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National Aeronautics and
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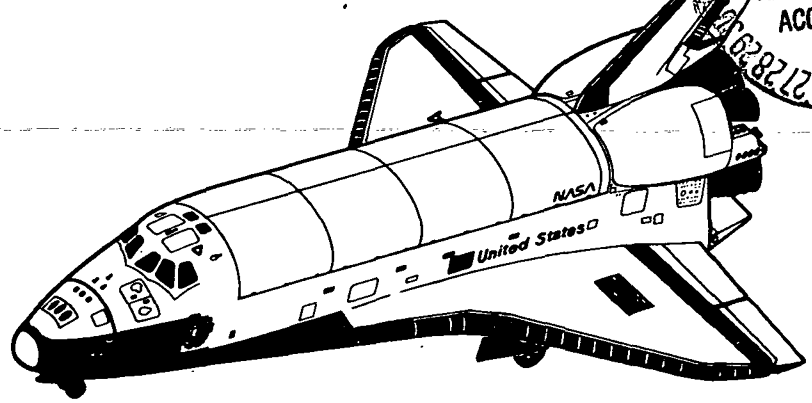
Press Kit

Project

NASA-NSTA
Shuttle Student
Involvement Project

For Secondary Schools

Student's Experiment to Fly on Third Shuttle Mission



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STUDENT'S EXPERIMENT TO FLY ON THIRD SHUTTLE MISSION

The third flight of NASA's Space Shuttle, now scheduled for March 22, will have an exceptional meaning for a high school student from Rose Creek, Minn. He will have a scientific experiment flying on it.

The experiment, "Insects in Flight Motion Study," was devised by Todd E. Nelson, an 18-year-old senior from Southland Public School, Adams, Minn., one of 10 finalists in the first national Space Shuttle Student Involvement Project.

The Shuttle Student Involvement Project for Secondary Schools is a joint venture of NASA and the National Science Teachers Association and is designed to stimulate the study of science and technology in the nation's secondary schools.

February 24, 1982

-more-

The insects to be examined are the velvetbean caterpillar moth and the honeybee drone. The object of the experiment is to study these two species under uniform conditions of light, temperature and pressure; the variable being the absence of gravity in space.

The experiment will focus on the flight behavior in zero gravity of two species of flying insects with differing ratios of body mass to wing area. Gravitational force is of primary importance for orientation and stable free flight of insects. The experiment will provide new aspects to research on responses of flying insects to changes in gravity which has been worked on at NASA's Ames Research Center, Mountain View, Calif.

Ten insects of each species will be carried in separate canisters, which will be stored in a Shuttle locker. The crew of the Space Shuttle (Jack Lousma and Gordon Fullerton) will remove the canisters from the storage locker and attach them to the mid-deck wall, where the insects will be observed and filmed by a data acquisition camera.

To broaden participation in the Shuttle Student Involvement Project, NASA solicited U.S. industrial firms and other groups to sponsor the development of the student experiments. Sponsors were asked to assign a company scientist to work with the student; fund the development of the experiment, including necessary hardware; provide travel funds to take the student to appropriate NASA installations during experiment development; and give the student assistance in analyzing post-flight data and preparing a final report.

The Avionics Division of Honeywell, Inc., of Minneapolis, agreed to sponsor Nelson's insect experiment. During the past six months Nelson has worked with Robert Moulton and Dr. Robert Peterson at Honeywell's headquarters to ready the experiment for flight.

Other who have assisted Nelson in this project are Robert D. Roberts, his teacher-advisor, and Dr. Bill Williams of the Bio-systems Division at Ames Research Center. Assisting with Shuttle payload integration was Chris Perner and John Jackson of the Crew Integration Section, NASA Johnson Space Center, Houston.

All 10 of the 1980-81 student project winners and their teacher-advisors will be the guests of NASA for "hands on" experience during the Shuttle post-flight payload retrieval activities and preparations for the fourth flight at the Kennedy Space Center, Fla. The students and teachers will participate in a workshop to include presentations by the principal investigators of the Space Science experiment package flown aboard the third Shuttle mission.

Nelson will also be present at the launch of the third Shuttle mission from Kennedy Space Center.

(END OF GENERAL RELEASE; BACKGROUND INFORMATION FOLLOWS.)

INSECT IN FLIGHT MOTION STUDY

Abstract

Gravitational force is of primary importance for orientation and stable free flight of insects. Responses of flying insects to changes in gravity have been studied in parabolic flight for brief periods of about 20 seconds by Dr. Bill Williams and a group of eminent entomologists at the NASA Ames Research Center.

The Insect in Flight Motion Study will investigate the flight behavior in zero gravity of two species of flying insects (the velvetbean moth and the honeybee) with differeing ratios of body mass to wing area.

The experiment will be carried out by placing a container aboard the Space Shuttle, stowed in a drawer in the mid deck of the Orbiter. An astronaut will remove the container holding the insects from the locker drawer, attach it to the wall of the mid deck and observe and film the insects as their behavior adapts to the zero gravity environment. After filming, the astronaut removes the insect container from the wall and returns it to the locker.

The insects and film will be returned to Earth for post-flight analysis and the preparation of a final report.

Student Investigator:	Todd E. Nelson Southland Public School Rose Creek, MN 55970
Corporate Sponsor:	Avionics Division Honeywell, Inc. Minneapolis, MD 55408
Scientist:	Dr. Robert Peterson Honeywell, Inc. 13350 U.S. Highway 19 South Clearwater, FL 33510
NASA Consultant:	Dr. Bill Williams Biosystems Division Ames Research Center Moffett Field, CA 94035

SUMMARY
SHUTTLE STUDENT INVOLVEMENT PROJECT FOR SECONDARY SCHOOLS

WHAT IS IT:	* Annual science education activity co-sponsored by NASA and the National Science Teachers Association
PURPOSE:	* Stimulate the study of science and engineering by engaging students in a competition to develop experiments suitable for flight aboard the Space Shuttle
WHO MAY ENTER:	* Students in grades 9 to 12 in all US public, private, and parochial and overseas schools, including US civil and military establishments, and US territories
MISSION ACCOMODATIONS:	* Most experiments will fly in Orbiter mid-deck stowage lockers * Receive up to one hour of crew involvement
RECOGNITION:	* Every student who enters receives certificate of participation * Up to 200 Regional Winners and their Teacher-advisors awarded trip to Space Shuttle symposia held at NASA research centers * Up to 20 National Winners and their Teacher-advisors awarded trip to National Space Shuttle Symposium held at Kennedy Space Center * Student and Teacher presented with commemorative medallion * School of student receives model of Space Shuttle for trophy case
KEY FEATURES	
VOLUNTEERISM :	* 200 teachers volunteer as advisors to regional winners * 300 scientists, engineers, and educators volunteer as regional and national judges * 200 scientists, engineers, and educators volunteer as advisors at regional conferences * 10 NSTA members volunteer as Regional Directors to accept proposals, solicit judges, and plan regional conferences
CORPORATE SPONSORS:	* Winners paired with corporate sponsors to develop experiment * Company assigns scientist to work with student * Provides funding for travel, hardware development, and post-flight analysis and reporting * Sponsor encouraged to consider continuing relationship such as employment, scholarships, etc.

SSIP Benefits:

* Provides students and teachers with clearer understanding of nature and conduct of science and engineering related to space activities.
* Systematic method for young people to bring new ideas to NASA.
* Contributes towards Space Act requirements to:
  - Provide for wide dissemination of information concerning NASA activities
  - Preserve U.S. role as leader in aeronautical and space science and technology.
* Helps humanize the space program for public by observing involvement of students.
* High degree of volunteer support and corporate sponsorship provides for high output with low costs to NASA.

PARTICIPATION:	1980-81	1981-82
TEACHER LETTERS:	7,900	8,500
ENTRY PACKETS REQUESTED:	70,000	86,500
PROPOSALS SUBMITTED:	1,500	2,800
REGIONAL WINNERS:	191	200
NATIONAL WINNERS:	10	20
CORPORATE SPONSORS:	11	

PREVIOUS STUDENT PROGRAMS:

* Skylab Student Project, Youth Science Congresses; Viking Student Intern Program; Viking Emblem Program; Participation in Science Fairs

SHUTTLE STUDENT INVOLVEMENT PROJECT

BACKGROUND AND NATURE OF PROJECT

Introduction

For twenty years NASA has conducted and participated in nationwide projects and competitions in order to encourage creative activity in science and related areas among secondary schools students. These activities began in 1961 with NASA participation in the Science Fairs of Science Service, a participation that continues to this day. From 1963 for a decade, with the National Science Teachers Association (NSTA), it cosponsored the Youth Science Congresses. In 1971-3 it conducted the Skylab Student Project and in 1974-6, the Viking Student Project, both cosponsored with NSTA.

To participate in these projects and to receive their awards, students were required to give evidence of their creative capacities, their understanding of science, and their ability to express their ideas in the spoken and written word. In the conduct of these projects, NASA's Educational Programs Division placed emphasis on the educational contribution of each to the participating students and teachers.

The Shuttle Student Involvement Project for Secondary Schools (SSIP-S) calls for a nation-wide competition, in which students submit proposals for scientific experiments, to be selected for flight or other appropriate accommodation on the Space Shuttle. The nearest examples of such a competition were the Skylab Student Project, and to a lesser extent, the Youth Science Congress.

In the Skylab Student Project, 100,000 announcements were mailed out which resulted in requests for 51,862 entry packet materials; the submission of 3,430 proposals; and from 305 regional winners, 25 were selected. The 25 student finalists and their science teacher-advisors were given the opportunity to discuss their proposed experiments and their integration with Skylab with NASA scientists and engineers at the Marshall Space Flight Center. At the time of the Skylab launch a conference was held for the students and selected Project officials to learn about other research being conducted on Skylab and to witness the launch. At appropriate times in the several stages of the Project, suitable awards were made.

In the Youth Science Congresses 150 to 200 secondary school students selected because of the quality of the scientific research they had undertaken, met in eight to ten regional groups, each of 15-20 students, usually at NASA Centers, to discuss their scientific investigations. Present at these regional presentations and engaging in the discussions were the other selected students, their teachers, and NASA, industry and university scientists. At the Congresses suitable awards were made.

The first Shuttle Student Involvement Project was initiated during the 1980-81 school year as a joint venture of NASA's Academic Affairs Division and the National Science Teachers Association (NSTA). The NSTA mailed out 100,000 announcement posters which resulted in requests for 70,000 entry packets; the submission of 1,500 proposals, and the selection of 191 winners from ten regions. All who entered the competition received certificates suitable for framing. The regional winners and their teacher-advisors were invited to participate in conferences held at NASA field centers, where the students presented their proposals before teams of professional scientists. Based on the guidance provided by the scientists, the regional winners were allowed to make minor revisions to their proposals prior to the final judging in Washington.

Ten national winners were selected in May, 1981. NASA then began to match the finalists with industrial or other non-NASA sponsors who will support the development and post-flight analysis of their experiments. Winners who are not matched with such sponsors will have their experiments supported by NASA. NASA retains the final determination to fly or otherwise accommodate winning proposals.

The Academic Affairs Division has also identified scientists and engineers at designated NASA field centers to serve as consultants to the students and their sponsors. These NASA consultants will assist with the structuring and readying for flight of the proposed experiment, gathering data, and advising on the preparation of a final report. This procedure is to be monitored by the contractor.

In August 1981, the ten students, their teacher-advisors, the corporate sponsors, and selected Project officials attended a conference at the Kennedy Space Center. At this meeting the students had the opportunity to present a progress report on their experiment, as well as to hear NASA officials discuss other Shuttle research and developments. The participants toured the KSC facilities and viewed the Space Shuttle Columbia being prepared for its second flight. At an awards dinner, the students and their teacher-advisors received commemorative medallions. The schools of the winners were also presented with scale models of the Shuttle inscribed with the students' name.

When the experiments are ready to fly, the students will be transported by either their sponsor or NASA to KSC to witness the launch and perhaps the landing and to receive their experimental data.

Whereas the Skylab Student Project was conducted only once, the SSIP-S is a continuing program. The second competition for the 1981-82 school year, again co-sponsored by NASA and NSTA, is currently underway. The deadline for this competition was February 1, 1982, with regional conferences to be held in March and student winners selected in May 1982. NASA plans to increase the number of winners for this competition from 10 to up to 20.

PURPOSES OF THE SSIP

Educational

NASA has always emphasized the science education value of its student programs. The Shuttle competition provides faculty members with a clearer understanding of and insights into the nature and conduct of science in space. The potential impact on curricula development and "hands on" training is especially important. As a teacher from Utah commented, "We can teach the scientific facts and theories in our classes, but until the student is able to internalize and apply them in an experiment, they seem very abstract."

The competition also uses the excitement surrounding the Shuttle launch as a means to motivate thousands of students to study science, and in particular, acquaints them with those variables available in the unique environment of space.

According to one of the regional student winners, "The knowledge and enthusiasm I brought back home with me was great. I learned about the scientific method of inquiry first hand, and became more aware of everything that is needed for the space program to be a reality so that I will no longer take these things for granted."

Source of New Ideas

The lifeblood of NASA is new ideas and SSIP-S provides a systematic method to bring fresh ideas into the agency. After welcoming participants to a student workshop, Dr. Robert Frosch, former Administrator of NASA, stated, "There is one key point I would like to make and that is that an involvement of students and student programs in NASA's work is not in any sense a kind of add-on or PR gimmick. It is more essential and inherent in what our task is than just something hung on the edge. We live off new ideas, we live off new ways to do things and new concepts and it is a simple social fact that a very large proportion of the new ideas come from the students and from the new entrants into any intellectual endeavor."

Recruitment Potential

While not a primary purpose of the competition, it cannot be ignored that the winners will be a small, but highly motivated and intelligent group of young people attracted to space and science and engineering who might otherwise have been attracted to other intellectual interests. As a New Jersey student wrote following the regional conference, "This project has only spurred me further on to pursue a career in the fields of aerospace engineering and space research."

Fulfill Space Act Requirements

The Charter which established NASA in 1958 specified the requirement for the Agency to "provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof." In addition, the Act calls upon NASA to preserve the "role of the United States as a leader in aeronautical and space science and technology." The SSIP-S program produces activities which contribute to both of these requirements.

Public Awareness of Space Program

Just as witnessed throughout the Skylab Program, the Shuttle competition will generate a large amount of public interest in the space program. Such articles can help to "humanize" the space program for the public by observing the involvement of local students in the competition. The announcements for the regional winners of the 1980-81 competition generated over 110 articles in hometown newspapers. Many of these appeared on the front page in conjunction with stories on the Shuttle launch, thus adding local interest to the first flight.

Cost Effectiveness

During a time of fiscal austerity in the Federal budget, it is especially important that NASA identify educational programs that provide for high output with low production costs. This has been the case with SSIP-S as much of the professional help in judging student proposals and working with winning experiments is obtained at no cost through the volunteer efforts of teachers and scientists. In addition, many of the costs for the preparation of the experiment for flight, the purchase of hardware, and related travel expenses are expected to be furnished by non-NASA sponsors.

MISSION OPPORTUNITIES

The first Space Shuttle flight took place in April of 1981. This will be followed by three additional orbital test flights over the next 12 months prior to the first operational flight. Once operational, Shuttle flights will occur approximately every two months with time between launches becoming shorter as operating experience is gained. These early missions will be launched from the NASA Kennedy Space Center in Florida, and will have durations of one to seven days with 135 to 200 nautical miles (250 to 370 km) orbital altitudes and 28.5 to 57.0 degree orbital inclinations. Depending on the complexity of individual experiments, a number of opportunities for student experiments are expected to be available during these early flights.

ACCOMMODATIONS

The Space Shuttle has been designed to support an extensive range of operations that make use of the special properties of space --- weightlessness, the broad view of the earth, and the ability to observe the rest of the universe unobscured and undistorted by the earth's atmosphere. Its provisions for accommodating flight experiments are correspondingly comprehensive and highly complex. The simplified accommodations described herein are presented only as general guidelines for students in developing their experiment concepts. Adherence to these guidelines will simplify the later development of flight hardware for the experiments and they should be observed; exceptions will be considered if they are truly essential to the experiment concept. In general, experiments that minimize weight and volume requirements and have small demands on crew time are easier to incorporate and are more likely to be selected for an early flight assignment.

For the early Shuttle flights, hardware developed specifically to support a student experiment will most likely be located in one of the stowage lockers in the Orbiter mid-deck for launch and return (fig. 1). Although other space may be allotted by NASA in special cases, all accommodations, available services, and environments shown in the following paragraphs are based on stowage in the Orbiter mid-deck lockers. As appropriate, experiments may be operated in the stowage lockers or removed and set up elsewhere in the cabin.

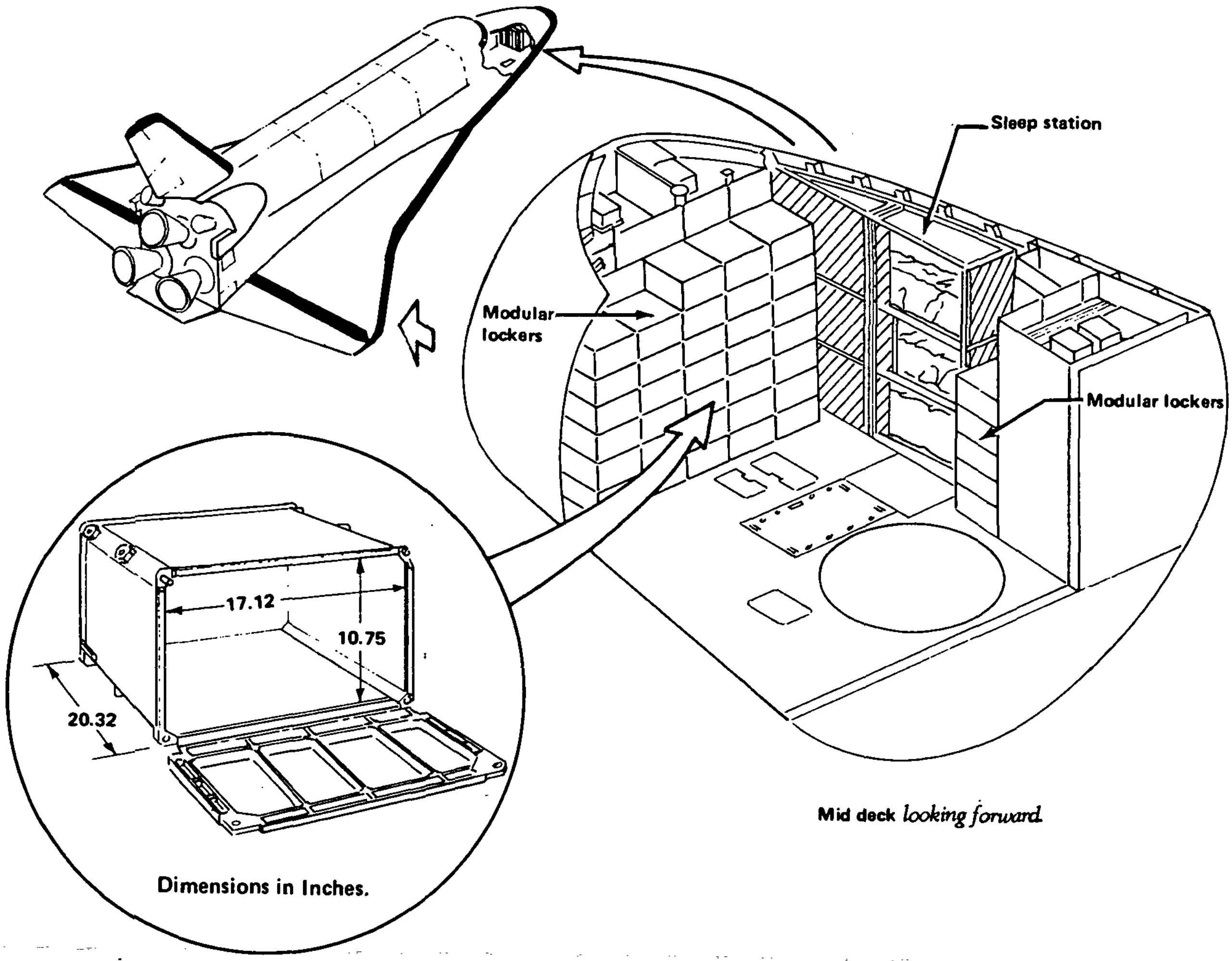

Fig. 1. Shuttle Orbiter mid-deck stowage lockers

Physical Accommodations

Mid-deck stowage lockers will be assigned on specific flights for student experiment use. More than one student experiment may share a locker since NASA will try to stow as many experiments as possible into any given locker. Additional available space may be allocated to student experiments on particular missions.

Basic dimension and loading characteristics are:

- Locker interior dimensions
  10.75 in. X 17.12 in. X 20.32 in. (approximately 2 $ft.^3$)
  (27.3 cm X 43.5 cm X 51.6 cm)

- Maximum stowage weight
  60 lbs (27.2 kg)

- Maximum loading
  30 lbs/ft^3 (480.5 kg/m^3)

Electrical

Because Shuttle electrical power availability will vary from mission to mission, student experiments should be self-contained using their own batteries, wherever possible. On some missions Shuttle power may be available to experiments in the Orbiter mid-deck from either 28 Vdc, or 115 Vac, 400 Hz, 3 phase, circuits. Due to allocation requirements to service all users, student experiments should typically not require more than 10 watts of power. Larger amounts of power for limited periods of time may be considered subject to available accommodations.

Thermal Control

No active thermal control hardware will be furnished by the Shuttle for student experiments. Heat produced by experiments must be dissipated by the cabin atmosphere. Individual experiments can dissipate up to 10 watts without a significant change in cabin temperature. Total heat rejection from all student experiments at any one time will not be allowed to exceed approximately 50 watts.

Control and Data

NASA will attempt to accommodate the requirements for control and data functions wherever reasonable. Cameras, closed circuit TV, and Shuttle-to-ground voice communications provided by NASA may be available to student experiments. Since provision of other control and data functions for student proposals may be difficult, recorders, timers, controllers, etc. furnished as an integral part of the experiment will simplify incorporation and flight assignment.

Pointing and Stabilization

Experiments which must view specific targets external to the Shuttle may be accommodated by viewports in the Orbiter aft flight deck. Obtaining and holding the target in the viewport field-of-view will require maneuvering and stabilization of the Orbiter. This capability exists but may often be committed to primary experiments on a mission.

Crew Operations

A maximum total time of one hour during the mission should be a guideline for crew involvement with each student experiment. If more than one of the crew is involved the allowable time for each should be reduced proportionally. Minimum crew involvement should be an experiment operational goal. For the flights considered for this competition, the crew will not leave the pressurized compartment to perform any experiment activities.

Support Equipment

A variety of equipment is carried on the Shuttle Orbiter to support normal flight operations and may be considered for use in support of student experiments. Listed below is equipment typical of that flown on all missions.

- Tools - Ratchet/torque wrench with sockets; combination and crescent wrenches, screw driver, hammer; vise grip and other pliers, Swiss army knife, scissors.

- Equipment - Exerciser (treadmill); food warmer, water dispenser; vacuum cleaner; mirrors; flashlight; stereo tape recorder with cassettes; head sets; binoculars; window filters; trash containers; lines; straps, cables.

- Environment/Medical Instrumentation - Sound level meter with octave analyzer; high and low rate and passive radiation dosimeters; blood pressure cuff; stethoscope; thermometers; otoscope; opthalmoscope; bioinstrumentation system (electrocardiograph device).

- Supplies - Tape, dry wipes, packing material.

- Television - Two portable TV cameras with monitors (viewfinders); one color lens; wide angle lens; cassette recorder and cassettes.

- Photography - 16mm Data Acquisition Camera; time coded; slow, fast, and normal motion film speeds; 5, 10, and 18mm, and zoom lens; film magazines. Hassleblad 70mm reflex camera; standard and 250mm lens; film magazines. Nikon 35mm single lens reflex; f/1.4 lens; 35mm film cassettes; 35mm self-developing CRT camera (photographs Orbiter operational data display on screen of a cathode ray tube); film cassettes. Accessory equipment (i.e., portable light, flash gun, filters, mounting brackets).

Safety

Obviously nothing may fly on the Shuttle that might endanger the safety of the mission, vehicle, or crew. Therefore, NASA must certify that everything that goes on board the Shuttle is safe and compatible with other elements of Shuttle operations.

Ground Accommodations

Under normal circumstances student experiments will be stowed 20-30 days before launch while the Orbiter is in a horizontal position in preparation for launch. Experiments stowed in the mid-deck requiring late installation because they include perishable items or need special environments may be accommodated as late as the day of launch. First access to experiment hardware after flight will be 12-24 hours after landing.

Mission Environment

Table 1 Orbiter Mid-deck General Environment

	Nominal	Range
Temperature	75°F (24°C)	55 to 95°F (13 to 35°C)
Humidity	50%	25 to 75%
Pressure	14.7 psi (1.0 bar)	8 to 18.1 psi (0.54 to 1.23 bar)
Acceleration		
Launch	Maximum loading 3.3g.	
On-orbit	For normal crew motion activity, accelerations may vary from 6×10^{-4}g (worst case) to less than 2×10^{-4}g for periods of quiescent crew activity. The minimum attainable acceleration level is 10^{-5}g. This level precludes any crew activity or firing of attitude control thrusters.	
Landing	Maximum loading 6.8g.	

1980-81 SSIP-S COMPETITION

The SSIP-S is open to regularly enrolled individual students in grades 9 through 12 in all U.S. public, private, parochial, and overseas schools, including U.S. civil and military overseas establishments, Puerto Rico, Guam, and the outlying U.S. territories.

In August of 1980, the NSTA mailed 100,000 announcement posters to high school science teachers. An additional 20,000 posters were distributed at various conferences and by NASA spacemobile lecturers. These mailings and distributions resulted in 70,000 requests for entry materials.

Proposals were then submitted to one of ten NSTA regional directors (see Table 2 for regional breakdowns). By the February 2, 1981 deadline, 1500 had been received at the regions.

Interdisciplinary teams of teachers, scientists and engineers reviewed the proposals and selected up to 20 semifinalists for each region. Regional conferences for the semifinalists were held during the months of March and April at various NASA field centers.

The 191 selected semifinalists represented 40 states, the District of Columbia, and Puerto Rico. Females numbered 44 (23%), while 147 were males (77%). There were some surprises in the grade distribution in that the lower grades had a higher level of representation than had been expected; 9th graders accounted for 36 semifinalists (18.8%), 10th graders numbered 38 (19.9%), 11th graders numbered 57 (29.9%) and the remaining 60 (31.4%) were in their last year of high school.

Since biology is the most regularly taught high school class it was not surprising to discover that 113 (60%) of the semifinalists' proposals dealt with biological experiments. Although physics experiments numbered 34 (17.8%), no other academic discipline accounted for more than 5% of the semifinalists; astronomy and astrophysics, 10 (5%); psychology/behavioral science, 10 (5%); chemistry, 9 (4.7%); engineering, 7 (3.5%); electronics, 5 (2.5%); environmental science, 2 (1.1%); and earth science, 1 (.5%).

Table 2 SSIP-S Regional Breakdown

Region I	Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont
Region II	New Jersey, Pennsylvania
Region III	Delaware, District of Columbia, Maryland, North Carolina, South Carolina, Virginia, West Virginia, dependent schools in Europe and the Middle East
Region IV	Alabama, Canal Zone, Florida, Georgia, Mississippi. Puerto Rico, Tennessee, Virgin Islands
Region V	Michigan, Ohio
Region VI	Illinois, Indiana, Kentucky
Region VII	Iowa, Minnesota, Missouri, Wisconsin
Region VIII	Arkansas, Kansas, Louisiana, New Mexico, Oklahoma, Texas
Region IX	Alaska, Colorado, Idaho, Montana, Nebraska, North Dakota, Oregon, South Dakota, Washington, Wyoming
Region X	Arizona, California, Guam, Hawaii, Nevada, Utah, dependent schools in the Pacific area

At the regional conferences the winning semifinalists, accompanied by their teacher-advisors, presented their proposals to other students, NASA representatives, and other professional scientists. The scientists were there to serve as consultants and gave suggestions to the students on how to improve their experiment prior to national judging.

A highly successful aspect of the regional conferences was the fact that no judging took place at this level. All 191 semifinalists were forwarded for national judging. This presented the opportunity to focus on support and cooperation at the regional conferences. As one of the teacher-advisors commented following the Region 10 meeting, "The way in which the symposium was run was of special interest to me. As a child, I was turned off to a career in music by the extreme competition among young musicians at music camp. The beauty of this program was the interest and cooperation of all involved."

After regional conferences, the students had an opportunity to upgrade their experiments. The proposals were then sent to NSTA headquarters for national judging. Panelists on the judging team included representatives from NASA, NSTA, the National Science Foundation, the National Institutes of Health, Department of Education, the American Association for the Advancement of Science, and several universities and consulting firms. The ten national winners were announced jointly by NASA and NSTA on May 8, 1981.

The winners included four females (40%) and six males (60%). The proposals represented seven experiments in biology (70%) and three in physics (30%). Of the ten winners, two (20%) were in 9th grade, two (20%) were in 10th, half were in 11th grade, and there was only one from the 12th grade.

After the selection of the finalists it was NASA's responsibility to match each student with an Agency scientist to serve as a consultant, and with a corporate sponsor.

As a consultant, the NASA scientist was asked to accept the responsibilities to:

- Serve as the focal point within the Agency to develop and integrate the student's experiment.
- Recommend appropriate experiment modifications to minimize experiment complexity or recommend other arrangements should NASA be unable to accommodate the experiment.
- Assist the student to analyze the experiment data from the flight and to prepare a final report.

To broaden participation in the program, NASA has solicited U.S. industrial firms and other groups to sponsor the experiment development activities of the student winners. The corporate sponsor is asked to accept the responsibilities to:

- Assign a company scientist or engineer to assist the student in transforming the winning proposal into a real experiment.

- Fund the development of the experiment, including necessary hardware and software not available or provided by NASA.
- If necessary, transport the student to the field center where the NASA consultant is located.
- Transport and accompany the student to KSC at the time of launch of the Shuttle to which the student's experiment has been assigned.
- Assist the student to analyze the experiment data from the flight and to prepare a final report.

In some cases, where a sponsor cannot be found or where the student proposal closely parallels a professional experiment already planned for a Space Shuttle mission, NASA may arrange for the student to work with a Principal Investigator as part of an existing research team. In other cases, minor modifications of professional experiment operations, or the collection of special data from existing instruments, may be made to accommodate the student proposals. In all cases, NASA will make every effort to see that the student receives sufficient information to write a final report.

The winning students, their NASA consultant, and corporate sponsor are listed in Table 3.

NATIONAL SSIP-S CONFERENCE

The ten national winners, their teacher-advisors, and sponsors attended a special Space Shuttle conference on August 28-29, 1981 at NASA's Kennedy Space Center. At the conference the students presented their experiment ideas before the other participants and received instruction procedures for integrating their experiments into a specific Shuttle mission. The conference participants also toured the KSC facilities and viewed the Columbia in preparation for its second flight.

An awards banquet was held on the final evening of the program. Finalists and their teacher-advisors received commemorative medallions. The winning entrants' schools received a model of the Space Shuttle inscribed with the finalist's name. All students who submitted a proposal idea to the competition received a certificate of participation.

STATUS OF REMAINING 1980-81 WINNERS

With the inclusion of the first student experiment on STS-3, NASA is anxious to accommodate the remaining investigators from the 1980-81 competition on early Shuttle missions. Corporate sponsors and NASA consultants have been asked to see if additional assistance can be provided to accelerate experiment development for possible flight on STS-4 and STS-5.

Table 3 SSIP-S 1980-81 National Winners

STUDENT INVESTIGATOR	EXPERIMENT TITLE	NASA CONSULTANT	CORPORATE SPONSOR
Wendy Angelo Poughkeepsie, NY	Biofeedback	Dr. Patricia Cowings Biomedical Research Div. ARC	Dr. Guy Methany Life Sciences, Inc. Houston, TX
Aaron K. Gillette Winter Haven, FL	Growth of Porifera in Zero Gravity	Dr. William Knott Biological Science Office KSC	Dr. Tania Hogan Martin Marietta Aerospace Orlando, FL
Pritchett "Chet" Harris Ambler, PA	Simulated Atmosphere on a Weightless Sphere	Dr. Daniel Fitzjarrald Fluid Dynamics Branch MSFC	Mr. Robert Fleenor Rockwell International Huntsville, AL
Karla R. Hauersperger Charlotte, NC	The Effect of Prolonged Space Travel on Levels of Trivalent Chromium in the Body	Dr. Carolyn Leach Biomedical Labs. Branch JSC	Dr. George Van Cochran Explorers Club New York, NY
Michelle A. Issel Wallingford, CT	Formation of Crystals in a Weightless Environment	Dr. Liam Sarsfield Fluid Mechanics & Acoustics Division LeRC	Mr. Charles Flugel Hamilton Standard Windsor Locks, CT
Amy M. Kusske Long Beach, CA	Effect of Exercise, Diet, and Zero Gravity on Lipoprotein Profiles	Dr. Harold Klein Office of Life Sciences ARC	Dr. William Douglas McDonnell Douglas Astronautics Company Huntington Beach, CA
Dave D. Madura Highland, IN	Effects of Space Travel on Cytokinesis & Karyokinesis (Will not perform this experiment, but will work on existing research team in similar discipline)	Dr. Harold Klein Office of Life Sciences ARC	Mr. George Mulhern Lockheed Missiles and Space Company Sunnyvale, CA
Todd E. Nelson Rock Creek, MN	Insect in Flight Motion Study	Dr. Bill Williams Biosystems Division ARC	Mr. Robert Moulton Honeywell, Aerospace and Defense Group Minneapolis, MN
D. Scott Thomas Johnstown, PA	Convection in Zero Gravity	Dr. Roger Kroes Solid State Branch MSFC	Mr. Gil Moore Thiokol Corporation Brigham City, UT
Daniel J. Weber New York, NY	Effects of Weightlessness on Arthritis	Dr. Emily Holton Biomedical Research Div. ARC	Mr. Jerry Houston General Dynamics Convair Division San Diego, CA
			Dr. Dave Larson Pfizer, Inc. Groton, CT

To provide a clearer understanding of the conduct of science and engineering in the space environment, NASA and NSTA have invited the students, their teacher-advisors, and corporate sponsors to a special workshop at KSC. They will receive "hands on" experience during STS-3 payload retrieval activities and STS-4 preparations on or about April 20-22, 1982. Through the post-flight experience with the student experiment that will be on STS-3, the participants will learn what will be expected of them when their experiments fly on future Shuttle flights.

CONCLUSION

The Shuttle Student Involvement Project for Secondary Schools is truly designed as an involvement program. By utilizing the natural youthful excitement surrounding the flights of the Space Shuttle, many thousands of high school students will be motivated to take a greater interest in their science courses, especially considering those variables that are unique to the space environment. NASA and NSTA hope to add their contributions, along with many other concerned groups, to the important effort to improve the level of the teaching of science and engineering in U.S. secondary schools.

SHUTTLE STUDENT INVOLVEMENT PROJECT

1981-82 REGIONAL CONFERENCE SCHEDULE

Region	Conference Location	NSTA Director	NASA Contact	Date
I	Goddard Space Flight Center Greenbelt, MD	Dr. J.W. Maben 203/869-5101	Elva Bailey 301/344-7207	Mar 25-26
II	Goddard Space Flight Center Greenbelt, MD	Dr. Leonard Krause 215/299-7771	Elva Bailey 301/344-7207	Mar 25-26
III	Langley Research Center Hampton, VA	Dr. Floyd Mattheis 919/757-6736	Hal Mehrens 804/827-3966	Mar 21-23
IV	Marshall Space Flight Center Huntsville, AL	Francis Stivers 904/724-8100	Jim Pruitt 205/453-0038	Mar 14-16
V	Lewis Research Center Cleveland, OH	Dr. John Schaff 419/537-2465	Lynn Bondurant 216/433-4444	Mar 29-Apr 1
VI	Marshall Space Flight Center Huntsville, AL	Dr. Hans Anderson 812/337-9404	Jim Pruitt 205/453-0038	Mar 14-16
VII	Lewis Research Center Cleveland, OH	LeRoy Lee 608/263-1692	Lynn Bondurant 216/433-4444	Mar 29-Apr 1
VIII	Johnson Space Center Houston, TX	Dr. Paul Cowan 817/788-2231	Jim Poindexter 713/483-4241	Apr 18-20
IX	Ames Research Center Moffett Field, CA	Richard Steiner 503/646-6275 ext 283	Garth Hull 415/965-5543	Mar 14-16
X	Ames Research Center Moffett Field, CA	Dr. Melanie Dean 714/692-1226	Mike Donahoe 415/965-5544	Mar 14-16

NSTA-NASA

SPACE SHUTTLE STUDENT INVOLVEMENT PROJECT

National Science Teachers Association
1742 Connecticut Avenue, N.W. • Washington, D.C. 20009 • 202/328-5800

The National Science Teachers Association is the world's largest organization dedicated to the improvement of all areas of science education at all grade levels, numbering over 40,000 members and subscribers. The Association is open to all those interested in the furthering of science education. Members include teachers of science in elementary and secondary schools and colleges, science educators and supervisors, scientists, and business and industry representatives.

NSTA is committed to the improvement of all formal science education; to the coordination of interdisciplinary communication among scientists and science teachers; to the stimulation of scientific literacy for students and adults; to the identification and motivation of students toward careers in science and engineering; to the creation of a public awareness of the importance of science; and to greater understanding of science as a basis for decisions in numerous questions of public policy.

As one way of carrying out its mission, NSTA has been strongly involved in programs involving students, particulary at the secondary level. Among them have been Tomorrow's Scientists and Engineers, funded by Exxon Corporation; the Skylab Student Project and the Viking Student Project, cosponsored by NASA; and currently the Shuttle Student Involvement Project for Secondary Schools.

The Association publishes three journals: <u>Science and Children</u>, directed to the elementary teacher, eight issues each year; <u>The Science Teacher</u>, offers topical articles for the general scientific and educational community, primarily at the secondary school level, nine issues each year; and the <u>Journal of College Science Teaching</u>, six issues emphasizing current approaches to science teaching in junior and community colleges. Other publications include instructional aids, reports, monographs, and a quarterly news bulletin for the membership.

NSTA is an affiliate of the American Association for the Advancement of Science.

SHUTTLE STUDENT INVOLVEMENT PROJECT

Program Management

NASA Headquarters	
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William D. Nixon	Chief, Education Services Branch
Alan Ladwig	SSIP Program Coordinator
Ames Research Center	
Bernard M. Donahoe (Mike)	Education Programs Officer
Garth A. Hull	Education Programs Officer
Goddard Space Flight Center	
Elva Bailey	Education Programs Officer
Richard Crone	Assistant Education Programs Officer
Jet Propulsion Laboratory	
Benito Casados	Manager, Education and Community Relations
Johnson Space Center	
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Langley Research Center

Harold E. Mehrens	Head, Office of Education and Community Services

Lewis Research Center

Lynn Bondurant	Chief, Public Services Office

Marshall Space Flight Center

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Dr. Helenmarie Hofman	Assistant Director, Member Services

NSTA Regional SSIP Directors

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