NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SPACE SHUTTLE MISSION STS-61B

PRESS KIT
NOVEMBER 1985

MORELOS B; AUSSAT-2; RCA SATCOM K-2

STS-61B INSIGNIA

S85-36645 -- This is the insignia designed by the STS-61-B crewmembers to represent their November 1985 mission aboard the space shuttle Atlantis, depicted here in Earth orbit, making only its second spaceflight. The design is surrounded by the surnames of the seven crewmembers. They are astronauts Brewster Shaw Jr., commander; Bryan D. O'Conner, pilot; Mary L. Cleave, Jerry L. Ross and Sherwood C. Spring, all mission specialists; and payload specialists Charles D. Walker, representing McDonnell Douglas, and Rodolfo Neri-Vela, representing Morelos of Mexico (note flag).

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RELEASE NO. 85-153 **November 1985**

61-B MISSION TO DEPLOY THREE SATELLITES, ERECT SPACE STRUCTURES

Testing concepts for erecting structures in space and the deployment of three communications satellites will highlight mission 61-B, the 23rd Space Shuttle flight, scheduled for launch no earlier than Nov. 26.

The 7-day mission will begin with the second night liftoff of the Shuttle program. Launch of Atlantis from Kennedy Space Center, FL, Pad 39A on its second flight is planned for a 9-minute window opening at 7:29 a.m. EST.

Atlantis will be placed in an orbit inclined 28.45 degrees to the equator. The initial orbit will be circular at an altitude of 218.5 miles. Orbital flight will extend as high as 235 miles for the satellite deployments.

The seven-member crew includes Brewster H. Shaw Jr., commander, and Bryan D. O'Connor, pilot. Mission specialists are Mary L. Cleave, Sherwood C. Spring and Jerry L. Ross. Flying as payload specialists are Mexico's Rodolfo Neri Vela and Charles Walker of McDonnell Douglas Astronautics CO.

Highlights of the mission include deployment of Morelos-B, the second in a series of communications satellites for Mexico. Release from the payload bay will be initiated by mission specialist Spring on Flight Day 1.

Morelos-B is a Hughes 376 satellite, the standard design used by many foreign nations and private companies. Morels will provide telephone, television and wire services to Mexico through a total of 22 transponders. A PAM-D will boost the spacecraft to geosynchronous orbit. The satellite will be stationed at 113.5 W. longitude over the equator south of Phoenix, AZ. The first Morelos spacecraft was deployed from the orbiter Discovery in June 1985.

One Flight Day 2, another Hughes 376 satellite will be deployed for Australia. Aussat II is the second of three operations satellites for the government-owned Australian National Satellite System. The first Aussat was successfully deployed from Discovery in August 1985.

The Aussat spacecraft has 11 12-watt and four 30-watt transponders to provide domestic communications to Australia's 15-million population. The system also will be used to improve both maritime and air traffic control communications, relay digital data for business purposes, provide standard telephone communications and direct satellite-to-home television broadcasts to major cities as well as to the bush country.

The deployment of this satellite also will be primarily the task of Spring. A PAM-D upper stage will boost the spacecraft to geosynchronous orbit.

The 4,144-pound RCA Satcom K-2 communications satellite will be ejected from the payload bay on Flight Day 3 under the direction of mission specialist Ross. This will be the first deployment of a spacecraft on the uprated D-2 model of the Payload Assist Module (PAM D-2).

Also aboard Atlantis for the 61-B mission is EASE/ACCESS, a combination of the two experiments designed to study an extravehicular method of construction in space.

The Experiment Assembly of Structures in Extravehicular Activity (EASE) is a study of EVA dynamics and human factors in construction of structures in space. In the orbiter's payload bay, Ross and Spring will assemble and disassemble an inverted tetrahedron consisting of six 12-foot beams. They will connect two of the beams to simulate Space Station construction and manipulate the assembled beam using the foot restraint and the Remote Manipulator System.

The Assembly Concept for Construction of Erectable Space Structures (ACCESS) experiment is a validation of ground-based timelines based on the neutral buoyancy water simulator at the Marshall Spaceflight Center, Huntsville, AL. Crewmembers will manually assemble and disassemble a 45-foot truss to evaluate concepts for assembling larger structures in space.

The McDonnell Douglas Continuous Flow Electrophoresis System (CFES) again will be flown on mission 61-B. This mission will test the mass production concept. Approximately 1 liter of raw hormone material will be purified over the first five days of flight. Payload specialist Walker will be performing sample evaluations throughout the flight. He will use syringe extractions for testing, and can make adjustments as necessary. Upon return to Earth, the material will be submitted to the Food and Drug Administration for testing.

Also being flown again is 3M Co.'s DMOS, or Diffused Mixing of Organic Solutions, designed to grow crystals through the combination of organic solutions. DMOS was flown on orbiter Discovery in November 1984. Under the supervision of Cleave, the DMOS apparatus will build six types of organic crystals for 3M. These crystals will be larger and more pure than those grown in a positive gravity environment.

A Getaway Special canister, holding an experiment for Telesat Canada, will be activated by Spring from the aft flight deck for a period of about 30 minutes. Six vapor deposition tubes will create metallic deposits for generation of crystal growth to make a mirror.

The large format IMAX movie camera is aboard Atlantis to document the payload by activities, including the spacewalks.

Also aboard is a hand-held Linhof large format camera for photography of Africa, particularly the areas of Ethiopia and Somalia. It will look for surface indications that might reveal the presence of water above or below the Earth's surface.

Mexican payload specialist Vela will conduct four experiments wile in orbit: transportation of nutrients inside bean plants, inoculation of group bacteria viruses, germination of three seed types, including abergon, lentil and wheat; and medical experiments which include measurements testing of internal equilibrium and volume change or the leg due to fluid shifts in zero-G.

Both Vela and Walker will be testing for the rate of absorption of two medications into the bloodstream while in space, Tylenol and Scopedex.

The orbiter Experiment (OEX), an onboard experimental digital autopilot software package, again will be tested on this flight. The autopilot software can be used with the orbiter, or another space vehicle such as the Orbital Transfer Vehicle which is under development, or even the Space Station. OEX is designed to provide precise stationkeeping capabilities between various vehicles operating in space.

Deorbit burn for reentry will occur on orbit 109, with landing at Edward Air Force Base, CA on orbit 110 at 6:23 p.m. EST, Dec. 3.

(END OF GENERAL RELEASE; BACKGROUND INFORMATION FOLLOWS.)

GENERAL INFORMATION

NASA Select Television Transmission

NASA-Select television coverage of Shuttle mission 61-B will be carried on a full satellite transponder:

Satcom F-2R, Transponder 13, C-Band
Orbital Position: 72 degrees west longitude
Frequency: 3954.5 MHz vertical polarization
Audio Monaural: 6.8 MHz

NASA-Select video also is available at the AT&T Switching Center, Television Operation Control in Washington, DC, and at the following NASA locations:

NASA Headquarters, Washington, DC
Langley Research Center, Hampton, VA
John F. Kennedy Space Center, FL
Marshall Space Flight Center, Huntsville, AL
Johnson Space Center, Houston, TX
Dryden Flight Research Facility, Edwards, CA
Ames Research Center, Mountain Valley, CA
Jet Propulsion Laboratory, Pasadena, CA

The schedule for television transmissions from the orbiter and for the change-of-shift briefings from Johnson Space Center, Houston, will be available during the mission at Kennedy Space Center, FL.; Marshall Space Flight Center, Huntsville, AL; Johnson Space Center; and NASA Headquarters.

The television schedule will be updated on a daily basis to reflect changes dictated by mission operations. Television schedules also may be obtained by calling COMSTOR (713/280-8711). COMSTOR is a computer data-base service requiring the use of a telephone modem.

Special Note to Broadcasters

Beginning Nov. 20 and continuing throughout the mission, approximately 7 minutes of audio interview material with the crew of 61-B will be available to broadcasters by calling 202/269-6572.

Briefings

Flight control personnel will be on 8-hour shifts. Change-of-shift briefings by the off-going flight director will occur at approximately 8-hour intervals.

61-B BRIEFING SCHEDULE

Time (EST)	Briefing	Origin
T-1 Day		
9:00 a.m.	EASE/ACCESS	KSC
9:45 a.m.	Morelos-B	KSC
10:15 a.m.	Morelos Payload Specialist Experiments	KSC
10:30 a.m.	RCA Satcom K-2	KSC
11:00 a.m.	Continuous Flow Electrophoresis System	KSC
11:30 am.	Diffusive Mixing of Organic Solutions	KSC
12 Noon	Telesat Getaway Special	KSC
T-Day		
8:30 p.m.	Post-launch Briefing	KSC
Launch Through End of Mission		
Times announced on NASA Select	Flight Director Change-of-Shift Briefings	JSC
Landing Day		
8:00 p.m.	Post-landing Briefing	DFRF

SHUTTLE MISSION 61-B – QUICK LOOK

Crew:	Brewster H. Shaw Jr., Commander Bryan D. O'Connor, Pilot Sherwood C. Spring, Mission Specialist (MS 1) Mary L. Cleave, Mission Specialist (MS 2) Jerry L. Ross, Mission Specialist (MS 3) Rodolfo Neri Vela, Payload Specialist Charles D. Walker, Payload Specialist
Orbiter:	Atlantis (OV-104)
Launch Site:	Pad 39A, Kennedy Space Center, FL
Launch Date/Time:	Nov. 26, 1985 – 7:29 p.m. EST (00:29 GMT)
Window:	9 minutes
Orbital Inclination:	28.45 degrees
Insertion Orbit:	190 n. mi circular (direct insertion), increasing to 204 by 196 during flight
Mission Duration:	6 days, 22 hours 54 minutes
Landing Date/Time:	Dec. 3, 1985, 3:23 p.m. PST (orbit 110)
Primary Landing Site:	Edward Air Force Base, CA
Weather Alternative:	Kennedy Space Center, FL
Cargo and Payloads:	
Deployable:	Morelos-B/PAM-D Aussat-2/PAM-D Satcom KU-2/PAM-D2
Attached:	Experimental Assembly of Structures with EVA/Assembly Concept for Construction of Erectable Space structure (EASE/ACCESS) IMAX Camera Get Away Special - Telesat Canada
Crew Compartment:	Continuous Flow Electrophoresis System (CFES) Diffusion Mixing of Organic Solutions (DMOS) Morelos Payload Specialist Experiments (MPSE) Protein Characterization
HIGHLIGHTS:	First Mexican Payload Specialist First flight of the PAM-D2 Heaviest PAM Payload (Satcom) First assembly of structure in space (EASE/Access) Deploy three satellites and stationkeeping target

61-B TRAJECTORY SEQUENCE OF EVENTS

Event	Orbit	Tig MET (d:h:m)	Burn Duration Min-sec	Delta v (fps)	Post burn Apogee/perigee (n mi)
Launch		0:00:00			
MECO		0:00:09			
OMS-2		0:00:43	183.8	280	191x190
Morelos-B Deploy	6	0:07:18			191x190
OMS-3 Separation	6	0:07:33	13.6	11	195x190
Morelos-B PMF	6D	0:08:04			
Aussat-2 Deploy	17	1:00:51			195x190
OMS-4 Separation	17	1:01:06	13.0	11	196x195
Aussat-2 PMF	18A	1:01:37			
Satcom-Ku-2 Deploy	31	1:21:28			
OMS-5 Separation	31	1:21:43	15.4	14	204x196
Satcom KU-2 PMF	31D	1:22:14			
Deorbit Burn	109	6:21:53	178.5	325.2	205x15
Landing	110	6:22:54			

SUMMARY OF MAJOR ACTIVITIES

Flight Day 1
Ascent
Payload bay doors open
RMS checkout
Activate CFES
Morelos deployment
Begin DMOS operations

Flight Day 2
Waste and supply water dump
Start CFES collection
Deploy Aussat-2
Checkout EMUs

Flight Day 3
Satcom deployment
Waste and supply water dump
Advanced Automatic Autopilot Stationkeeping Test

Flight Day 4
Supply water dump
EVA 1 for EASE/ACCESS
Deploy stationkeeping target
Advanced Automatic Autopilot Stationkeeping Test

Flight Day 5
Waste water dump
Advanced Automatic Autopilot Stationkeeping Test
EMU maintenance and recharge

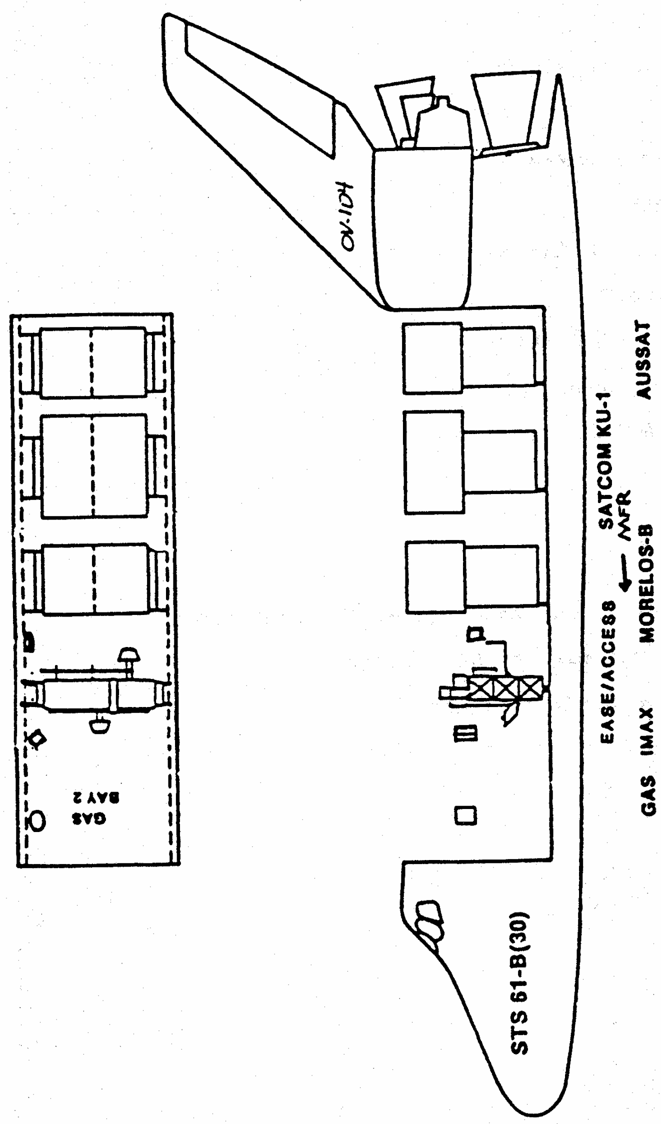
Flight Day 6
EVA 2 with RMS - EASE/ACCESS

Flight Day 7
CFES deactivation
Supply and wastewater dump
Crew press conference
Cabin stowage

Flight Day 8
Deorbit burn (orbit 110)
Landing at Edwards AFB

61-B PAYLOAD AND VEHICLE WEIGHTS SUMMARY

	Pounds
Orbiter Empty	174,363
Satcom	4,245
Satcom & PAM-D	12,258
Aussat-2	4,500
Aussat-2 & PAM-D	7,634
Morelos-B	4,500
Morelos-B & PAM-D	7,582
Getaway Special	228
EASE/ACCESS	4,685
IMAX	500
CFES	791
DMOS	190
Orbiter Including Cargo at SRB Ignition	261,455
Total Vehicle at SRB Ignition	4,518,601
Orbiter Landing Weight	204,400



61-B CARGO ARRANGEMENT

EASE/ACCESS

EASE: Experimental Assembly of Structures in Extravehicular Activity

ACCESS: Assembly Concept for Construction of Erectable Space Structures

The goal of the EASE/ACCESS experiments is to construct the first large structures in space. In both experiments, crew members assemble small components to form larger structures, just as may eventually be done to build the Space Station.

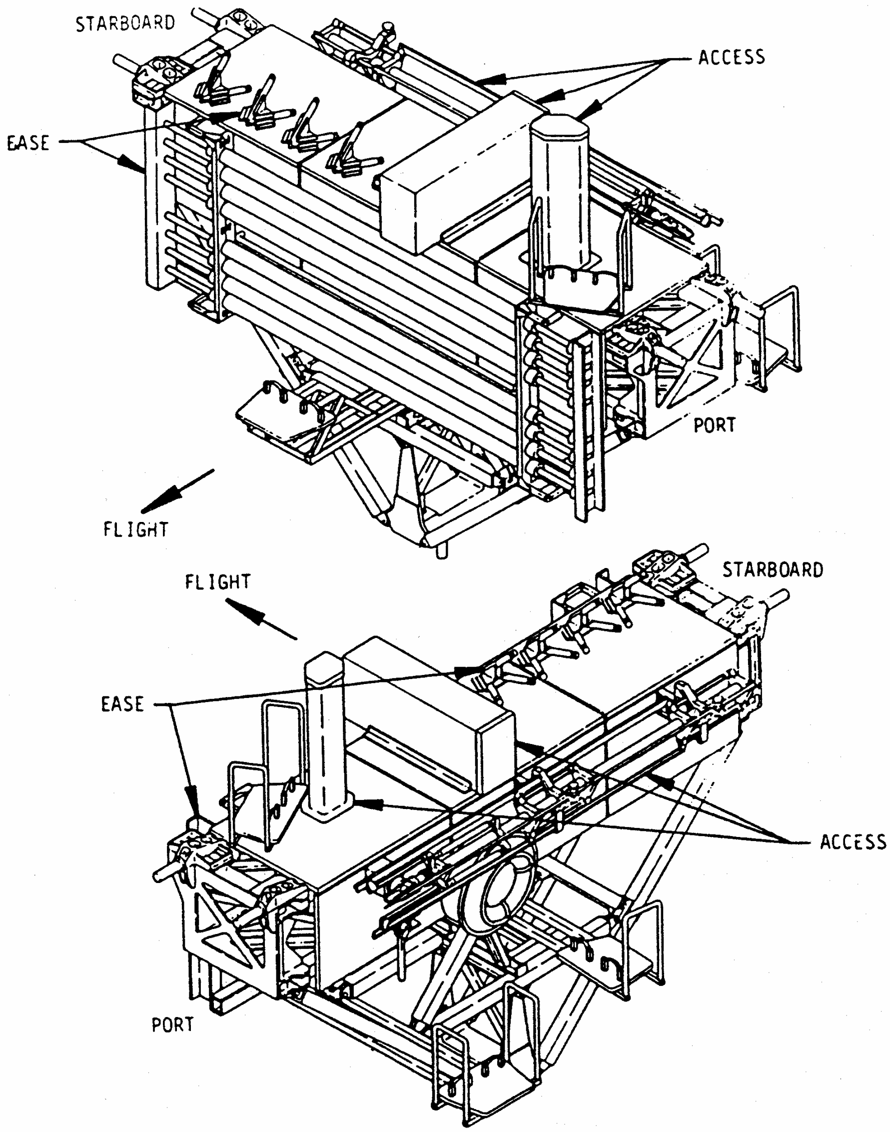
Working in the Shuttle payload bay, astronauts will assemble the two structures. EASE and ACCESS, during two extravehicular activities (EVAs). The first EVA is devoted to experiments to study human performance of construction tasks in space. The second is dedicated to supplementary experiments that explore alternative construction techniques and practice Space Station maintenance scenarios.

Experiment objectives are to:

- Gain valuable on-orbit construction experience;
- Compare assembly rates and techniques used in space to those used during ground assembly tests in neutral buoyancy water tank tests simulating the space environment;
- Identify ways to improve erectable structures to ensure productivity, reliability and safety; and
- Evaluate Space Station assembly and maintenance concepts and techniques.

NASA’s Marshall Space Flight Center, Huntsville, AL is managing this first demonstration of microgravity construction techniques. EASE was developed in a joint effort between Marshall and the Massachusetts Institute of Technology. ACCESS was developed by NASA’s Langley Research Center, Hampton, VA. In preparation for this mission, these institutions have worked together, designing the structures, developing assembly methods in ground-based and neutral buoyancy simulations, and assisting in crew training.

Both EASE and ACCESS are large space structures distinguished by different assembly methods and physical characteristics. Access is a “high-rise” tower composed of many small struts and nodes. ACCESS is assembled with crew members in fixed work stations. EASE is a geometric structure that looks like an inverted pyramid and is composed of a few large beams and nodes. Crew members move about during EASE assemblies, rather than working in fixed positions.



STARBOARD
ACCESS
EASE
PORT
FLIGHT
FLIGHT
STARBOARD
EASE
ACCESS
PORT

EASE/ACCESS

ACCESS

Height: Completely assembled - 45 feet
Assembly fixture - 11 ft.

The entire structure consist of 93 tubular aluminum struts 1 inch in diameter. Thirty-three are 4.5-ft.-long struts; 60 are 6-ft.-long diagonal struts; 33 are identical nodal joints (1 bay or cell); 9 struts are used within and between bays; 6 struts join at one node.

EASE

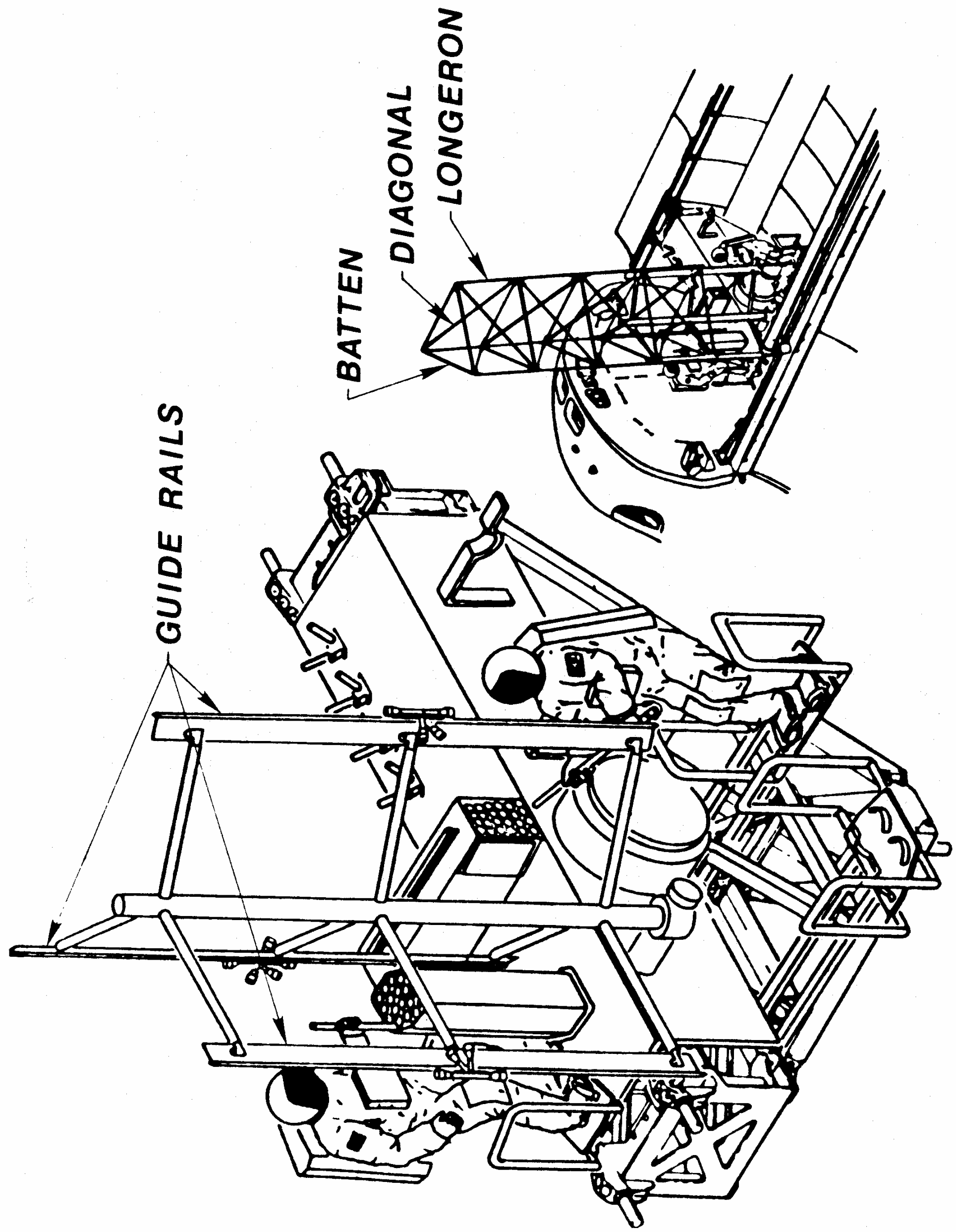
Height: Completely assembled - 12 ft.

The structure consists of 6 aluminum beams, each 12 ft. long, weighing 64 lb., containing four identical nodal joints.

Assembly Equipment – The Mission Peculiar Equipment Support Structure (MPESS), which spans the 15-ft. width of the payload bay, serves as a work platform and equipment carrier for the assembly experiments. Interface plates, attached to the support structure skeleton, allow easy mounting of 4-foot restraints and several hand restraints where astronauts can anchor themselves, making assembly procedures safer and easier.

No tools are used for this first on-site assembly. The crew members "snap" together the prefabricated components to form each structure. Both the larger EASE beams and the smaller ACCESS struts are joined by nodes, clusters of sockets, which are locked into place by sleeves on the ends of a beam or strut. ACCESS nodes and struts are located in canisters mounted on the sides and top of the support structure near astronaut work stations; EASE beams are clamped to the front surface of the support platform, and the nodes are mounted on top. The EASE/ACCESS support structure and other equipment occupy approximately one-fourth of the payload bay.

Crew Activity – The EASE/ACCESS experiments are supported by five of the seven 61-B crew members: the commander, the pilot, and the three mission specialists. The ability to make timely, on-the-scene judgments and to provide activity reports is central to the first orbital construction mission. Mission specialists Ross (EV-1) and Spring (EV-2) serve as structural assembly experts during two EVAs. They build the structures working from and around the MPESS. A third mission specialist, Mary Cleave, operates the orbiter robot arm to position crew members during some special construction tasks. Either the commander or pilot will oversee operations and assist with data collection such as filming activities.


GUIDE RAILS
BATTEN
DIAGONAL
LONGERON

EVA-1: Baseline Experiments

The first space construction walk is planned for 6-hours duration using crewmembers Ross and Spring. The EVA begins with the ACCESS experiment. The baseline experiment assembly technique requires both crew members to be positioned in designated work areas: one stands in foot restraints at the support structure base and the other works in similar restraints on top of the work platform. This “assembly line in space” technique allows rapid construction for measurements of productivity.

ACCESS Assembly Procedures:

1. Unstow assembly fixture, raise it to a vertical position, and unfold three guiderails;

2. Remove struts and nodes from three stowage canisters;

3. Connect nodes and struts on assembly fixture, forming one cell or bay;

4. Slide finished bay upward along guiderails to the top of the assembly fixture;

5. Repeat procedure to construct nine more bays; and

6. Disassemble by sliding bays down, removing and stowing nodes and struts.

The second half of this EVA is devoted to the EASE experiments. To measure learning and productivity, the structure is assembled and disassembled repeatedly. Investigators are planning for at least six full assemblies during the EVA. The baseline experiment techniques allow astronauts to move about freely, using foot restraints as necessary.

EASE Assembly Procedures

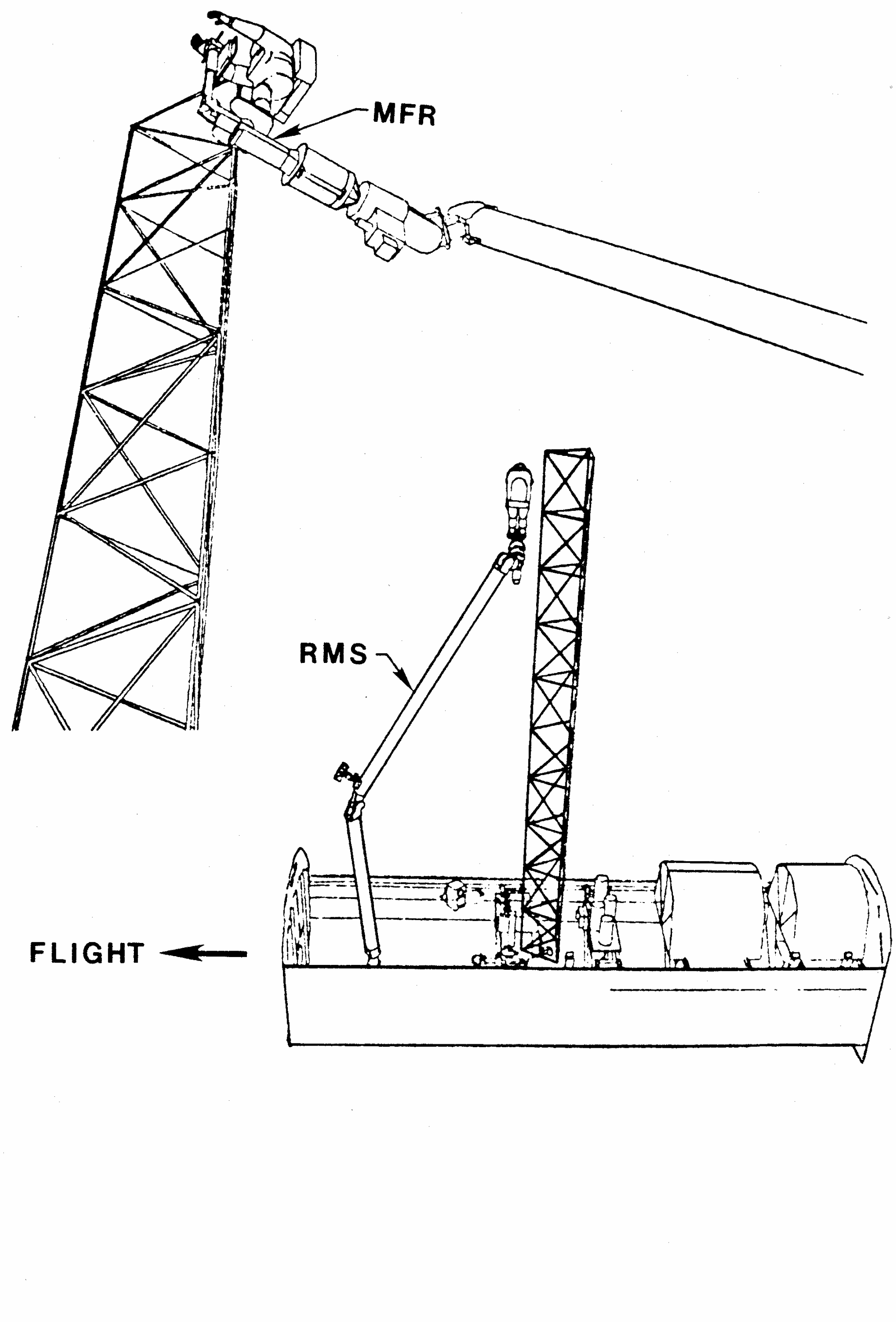
1. Unstow beams clamped to the front of the work platform;

2. Connect three vertical beams to a node attached to the top of the work platform;

3. Connect three horizontal beams to the three vertical beams by nodes; and

4. Repeatedly assemble and disassemble structure

The EVA crew members can alter assembly method as necessary and will do as many assemblies as time allows.


MFR
RMS
FLIGHT

EVA-2: Supplementary Experiments

To enhance the value of this mission for space Station planning, several additional tasks will be undertaken with both structures on a second space construction walk involving Ross and Spring. Supplementary experiments include manipulating the large space structures, simulating Space Station maintenance operations, installing flexible cable and using the orbiter robot arm to assist the astronauts during structural assembly. The second EVA begins with the construction of nine ACCESS bays using the baseline experiment technique. One crew member then is positioned on the manipulator foot-restraint work station and moved around by Cleave from inside the flight deck. The manipulator work station is outfitted with a specially designed ACCESS component carrier.

Second ACCESS Assembly Procedures:

1. Assemble first nine bays from fixed work stations mounted to the support structure;

2. Pack component carrier with struts and nodes needed to construct one bay; and

3. Move MFR crew member on the RMS to the top of the existing ACCESS bay where he completes the tenth bay.

ACCESS Maintenance and Repair Tasks:

When 10 full bays are constructed, Space Station maintenance and repair tasks scheduled to be practiced are:

1. To stimulate stringing electrical cable, both crew members will string flexible cable along the ACCESS truss framework;

2. To rehearse repair of a damaged structure, MFR crew member removes and replaces struts and nodes;

3. To practice handling large frameworks, MFR crew member removes entire structure from the assembly fixture and maneuvers it in the payload bay. Structure is reattached, disassembled, and stowed.

During the second half of the EVA, EASE is constructed with one crew member positioned in the foot restraint. The other works at the equipment support structure base, using foot restraints as necessary.

Second EASE Assembly Procedures:

1. Unstow beams clamped to front of work platform;

2. Move MFR crew member, equipped with beams and nodes, to the top of the EASE structure;

3. Attach three vertical beams to a node mounted on top of the support structure; and

4. Connect three horizontal beams to three vertical beams with nodes to complete structure.

EASE Maintenance Tasks:

1. To practice maneuvering large geometric structures, crew members remove entire structure and move it around;

2. Crew members connect two EASE beams to form a 23.5-ft., 130-lb. beam; and

3. To practice handling long structures in space, crew members transport and manipulate the connected beams.

Data Collection

Careful observation of crew activities is needed to understand the human factor elements of space construction. Aspects such as learning, productivity and fatigue are important as well as the biomedical effects of working during EVAs. During the EVAs, researchers from Marshall, MIT and Langley will monitor the mission from Johnson Space Center. Video cameras located in the orbiter payload bay and on the robot arm will be used to record images of each crew member at work. Movie cameras mounted in the aft-flight deck windows will be synchronized to generate a 3-D film which will be used to analyze astronaut motions.

Following the flight, investigators will retrieve more detailed information from the video and film. The film will be used to reconstruct 3-dimensional images of astronauts at work during the experiments to derive body positions, equipment locations, and any difficulty in completing a task. Planners will use mission data to construct computer models for completing similar EVA tasks. In addition to recorded data, crew reports on activities and tasks will be provided to investigators. The crew members' suits are instrumented to monitor pulse rate and oxygen use to that biomedical profiles on working in space can be obtained.

EASE/ACCESS Mission Team

George Levin, Office of Space Flight, Flight Demonstration Division is Program Manager. Edward Valentine, Spacelab Payload Project Office, MSFC, is mission manager.

Principal investigator for the EASE experiment is Dr. David Akin of Massachusetts Institute of Technology. EASE is a joint development effort between the MIT Space Systems Laboratory, Cambridge, and Marshall.

Principal investigator for the ACCESS is Walter L. (Doug) Heard at Langley Research Center.

MORELOS COMMUNICATIONS SATELLITE

Morelos is the second of two spacecraft to be launched by the Space Shuttle for the Secretariat of Communications and Transportation, Mexico. Morelos will provide advanced telecommunications tot he most remote parts of Mexico: educational TV, commercial programs over the national TV network, telephone and facsimile services and data and business transmissions. Television programming will originate in at least 12 principal cities. Cultural, educational and athletic events will be televised nationwide. The Hughes Space and Communications Group is prime contractor.

Morelos is a spin-stabilized, gyrostat design with a despun antenna and communications payload. Two cylindrical solar panels, one fixed and one extendible, supply prime power to the spacecraft. At launch, Morelos is mated to the PAM-D stage with the antenna reflector and aft solar panel are stowed. The PAM-D stage supplies the necessary impulse for injection into a transfer orbit. Shortly after separation of the spacecraft from the orbiter Discovery, an omnidirectional antenna is deployed.

Morelos' two cylindrical solar panels telescope when the spacecraft is in orbit. In launch position, with antenna reflector folded down, Morelos is 9 ft., 4 in. high. In orbit with panels extended and antenna erected, it is 21 ft., 8 in., high. It is 7 ft., 1 in. in diameter and weighs 1,422 lb. at the beginning of life I orbit. Four thrusters using 293 lb. of hydrazine propellant, provide orbit and attitude control during the satellite's 9-year planned mission life.

From low-Earth orbit, the cradle's protective sunshield is opened and a table at the base spins the satellite to 55 rpm to provide gyroscopic stability. Four springs push the satellite into space and 45 minutes later, an onboard sequencer fires the McDonnell Douglas payload assist module (PAM). A Morton Thiokol Star apogee kick-motor places the satellite into a circular synchronous orbit.

Morelos-B will not be activated once it achieves its geosynchronous orbit. Rather, it will remain inert for a period up to two years, drifting naturally to its final longitude. Near its operating position, the reflector antenna and electronics shelf are despun and achieve close pointing accuracy. The satellite drifts into final orbit and is placed in operating position with onboard thrusters.

NASA has been reimbursed $10 million by the Mexican government for launch services associated with the Morelos-B satellite.

MEXICAN PAYLOAD SPECIALIST EXPERIMENTS

Rodolfo Neri Vela will be performing a series of mid-deck cabin experiments as well as take photographs of Mexico. The experiments are:

Effects of Spatial Environment on the Reproduction and Growing of Bacteria (REPGROW) – Cultures of Escherichia coli B-strain bacteria will be mixed on orbit with different bateriophages that attack the Escherichia coli and subsequently, are observed for possible changes and photographed as required.

Transportation of Nutrients in a Weightless Environment (TRANSPORT) – Ten plant specimens will be planted in containers that will allow a radioactive tracer to be released on orbit for absorption by the plants. At selected intervals, each plant will be sectioned and the segments will be retained for post-flight analysis to determine the rate and extent of absorption.

Electropuncture and Biocybernetics in Space (ELECTRO-PUNCTURE) – The objective of the experiment is to validate electropuncture theories. These theories state that disequilibrium in the behavior of human organs can be monitored and stimulated by using electric dc current in specified zones. This experiment is performed by measuring the conductance of electricity in a predetermined zone. If a disequilibrium is detected, exercises or stimulus will be applied for a certain period until the value of the conductance falls into the normal range.

Effects of Weightlessness and Light on Seed Germination (SEEDS) – Seed specimens of amaranth, lentil and wheat will be planted on orbit during Flight Day 2 in two identical containers. Subsequently, one container will be exposed to illumination and the other to constant darkness. Photographs of the resulting sprouts will be taken every 24 hours. One day prior to landing, the sprouts will be submitted to a metabolical detention process for subsequent histological examination on Earth to determine the presence and localization of starch granules.

Photography of Mexico (PHOTO) – Post-earthquake photography of Mexico and Mexico City.

AUSSAT -2

Aussat, the Australian national satellite communications system, will provide a wide range of domestic services to the entire continent and its offshore islands. This includes direct television broadcast to homesteads and remote communities, high-quality television relays between major cities, digital data transmission for both telecommunications and business use, voice applications for urban and remote areas, centralized air traffic control services and maritime radio coverage. Aussat-2 is the second in a system of three to be operated by Australia's national satellite company, Aussat Proprietary Ltd.

Aussat-2 uses two telescoping cylindrical solar panels and a folding antenna for compactness during launch. After the satellite nears its orbital position, the antenna erects and the outer solar panel deploys, exposing the inner solar array.

Aussat's antenna system will provide seven transmit beams and three receive beams. Five transmit beams serve the Homestead and Community Broadcasting Satellite Service: four contiguously placed over the western, central, northeast and southeast regions of the Australian content and one over Papua, New Guinea. The other two are national beams which provide continental coverage for Fixed Satellite Service.

Aussat will carry 15 channels, each 45 MHz wide. Four will use high-power, 30-watt traveling wave tube amplifiers (TWTAs) to provide radio and television services to Australia's remote areas. The remaining 11 channels will operate with 12-watt TWTAs. It will be possible to connect the communications channels individually to the transmit beams by ground command. This arrangement will provide traffic flexibility for the system.

The satellite's diameter is nearly 7.2 ft. Stowed for launch its height is 9.2 ft. In orbit, with antennas deployed and aft solar panel extended, the height will increase to 71 ft. Its initial on-station weight will be about 1,322 lb.

The Aussat satellites, with a mission life of 7 years, will operate at the 14/12 GHz Ku-band. Two spacecraft will be located above the equator just north of Papua, New Guinea, at 156 degrees and 164 degrees east longitude. The third satellite will be located at 160 degrees east longitude.

The master control station for the Aussat system will be in Sydney and backup control equipment will be installed in Perth. Monitoring equipment will be installed at Earth stations in Sydney, Perth, Brisbane and Adelaide.

Hughes Space and Communications Group built the three satellites and two telemetry, tracking, command monitoring stations.

NASA has been reimbursed $9.5 million by the Australian government for launch services associated with the Aussat 2.

RCA SATCOM K-2

Two of a planned fleet of three communications satellites, operating in the Ku-band part of the spectrum, will be launched for RCA American Communications, Inc., in 1985. The third is scheduled for launch in 1987.

Each of the spacecraft, designated Satcom K-1, K-2 and K-3, will have 16 channels operating at 54 MHz usable bandwidth wile providing coverage of the continental 48 states. The spacecraft are designed to provide coverage to the continental 48 states, or to either the eastern half or western half.

The first of the series to be launched is Satcom K-2, on STS 61-B, which has been assigned an orbital position of 81 degrees west longitude. Satcom K-1, assigned an orbital position of 85 degrees west longitude, is to be orbited aboard the Shuttle Columbia on Dec. 18.

The three-axis stabilized spacecraft are equipped with power, attitude control, thermal control, propulsion, structure, and command ranging and telemetry systems necessary to support mission operations from launch vehicle separation through 10 years of operational life in geosynchronous orbit.

This new generation of spacecraft carries 45-watt transponders, which permits the use of Earth station antennas a small as 3 ft. in diameter. Because Ku-band frequencies are not shared with terrestrial microwave systems, antennas served by the satellites can be located within major metropolitan areas characterized by heavy terrestrial microwave traffic.

Following the launch of Satcom K-2, it will be placed into a 23,000-mi. geosynchronous orbit. After this, the 280-square-foot solar panels will deploy from the 67-by-84-by-60-in. main spacecraft structure. The spacecraft will then be tested for in-orbit operation and locked into its orbital slot of 81 degrees W. longitude.

The spacecraft main structure contains all electronic boxes, batteries, propulsion and attitude control equipment on eight honeycomb panels. Including the antenna feedhorn tower, the maximum spacecraft main body height is 90 in. Transponders and housekeeping components are mounted on four panels, two each on the “north” and “south” sides of the spacecraft.

Additional housekeeping equipment is mounted on a base panel, facing away from the Earth. The Earth-facing panel provides a mounting surface for the communication antenna reflector with its component feed assembly, a command and telemetry antenna and the Earth sensors for attitude control.

The Satcom KU-band communications capability is provided by 15 45-watt traveling wave tube amplifiers for each of the 16 channels and six traveling wave tube amplifiers for redundancy. The 16 channels are set up in two groups of eight, each group contains three spare amplifier tubes. Each of the 16 channels uses active frequency and polarization interleaving to permit the simultaneous use of each. The channels have a usable bandwidth of 54 MHz.

The spacecraft is controlled in geosynchronous orbit by a high speed momentum wheel which has active speed control and wheel-axis roll trim. Momentum damping is provided by onboard magnetic torquers with backup provided by onboard reaction control system hydrazine thrusters.

Main spacecraft power comes from the deployed solar array with three battery systems providing backup power.

Satcom K-2, owned and operated by RCA American Communications (RCA Americom), is one of three Ku-band domestic communications satellites operating in the 12 to 14 Gigahertz range. There are 16 operational transponders and six spares, each transmitting 45 watts of power, more than the 12 or 30 watts used for C-band transponders.

RCA Satcom Ku-2 is a version of the RCA 4000 three-axis, stabilized spacecraft, similar in appearance to the ASC-1 satellite deployed from Discovery in August 1985. It will provide television programming in three ways:

Satellite Master Antenna Television (SMATV) will provide entertainment and educational services. Receiver antennas will be installed at multi-unit residential complexes such as condominiums and apartments, hotels, hospitals and schools.

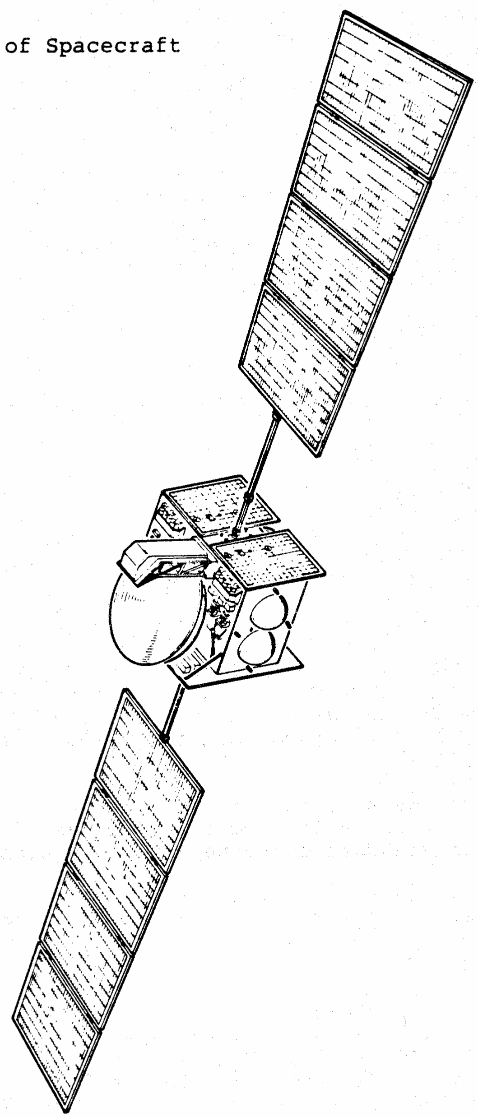
Direct-to-Home services will distribute a wide range of programming choices to homes far removed from cable systems or standard over-the-air television stations.

The syndication System will deliver time-sensitive programming to commercial broadcast television stations.

PAM D-2

The PAM D-2 is instrumented with radio frequency telemetry which will downlink data to tracking aircraft during the burn of the solid rocket motor, a mission requirement for the first flight of a PAM-D2. This uprated, upper stage is identical to the PAM-D, except for size and weight. The spin-up will be noticeably slower due to the larger mass and inertial components of the payload. PAM-D2 is designed to lift up to 4,200 lb. to geosynchronous orbit, compared to the 2,800-lb. PAM-D version.

Top (North) of Spacecraft



RCA AMERICOM Ku-BAND SPACECRAFT

DIFFUSIVE MIXING OF ORGANIC SOLUTIONS

The Diffusive Mixing of Organic Solutions (DMOS-2) experiment is intended to grow organic crystals in near-zero gravity. 3M scientists hope to produce single crystals that are purer and larger than those available on Earth and will study their optical and electrical properties. DMOS experiments also will include an investigation into the process of fluid mixing within the DMOS cells.

One of the potential applications, of the crystals 3M is growing, is making optical devices comparable to electronic devices, though much faster. Possible uses include optical switches and computers that process information with light instead of electricity.

The DMOS-2 experiment will be flown in six football-size chemical reactors carried in the mid-deck area. The reactors, or cells, are housed in the Experimental Apparatus Container supplied by NASA.

Each cell consists of three chambers into which organic liquids will be loaded. In space, valves between the chambers will be opened and the liquids allowed to mix.

The experiment will be controlled by the Generic Electronic Module (GEM), a bubble-memory computer about the size of a hatbox that also was used successfully to operate 3M's two previous space experiments (DMOS-1) and Physical Vapor Transport of Organic Solids). The GEM has a hand-held keyboard display that lets the crew control the experiment.

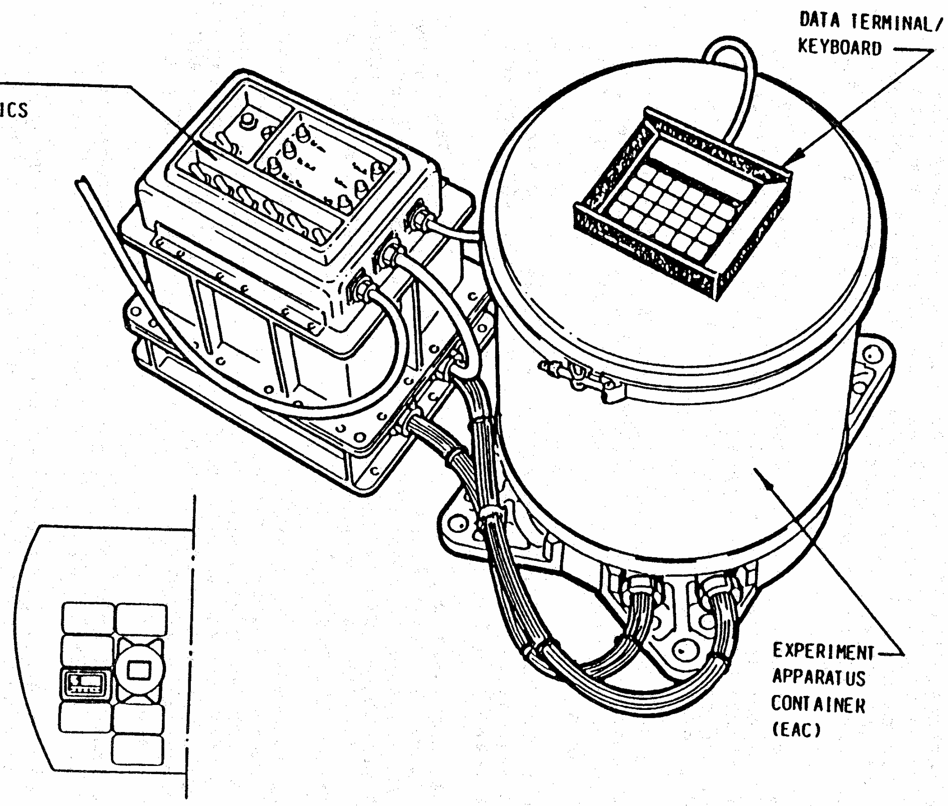
The hardware for DMOS-2 is similar in size and function to that of DMOS-1. However, the new hardware is of modular construction and includes a quick-change cell installation feature, larger loading holes for chemicals, a more positive valve-opening assembly that uses a lever instead of the cam-and-roller of DMOS-1 and electronics mounted on each cell instead of on a single control board.

Dr. Marc Radcliffe, a chemist with 3M, is principal investigator and Dr. Earl Cook, a 3M physicist, is co-investigator.

Two of the cells are devoted to a study of the physics of the mixing process. One cell uses a yellow and blue dye with light density methanol in the middle chamber and the other cell uses a red dye in the middle with heavier density heptane in the end chambers. These will help explore variations in mixing based on density differences.

Of the four crystal growth experiments, two are devoted to studies of the molecular growth and ordering under near ideal conditions in space and the other two examine the way crystals pack together and how this packing affects their electro-optical properties. One of the crystal growing experiments uses cyanine tosylate and triethylammonium oxonol in chloroform. The other crystal growth and both crystal packing experiments use proprietary chemicals.

All six cells will be activated just prior to the first sleep period and will remain active throughout the flight. An hour prior to landing, the two fluid-mixing cells will be closed so that entry forces don't change the dye concentrations. In the crystal experiments, the valves between cell chambers will be left open to insure no damage to crystals which may have been growing in the valve area.



DMOS CONFIGURATION

GETAWAY SPECIAL EXPERIMENT
(Telesat of Canada)

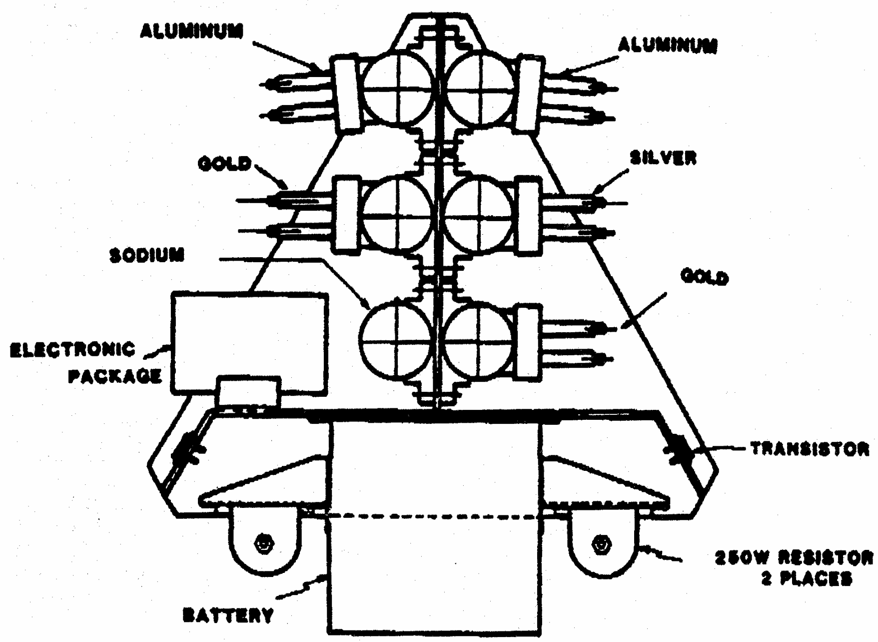
To stimulate Canadian student interest in the space program, Telesat sponsored a national competition soliciting science experiments from high school students throughout Canada. The contest resulted in 72 entries from nearly 300 Canadian students. After screening by Telesat Canada and Canadian National Research Council scientists, seven finalists were selected for judging by a panel which included Dr. Stuart Smith, chairman of the Science Council of Canada, Dr. Alphonse Ouimet, a member of the Telesat Board of Directors and Dr. Jeff Hoffman, NASA astronaut.

The panel selected the experiment submitted by Daniel Rey and Jean-Francois Deschenes of the Ecole Secondaire Charlebois, Ottawa, Ontario. Their experiment, entitled “Towards a Better Mirror,” proposed to fabricate mirrors in space that would provide higher performance than similar mirrors made here on Earth.

On Earth, oxidation lowers the reflectivity of mirrors as air interacts with the metal used in mirror production. The experiment uses vapor deposition. The experiment assembly is built on an aluminum T-beam support structure which holds six vapor deposition tubes. The products of the experiment will be tested post flight using a number of sophisticated optical techniques to determine precise measurements of the on-orbit coating process. These measurements will be used to compare the space-made mirrors with control mirrors made on Earth during the flight.

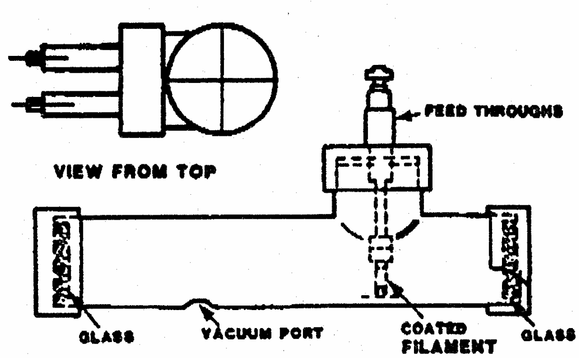
GETAWAY SPECIAL EXPERIMENT

"Towards A Better Mirror"



VIEW LOOKING INTO CANISTER

Experimental Cylinder



PROTEIN CRYSTAL GROWTH EXPERIMENT

The hand-held Protein Crystal Growth Experiment, conducted by payload specialist Walker, it is one of a series of experiments being flown to study the possibility of crystallizing biological materials such as hormones, enzymes and other proteins. Successful crystallization of these materials, which are very difficult to crystallize on Earth, will allow their three-dimensional atomic structure to be determined by X-ray crystallography. Knowledge of the atomic structure hopefully will lead to a capability to develop pharmaceuticals to enhance or inhibit the protein's function on a rational manner.

The experiment consists of two vapor diffusion crystal growth units and one dialysis growth unit. Each vapor diffusion unit is 3 in. wide, 14 in. long and 1/2 in. thick and contains 24 small crystal growth chambers. Each f the 48 chambers is equipped with a porous liner saturated with precipitating agent such as alcohol or saline solution. A small drop of protein solution will be injected into each chamber shortly after entering orbit.

Up to six of the growth chambers will be "seeded" by injecting a microscopic particle crystallized protein into the droplet to form a nucleus for a larger crystal.

The dialysis unit is a block of Lexan (about 1 by 1 in. and 1/2 by 5 in.) with an internal cylindrical cavity containing small glass ampoules of precipitating solution suspended in water. Also suspended in the cavity are three small dialysis buttons activated by shaking the unit, causing the fragile glass ampoules to break, and releasing the precipitating agent to mix with the water. The proteins in the dialysis buttons are then crystallized through dialysis.

After activation and photography, the units are stowed to allow crystallization to proceed in a vibration-free, gravity-free environment. At the end of the mission, the units are photographed again and prepared for entry, landing and removal.

CONTINUOUS FLOW ELECTROPHORESIS EXPERIMENT (CFES)

The McDonnell Douglas continuous flow electrophoresis device will make its seventh trip into space aboard Atlantis on flight 61-B. The objective of this mission is to separate a sufficient quantity of biological material for animal and clinical testing of a breakthrough pharmaceutical.

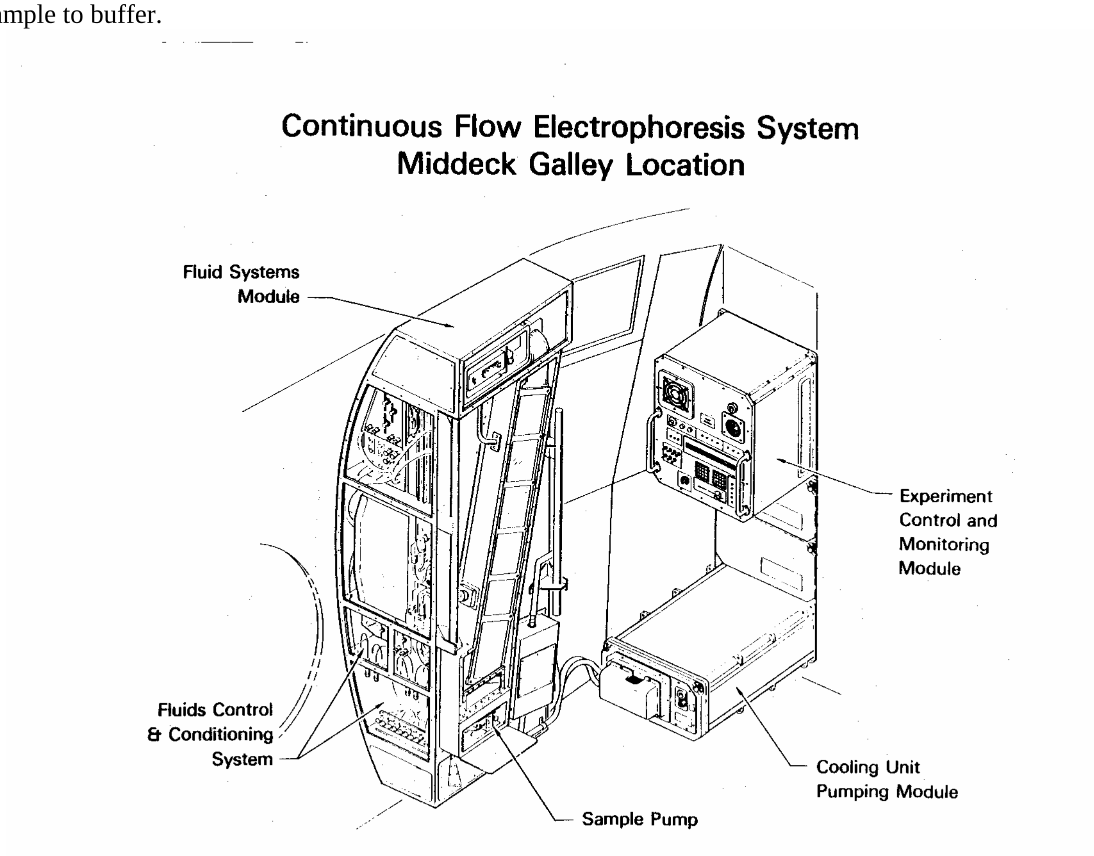
Charles D. Walker, McDonnell Douglas engineer and payload specialist, will monitor the operation of this machine and conduct biological assays. This is Walker's third flight as payload specialist.

The continuous flow electrophoresis device will operate for about 175 hours during the 7-day mission. It is expected that about 66 hours of processing time will be necessary to purify the approximately 1 quart of concentrated protein material on board.

To ensure that the desired hormone is being separated and collected within the fluid modules, once each day Walker will run a test on a sample of material taken from the collection streams. Using assay material carried on board separately, he will test for hormone presence in the fluid.

Walker will test daily for the presence of contamination. These tests will be made by withdrawing small samples of fluid from five locations and incubating them in vials previously loaded with freeze-dried reactants. Post-flight results from mission 51-D in April 1985 showed that preflight levels of cleanliness were maintained.

After separation of the biological material is complete, Walter will reconfigure the CFES device to permit additional research on the effects that varying sample concentrations have on the efficiency of the process. Several samples of differing concentrations will be tested to determine the optimum concentration ratio of sample to buffer.



IMAX

The IMAX project is a cooperative effort between the Canadian IMAX company and NASA. The system uses a specially designed 70 mm film camera to record color motion images on specially sprocketed film. During this flight, the IMAX camera will be used to document payload bay activities associated wit the EASE/ACCESS assembly during the two planned space construction walks.

The camera is mounted in the payload bay in a pressure-sealed container with a viewing windows. The windows has a sliding door which opens when the camera is in operation. The camera is controlled from the aft flight deck, exposing the film through a 30 mm fisheye lens.

IMAX cameras flew on STS missions 412-C, 41-D and 41-G to document payload bay and orbiter mid-deck and flight-deck crew activities along with spectacular views of space and the Earth. Film from those missions is included in the IMAX production “The Dream is Alive.”

STS-61B CREWMEMBERS

S85-38825 – This is the official portrait of the STS-61B crewmembers. Kneeling next to the mission insignia are Astronaut Brewster Shaw Jr., (right), mission commander; and Bryan D. O'Conner (left), pilot. In the back row are (l.-r.) Charles D. Walker, McDonnell Douglas payload specialist; Jerry L. Ross, Mary L. Cleve and Sherwood C. Spring -- all mission specialists; and Rodolfo Neri-Vela, Morelos payload specialist.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration.

BIOGRAPHICAL DATA

BREWSTER H. SHAW JR., Lieutenant Colonel, USAF, is mission commander. Born May 16, 1945, in Cass City, MI, he became a NASA astronaut in 1978.

Shaw received bachelor and master of science degrees in engineering mechanics from the University of Wisconsin at Madison. He entered the Air Force in 1969 and received his wings in 1970. He served as an F-100 combat fighter pilot in Phan Rang Air Base, Vietnam, and an F-4 fighter pilot in Thailand. He has logged more than 4,200 hours in some 30 types of aircraft, including 644 combat hours in F-100 and F-4 fighters.

Shaw was pilot of STS-9 (Spacelab 1), launched in 1983.

BRYAN D. O'CONNOR, Lieutenant Colonel, USMC, is 61-B pilot. He was born Sept. 6, 1946 in Orange CA., and became a NASA astronaut in 1980.

O'Connor received a bachelor of science degree in engineering from the U.S. Naval Academy and master of science in aeronautical systems from the University of West Florida.

A graduate of the U.S. Navy Test Pilot School, he participated in evaluations of various conventional and VSTOL aircraft. He was Naval Air Test Center program manager for all AV-8 Harrier projects, including the first Navy preliminary evaluation of the YAV-8B advanced Harrier prototype. He has more than 3,000 hours flying time, including 2,700 in jet aircraft.

SHERWOOD C. SPRING, Lieutenant Colonel, USA, is one of three mission specialists on 61-B. He was born Sept. 3, 1944, in Hartford CT, and became a NASA astronaut in 1980.

Spring received a bachelor of science degree in general engineering at the U.S. Military Academy and master of science in aerospace engineering from the University of Arizona.

Following graduation from West Point, he served in Vietnam with the 101st Airborne Division and later as a pilot with the 1st Cavalry Division. He worked 3-1/2 years as experimental test pilot and project officer on prototype rotary-wing and fixed-wing aircraft and served as operations officer for the 19th Aviation Battalion in Pyontaek, Korea. He has military and civilian experience in 25 types of airplanes and helicopters and has logged over 3,000 hours, including more than 700 in jets.

MARY L. CLEAVE, Ph.D., is a mission specialist. Born Feb. 5, 197, in Southhampton, NY, she became a NASA astronaut in 1980.

Cleave received a bachelor of science degree in biological sciences from Colorado State University, a master of science in microbial ecology, and doctorate in civil and environmental engineering from Utah State University.

At Utah State, she held graduate research, research phycologist and research engineer assignments in the Ecology Center and Utah Water Research Laboratory. Her technical assignments at NASA include work at the Shuttle Avionics Integration Laboratory and as CAPCOM on five Space Shuttle flights. She also worked on the malfunctions procedures book and crew equipment design.

BIOGRAPHICAL DATA

JERRY L. ROSS, Major, USAF, is a mission specialist. Born Jan. 20, 1948, in Crown Point, IN, he became a NASA astronaut in 1980.

Ross received bachelor of science and master of science degrees in mechanical engineering from Purdue University. He entered active duty with the Air Force and conducted computer-aided design studies on ramjet and mixed cycle propulsion systems and served as project engineer for captive tests of a supersonic ramjet missile using a rocket sled track.

As chief B-1 flight test engineer, he was responsible for t raining and supervising all Air Force B-1 flight test engineer crewmembers and performing the mission planning for the B-1 offensive avionics test aircraft. Ross has flown in 19 types of aircraft, has a private pilot's license and has logged more than 920 hours.

RODOLFO NERI VELA, Ph.D., is one of two payload specialists. He was born Feb. 19, 1952 in Chilpancingo, Gro., Mexico.

Vela received a bachelor's degree in mechanical and electronic engineering from the University of Mexico; studied the master's program in science, specializing in telecommunications systems, at the University of Essex, England; and received a doctoral degree in electromagnetic radiation from the University of Birmingham, England, where he also did postdoctoral research in waveguides.

Vela has conducted research and system planning on antennas and satellite communications systems at the Institute of Electrical Research, Mexico. He also headed the department of Planning and Engineering of the Morelos Satellite Program at the Mexican Ministry of Communications and Transportation. He is a post-graduate lecturer and researcher at the University of Mexico on antenna theory and design, satellite communications systems and Earth station technology.

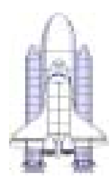
CHARLES DAVID WALKER is payload specialist. Born Aug. 29, 1948, in Bedford, IN, he is chief test engineer for the McDonnell Douglas electrophoresis Operations in Space (EOS) project.

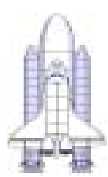
Walker received a bachelor of science degree in aeronautical and astronautical engineering from Purdue University. He flew on missions 41-D and 51-D with the EOS middeck payload.

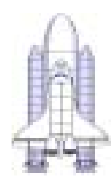
As payload specialist, Walker will operate the materials processing device developed by McDonnell Douglas as part of its Electrophoresis Operations in Space project, which is aimed at separating large quantities of biological materials in space for ultimate use in new pharmaceuticals.

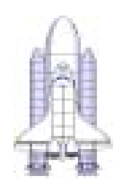
SHUTTLE FLIGHTS AS OF NOVEMBER 1985

22 TOTAL FLIGHTS OF THE SHUTTLE SYSTEM









	STS-61A 10/30/85 - 11/06/85		
	STS-51F 07/29/85 - 08/06/85		
	STS-51B 04/29/85 - 05/06/85		
STS-9 11/28/83 - 12/08/83	STS-41G 10/05/84 - 10/13/84	STS-51-I 08/27/85 - 09/03/85	
STS-5 11/11/82 - 11/16/82	STS-41C 04/06/84 - 04/13/84	STS-51G 06/17/85 - 06/24/85	
STS-4 06/27/82 - 07/04/82	STS-41B 02/03/84 - 02/11/84	STS-51D 04/12/85 - 04/19/85	
STS-3 03/22/82 - 03/30/82	STS-8 08/30/83 - 09/05/83	STS-51C 01/24/85 - 01/27/85	
STS-2 11/12/81 - 11/14/81	STS-7 06/18/83 - 06/24/83	STS-51A 11/08/84 - 11/16/84	
STS-1 04/12/81 - 04/14/81	STS-6 04/04/83 - 04/09/83	STS-41D 08/30/84 - 09/05/84	STS-51J 10/03/85 - 10/07/85
OV-102 Columbia (6 flights)	**OV-099 Challenger (9 lights)**	**OV-103 Discovery (6 flights)**	**OV-104 Atlantis (1 flight)**