDE

MARSHALL SPACE FLIGHT CENTER, Ala.--The Space Shuttle Orbiter Enterprise is hoisted up the side of the 36-story-tall dynamics test stand at NASA's Marshall Space Flight Center, Huntsville, Ala. This is the second time the Enterprise has been installed in the test stand since its arrival here in March 1978. It will be mated to an External Tank and two Solid Rocket Boosters for ground vibration tests simulating liftoff.

-30-

October 1978

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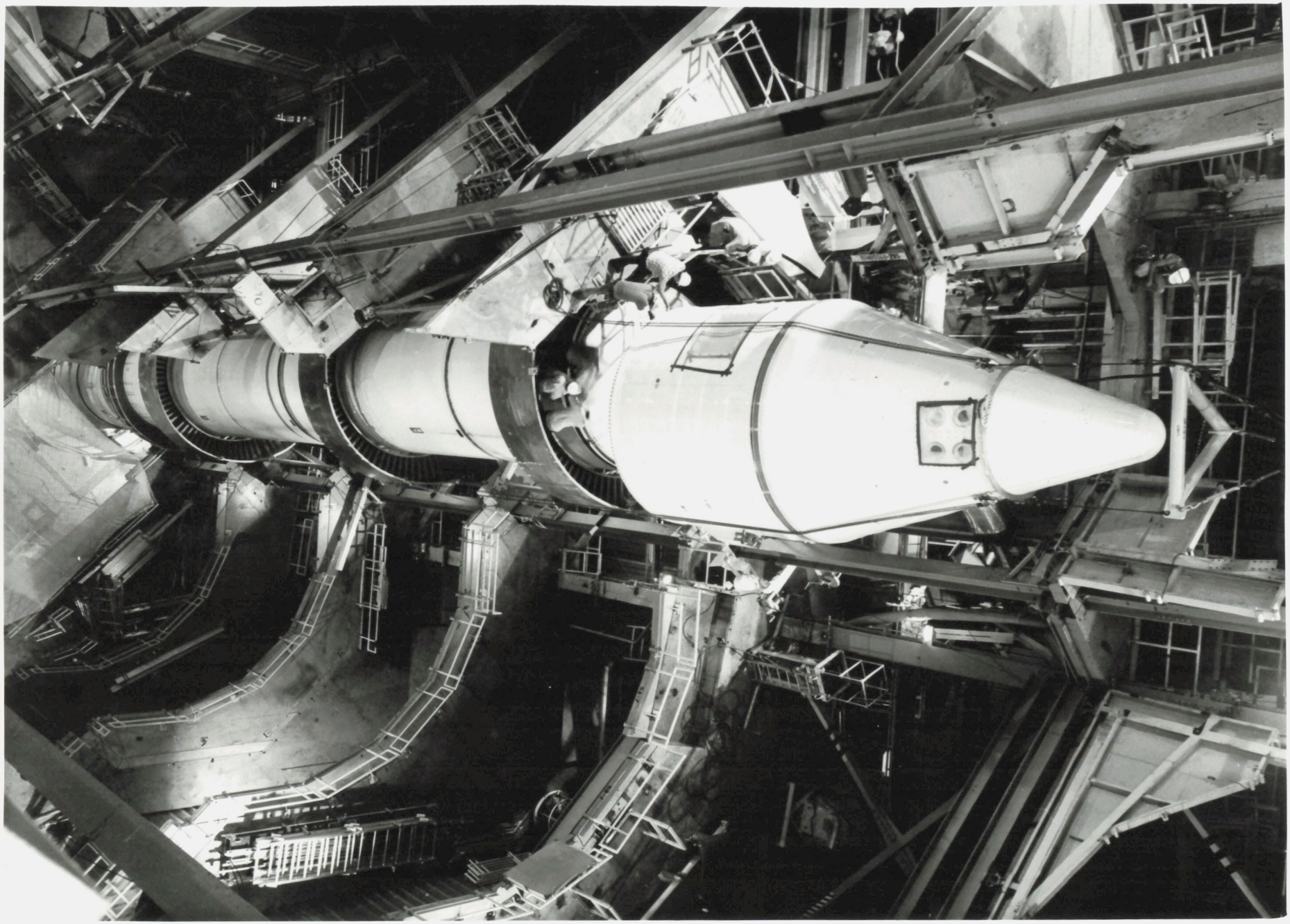
MSFC - Form 2914-22 (October 1976)



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Marshall Space Flight Center, Alabama 35812
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PHOTO NO. 8-91944
78P-43

COMPLETE SPACE SHUTTLE BEING ASSEMBLED

MARSHALL SPACE FLIGHT CENTER, Ala. -- The forward assembly of a Space Shuttle Solid Rocket Booster is lowered into place in the dynamics test stand at NASA's Marshall Space Flight Center, Huntsville, Ala. Two of these boosters are being stacked vertically in the stand in preparation for the assembly of all elements of the Space Shuttle. Following the operation shown here, an External Tank and the Orbiter "Enterprise" will be added to complete the Shuttle assembly. This will be done on Oct. 5th. This will be the first buildup of a complete Shuttle as it will appear for its maiden flight in 1979. The Shuttle is being assembled in the Huntsville test stand in preparation for ground vibration testing to verify that it will perform as predicted during actual launch from the Kennedy Space Center in Florida.

-30-

September 29, 1978

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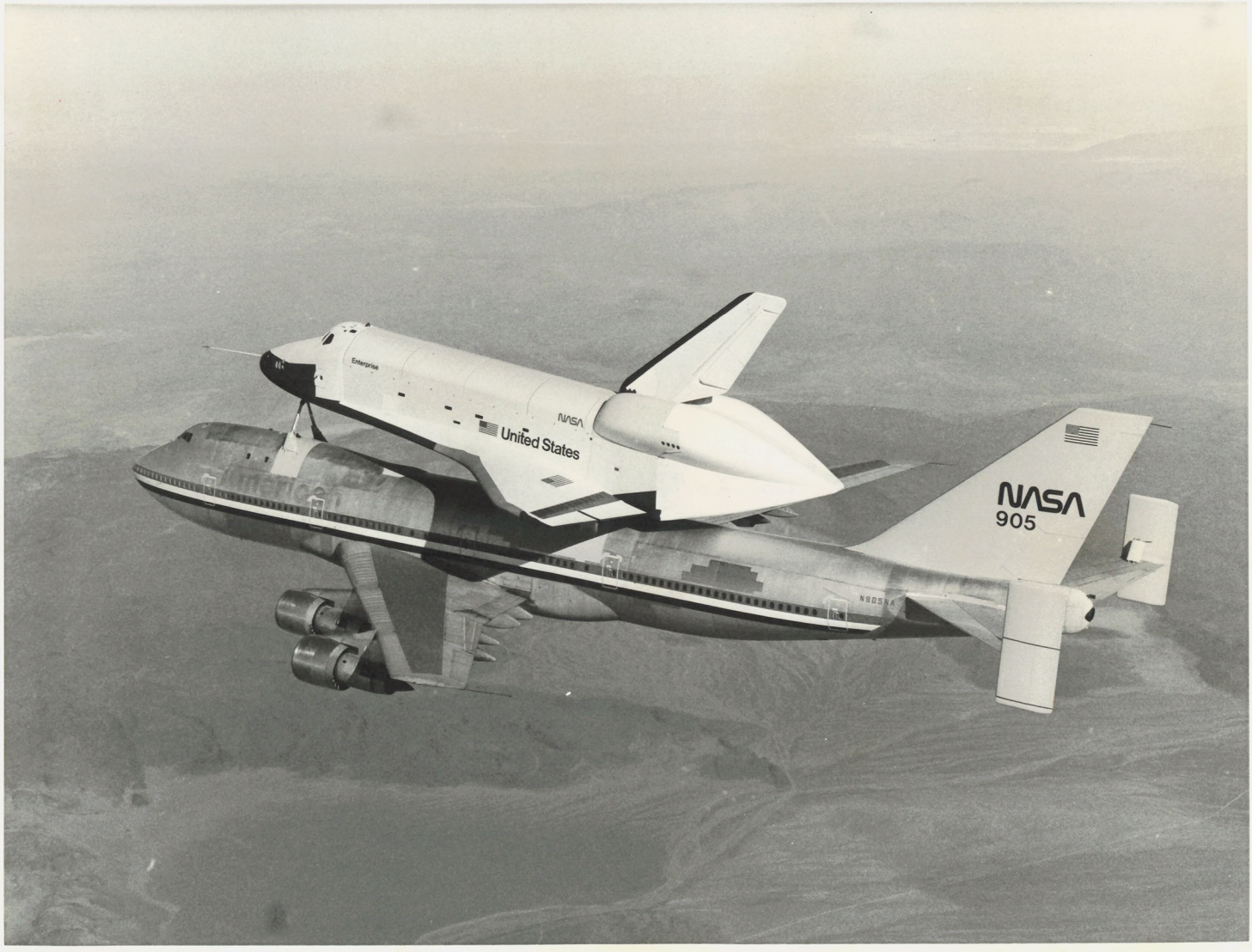

Space Shuttle

National Aeronautics and Space Administration

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18 FEBRUARY 1977

DRYDEN FLIGHT RESEARCH CENTER, CALIFORNIA

SHUTTLE ALT CAPTIVE INERT FLIGHT-----The Shuttle Orbiter 101 "Enterprise" is seen riding "piggy-back" atop the NASA 747 aircraft during the first of six Approach and Landing Test unmanned, inert captive Orbiter flights made at the Dryden Flight Research Center, California, on February 18, 1977. Specially installed support struts hold the 150,000-lb. (68,000 kg.) Orbiter onto the larger carrier aircraft. The purpose of this flight was to obtain evaluation of low speed performance and handling qualities. The tailcone on the Orbiter is an aerodynamic fairing to reduce buffeting on the 747 tail surfaces. This picture was taken from a T-38 chase plane when the 747/Orbiter was about 16,000 feet altitude. This first captive, unmanned inert flight of the Orbiter was about 2 hours and 8 minutes in duration. The photographer's chase plane was to the left and slightly above the 747/Orbiter. The desert terrain of Southern California can be seen below.

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Lyndon B. Johnson Space Center
Houston, Texas 77058
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13 SEPTEMBER 1977 S77-28144

DRYDEN FLIGHT RESEARCH CENTER, EDWARDS, CA

SHUTTLE ALT FF-2 LANDING --- The Shuttle Orbiter 101 "Enterprise" stirs up a cloud of desert sand and dust as it lands to conclude a five-minute, 28-second unpowered flight during the second free flight of the Shuttle Approach and Landing Tests (ALT) conducted on September 13, 1977 at the Dryden Flight Research Center in Southern California. The Orbiter 101 crew was Astronauts Joe H. Engle , commander, and Richard H. Truly, pilot. The ALT free flights are designed to verify Orbiter subsonic airworthiness, integrated systems operations and pilot-guided approach and landing capability and satisfy prerequisites to automatic flight control and navigation mode. On the right a T-38 chase plane comes in for a landing, also. This picture was taken with an Air Force Test Center 70mm Hasselblad camera installed on an M-4 tracking mount parked on the lake bed.

pg.17

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18 FEBRUARY 1977

DRYDEN FLIGHT RESEARCH CENTER, CALIFORNIA

SHUTTLE ALT CAPTIVE INERT FLIGHT-----The Shuttle Orbiter 101 "Enterprise" is seen riding "piggy-back" atop the NASA 747 during the first of six Approach and Landing Test unmanned, inert Orbiter flights made at the Dryden Flight Research Center in Southern California on February 18, 1977. Specially installed support struts hold the Orbiter onto the larger carrier aircraft. The purpose of this flight was to obtain evaluation of low speed performance and handling qualities. The tailcone on the Orbiter is an aerodynamic fairing to reduce buffeting on the 747 tail surfaces. This picture was taken from a T-38 chase plane when the 747/Orbiter craft was about 16,000 feet altitude. This first captive, inert flight of Orbiter was about 2 hours and 8 minutes in duration. Another chase plane can be seen in the right background. The photographer's chase plane was below and to the left of the 747/Orbiter. The Southern California desert area can be seen below.

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18 FEBRUARY 1977

DRYDEN FLIGHT RESEARCH CENTER, CALIFORNIA

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18 FEBRUARY 1977

DRYDEN FLIGHT RESEARCH CENTER, CALIFORNIA

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Space Shuttle Orbiter and 747 Carrier Aircraft

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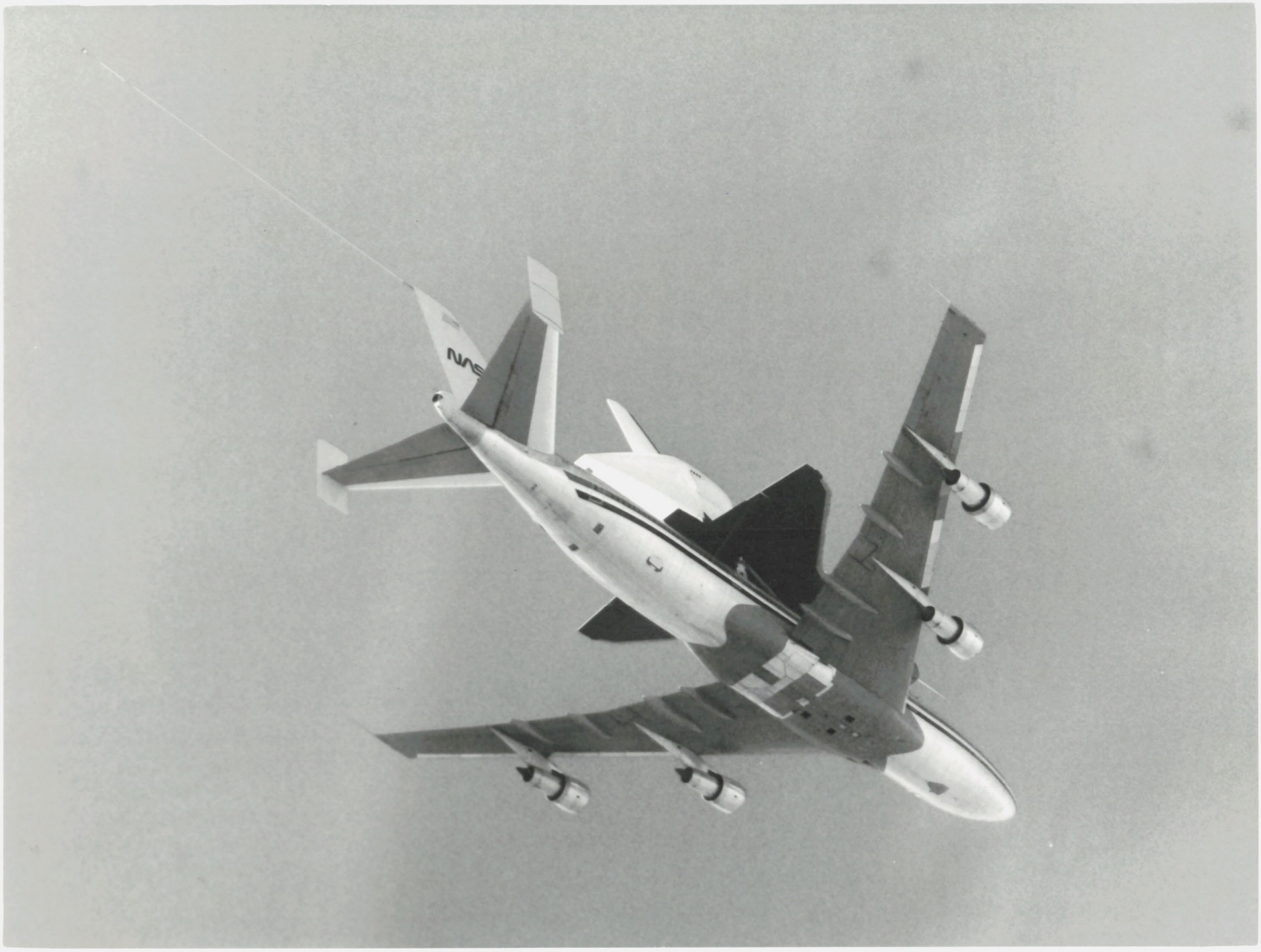
Space Shuttle Orbiter and 747 Carrier Aircraft

NASA's Space Shuttle Orbiter *Enterprise* mated to the Boeing 747 Shuttle Carrier Aircraft during Approach and Landing Tests (ALT) at the NASA Dryden Flight Research Center at Edwards, California. The Orbiter (about the size of a DC-9 commercial jet) weighs 68,000 kilograms (150,000 pounds), measures 37 meters (122 feet) long, is 17 meters (57 feet) high and has a wing-span of 24 meters (78 feet).

NASA
S- 77- 21286



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18 FEBRUARY 1977

DRYDEN FLIGHT RESEARCH CENTER, CALIFORNIA

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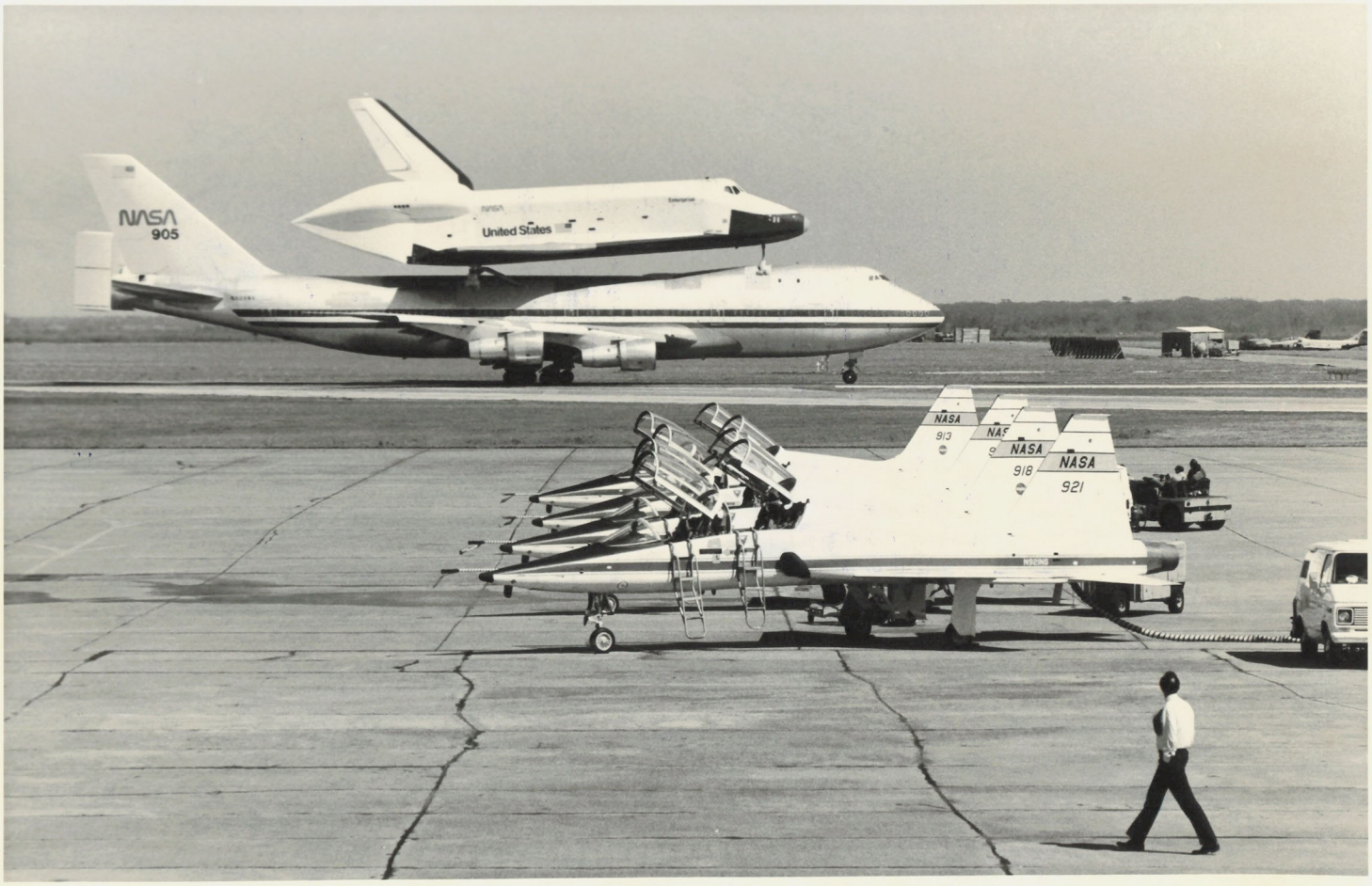

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B & W

10 MARCH 1978 S-78-27083

JOHNSON SPACE CENTER, HOUSTON, TEXAS

SHUTTLE ALT CRAFT AT ELLINGTON AFB --- NASA 905, a 747 carrier craft for the Space Shuttle Orbiter 101 "Enterprise", arrives at Ellington Air Force Base (EAFB) on March 10, 1978, for a three-day stopover en route to Marshall Space Flight Center (MSFC) for tests. Four T-38 aircraft sit on the flight line in the foreground. A large crowd of onlookers awaited the landing, out of frame. The Orbiter 101, with the aid of NASA 905, completed Approach and Landing Test (ALT) series in October 1977. A successor craft will begin Orbiter Flight Tests (OFT) in spring 1979.

FRI JUL 11 1980

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18 FEBRUARY 1977

DRYDEN FLIGHT RESEARCH CENTER, CALIFORNIA

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[redacted]

The space shuttle is shown here riding piggy back on mother ship, a Boeing 747. The captive flights are over and the first free flight is scheduled for Aug. 12.

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13 SEPTEMBER 1977

DRYDEN FLIGHT RESEARCH CENTER, EDWARDS, CALIFORNIA

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FRI JUL 11 1980

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NEW YORK TO NORFOLK: This six-photo montage is a composite photo taken by the Earth Resources Technology Satellite-1 (ERTS-1) taken from an altitude of 905 kilometers (562 statute miles) on two successive days, October 10-11, 1972.

SEP 28 1973

Space-photography

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JOHN F. KENNEDY SPACE CENTER, NASA
KENNEDY SPACE CENTER, FLORIDA 32899

FOR RELEASE JANUARY 26, 1973 PHOTO NO. 518-KSC-172-8-199

Satellite

KENNEDY SPACE CENTER, FLA. -- ERTS-1 Band 5 (red in the visible spectrum) gives the greatest contrast for features on land, providing good distinction between urban and non-urban areas. Brevard's cities and suburbs and man-made features such as highways and the facilities at the Kennedy Space Center and Cape Kennedy are clearly visible in this band. Band 4 (green in the visible spectrum-not shown) provides water penetration as well. This photo of East Central Florida was taken by ERTS-1 from an altitude of approximately 570 miles on September 6, 1972.

DATE USED
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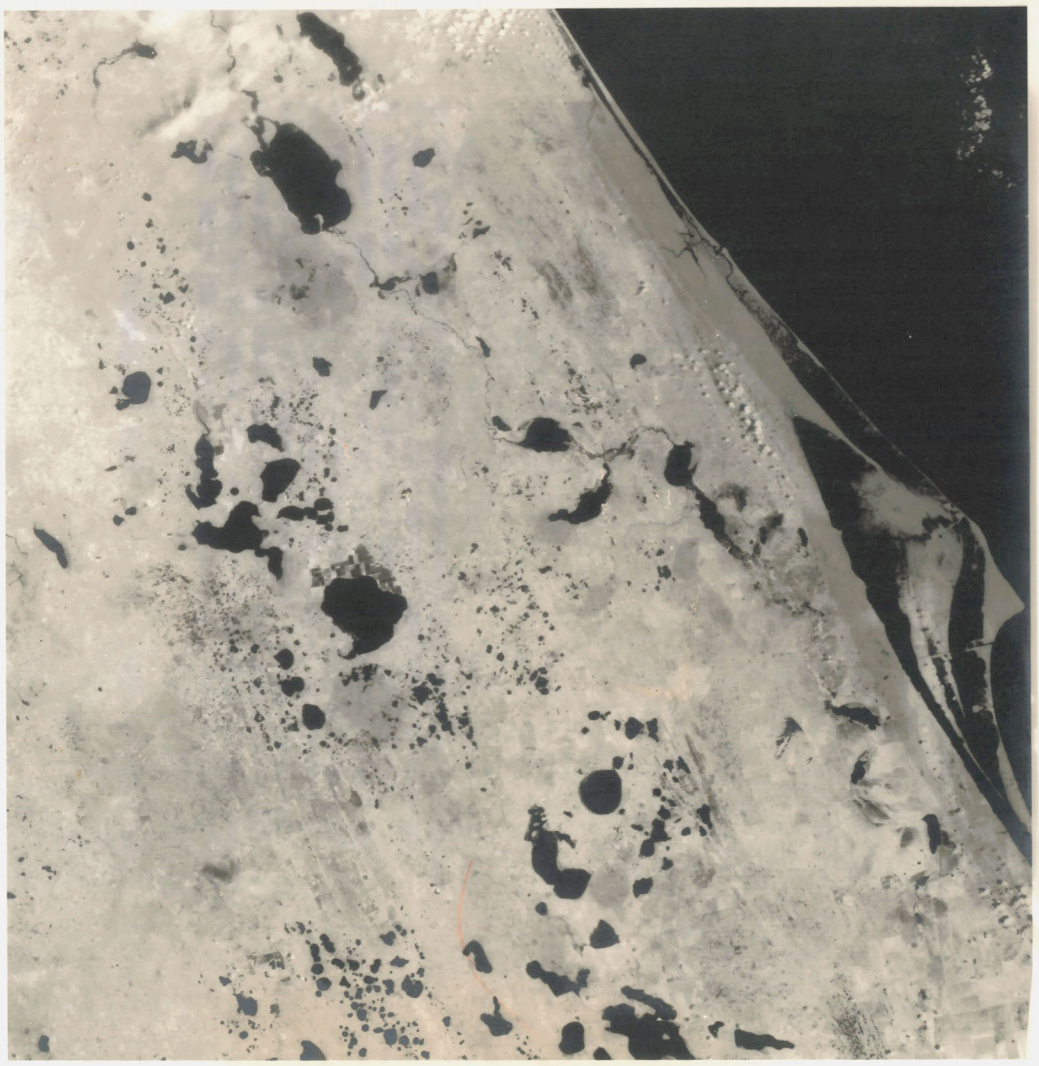

JOHN F. KENNEDY SPACE CENTER, NASA
KENNEDY SPACE CENTER, FLORIDA 32899

FOR RELEASE JANUARY 26, 1973 PHOTO NO. 518-KSC-172-8-257

Satellite

KENNEDY SPACE CENTER, FLA.-- ERTS-1 band 7 (near infrared and not visible to the human eye) provides a clear definition of water surface, drainage patterns, moist soil and helps to detect map errors with regard to streams, swampy areas and lake shapes. Brevard wetlands and pattern of individual mauch farms bordering Lake Apopke (left center) are clearly apparent. Band 6 (not shown) is also in the near infrared. It shows many of the same features plus some vegetative difference. This photo of East Central Florida was taken by ERTS-1 from an altitude of approximately 570 miles on September 6, 1972.

DATE USED
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