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IN REPLY
REFER TO DTIC-RS (FOIA 2000-148)

SEP 19 2000

Mr. John Greenewald, Jr.
[redacted]
Northridge, CA 91325

Dear Mr. Greenewald:

This is in reply to your letter dated August 14, 2000, received in this office August 28, 2000, requesting information under the Freedom of Information Act (FOIA). Under Department of Defense rules implementing the FOIA, published at 32 CFR 286, your request was categorized as **"other."**

Release of document AD B206699, *A Brief History of the DoD Space Test Program*, dated December 1995, may only be approved by the appropriate Air Force controlling activity. Therefore, your request has been referred to the following organization for processing and direct response back to you:

Commander
OL-P, 11 CS/SCSR (FOIA)
1000 Air Force Pentagon
Washington, DC 20330-1000
(703) 696-7263

Please direct all future correspondence related to document AD B206699 to the above organization.

No assessable fees were incurred for services from the Defense Technical Information Center related to processing this request. Please call me at (703) 767-9194 if you have any questions.

Sincerely,

Kelly D. Akers

KELLY D. AKERS
FOIA Program Manager

DEPARTMENT OF THE AIR FORCE
11TH WING

November 6, 2000

11 CS/SCS (FOIA)
1000 Air Force Pentagon
Washington DC 20330-1000

John Greenewald
[redacted]
Northridge, CA 91325

Dear Mr. Greenewald

This is in response to your August 14, 2000 Freedom of Information Act request for a copy of document AD B206699, entitled A Brief History of the DOD Space Test Program, Thomas Hagler dated December 1995. We received your request from the Defense Technical Information Center on September 27, 2000.

In this instance, we are unable to meet the time limits imposed by the Freedom of Information Act. We need additional time to search for the records you requested.

Please be assured that your request is being processed as quickly as possible.

If you have any question, please contact Ms. Penny Jenkins at (703) 696-7270 and refer to case #00-1600.

Sincerely

RHONDA M. JENKINS
Chief, Documentation Information &
Services Branch

DEPARTMENT OF THE AIR FORCE
11TH WING

14 FEB 2001

11 CS/SCS (FOIA)
1000 Air Force Pentagon
Washington DC 20330-1000

John Greenewald, Jr.
[redacted]
Northridge, CA 91325

Dear Mr. Greenewald

This is response to your August 14, 2000 Freedom of Information Act request for document AD B206699, entitled A Brief History of the DOD Space Test Program, Thomas Hagler (FOIA case 00-1600).

To satisfy your request, our action officers reviewed all material maintained locally by the Directorate of Space and Nuclear Deterrence (SAF/AQS). Because some of the documents contained material that was not releasable, we excluded that material, and prepared the remainder for release to you. Material that has not been included for this FOIA request falls under the following exemptions:

1. 5 USC 552 (b)(1) reference (a) relating to classified material and material that when combined with other material, discloses classified information. All classified information removed from the document was currently and appropriately classified.

2. 5 USC 552 (b)(3) reference (a) relating to material not subject to release by statute. The statute covering this material is 10 USC 130, Authority to Withhold Unclassified Technical Data with Military or Space Application.

3. 5 USC 552 (b) (6) relating to personnel information.

You may appeal this decision by writing to the Office of the Secretary of the Air Force within 60 calendar days after the date of this letter. The appeal should include the reasons for reconsideration along with a copy of this letter and be addressed to:

Secretary of the Air Force
Thru: 11 CS/SCS (FOIA)
1000 Air Force Pentagon
Washington DC 20330-1000

Sincerely

DARLEEN A. DRUYUN
Principal Deputy Assistant Secretary
(Acquisition & Management)

Attachment:
1. Requested record

AEROSPACE DIVISION NOTE
ADN 95-5

A BRIEF HISTORY OF THE DOD SPACE TEST PROGRAM

December 1995

By

[redacted]

(b)(6)

Approved by

[redacted]
Division Manager

GOVERNMENT PROPRIETARY INFORMATION INCLUDED

~~DISTRIBUTION AUTHORIZED~~

~~to U.S. Government agencies only; test and evaluation; December 1995. Other requests for this document should be referred to SAF/AQXA~~

~~WARNING~~

~~Document contains technical data whose export is restricted by the Arms Export Control Act (Title 22, U.S.C., Sec 2751 et seq.) or Executive Order 12470. Violators of these export laws are subject to severe criminal penalties.~~

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Suite 800
1215 Jefferson Davis Highway
Arlington, VA 22202-3251

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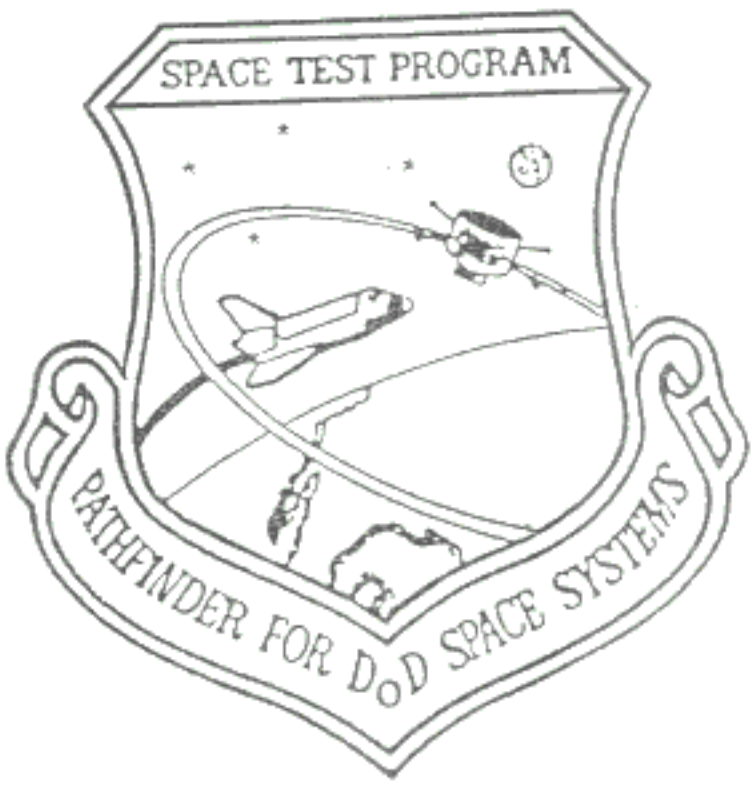
PREFACE



This division note is a brief history of the DOD Space Test Program (STP) from its inception in 1966 through 1994. Included are descriptions of the STP organization and management, a chronology of space missions and associated specifications, and a summary of the experiments, along with a compilation of experiment results and the resulting benefits to DOD systems and technology. An annex to this report is available that provides corresponding information on the various classified experiments that have been flown by STP. Both documents were prepared under the guidance of Maj [redacted] SAF/AQSL.

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Note: No missions were flown in 1973, 1980, 1981, and 1987.

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I. INTRODUCTION

Over the past three decades, the Department of Defense (DOD) has dramatically increased its use of space as a theater of operations. The result has been an equally dramatic increase in both the number and complexity of our nation's military space assets. The importance of the tasks performed by these space systems has, in turn, created the need for both constant improvements to the systems themselves, and an improved understanding of the space environment in which they must operate. In 1966, the DOD established the Space Test Program (STP) to fill this need.

With the Department of the Air Force as the program's executive agent, STP flies the greatest possible number of militarily-relevant, high-priority DOD space research experiments possible, given the constraints of opportunity and funding. STP flies both prototype and developmental tests, enhancing our understanding of the space environment, supporting the development of improved components, and/or proving-out new component technologies and applications. It provides substantial risk mitigation for military space system concepts and technologies, and allows for swifter and more assured transition of advanced concepts to operational status. Over its nearly thirty-year history, STP has provided flight systems design, support, experiment integration, data collection, and data processing for 368 space experiments (through calendar year 1994).

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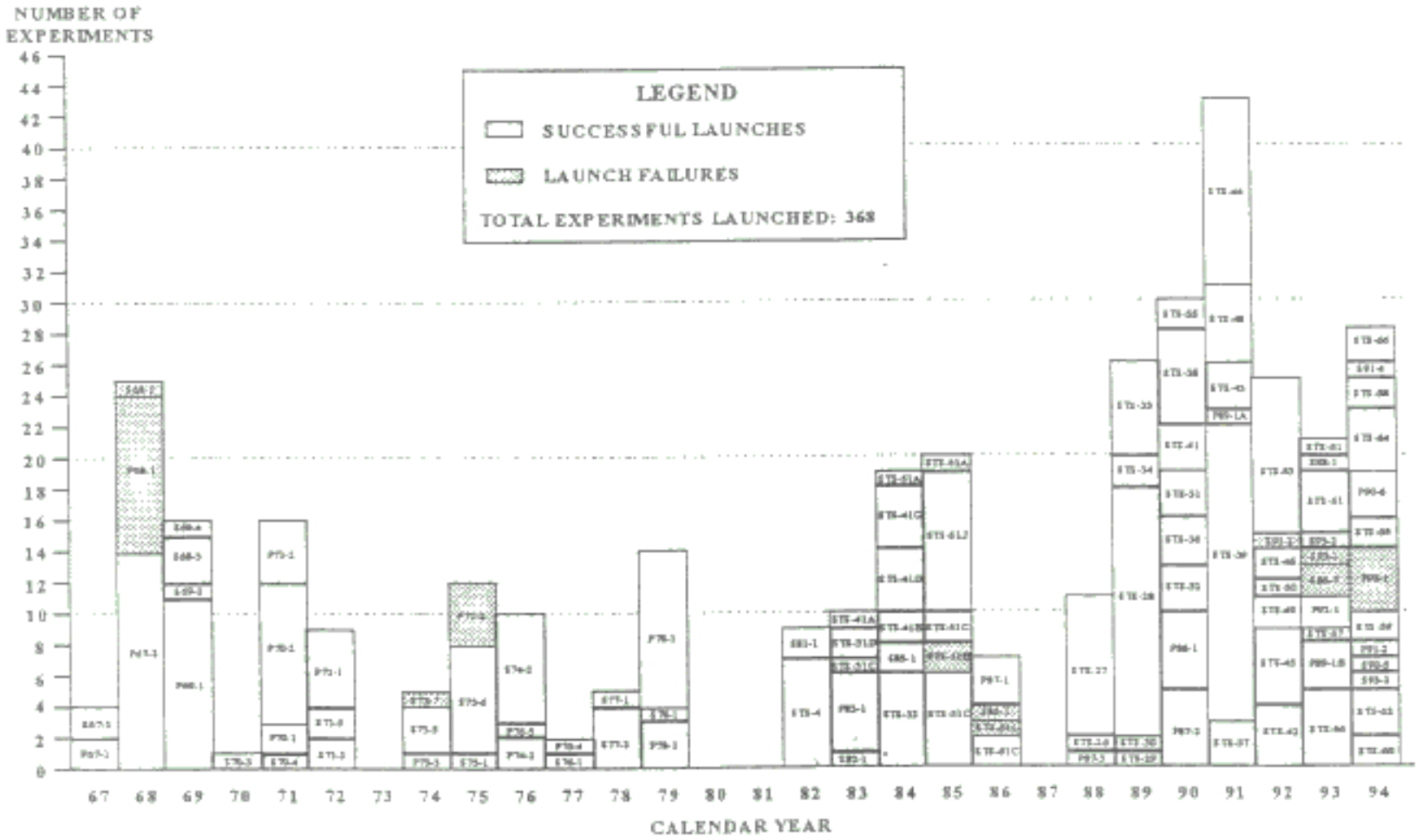
II. EXECUTIVE SUMMARY

LAUNCH HISTORY

Figure 1 shows the Space Test Program (STP) history from its first launch in 1967 through 1994, and contains both missions per year and the number of experiments in each mission. Each mission shown has an STP-associated payload, incorporating from one to several individual experiments. STP has a record of 368 successful launches, with only 11 missions (carrying 28 experiments) that either failed to acquire useful data or were lost due to a launch failure.

Figure 1 STP Launch History, 1967 - 1994



Experiments were sponsored predominantly by STP, but did include 33 experiments whose funding was provided by non-STP applicants. The technologies demonstrated under these non-STP missions are, however, of interest to DOD, NASA, and collateral organizations, and are integral to the broad technology base being developed under STP participation: STP methods and procedures of management and integration were utilized so as to allow the most cost-effective execution of these tests.

CATEGORIES OF STP EXPERIMENTS

The space experiments that are conducted by STP fall into three major categories. The first includes those experiments addressing systems, subsystems, or related spacecraft components; the second provides measurements of the space environment; and the third explores military man-in-space options and benefits. Within each category, the experiments are designed and executed so as to demonstrate feasibility, improve operational design, provide early capabilities, perform operational system risk-reduction, develop the knowledge base, and exploit unanticipated discoveries to the greatest extent possible. Figure 2 lists these three categories of experiments, and (where applicable) the experiment types within the categories.

Figure 2 Category Overview of STP Experiments

CATEGORIES OF SPACE TEST PROGRAM EXPERIMENTS 1967-1994

- **SYSTEM/SUBSYSTEM AND RELATED TESTS**
  - **ADVANCED COMMUNICATION TESTS**
  - **SPACECRAFT SUBSYSTEMS TESTS**
  - **GEODETIC MAPPING FOR NAVIGATION**
  - **GROUND RADAR CALIBRATION**
  - **SPACE MANUFACTURING**
  - **MEDICAL TECHNOLOGY**
  - **SENSOR DEVELOPMENT**
- **SPACE ENVIRONMENT MEASUREMENTS**
  - **NEUTRAL ATMOSPHERE MEASUREMENTS**
  - **IONOSPHERIC MEASUREMENTS**
  - **WAVE PROPAGATION MEASUREMENTS**
  - **MAGNETOSPHERE MEASUREMENTS**
  - **GEOMAGNETIC FIELD MEASUREMENTS**
  - **SOLAR X-RAY, UV, AND PARTICLE MEASUREMENTS**
  - **COSMIC RAY MEASUREMENTS**
  - **BACKGROUND IR, UV MEASUREMENTS**
  - **NEAR-EARTH ENVIRONMENT**
  - **SPACECRAFT ENVIRONMENT**
- **MAN IN SPACE INVESTIGATIONS**

System and subsystem tests of spacecraft components are necessary in order to develop improved components or to prove-out new component technologies and applications. These tests therefore provide substantial risk mitigation for military space system concepts and technologies, and allow for swifter and more assured transition of these concepts to operational status. The following describes several examples.

- Advanced communications tests have led to improved tactical communications, improved survivability of communications systems, and concepts for small, inexpensive space-based communications systems for use on the battlefield.

- Through STP testing, spacecraft subsystems have been made more reliable and survivable.

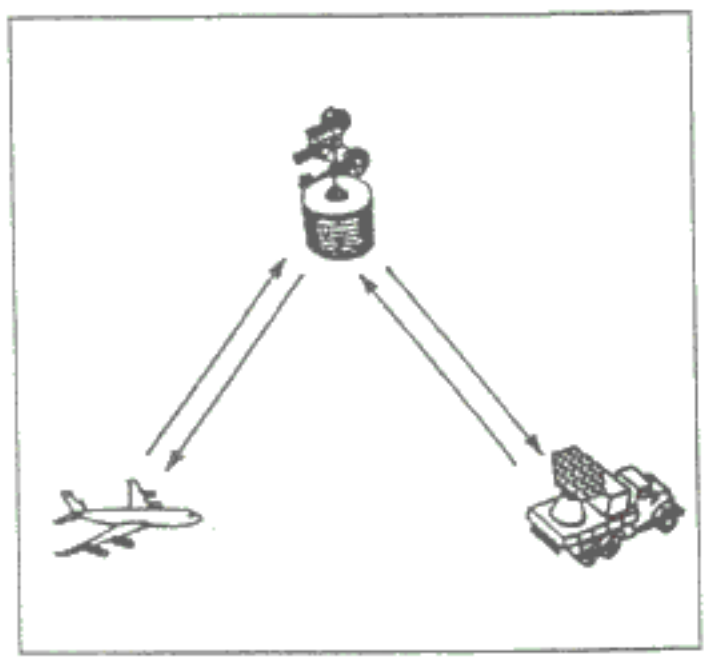
- Experiments related to navigation have been successful in improving geodetic survey accuracy worldwide and have demonstrated critical hardware for the Global Positioning System (GPS).

- STP conducted experiments that provided different sizes and shapes of space objects for the calibration of ground radar. These experiments were of significant value, especially to segments of the ballistic missile defense effort.

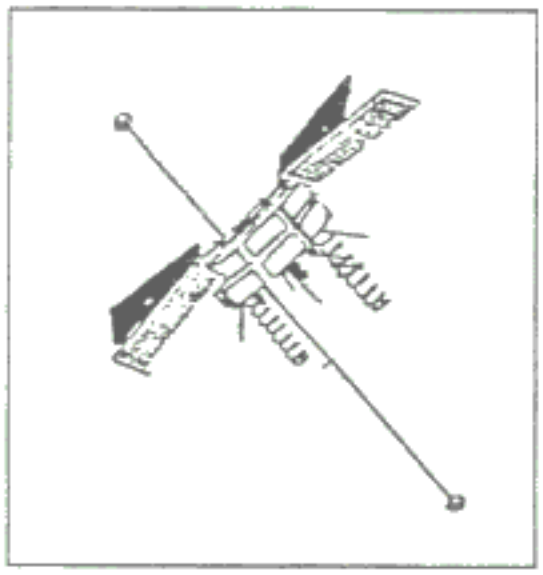
- Experiments related to manufacturing products in space (e.g., pharmaceuticals) lead to improved and less expensive products. STP supports a continuing experiment series in this area.

BENEFITS TO MILITARY OPERATIONS

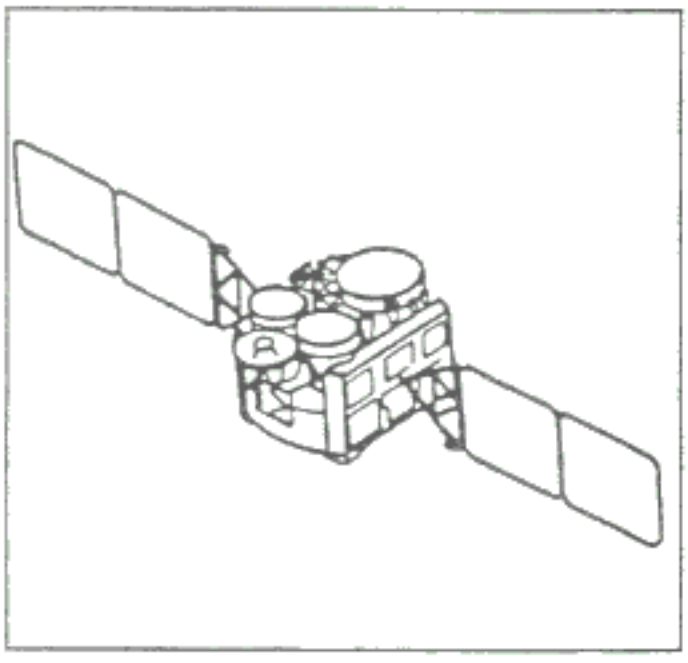
The following provides specific examples of benefits to military operations from experiments conducted by STP.



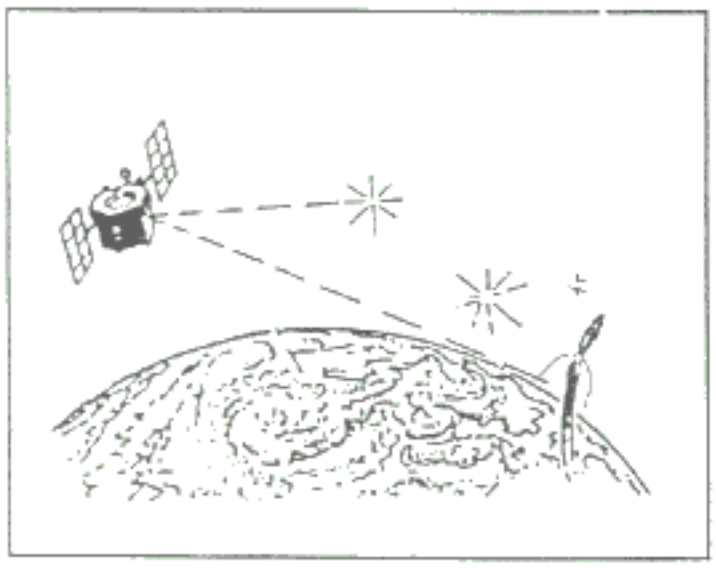
In 1968, STP flew the Lincoln Experimental Satellite No. 6 (LES-6). This mission proved the utility of UHF satellite communications for tactical purposes and led to the current FLEETSAT-based tactical communications system.



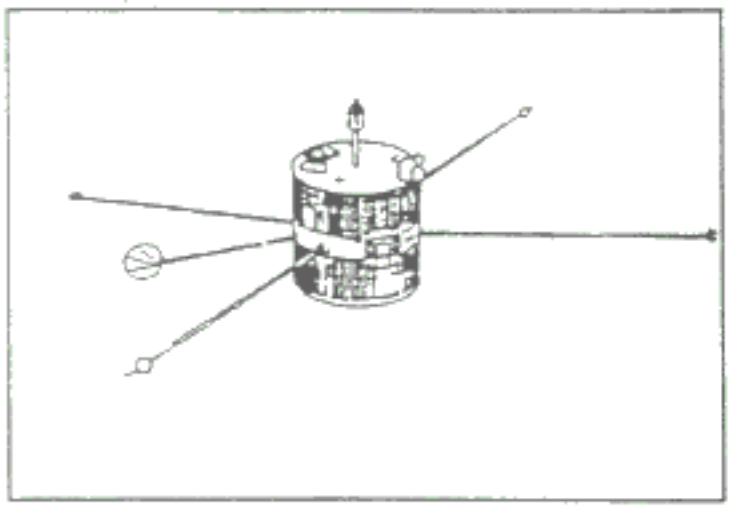
The TIMATION-3 satellite, launched by STP in 1974, carried a prototype of an advanced, high-accuracy rubidium clock. The successful space demonstration of this time-keeping technology was a major and direct contribution to the Global Positioning System.



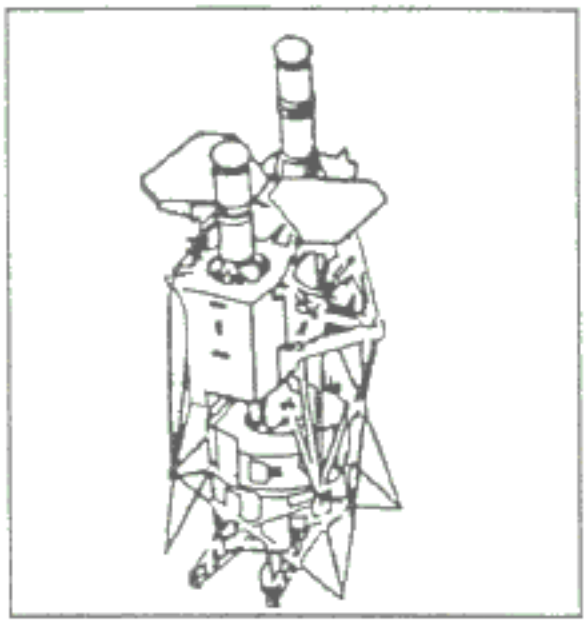
Advanced design concepts and highly capable thermal coatings are allowing many satellite thermal control architectures to be comprised solely of passive components. This allows significant cost savings, since active thermal control components (such as pumped fluid loops and louvered radiators) can add an order of magnitude of complexity and cost to the design, manufacture, and operation of the vehicle. In 1972, STP flew mission P72-1, which carried (among others) an experiment designated ML-101: Stability of Thermal Materials. This tested an improved thermal control coating for military satellites. The space test demonstrated the effectiveness and durability of the new coating, and led to its use on a number of military satellites, including the Defense Satellite Communications System (DSCS).



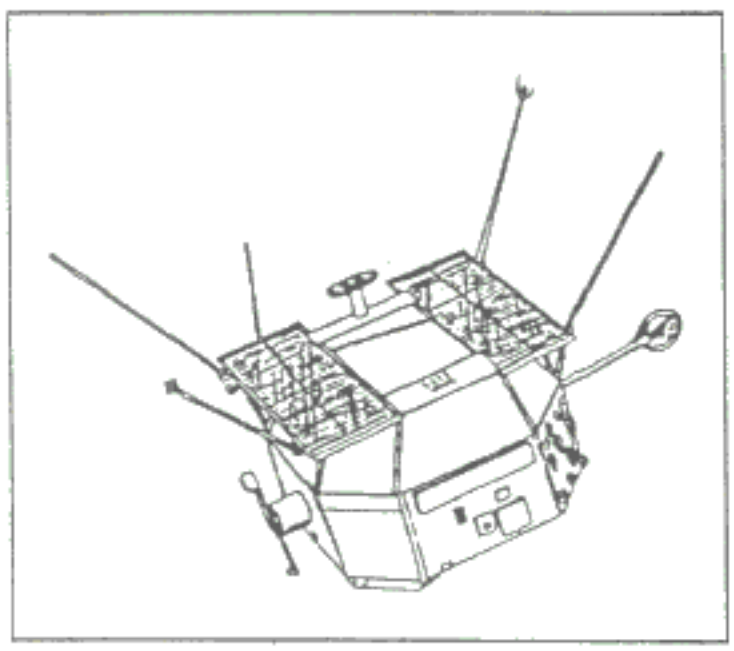
STP has flown several experiments to obtain background data for sensor operations in space. A particularly valuable set of data, collected on missions flown from 1967 to 1971, was comprised of IR background spectral variations and a mapping of the celestial IR background, and was used to determine the design parameters for a number of military satellite surveillance systems.



The phenomenon known as spacecraft charging results in the build-up of differing electric potentials on the various surfaces of a spacecraft. The differing potentials can cause arcing between these sections, possibly shorting-out electronics, initiating pyrotechnics, or otherwise disabling a spacecraft. In 1979, STP launched the SCATHA satellite, which performed 14 experiments to characterize spacecraft charging, returning a wealth of useful data. The SCATHA data base for analyzing spacecraft anomalies and has been the primary source of data for military standards related to spacecraft charging.



STP made a major contribution to a second-generation tactical communications system with the launch of LES-8 and 9 in 1976. These missions demonstrated the use of K-band tactical communications on a worldwide basis and was the prototype for a second generation, high reliability/survivability tactical communications system.



The Combined Release and Radiation Effects Satellite (CRRES) mission was launched by STP in 1990. It contributed to improved space power systems through the demonstration and evaluation of a new high efficiency solar panel, and also tested and space qualified advanced microelectronic components in support of military space operations.

SPACE ENVIRONMENT EXPERIMENTS

Accuracy and broad applicability of space environment models an atmospheric standards is vital to military space operations. STP's characterization of the space environment has direct military benefits, contributing significantly to the development and enhancement these models. Several examples follow.

- Measurements of the upper atmosphere (densities, constituents, etc.) are important to the understanding of atmospheric chemistry, the behavior of the ionosphere, the effect of high-altitude nuclear explosions, and the precise orbital predictions of low-altitude satellites.

- The ionosphere plays a very important role in radio propagation below Ultra High Frequencies (UHF), making proper characterization of the its properties and behavior vital to the reliability of many military communications systems. STP has flown experiments to better characterize the ionosphere specifically for the purpose of improving communications.

- Wave propagation data are important to communication system design and analysis of channel characteristics (such as electromagnetic noise and antenna impedance). Experiments flown by STP experiments have made direct measurements related to wave propagation.

- The earth's magnetosphere encompasses the orbits of many long-duration satellites. To accurately predict the life span of these satellites and that of future systems, it is necessary to understand the environment and perturbations in this region, especially those driven by solar particle flux. With a proper understanding, operational procedures can be developed to protect satellites during potentially dangerous solar events.

- The earth's magnetic field is non-uniform and is undergoing continuous change, including distortions from solar activity. Magnetic field activity has a direct impact on space systems (e.g. satellites using magnetic torquers for attitude control). STP geomagnetic field experiments have been directed toward a better understanding of the field anomalies.

- The influence of incident solar radiation on the earth, its weather, and communications varies widely with radiation type and amount. Solar flares, for example, can cause worldwide communications blackouts in certain frequency bands, and often produce the high-energy particles that can damage or disable a satellite. STP experiments have made measurements of solar ultraviolet (UV), X-rays, low energy nuclear particles of the solar wind, and high energy particles released by solar flares, all aimed at improving the forecasting techniques required to preserve valuable national space assets.

- Characterization of the cosmic ray background is required for proper operation of nuclear detonation detection satellites and for estimation of damage to components of long-duration spacecraft. STP experiments have contributed to knowledge of cosmic rays, including two experiments that were very successful at improving measurement techniques.

- The proper operation of military surveillance satellites requires a thorough knowledge of earth, earth limb, and celestial backgrounds. STP experiments gathered such data in the infrared (IR), visible, and UV regions of the spectrum. Measurements in the IR region in particular contributed directly to the design of several military satellite surveillance systems.

- The earth and near-earth environment includes regions of cloud formation and the oceans. STP has carried experiments related to cloud formation and ocean current and wave heights.

- Knowledge of the environment within and around space hardware, whether that hardware be a free-flying spacecraft or a payload in the cargo bay of the Shuttle, is required to plan for system survival and proper operation. STP has carried out experiments related to spacecraft environment, including a major investigation of spacecraft charging at geosynchronous orbit and a monitoring system for the Space Shuttle cargo bay. The latter is now flown regularly on both NASA and DOD Shuttle missions.

- STP experiments have supported investigations into the benefits of conducting military activities by military personnel in space, and into the aids and support equipment that might be required. Experiments have also been conducted to investigate the behavior of living tissues in space, and to develop advanced manufacturing techniques for pharmaceuticals.

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III. ORGANIZATION AND MANAGEMENT

AUTHORITY

The Space Test Program (STP) was established in 1966 as a Department of Defense (DOD) activity under the executive management of the Air Force. The authority and responsibilities of the program are specified in AFR 80-2/AR 70-43/OPNAVINST 3913.1. A revision of this charter has been coordinated and is being pubslihed.

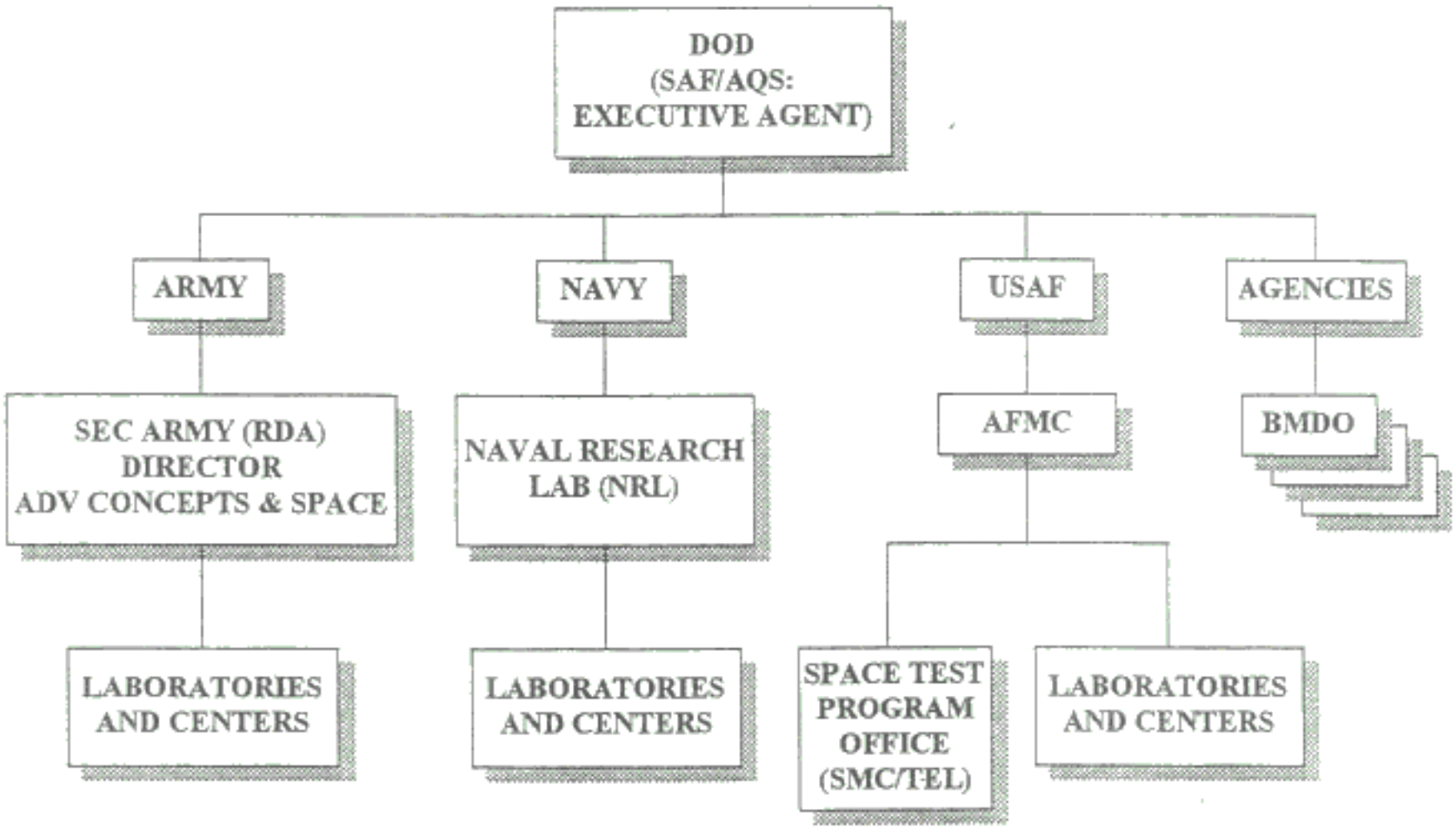
The primary responsibility of STP is established in a memorandum from the Director of Defense Research and Engineering (DDR&E) to the Assistant Secretary of the Air Force (R&D), 15 July 1966. It stated that STP is to provide spaceflight for DOD experiments not authorized their own means of flight. Approval of a plan for providing this service was contained in a memorandum, dated 15 August 1968, from DDR&E to each of the three military departments' Assistant Secretary (R&D). A third memorandum, dated 3 October 1978, from DDR&E, again to the Assistant Secretary (R&D) of each of the military departments, set forth as an objective of the Space Test Program the "use [of] the manned Shuttle as a laboratory in space for DOD experiments." A fourth memorandum, from the Air Force Under Secretary (SAF/US) to the USAF Vice Chief of Staff, dated 20 February 1986, commissioned the additional responsibility of flying space experiments that were designed to define the role of military man in space.

The current STP charter comes from the 6 November 1995 memorandum from the Secretary of Defense, designating that STP should be maintained as "a multi-user space program whose role is to be the primary provider of space flight for the entire DOD space research community." This statement came after a review of potential program management changes, with the conclusion being that the current program structure of Air Force management and funding should be maintained. The memorandum accompanied a Management and Funding Policy statement, with that statement now serving as the STP Charter.

ORGANIZATION

The structure established to execute STP is illustrated in Figure 3. The Director of Space Programs, Office of the Assistant Secretary of the Air Force for Acquisition (SAF/AQS), is responsible for the overall STP management. STP planning and the execution of the individual flight programs is the responsibility of the Space Test Program (SMC/TEL, located at Kirtland AFB, NM).

Figure 3: Space Test Program Organization

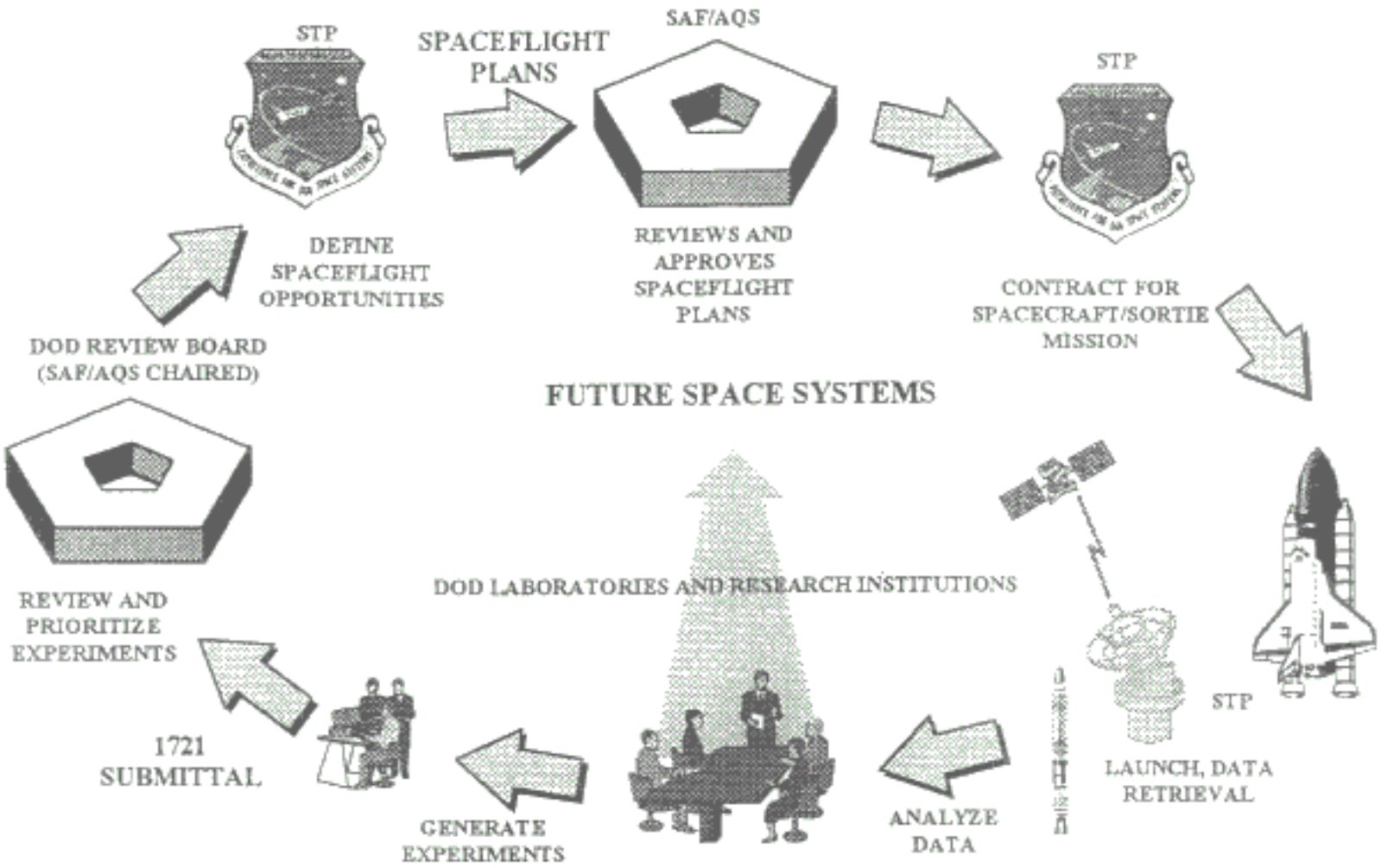


PROCEDURE FOR OBTAINING SPACEFLIGHT

DOD space experiments normally originate in (and are therefore sponsored by) DOD laboratories or in research institutions supporting the DOD. For a non-DOD organization to apply for Space Test Program support, it must first gain the sponsorship of a DOD organization. Application for STP support begins with the submittal through channels to SAF/AQS of a Request for Spaceflight Form DD 1721 (DD 1721-1 for Shuttle crew cabin experiments) by the sponsoring DOD organization. Each May, SAF/AQS convenes a DOD Space Experiment Review Board (SERB) to review and prioritize the experiments submitted for flight since the previous year's SERB meeting. SAF/AQS forwards the prioritized list of experiments to the Space Test Program Office for planning and execution of the flight program. SAF/AQS has the authority, however, to both reprioritize the experiment list and to add to the list (at whichever priority position it deems appropriate) experiments from outside of STP prioritization process. (The latter are usually classified payloads.)

Figure 4 depicts the STP experiment cycle, from the initial submission of the experiment for flight through data delivery to the experimenter for evaluation and use.

Figure 4: Space Test Program Experiment Cycle



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IV. MISSION SUMMARY AND EXPERIMENT RESULTS

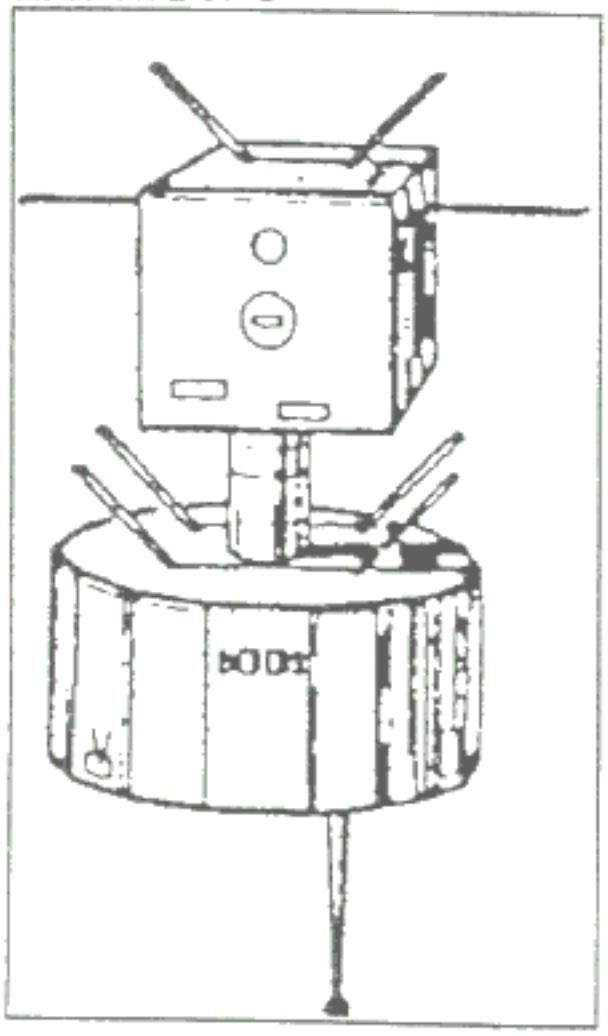
GENERAL

This section summarizes the missions and experiments that have been carried out by the Space Test Program (STP) from 1967 through 1994. No test missions were flown in 1973, 1980, 1981, and 1987. The costs indicated are mission costs to STP. Although this cost normally only includes mission planning and integration, it may also include the cost of a spacecraft and, in some cases, the cost of a launch vehicle.

The experimental payload being tested is justified and funded by the sponsoring laboratory or research institutions. An experiment marked with a single asterisk (*) is a non-STP experiment that was flown by STP. No summary data are included for these experiments. Experiments marked with a double asterisk (**) are Space Shuttle crew cabin experiments. Prior to 1987, the cost of crew cabin experiments was included in a general Air Force Space Shuttle cost line item. Beginning in 1987, the cost of crew cabin experiments was charged to STP on a consolidated basis. The consolidated cost of these experiments from 1987 through 1992 is estimated at a $2.63 million. The consolidated cost in 1993 was $1.3 million, and in 1994 it was approximately $0.986 million. Experiment results (measures of success) have been defined as the percentage achieved of the planned experiment objectives, based on the judgment of the principal investigator.

1967 MISSIONS

Mission P67-1



1. Launch Date: 29 June 1967
2. Launch Vehicle: Thor-Burner II
3. Launch Site: WTR
4. Mission Duration: 15 months
5. Orbital Parameters: apogee: 2,133 NM, perigee: 2,055 NM, inclination 89.8°
6. Contractor: Cubic Corporation
7. Cost: $0.25 million.
8. List of Experiments:

   a. OCE-701 (SECOR 9)
   b. ONR-801 (AURORA 1)

9. Experiment Summary:

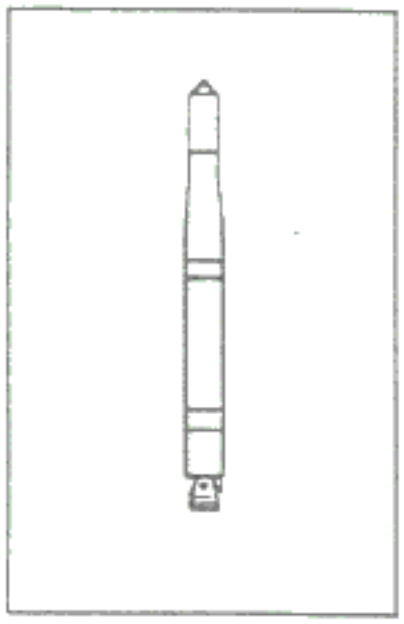
a. OCE-701 (SECOR 9)

1. Sponsor - US Army
2. Wt - 39 lbs, Vol - 1 cu ft, Power - 36 W
3. OCE-701 was the first experiment in a series whose objective was to improve geodetic survey accuracy worldwide. The experiment was 100 percent successful and provided data for military target location and mapping.

b. ONR-801 (AURORA 1)

1. Sponsor - US Navy
2. Wt - 47 lbs, Vol - 2.3 cu ft, Power - 3.5 W
3. The objective of ONR-801 was to obtain data on background radiation in the UV wavelength. The experiment was 100 percent successful and contributed to the background data base for surveillance satellites.

Mission S67-3



1. Launch Date: 7 August 1967
2. Launch Vehicle: LTTAT-Agena (host vehicle)
3. Launch Site: WTR
4. Mission Duration: 2 months
5. Orbital Parameters: apogee: 191 NM, perigee: 101 NM, inclination 80.0°
6. Contractor: Lockheed
7. Cost: $0.13 million
8. List of Experiments:

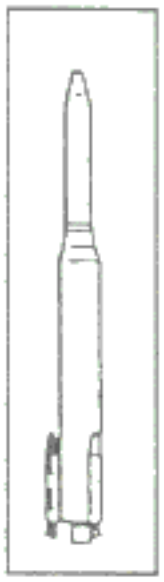
   a. SSD-701 (RM-15)
   b. SSD-702 (RM-12)

9. Experiment Summary:

a&b. SSD-701 (RM-15) and SSD-702 (RM-12)

1. Sponsor - US Air Force
2. Wt - (RM-15) 91 lbs, (RM-12) 91 lbs
   Vol - (RM-15) 0.7 cu ft, (RM-12) 0.7 cu ft
   Power - (RM-15) 30 W, (RM-12) 59 W
3. The objective of experiments SSD-701 and SSD-702 was to measure the spectral variation in the earth's background radiation in the IR spectrum. These experiments were 90 percent successful and made significant contributions to the design parameters of a number of military satellite surveillance systems.

Mission S68-2



1. Launch Date: 18 May 1968
2. Launch Vehicle: Thorad-Agena D (host vehicle)
3. Launch Site: WTR
4. Mission Duration: N/A (booster failed)
5. Orbital Parameters: N/A
6. Contractor: Cubic Corporation
7. Cost: $0.08 million
8. List of Experiments:

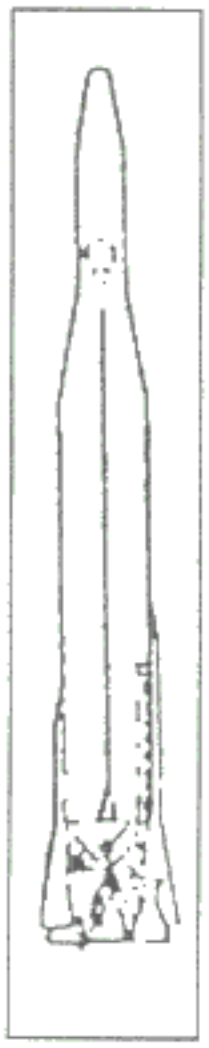
    a. OCE-704 (SECOR 10)

9. Experiment Summary:

    a. OCE-704 (SECOR 10)

        1. Sponsor - US Army
        2. Wt - 39 lbs, Vol - 1 cu ft, Power - information not available
        3. The objective of OCE-704 was to obtain data to improve geodetic survey accuracy worldwide. Since the experiment failed to achieve orbit, no useful data were obtained.

Mission P68-1



1. Launch Date: 16 August 1968
2. Launch Vehicle: Atlas-Burner II
3. Launch Site: WTR
4. Mission Duration: N/A (launch vehicle failed)
5. Orbital Parameters: N/A
6. Contractor: Boeing, GD/Convair
7. Cost: $8.5 million
8. List of Experiments:

    a. OCE-801 (SECOR)
    b. OCE-802 (SECOR)
    c. RTD-701 (Lincoln Calisphere #3)
    d. SSD-827 (RM-18)
    e. SSD-801 (Earth Limb Measurement)
    f. NAS-801 (ORBISCAL 1)
    g. NAS-804 (LIDOS)
    h. RPL-902 (Vacuum Friction)
    i. AVL-802 (Grid Sphere Drag)
    j. RTD-802 (RADCAT)

9. Experiment Summary:

Since the booster firing failed to separate on this mission, no experiment data were obtained. The objective of each experiment is listed below:

a&b. OCE-801 (SECOR) and OCE-802 (SECOR)

1. Sponsor - US Army
2. Wt - 39 lbs, Vol - 1 cu ft for each, Power - 3 W
3. The objective of OCE-801 and OCE-802 was to improve geodetic mapping.

c. RTD-701 (Lincoln Calisphere #3)

1. Sponsor - US Army
2. Wt - 84 lbs, Vol - 8.6 cu ft, Power - N\A
3. The objective of RTD-701 was to provide a target for ground radar calibration.

d. SSD-827 (RM-18)

1. Sponsor - US Air Force
2. Wt - 91 lbs, Vol - 0.9 cu ft, Power - 59 W
3. The objective of SSD-827 was to obtain a background data base.

e. SSD-801 (Earth Limb Measurements)

1. Sponsor - US Air Force
2. Wt - 40 lbs, Vol - 3.3 cu ft, Power - 17 W
3. The objective of SSD-801 was to obtain background data at the earth's limb.

f. NAS-801 (ORBISCAL 1)

1. Sponsor - US Navy
2. Wt - 66 lbs, Vol - 5.3 cu ft, Power - information not available
3. The objective of NAS-801 was to determine the occurrence of hyperefficient propagation paths for ionospheric communications.

g. NAS-804 (LIDOS)

1. Sponsor - US Navy
2. Wt - 123 lbs, Vol - 34.8 cu ft, Power - 25 W
3. The objective of NAS-804 was to carry out geodetic and gravitational measurements, including the earth's mass gravitational constant.

h. RPL-902 (Vacuum Friction)

1. Sponsor - US Air Force
2. Wt - 26 lbs, Vol - 0.7 cu ft, Power - N\A
3. The objective of RPL-902 was to measure friction in the vacuum of space.

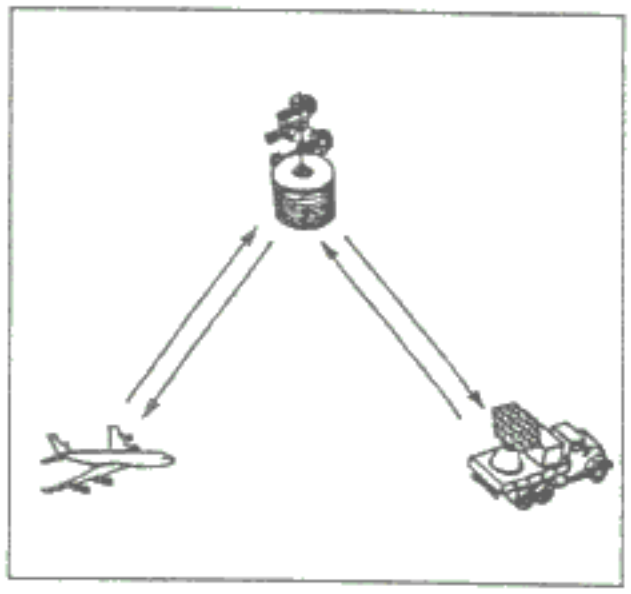
i. AVL-802 (Grid Sphere Drag)

1. Sponsor - US Air Force
2. Wt - 99 lbs, Vol - 117 cu ft, Power - self-contained
3. The objective of AVL-802 was to place a sphere at acquisition altitude for calibration of ground radar.

j. RTD-802 (RADCAT)

1. Sponsor - US Air Force
2. Wt - 395 lbs, Vol - 120 cu ft, Power - information not available
3. The objective of RTD-802 was to provide a target for ground radar calibration.

Mission P67-2



1. Launch Date: 26 September 1968
2. Launch Vehicle: Titan IIIC
3. Launch Site: ETR
4. Mission Duration: 18 days
5. Orbital Parameters: apogee: 19,368 NM, perigee: 18,989 NM, inclination 2.9°
6. Contractor: Lincoln Laboratories
7. Cost: $1.2 million
8. List of Experiments:

a. SSD-601 (Electron Flux)
b. SSD-602 (Particle Spectrometer)
c. SSD-605 (Very High Energy Particles)
d. SSD-606 (Low Energy Particles)
e. SSD-607 (Low Energy Spectrometer)
f. SSD-609 (Angular Distribution of Electrons)
g. SSD-610 (VLF Signals)
h. SSD-651 (Lyman Alpha)
i. CRLF-602 (Geomagnetic Field)
j. CRLF-726 (Magnetic Storms)
k. CRLF-735 (Communications)
l. CRLS-743 (Particle Flux Spectra)

m. RPL-733 (Zero Gravity Liquid Heat Transfer)
n. RTD-704 (Lincoln Experimental Satellite No. 6/LES-6)

9. Experiment Summary:

a. SSD-601 (Electron Flux)

1. Sponsor - US Air Force
2. Wt - 6 lbs, Vol - 0.2 cu ft, Power - 2 W
3. The objective of SSD-601 was to measure electron flux. The experiment was only 20 percent successful.

b. SSD-602 (Particle Spectrometer)

1. Sponsor - US Air Force
2. Wt - 12 lbs, Vol - 0.25 cu ft, Power - 3 W
3. The objective of SSD-602 was to measure the electron and proton particle population in the earth's magnetosphere. The experiment was 85 percent successful and assisted in the generation of a data base for increased satellite survivability.

c. SSD-605 (Very High Energy Particles)

1. Sponsor - US Air Force
2. Wt - 12 lbs, Vol - 0.25 cu ft, Power - information not available
3. The objective of SSD-605 was to measure cosmic rays in the magnetosphere. No useful data were obtained from this experiment.

d. SSD-606 (Low Energy Particles)

1. Sponsor - US Air Force
2. Wt - 2.5 lbs, Vol - 0.1 cu ft, Power - information not available
3. The objective of SSD-606 was to measure low-energy particles in the magnetosphere. The experiment was 70 percent successful and contributed to a redesign of associated the Air Force research program.

e. SSD-607 (Low Energy Spectrometer)

1. Sponsor - US Air Force
2. Wt - 6 lbs, Vol - 0.1 cu ft, Power - information not available
3. The objective of SSD-607 was to measure the spectrum of low-energy particles in the magnetosphere. The experiment obtained no useful data.

f. SSD-609 (Angular Distribution of Electrons)

1. Sponsor - US Air Force
2. Wt - 4 lbs, Vol - 0.1 cu ft, Power - information not available
3. The objective of SSD-609 was to measure the angular distribution of electrons in the magnetosphere. The experiment was approximately 25 percent successful.

g. SSD-610 [Very Low Frequency (VLF) Signals]

1. Sponsor - US Air Force
2. Wt - 7 lbs, Vol - 0.1 cu ft, Power - information not available
3. The objective of SSD-610 was to investigate the propagation of very low frequency radio signals. Although the experiment was only 10 percent successful, the data obtained were input to the data base for VLF communications systems.

h. SSD-651 (Lyman Alpha)

1. Sponsor - US Air Force
2. Wt - 20 lbs, Vol - 0.3 cu ft, Power - information not available
3. The objective of SSD-651 was to define the UV background from geosynchronous orbit. The experiment was 90 percent successful and contributed to the UV background data base.

i&j. CRLF-602 (Geomagnetic Field) and CRLF-726 (Magnetic Storms)

1. Sponsor - US Air Force
2. Wt - 18 lbs, Vol - 0.5 cu ft, Power - 1 W
3. The objective of both CRLF-602 and CRLF-726 was to measure the earth's magnetic field, both ambient and as distorted by solar activity. Both experiments failed (5 percent success) due to problems with the magnetometer mounting booms.

k. CRLF-735 (Communications)

1. Sponsor - US Air Force
2. Wt - 5 lbs, Vol - 0.1 cu ft, Power - 10 W
3. The objective of CRLF-735 was communications technology. The experiment was only 10 percent successful.

l. CRLS-743 (Particle Flux Spectra)

1. Sponsor - US Air Force
2. Wt - 21.5 lbs, Vol - information not available, Power - 1.2 W
3. The objective of CRLS-743 was to measure solar radiation. The experiment was only 20 percent successful.

m. RPL-733 (Zero Gravity Liquid Heat Transfer)

1. Sponsor - US Air Force
2. Wt - 28 lbs, Vol - 1.0 cu ft, Power - N\A
3. The objective of RPL-733 was to test a zero gravity cryogenic heat transfer medium for liquid propellant rocket motors. The experiment was 100 percent successful and contributed significantly to restartable upper stages.

n. RTD-704 (LES-6)

1. Sponsor - US Air Force
2. Wt - 330 lbs, Vol - 72 cu ft, Power - 150 W
3. The objective of RTD-704 was to demonstrate the use of space for tactical military communications. The experiment was 100 percent successful and contributed significantly to the current tactical communications system.

1969 MISSIONS

Mission P69-1

1. Launch Date: 18 March 1969
2. Launch Vehicle: Atlas F
3. Launch Site: WTR
4. Mission Duration: 2 days
5. Orbital Parameters: Three selected orbits initiated from a single bus.
   (1) apogee: 253 NM, perigee: 215 NM, inclination 99.1°,
   (2) apogee: 315 NM, perigee: 251 NM, inclination 98.8°,
   (3) apogee: 3,125 NM, perigee 252 NM, inclination 104.7°
6. Contractor: General Dynamics/Convair
7. Cost: $1.1 million
8. List of Experiments:

   a. CRLUS-830 (Solar Radiation Monitor)-(1)
   b. ML-901 (Stability of Thermal Materials)-(1)
   c. NAS-905 (Atmospheric Electric Field)-(1)
   d. ARX-901 [Test Cadmium Sulfide (CdS) Cells]-(1)
   e. CRL-001 (Meteor Trail Calibration)-(1)
   f. WL-802 (Radiobiological Observatory)-(2)
   g. SSD-850 [Radio Frequency Interference (RFI) in Orbit]-(2)
   h. ARPA-819 (Ion Density Gradient)-(2)

i. NAS-906 (Atmospheric Electric Field)-(2)
j. CRLFS-802 (Radiation Belt Monitoring)-(3)
k. NAS-801 (ORBISCAL 2)-(3)

9. Experiment Summary:

a. CRLUS-830 (Solar Radiation Monitor)

1. Sponsor - US Air Force
2. Wt - 123 lbs, Vol - 4.4 cu ft, Power - 33 W
3. The objective of CRLUS-830 was to continue the investigation of solar flare phenomena. The experiment was 35 percent successful. The data obtained were an input to communications systems planning.

b. ML-901 (Stability of Thermal Materials)

1. Sponsor - US Air Force
2. Wt - 2 lbs, Vol - 0.05 cu ft, Power - 0.5 W
3. The objective of ML-901 was to investigate the stability of thermal materials in space. The experiment acquired no useful data.

c. NAS-905 (Atmospheric Electric Field)

1. Sponsor - US Navy
2. Wt - 2 lbs, Vol - 0.1 cu ft, Power - 3 W
3. The objective of NAS-905 was to take VLF noise background measurements for military communications systems. The experiment was 100 percent successful and contributed to the evaluation of a VLF communications system.

d. ARX-901 (Test CdS Cells)

1. Sponsor - US Air Force
2. Wt - 2 lbs, Vol - 0.02 cu ft, Power - 3.5 W
3. The objective of ARX-901 was to test in space the efficiency and survivability of cadmium sulfide solar cells. The experiment was 100 percent successful and established CdS solar cells as a candidate for space solar power systems.

e. CRL-001 (Meteor Trail Calibration)

1. Sponsor - US Air Force
2. Wt - 6 lbs, Vol - 0.05 cu ft, Power - 5 W
3. The objective of CRL-001 was to calibrate ground-based antennas that measure elevation and azimuth angles of radar returns of a meteor trail. Results are not available.

f. WL-802 (Radiological Observatory)

1. Sponsor - US Air Force
2. Wt - 15 lbs, Vol - 0.15 cu ft, Power - 7.5 W
3. The objective of WL-802 was to assess the radiation hazards for man in space over long periods of time. The experiment was 80 percent successful and provided data for planning space station type activities.

g. SSD-850 (RFI in Orbit)

1. Sponsor - US Air Force
2. Wt - 31 lbs, Vol - 2.5 cu ft, Power - information not available
3. The objective of SSD-850 was to investigate radio frequency interference in orbit. No useful data were obtained from this experiment.

h. ARPA-819 (Ion Density Gradient)

1. Sponsor - DOD (ARPA)
2. Wt - 22 lbs, Vol - 1 cu ft, Power - 7.5 W
3. The objective of ARPA-819 was to investigate horizontal ionospheric density gradients. The experiment was 80 percent successful and provided data for design of over-the-horizon (OTH) radar systems and communications systems.

i. NAS-906 (Atmospheric Electric Field)

1. Sponsor - US Navy
2. Wt - 2 lbs, Vol - 0.1 cu ft, Power - 3 W
3. NAS-906 was a companion experiment to NAS-905, c. above, and was also 100 percent successful.

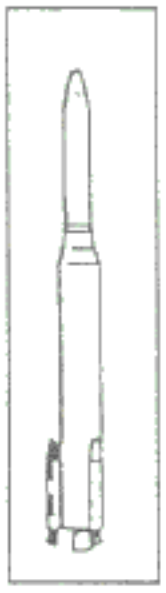
j. CRLFS-802 (Radiation Belt Monitoring)

1. Sponsor - US Air Force
2. Wt - 82 lbs, Vol - 3.9 cu ft, Power - 38 W
3. The objective of CRLFS-802 was to measure the intensity of radiation in the radiation belts. The experiment was 85 percent successful and contributed to the design of satellites for survivability in the radiation belts.

k. NAS-801 (ORBISCAL 2)

1. Sponsor - US Navy
2. Wt - 22 lbs, Vol - 5.3 cu ft, Power - information not available
3. The objective of NAS-801 was to study RF propagation in the ionosphere. The experiment was successful. Data were used to determine hyperefficient propagation paths.

Mission S69-2



1. Launch Date: 14 April 1969
2. Launch Vehicle: Thorad-Agena D
3. Launch Site: WTR
4. Mission Duration: 1 year
5. Orbital Parameters: apogee: 612 NM, perigee: 573 NM, incljnation 99.9°
6. Contractor: Cubic Corp and ITT Federal Labs
7. Cost: $0.05 million
8. List of Experiments:

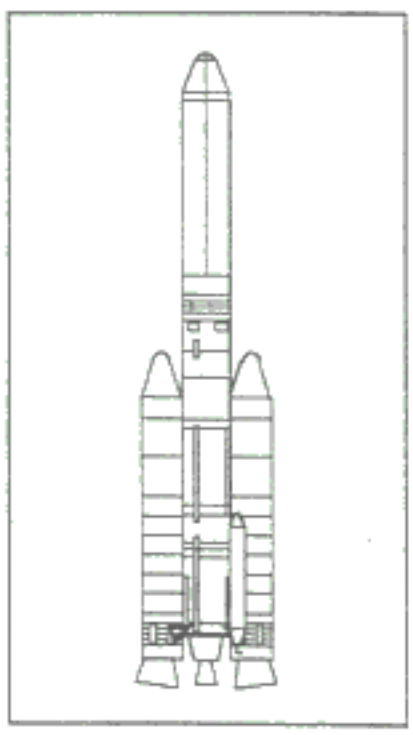
   a. OCE-902 (SECOR 13)

9. Experiment Summary:

OCE-902 (SECOR 13)

1. Sponsor - US Army
2. Wt - 39 lbs, Vol - 1 cu ft, Power - 3.0 W
3. OCE-902 was part of a series of space experiments designed to improve geodetic survey accuracy worldwide. The experiment was 100 percent successful and contributed to military target location.

Mission S68-3



1. Launch Date: 23 May 1969
2. Launch Vehicle: Titan IIIC
3. Launch Site: ETR
4. Mission Duration: 6 months
5. Orbital Parameters: apogee: 60,352 NM, perigee: 9,189 NM, inclination 32.8°
6. Contractor: TRW Systems
7. Cost: $1 million
8. List of Experiments:

   a. CRLF-736 (VLF Plasma Waves)
   b. CRLF-821 (Solar Flare Monitor)
   c. CRLFS-829 (Solar Flare Monitor)

9. Experiment Summary:

a. CRLF-736 (VLF Plasma Waves)

1. Sponsor - US Air Force
2. Wt - 4 lbs, Vol - 0.15 cu ft, Power - 2 W
3. The objective of CRLF-736 was to investigate the feasibility of military communications at very low frequencies. The experiment was 40 percent successful and produced data for the evaluation of a VLF military communications system.

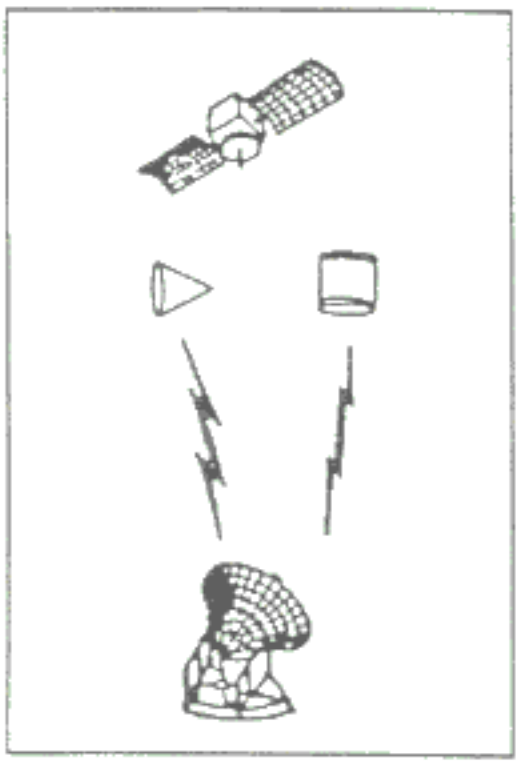
b. CRLF-821 (Solar Flare Monitor)

1. Sponsor - US Air Force
2. Wt - 26 lbs, Vol - 2.0 cu ft, Power - information not available
3. The objective of CRLF-821 was to obtain data on X-rays and high-energy protons and electrons emitted during solar flares. The experiment was 100 percent successful and contributed to the data base for understanding and predicting solar flares.

c. CRLFS-829 (Solar Flare Monitor)

1. Sponsor - US Air Force
2. Wt - 18 lbs, Vol - 0.25 cu ft, Power - 2 W
3. The objective of CRLFS-829 was to further understand the solar flare phenomena. The experiment was 30 percent successful.

Mission S69-4



1. Launch Date: 30 September 1969
2. Launch Vehicle: Thorad-Agena D
3. Launch Site: WTR
4. Mission Duration: 270 days
5. Orbital Parameters: apogee: 510 NM, perigee: 500 NM, inclination 70.7°
6. Contractor: information not available
7. Cost: $0.03 million
8. List of Experiments:

a. NRL-101 (SOICAL-3)

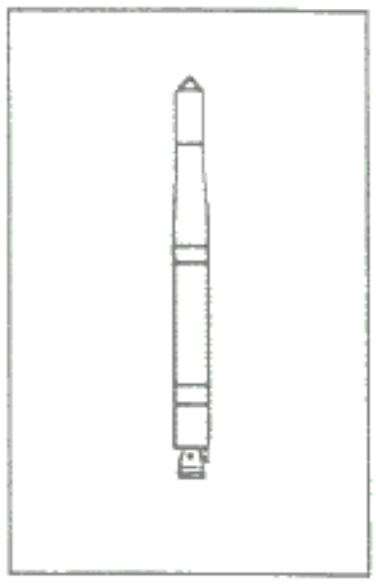
9. Experiment Summary:

a. NRL- 101 (SOCIAL-3)

1. Sponsor - US Navy
2. Wt - 13 lbs, Vol - 8.2 cu ft, Power - information not available
3. NRL-101 was part of a series of four missions to place ballistic shapes at acquisition altitudes for checkout and calibration of ground radars. The experiment was 100% successful.

1970 MISSIONS

Mission S70-3



1. Launch Date: 8 April 1970
2. Launch Vehicle: Thor-Agena (NASA)
3. Launch Site: WTR
4. Mission Duration: 1 year
5. Orbital Parameters: apogee: 599 NM, perigee: 591 NM, inclination 107°
6. Contractor: Cubic Corporation
7. Cost: $0.05 million
8. List of Experiments:

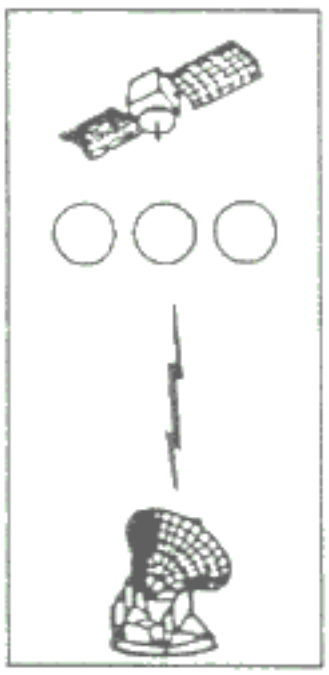
a. TPCOM-101 (TOPO A)

9. Experiment Summary:

a. TPCOM-101 (TOPO A)

1. Sponsor - US Army
2. Wt - 39 lbs, Vol - 0.1 cu ft, Power - 3 W
3. TPCOM-101 demonstrated a new concept in geodetic mapping. The experiment was 100% successful.

Mission S70-4



1. Launch Date: 17 February 1971
2. Launch Vehicle: Thor-Burner II
3. Launch Site: WTR
4. Mission Duration: Information not available
5. Orbital Parameters: apogee: 451 NM, perigee: 413 NM, inclination 98.8°
6. Contractor: Information not available
7. Cost: $0.05 million
8. List of Experiments:

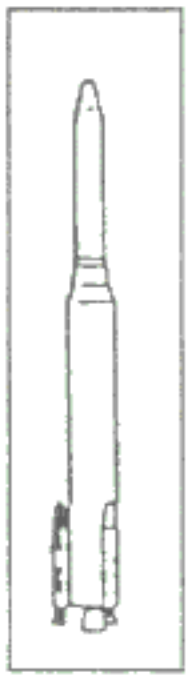
   a. NRL-102 (Calsphere 3,4,5)

9. Experiment Summary:

   a. NRL-102 (Calsphere 3,4,5)

   1. Sponsor - US Navy
   2. Wt - 5 lbs, Vol - 1.5 cu ft, Power - information not available
   3. Calsphere 3, 4, and 5 were ballistic shapes placed at reentry locations for the calibration of ground radar. The experiments were 70 percent successful.

Mission P70-1



1. Launch Date: 8 June 1971
2. Launch Vehicle: Long Tank Thorad-Agena D
3. Launch Site: WTR
4. Mission Duration: 2 months
5. Orbital Parameters: apogee: 314 NM, perigee: 295 NM, inclination 90.22°
6. Contractor: Boeing Corporation
7. Cost: $3.1 million
8. List of Experiments:

   a. SAMSO-001 (Celestial IR)
   b. SAMSO-203 (Attitude Sensing)

9. Experiment Summary:

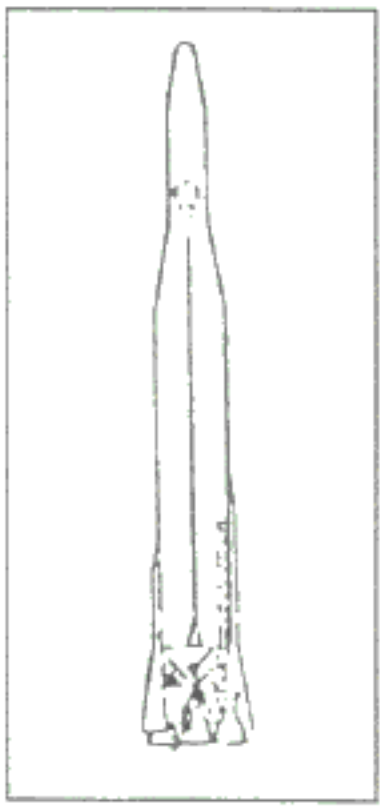
a. SAMSO-001 (Celestial IR)

1. Sponsor - US Air Force
2. Wt - 148 lbs, Vol - 8 cu ft, Power - 80 W
3. The objective of SAMSO-001 was to measure the spectral variation in the IR background. The experiment was 40 percent successful and contributed data to the design of surveillance satellites.

b. SAMSO-203 (Attitude Sensing)

1. Sponsor - US Air Force
2. Wt - 4.5 lbs, Vol - 0.1 cu ft, Power - 3.5 W
3. The objective of SAMSO-203 was to test a system for determining attitude of a reentry vehicle. The experiment was 100 percent successful and contributed to the data base for possible future use on ballistic missile reentry systems.

Mission P70-2



1. Launch Date: 7 August 1971
2. Launch Vehicle: Atlas F
3. Launch Site: ETR
4. Mission Duration: 11 months
5. Orbital Parameters: See individual experiments
6. Contractor: General Dynamics/Convair
7. Cost: $5.4 million
8. List of Experiments:

a. CRLU-928 (Cannonball 2)
b. SSD-975 (Plasma Resonance)
c. SAMSO-132 (Proton Analyzer)
d. CRL-210 (Velocity Mass Spectrometer)
e. NASC-117 (VLF Impedance)
f. SSD-980 (Neutral Atmosphere Composition)
g. OAR-901 (Atmospheric Density "Musketball")
h. AVL-802 (Grid Sphere Drag #2)
i. RTD-701 (Calibration Sphere #4)

9. Experiment Summary:

a. CRLU-928 (Cannonball 2) - apogee: 2254 km, perigee: 154 km, inclination 92.0°

1. Sponsor - US Air Force
2. Wt - 160 lbs, Vol - 0.6 cu ft, Power - 15 W
3. The objective of CRLU-928 was to measure the constituents and density of the atmosphere above 130 km. The experiment was 60 percent successful and contributed to the prediction of orbits for low-altitude satellites.

b. SSD-975 (Plasma Resonance) - apogee: 1,065 NM, perigee: 72 NM, inclination 92.01°

1. Sponsor - US Air Force
2. Wt - 4.6 lbs, Vol - 0.05 cu ft, Power - 5 W
3. The objective of SSD-975 was to validate a new technique for measuring electron density and temperature in the ionosphere. The experiment was 100 percent successful and contributed to planning for communications system performance.

c. SAMSO-132 (Proton Analyzer) - apogee: 1,065 NM, perigee: 72 NM , inclination 92.01°

1. Sponsor - US Air Force
2. Wt - 32 lbs, Vol - 1.1 cu ft, Power - 26 W
3. The objective of SAMSO-132 was to measure proton flux. The experiment was 50 percent successful and provided data for the study of satellite survivability.

d. CRL-210 (Velocity Mass Spectrometer) - apogee: 477 NM, perigee: 74 NM, inclination 87.61°

1. Sponsor - US Air Force
2. Wt - 10.5 lbs, Vol - 0.05 cu ft, Power - 10 W
3. The objective of CRL-210 was to measure very high altitude atmospheric composition. The experiment was 100 percent successful and contributed data to atmospheric modeling.

e. NASC-117 (VLF Impedance) - apogee: 477 NM, perigee: 74 NM, inclination 87.61°

1. Sponsor - US Air Force
2. Wt - 52 lbs, Vol - 0.7 cu ft, Power - 32.5 W
3. The objective of NASC-117 was to measure the impedance of radio communications at very low frequencies. The experiment was 100 percent successful and provided data for the evaluation of communications systems for submarines.

f. SSD-980 (Neutral Atmosphere Composition) - apogee: 477 NM, perigee: 74 NM, inclination 87.6°

1. Sponsor - US Air Force
2. Wt - 6.1 lbs, Vol - 0.15 cu ft, Power - 2 W
3. The objective of SSD-980 was to measure neutral atmosphere composition. The experiment was only 20 percent successful.

g. OAR-901 (Atmospheric Density "Musketball") - apogee: 568 NM, perigee: 495 NM, inclination 87.62°

1. Sponsor - US Air Force
2. Wt - 800 lbs, Vol - 5.4 cu ft, Power - N\A
3. The objective of OAR-901 was to measure the average density of the atmosphere at 130 km. The experiment was 100 percent successful and contributed to the prediction of orbits for low-altitude satellites.

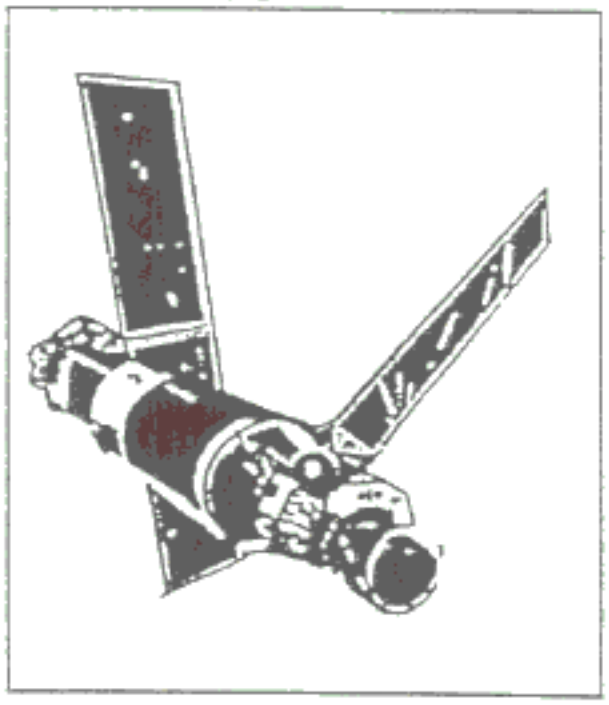
h. AVL-802 (Grid Sphere Drag #2) - apogee: 484 NM, perigee: 569 NM, inclination 87.61°

1. Sponsor - US Air Force
2. Wt - 97 lbs, Vol - 9.2 cu ft, Power - 14 W
3. The objective of AVL-802 was to provide a space target for ground radar calibration. No useful data were acquired.

i. RTD-701 (Calibration Sphere #4) - apogee: 494 NM, perigee: 564 NM, inclination 87.62°

1. Sponsor - US Army
2. Wt - 82.4 lbs, Vol - 28 cu ft, Power - 0 W
3. The objective of RTD-701 was to provide an object of known cross-section at a typical acquisition altitude for ground radar. The experiment was 100 percent successful and contributed to ground Ballistic Missile Defense (BMD) radar calibration.

Mission P71-2



1. Launch Date: 17 October 1971
2. Launch Vehicle: Thorad-Agena D
3. Launch Site: WTR
4. Mission Duration: 14 months
5. Orbital Parameters: apogee: 434 NM, perigee: 418 NM, inclination 92.72°
6. Contractor: Lockheed Missiles and Space Company
7. Cost: $18.1 million
8. List of Experiments:

    a. ONR-001 (Energetic Particles)
    b. RTD-806 (Solar Array)
    c. SAMSO-002 (Celestial IR)
    d. NSA-001 (Communications)

9. Experiment Summary:

a. ONR-001 (Energetic Particles)

1. Sponsor - US Navy
2. Wt - 84 lbs, Vol - 9.4 cu ft, Power - 38 W
3. The objective of ONR-001 was to obtain data to help understand what happens to the ionosphere during a high-altitude nuclear detonation. The experiment was 90 percent successful and contributed to a simulated study of nuclear effects on communications.

b. RTD-806 (Solar Array)

1. Sponsor - US Air Force
2. Wt - 250 lbs, Vol - 3.2 cu ft, Power - 75 W
3. The objective of RTD-806 was to demonstrate in space a flexible "roll-up" type of solar cell power system. The experiment was 100 percent successful. The technology from the experiment was used in the NASA Hubble Telescope design.

c. SAMSO-002 (Celestial IR)

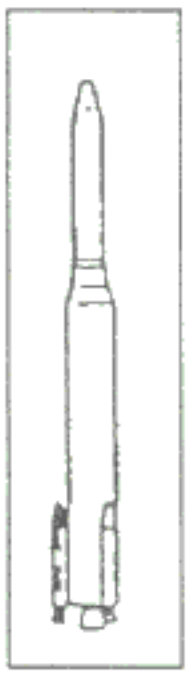
1. Sponsor - US Air Force
2. Wt - 128 lbs, Vol - 11 cu ft, Power - 544 W
3. The objective of SAMSO-002 was to obtain background luminosity in the infrared region. The experiment was 80 percent successful and contributed to the design of surveillance systems.

d. NSA-001 (Communications)

1. Sponsor - National Security Agency
2. Wt - 17 lbs, Vol - 0.5 cu ft, Power - information not available
3. The objective of NSA-001 was to conduct tests on secure communications links. The experiment was 100 percent successful and demonstrated an antijam secure communications link.

1972 MISSIONS

Mission S71-3



1. Launch Date: 19 April 1972
2. Launch Vehicle: Thorad-Agena
3. Launch Site: WTR
4. Mission Duration: 2.5 days
5. Orbital Parameters: apogee: 150 NM, perigee: 83 NM, inclination 81.5°
6. Contractor: Aerospace Corporation Labs
7. Cost: $0.15 million
8. List of Experiments:

   a. CRLS-235 (Ion Gauge)
   b. SSD-987 (Night Glow)

9. Experiment Summary:

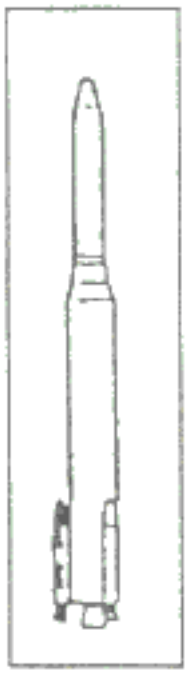
   a. CRLS-235 (Ion Gauge)

      1. Sponsor - US Air Force
      2. Wt - 5.5 lbs, Vol - 0.2 cu ft, Power - 2 W
      3. The objective of CRLS-235 was to obtain ion data for orbit prediction. The experiment was 80 percent successful and contributed to short-term, low-altitude orbit prediction.

   b. SSD-987 (Night Glow)

      1. Sponsor - US Air Force
      2. Wt - 12 lbs, Vol - 0.25 cu ft, Power - 4.5 W
      3. The objective of SSD-987 was to measure earthglow and to correlate it with skyglow. The experiment was 80 percent successful and was used to predict nightglow interference in surveillance satellite design.

Mission S71-5



1. Launch Date: 25 May 1972
2. Launch Vehicle: Thorad-Agena
3. Launch Site: WTR
4. Mission Duration: 2.5 days
5. Orbital Parameters: apogee: 1,786 NM, perigee: 85 NM, inclination 96.3°
6. Contractor: Aerospace Corporation Labs
7. Cost: $0.08 million
8. List of Experiments:

    a. CRL-237 (Density Gauge)
    b. CRLS-228 (Atmosphere Density and Composition)

9. Experiment Summary:

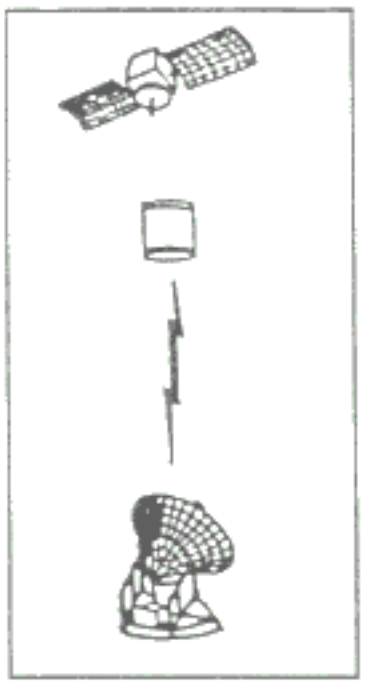
    a. CRL-237 (Density Gauge)

        1. Sponsor - US Air Force
        2. Wt - 9 lbs, Vol - 0.12 cu ft, Power - 5 W
        3. The objective of CRL-237 was to measure atmospheric density. The experiment was only 5 percent successful and contributed little useful data.

    b. CRLS-228 (Atmospheric Density and Composition)

        1. Sponsor - US Air Force
        2. Wt - 16 lbs, Vol - 0.35 cu ft, Power - 8 W
        3. The objective of CRLS-228 was to measure atmospheric density and composition. The experiment acquired no useful data.

Mission P72-1



1. Launch Date: 2 October 1972
2. Launch Vehicle: Atlas F
3. Launch Site: WTR
4. Mission Duration: 12 years
5. Orbital Parameters: apogee: 412 NM, perigee: 401 NM, inclination 98.4°
6. Contractor: Boeing Company, General Dynamics/Convair
7. Cost: $9.2 million
8. List of Experiments:

    a. ARPA-501 (Gamma Spectrometer)
    b. RTD-802 (RADCAT Cylinder #2)
    c. ML-101 (Stability of Thermal Materials)
    d. NRL-114 (Extreme UV Radiation)
    e. SSD-988 (Low Altitude Particles)

9. Experiment Summary:

a. ARPA-501 (Gamma Spectrometer)

1. Sponsor - DOD (ARPA)
2. Wt - 415 lbs, Vol - 7.8 cu ft, Power - 34 W
3. The objective of ARPA-501 was to obtain data on X-ray background. The experiment was 90 percent successful and provided data important to the knowledge of atmospheric temperatures and densities.

b. RTD-802 (RADCAT Cylinder #2)

1. Sponsor - DOD (ARPA)
2. Wt - 448 lbs, Vol - 127 cu ft, Power - 0 W
3. The objective of RTD-802 was to provide an object of known cross-section at a typical acquisition altitude for ground radar. The experiment was 100 percent successful and contributed to BMD ground radar calibration.

c. ML-101 (Stability of Thermal Materials)

1. Sponsor - US Air Force
2. Wt - 2 lbs, Vol - 0.06 cu ft, Power - 0.5 W
3. The objective of ML-101 was to test a new thermal control coating for spacecraft. The experiment was 100 percent successful. The new coating has been used on the DSCS and other military spacecraft.

d. NRL-114 (Extreme UV Radiation)

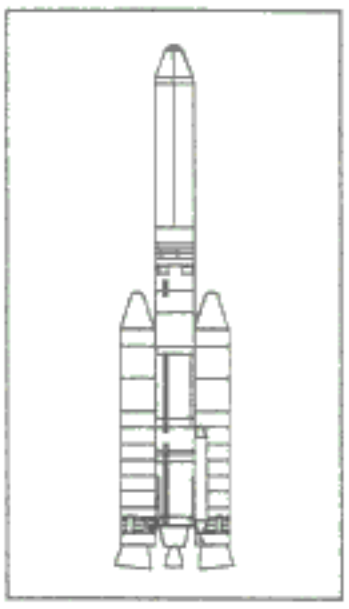
1. Sponsor - US Navy
2. Wt - 20 lbs, Vol - 5.9 cu ft, Power - 2.4 W
3. The objective of NRL-114 was to measure background radiation in the extreme UV spectrum. The experiment was 100 percent successful and provided extensive mapping of background UV radiation for surveillance satellite design purposes.

e. SSD-988 (Low Altitude Particles)

1. Sponsor - US Air Force
2. Wt - 39 lbs, Vol - 1 cu ft, Power - 20 W
3. The objective of SSD-988 was to measure charged particles in the lower ionosphere. The experiment was 100 percent successful and contributed to understanding ionospheric effects on communications.

1974 MISSIONS

Mission S73-7



1. Launch Date: 29 October 1974
2. Launch Vehicle: Titan IIID
3. Launch Site: WTR.
4. Mission Duration: None (no additional information available)
5. Orbital Parameters: Not Available
6. Contractor: Space Data Corporation
7. Cost: $0.8 million
8. List of Experiments:

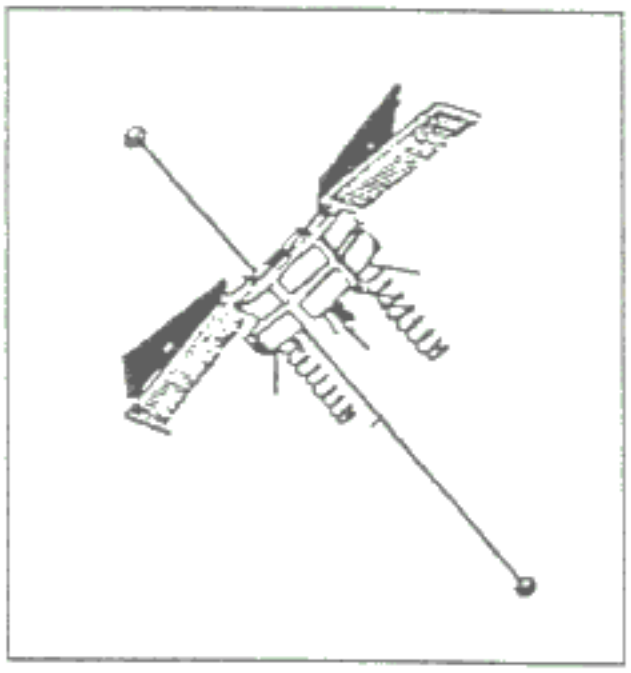
   a. ARPA-101 (Calibration Satellite)

9. Experiment Summary:

   a. ARPA-101 (Calibration Satellite)

   1. Sponsor - DOD (ARPA)
   2. Wt - 125 lbs, Vol - information not available, Power - information not available
   3. The objective of ARPA-101 was to provide a target in space for testing ground-based sensors. The ejection system failed, and no useful data were obtained.

Mission P73-3



1. Launch Date: 14 July 1974
2. Launch Vehicle: Atlas F
3. Launch Site: WTR
4. Mission Duration: 6 months
5. Orbital Parameters: apogee: 7,283 NM, perigee: 7,283 NM, inclination 125.1°
6. Contractor: Fairchild Space and Electronics Company
7. Cost: $5.6 million
8. List of Experiments:

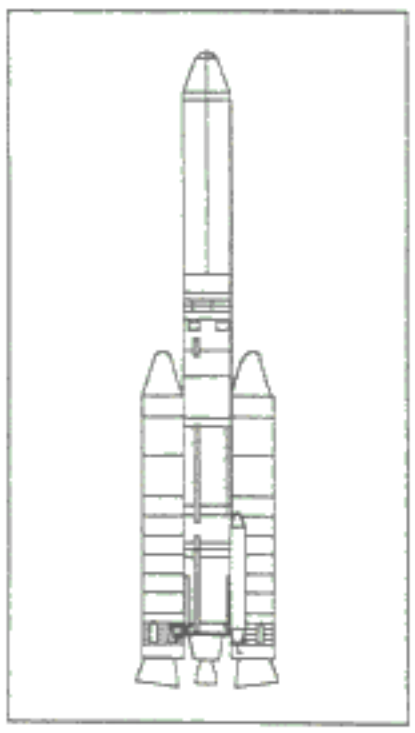
    a. NRL-115 (TIMATION III)

9. Experiment Summary:

    a. NRL-115 (TIMATION III)

        1. Sponsor - US Navy
        2. Wt - 440 lbs, Vol - 3.5 cu ft, Power - 21 W
        3. The objective of NRL-115 was to demonstrate in space the rubidium clock concept, a critical element of a highly accurate global positioning system. The experiment was 100 percent successful and contributed directly to the NAVSTAR GPS system.

Mission S73-5



1. Launch Date: 29 October 1974
2. Launch Vehicle: Titan IIID
3. Launch Site: WTR
4. Mission Duration: 6 months
5. Orbital Parameters: apogee: 2,069 NM, perigee: 58 NM, inclination 96.69°
6. Contractor: Boeing Aerospace Company
7. Cost: $4.3 million
8. List of Experiments:

    a. CRLS-211 (Low Altitude Density)
    b. CRLS-213 (Atmospheric Heating)
    c. CRL-212 (Thermosphere Composition)

9. Experiment Summary:

a. CRLS-211 (Low Altitude Density)

1. Sponsor - US Air Force
2. Wt - 38 lbs, Vol - 0.7 cu ft, Power - 20 W
3. CRLS-211 was part of a coordinated series of experiments to improve atmospheric models. The experiment was 100 percent successful and contributed to better models for OTH, DSCS II, navigation, signal propagation, and satellite ephemeris prediction.

b. CRLS-213 (Atmospheric Heating)

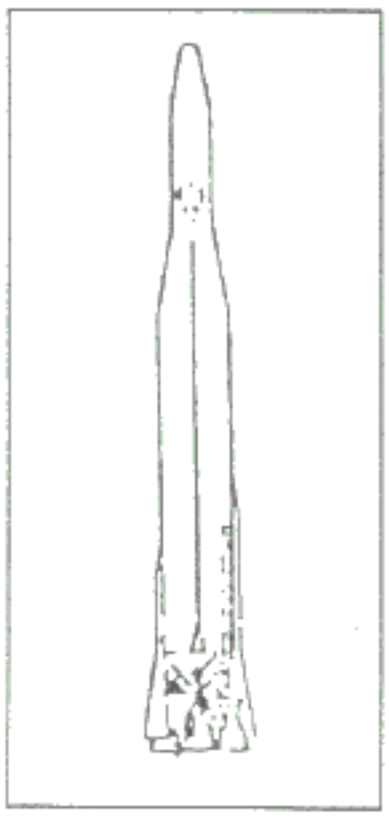
1. Sponsor - US Air Force
2. Wt - 31 lbs, Vol - 1.3 cu ft, Power - 20 W
3. CRLS-213 was part of a coordinated series of experiments to improve atmospheric models. The experiment was 50 percent successful and contributed to better models for OTH, DSCS II, navigation, signal propagation, and satellite ephemeris prediction.

c. CRL-212 (Thermosphere Composition)

1. Sponsor - US Air Force
2. Wt - 55 lbs, Vol - 1.5 cu ft, Power - 43 W
3. CRL-212 was part of a coordinated series of experiments to improve atmospheric models. The experiment was 100 percent successful and contributed to better models for OTH, DSCS II, navigation, signal propagation, and satellite ephemeris prediction.

1975 MISSIONS

Mission P72-2



1. Launch Date: 12 April 1975
2. Launch Vehicle: Atlas F
3. Launch Site: WTR
4. Mission Duration: N/A (booster failed)
5. Orbital Parameters: N/A (booster failed)
6. Contractor: Rockwell International
7. Cost: $20.1 million
8. List of Experiments:

   a. DNA-002 (Wide Band Radio Propagation)
   b. SAMSO-206 (UV Horizon)
   c. ONR-123 (Aerosol Monitor)
   d. SAMSO-207 (IR Mapping)

9. Experiment Summary:

Due to booster failure on this mission, none of the experiments acquired any useful data. The objectives of these experiments are listed below:

a. DNA-002 (Wide Band Radio Propagation)

1. Sponsor - Defense Nuclear Agency (Defense Atomic Support Agency)
2. Wt - 14 lbs, Vol - 0.3 cu ft, Power - 36 W
3. The objective of DNA-002 was to investigate radio propagation.

b. SAMSO-206 (UV Horizon)

1. Sponsor - US Air Force
2. Wt - 76 lbs, Vol - 3.8 cu ft, Power - 17 W
3. The objective of SAMSO-206 was to map the UV spectrum at the earth's horizon.

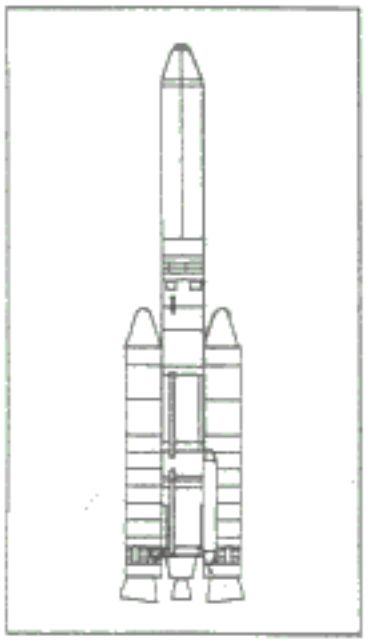
c. ONR-123 (Aerosol Monitor)

1. Sponsor - US Navy
2. Wt - 2 lbs, Vol - 0.02 cu ft, Power - 0.2 W
3. The objective of ONR-123 was to measure the concentration and vertical distribution of aerosols in the stratosphere.

d. SAMSO-207 (IR Mapping)

1. Sponsor - US Air Force
2. Wt - 450 lbs, Vol - 15.6 cu ft, Power - 550 W
3. The objective of SAMSO-107 was to map the celestial sphere at IR frequencies.

Mission S75-1



1. Launch Date: 4 December 1975
2. Launch Vehicle: Titan 3D
3. Launch Site: WTR
4. Mission Duration: 30 Days
5. Orbital Parameters: apogee: 191 NM, perigee: 66 NM, inclination 96.4°
6. Contractor: Lockheed Missiles and Space Company
7. Cost: $0.15 million
8. List of Experiments:

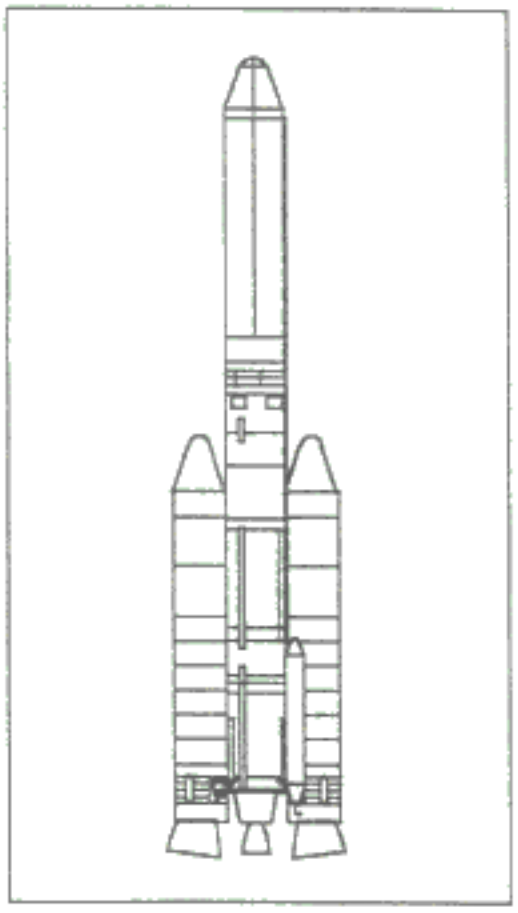
a. SAMSO-263 (Vehicle Velocity Sensor)

9. Experiment Summary:

a. SAMSO-263 (Vehicle Velocity Sensor)

1. Sponsor - US Air Force
2. Wt - 5 lbs, Vol - 0.1 cu ft, Power - 1 W
3. The objective of SAMSO-263 was to test a yaw detection system. The experiment was 100 percent successful and contributed to an improved system for yaw control of reentry vehicles.

Mission S73-6



1. Launch Date: 4 December 1975
2. Launch Vehicle: Titan 3D
3. Launch Site: WTR
4. Mission Duration: 6 months
5. Orbital Parameters: apogee: 454 NM, perigee: 71 NM, inclination 96.2°
6. Contractor: Boeing Corporation
7. Cost: $4.4 million
8. List of Experiments:

   a. CRL-219 (Polar Atmosphere Dynamics)
   b. CRLS-224 (Low Altitude Trapped Radiation)
   c. CRL-234 (Accelerometer)
   d. CRLS-223 (Density Variations)
   e. CRL-226 (Atmosphere Measurements)
   f. CRL-221 (Density Variations)
   g. CRL-222 (Neutral Atmosphere)

9. Experiment Summary:

a. CRL-219 (Polar Atmosphere Dynamics)

1. Sponsor - US Air Force
2. Wt - 32 lbs, Vol - 1.3 cu ft, Power - 16 W
3. The objective of CRL-219 was to investigate the dynamics of the polar atmosphere. The experiment was 85 percent successful and contributed to the development of attitude sensors.

b. CRLS-224 (Low Altitude Trapped Radiation)

1. Sponsor - US Air Force
2. Wt - 35 lbs, Vol - 1.5 cu ft, Power - 6.1 W
3. The objective of CRLS-224 was to measure the trapped radiation in the upper atmosphere. No data are available on the results of this experiment.

c. CRL-234 (Accelerometer)

1. Sponsor - US Air Force
2. Wt - 3 lbs, Vol - 0.03 cu ft, Power - 5 W
3. The objective of CRL-234 was to measure satellite deceleration caused by aerodynamic drag. No data are available on the results of this experiment.

d. CRLS-223 (Density Variations)

1. Sponsor - US Air Force
2. Wt - 7 lbs, Vol - 0.25 cu ft, Power - 2 W
3. The objective of CRLS-223 was to measure localized density variations in the upper atmosphere caused by gravity waves and other effects. The experiment was 95 percent successful and contributed to the development of an atmosphere model.

e. CRL-226 (Atmosphere Measurements)

1. Sponsor - US Air Force
2. Wt - 55 lbs, Vol - 0.8 cu ft, Power - 12 W
3. The objective of CRL-226 was to measure electrons and protons of very low energy in the auroral zone and to correlate those measurements with magnetic and electric field data. The experiment was 85 percent successful and contributed to the understanding of space charging for satellite survivability.

f. CRL-221 (Density Variations)

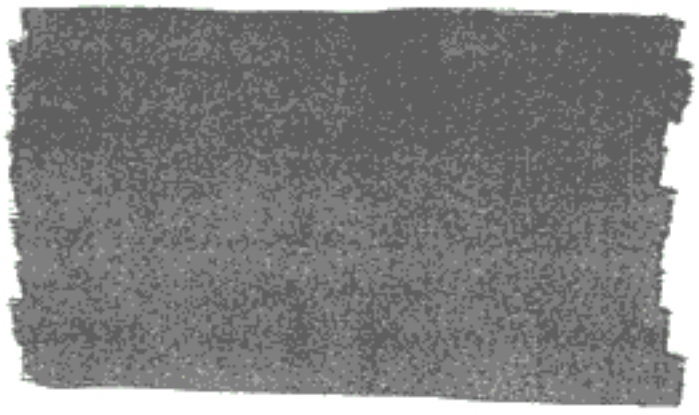
1. Sponsor - US Air Force
2. Wt - 21 lbs, Vol - 0.3 cu ft, Power - 12 W
3. The objective of CRL-221 was to increase the data available for the development of atmospheric models. The experiment was 75 percent successful and contributed to a satellite ephemeris generation model.

g. CRL-222 (Neutral Atmosphere)

1. Sponsor - US Air Force
2. Wt - 22 lbs, Vol - 0.53 cu ft, Power - 21 W
3. The objective of CRL-222 was to measure very high altitude atmospheric composition. The experiment was 100 percent successful and contributed to neutral atmosphere modeling.

1976 MISSIONS

Mission P74-1



1. Launch Date: 15 March 1976
2. Launch Vehicle: Titan IIIC
3. Launch Site: ETR
4. Mission Duration: 3 years
5. Orbital Parameters: See individual experiments
6. Contractor: Martin Marietta, TRW
7. Cost: $28.1 million
8. List of Experiments:

(b)(1)

a. NRL-111 (SOLRAD)
b. LL-208 (Lincoln Experimental Satellite No. 8 and 9/LES 8/9)

9 Experiment Summary:

a. NRL-111 (SOLRAD) - apogee: 64,460 NM, perigee: 63,775 NM, inclination 26.5°

1. Sponsor - US Navy
2. Wt - 1206 lbs, Vol - 15 cu ft, Power - information not available
3. The objective of NRL-111 was to measure a wide range of solar radiation through the use of multiple instruments. The experiment was 90 percent successful and contributed to Air Force weather prediction and real-time communications management.

b. LL-208 (LES 8/9) - apogee: 19,344 NM, perigee: 19,344 NM, inclination 25.0°

1. Sponsor - US Air Force
2. Wt - 1059 lbs, Vol - 450 cu ft, Power - 280 W (each spacecraft)
3. The objective of LL-208 was to demonstrate in space a second generation tactical communications system that is reliable and survivable. The experiment was 95 percent successful and provided a prototype for an advanced military communications system using K-band frequency.

Mission P76-5

1. Launch Date: 22 May 1976
2. Launch Vehicle: Scout
3. Launch Site: WTR
4. Mission Duration: 3 years
5. Orbital Parameters: apogee: 573 NM, perigee: 537 NM, inclination 99.6°
6. Contractor: Johns Hopkins Applied Physics Lab
7. Cost: $3.8 million
8. List of Experiments:

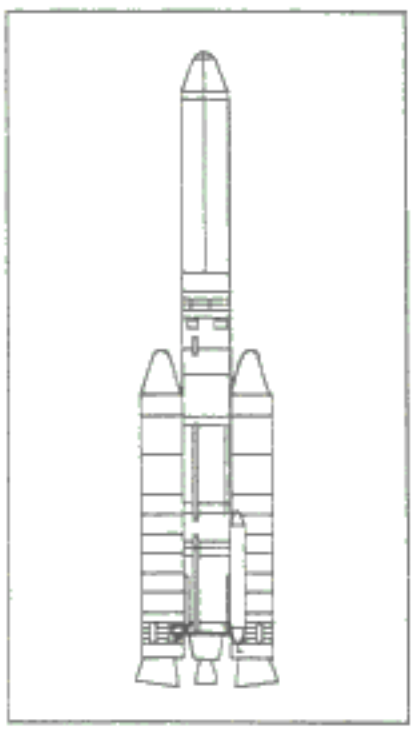
    a. DNA-002 (Wideband Radio)

9. Experiment Summary:

    a. DNA-002 (Wideband Radio)

        1. Sponsor - DOD (DNA)
        2. Wt - 15 lbs, Vol - 10 cu ft, Power - 46 W
        3. DNA-002 was a propagation experiment for a multifrequency beacon; frequency range VHF to S-band. The experiment was 80 percent successful and contributed to an ionospheric radio/radar disturbance VHF/S-band data base.

Mission S74-2



1. Launch Date: July 1976
2. Launch Vehicle: Titan 3D
3. Launch Site: WTR
4. Mission Duration: 6 months
5. Orbital Parameters: apogee: 4,309 NM, perigee: 128 NM, inclination 97.5°
6. Contractor: Boeing Aerospace Company
7. Cost: $4.4 million
8. List of Experiments:

    a. CRLS-217 (Energetic Electron Environment)
    b. CRLS-216 (ELF/VLF)
    c. CRL-214 (Trapped Protons)
    d. CRL-215 (Electric Fields/Ion Drift)
    e. ONR-118 (Low Energy Spectrometer)
    f. ONR-104 (Electric Field)
    g. CRLS-218 (Electron Spectrometer)

9. Experiment Summary:

a. CRLS-217 (Energetic Electron Environment)

1. Sponsor - US Air Force
2. Wt - 8 lbs, Vol - 0.1 cu ft, Power - 2 W
3. The objective of CRLS-217 was to investigate high-energy electrons in the magnetosphere. The experiment was 80 percent successful and contributed to the survivability of satellites operating in this region.

b. CRLS-216 (ELF/VLF)

1. Sponsor - US Air Force
2. Wt - 7 lbs, Vol - 0.06 cu ft, Power - 8 W
3. The objective of CRLS-216 was to investigate the feasibility of low-frequency communications. The experiment was only 5 percent successful.

c. CRL-214 (Trapped Protons)

1. Sponsor - US Air Force
2. Wt - 16 lbs, Vol - 0.4 cu ft, Power - 7 W
3. The objective of CRL-214 was to gather data on high-energy trapped particles in the magnetosphere. The experiment was 80 percent successful and contributed to satellite survivability.

d. CRL-215 (Electric Fields/Ion Drift)

1. Sponsor - US Air Force
2. Wt - 15 lbs, Vol - 0.56 cu ft, Power - 11 W
3. The objective of CRLS-215 was to investigate electric fields in the magnetosphere. The experiment was 20 percent successful and contributed to attitude sensor development.

e. ONR-118 (Low Energy Spectrometer)

1. Sponsor - US Navy
2. Wt - 7 lbs, Vol - 0.12 cu ft, Power - 2 W
3. The objective of ONR-118 was to measure low-energy protons and electrons in the magnetosphere. The experiment was 100 percent successful and contributed to the understanding of magnetospheric particle populations and prediction capabilities for VLF communications during disturbances and magnetic storms.

f. ONR-104 (Electric Field)

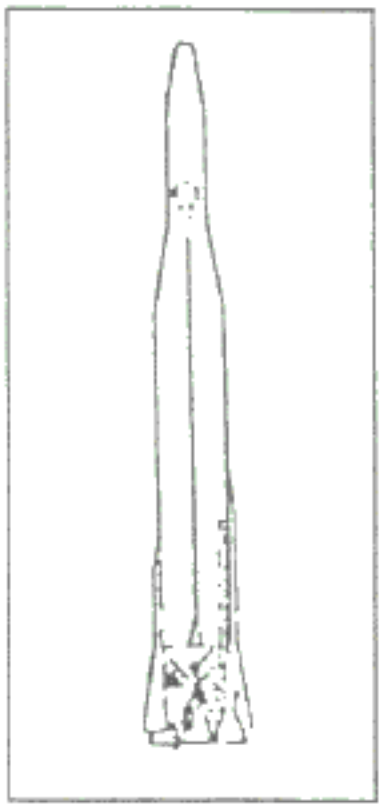
1. Sponsor - US Navy
2. Wt - 16 lbs, Vol - 0.8 cu ft, Power - 4 W
3. The objective of ONR-104 was to investigate noise spectra in the 10 to 100 kHz range. The experiment was 100 percent successful and contributed to predictions of VLF noise background for military communications systems.

g. CRLS-218 (Electron Spectrometer)

1. Sponsor - US Air Force
2. Wt - 8 lbs, Vol - 0.14 cu ft, Power - 7 W
3. The objective of CRLS-218 was to augment data obtained from other experiments on particle population in the earth's magnetosphere. The experiment was 80 percent successful and contributed to improved satellite survivability.

1977 MISSIONS

Mission P76-4



1. Launch Date: 23 June 1977
2. Launch Vehicle: Atlas-F
3. Launch Site: WTR
4. Mission Duration: Indefinite (NAVSTAR Prototype)
5. Orbital Parameters: apogee: 10,938 NM perigee: 10,876 NM, inclination 64°
6. Contractor: Fairchild Space and Electronics Company
7. Cost: $6.1 million
8. List of Experiments:

   a. NRL-116 (Navigation Technology Satellite/NTS-2)

9. Experiment Summary:

   a. NRL-116 (NTS-2)

      1. Sponsor - US Navy
      2. Wt - 450 lbs, Vol - 110 cu ft, Power - 100 W
      3. The objective of NRL-116 was to continue research in space related to a global positioning system. NRL-116 actually became the prototype for the NAVSTAR system.

Mission S76-1

GRAPHIC NOT AVAILABLE

1. Launch Date: Not Available
2. Launch Vehicle: Not Available
3. Launch Site: Not Available
4. Mission Duration: Not Available
5. Orbital Parameters: Not Available
6. Contractor: Lockheed Missiles and Space Company
7. Cost: $1.55 million
8. List of Experiments:

   a. DMA-501 (NAVPAC-1)

9. Experiment Summary:

   a. DMA-501 (NAVPAC-1)

      1. Sponsor - DOD (Defense Mapping Agency)
      2. Wt - 70 lbs, Vol - information not available, Power - information not available
      3. Objective not available.

1978 MISSIONS

Mission S77-1

GRAPHIC NOT AVAILABLE

1. Launch Date: Not Available
2. Launch Vehicle: Not Available
3. Launch Site: Not Available
4. Mission Duration: Not Available
5. Orbital Parameters: Not Available
6. Contractor: Aerojet Electro-Systems
7. Cost: $0.1 million
8. List of Experiments:

   a. DMA-501 (NAVPAC-2)

9. Experiment Summary:

   a. DMA-501 (NAVPAC-2)

      1. Sponsor - DOD (Defense Mapping Agency)
      2. Wt - 70 lbs, Vol - information not available, Power - information not available
      3. Objective not available.

Mission S77-2

GRAPHIC NOT AVAILABLE

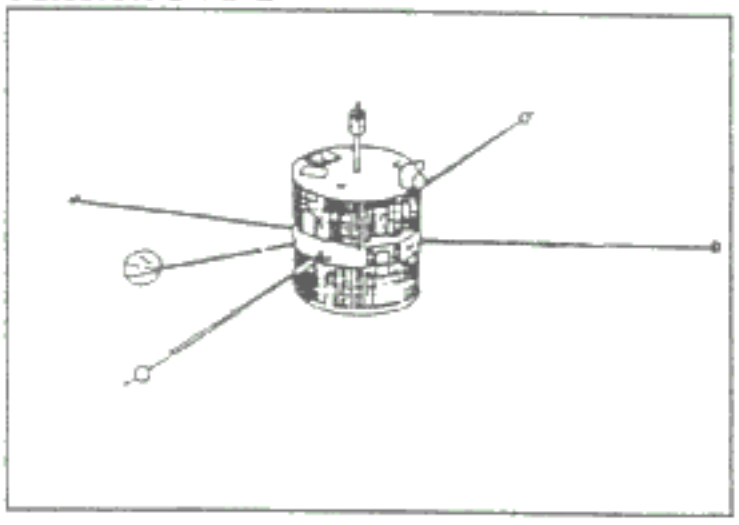
1. Launch Date: Not Available
2. Launch Vehicle: Not Available
3. Launch Site: Not Available
4. Mission Duration: 172 days
5. Orbital Parameters: apogee: 143 NM perigee: 89 NM, inclination - Polar
6. Contractor: Lockheed Missiles and Space Company
7. Cost: $0.94 million
8. List of Experiments:

d. ONR-305 (Galactic Proton Modulations)

1. Sponsor - US Navy
2. Wt - 6.2 lbs, Vol - 0.2 cu ft, Power - 1.5 W
3. The objective of ONR-305 was to obtain measurements of the geomagnetic field. The experiment was 100 percent successful and contributed to the geomagnetic field data base.

1979 MISSIONS

Mission P78-2



1. Launch Date: 30 January 1979
2. Launch Vehicle: Delta
3. Launch site: ETR
4. Mission Duration: 12 years
5. Orbital Parameters: apogee: 23,347 NM, perigee: 14,847 NM, inclination 7.9°
6. Contractor: Martin Marietta Corporation
7. Cost: $29.0 million
8. List of Experiments:

   a. ML-902 (Thermal Control Coatings)
   b. SAMSO-402 (Spacecraft Charging)
   c. ONR-302 (Plasma Interaction)

9. Experiment Summary:

a. ML-902 (Thermal Control Coatings)

1. Sponsor - US Air Force
2. Wt - 3 lbs, Vol - 0.1 cu ft, Power - 1.2 W
3. The objective of ML-902 was to investigate the degradations of thermal control coatings in geosynchronous orbit. The experiment was 100 percent successful. The data were used in a data base for spacecraft thermal control coatings.

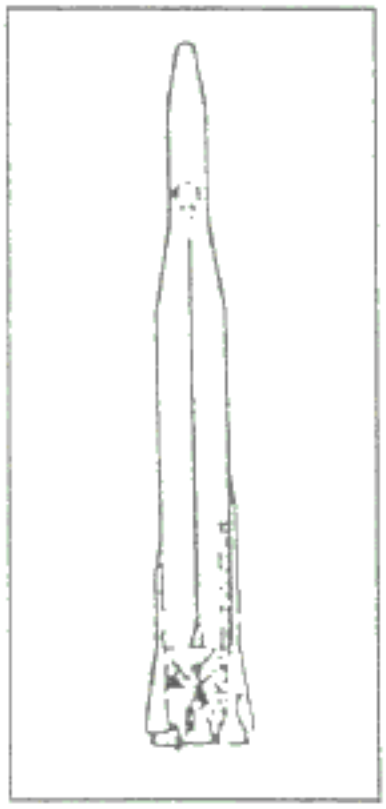
b. SAMSO-402 (Spacecraft Charging)

1. Sponsor - US Air Force
2. Wt - 147 lbs, Vol - 2.7 cu ft, Power - 34.5 W
3. The objective of SAMSO-402 was to investigate the phenomena of spacecraft charging at high altitude. The experiment was 100 percent successful. The data were used to investigate spacecraft anomalies and prepare a spacecraft charging military specification.

c. ONR-302 (Plasma Interaction)

1. Sponsor - US Navy
2. Wt - 72 lbs, Vol - 0.8 cu ft, Power - 36.0 W
3. The objective of ONR-302 was to study naturally occurring and artificially stimulated wave particle interactions in the magnetospheric plasma. The experiment was 100 percent successful. The data contributed to the data base on particle interactions in the magnetosphere.

Mission P78-1



1. Launch Date: 24 February 1979
2. Launch Vehicle: Atlas F
3. Launch Site: WTR
4. Mission Duration: 6 years
5. Orbital Parameters: 320 NM circular, Inclination 97.8°
6. Contractor: Ball Aerospace Corporation
7. Cost: $21.0 million
8. List of Experiments:

   a. ARPA-301 (Gamma Ray Spectrometer)
   b. CRLS-229 (Solar X-Ray Spectroheliograph)
   c. CRL-251 (High Latitude Particles)
   d. ECOM-721 (XUV Spectrometer)
   e. NRL-401 (Solar Wind)
   f. ONR-601 (Aerosol Measurement II)
   g. NRL-608 (X-Ray Monitoring)
   h. NRL-128 (Solar Flare X-Ray Spectrometer)
   i. NRL-126 (Course Spectroheliograph)
   j. NRL-304 (Solar Photometer for XUV)

9. Experiment Summary:

a. ARPA-301 (Gamma Ray Spectrometer)

1. Sponsor - DOD (ARPA)
2. Wt - 322 lbs, Vol - information not available, Power - information not available
3. The objective of ARPA-301 was to investigate gamma radiation in the atmosphere. The experiment was 100 percent successful and contributed to the background radiation data base.

b. CRLS-229 (Solar X-Ray Spectroheliograph)

1. Sponsor - US Air Force
2. Wt - 50 lbs, Vol - 3.7 cu ft, Power - 15 W
3. The objective of CRLS-229 was to obtain a spectroheliogram of the solar corona. The experiment was 100 percent successful. The data were used to aid in solar flare research.

c. CRL-251 (High Latitude Particles)

1. Sponsor - US Air Force
2. Wt - 71 lbs, Vol - 1.7 cu ft, Power - 17 W
3. The objective of CRL-251 was to measure the flux of particles precipitating from the high-latitude polar caps. The experiment was 100 percent successful and was used to plan communications in polar regions.

d. ECOM-721 (XUV Spectrometer)

1. Sponsor - US Army
2. Wt - 13 lbs, Vol - 0.2 cu ft, Power - 4.3 W
3. The objective of ECOM-721 was to measure extreme ultraviolet (EUV) radiation in the upper atmosphere. The experiment was 100 percent successful and contributed to the EUV data base.

e. NRL-401 (Solar Wind)

1. Sponsor - US Navy
2. Wt - 135 lbs, Vol - 2.1 cu ft, Power - 14 W
3. The objective of NRL-401 was to measure the plasma in the solar wind. The experiment was 100 percent successful and contributed to the solar wind data base.

f. ONR-601 (Aerosol Measurement II)

1. Sponsor - US Navy
2. Wt - 3 lbs, Vol - 0.02 cu ft, Power - 0.2 W
3. The objective of ONR-601 was to measure aerosol and ozone in the earth's stratosphere. The experiment was 100 percent successful and provided a data base on concentration and vertical distribution of aerosol and ozone.

g. NRL-608 (X-Ray Monitoring)

1. Sponsor - US Navy
2. Wt - 10 lbs, Vol - 0.5 cu ft, Power - 6.0 W
3. The objective of NRL-608 was to monitor X-ray activity in auroral regions. The experiment was 100 percent successful and provided a data base on X-ray burst activity and a map of auroral X-ray activity.

h. NRL-128 (Solar Flare X-Ray Spectrometer)

1. Sponsor - US Navy
2. Wt - 76 lbs, Vol - 1.6 cu ft, Power - 7.5 W

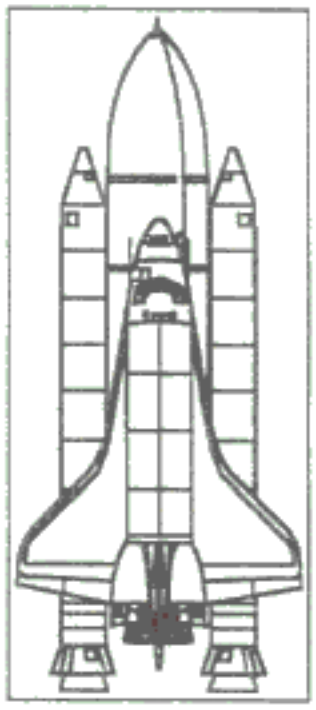
9. Experiment Summary:

a. DMA-501 (NAVPAC-3)

1. Sponsor - DOD (Defense Mapping Agency)
2. Wt - 70 lbs, Vol - information not available, Power - information not available
3. Objective not available.

1982 MISSIONS

STS-4
(mission information classified)



1. Launch Date: Not Available
2. Launch Vehicle: Not Available
3. Launch Site: Not Available
4. Mission Duration: Not Available
5. Orbital Parameters: Not Available
6. Contractor: Lockheed Missiles and Space Company
7. Cost: $34.4 million
8. List of Experiments:

   a. AFGL-201 (Cryogenic Infrared Radiance Instrument for Shuttle/CIRRIS)
   b. SAMSO-508 (Space Sextant)
   c. AFGL-801A (Horizon Ultraviolet Program/HUP)
   d. AFGL-804 (Sheath, Wake, and Charging)
   e. CRL-258 (Passive Cosmic Ray Detector)
   f. NRL-802 (Effects on Plasma in Space)
   g. SD-101 (Solar Aspect Sensor)

9. Experiment Summary:

a. AFGL-201 (CIRRIS)

1. Sponsor - US Air Force
2. Carrier - STP Engineering Support Structure
3. Wt - 3600 lbs, Vol - 89.2 cu ft, Power - 500 W

4. The objective of AFGL-201 was to take high-resolution measurements of the optical contamination environment self-induced by the Shuttle and to collect earth limb background and foreground data.

b. SAMSO-508 (Space Sextant)

1. Sponsor - US Air Force
2. Carrier - STP Engineering Support Structure
3. Wt - 182 lbs, Vol - 6.0 cu ft, Power - 195 W
4. The objective of SAMSO-508 was to investigate an onboard autonomous spacecraft navigation capability. The experiment was successful. The data were used to further autonomous spacecraft navigation technology.

c. AFGL-801A (HUP)

1. Sponsor - US Air Force
2. Carrier - STP Engineering Support Structure
3. Wt - 40 lbs, Vol - 1.0 cu ft, Power - 12 W
4. The objective of AFGL-801A was to measure the earth's horizon profile in several ultraviolet wavelengths and to develop new horizon sensors for spacecraft. The experiment was 100 percent successful. The data were provided to missile defense and remote sensing activities, including SDIO.

d. AFGL-804 (Sheath, Wake, and Charging)

1. Sponsor - US Air Force
2. Carrier - STP Engineering Support Structure
3. Wt - 53.5 lbs, Vol - 0.5 cu ft, Power - 29 W
4. The objective of AFGL-804 was to measure actual environmental plasma disturbance on test bodies. The experiment was 100 percent successful. The data were used to model plasma/large body interactions for future space missions.

e. CRL-258 (Passive Cosmic Ray Detector)

1. Sponsor - US Air Force
2. Carrier - STP Engineering Support Structure
3. Wt - 1 lbs, Vol - 0.0017 cu ft, Power - N\A
4. The objective of CRL-258 was to measure composition, flux, and energy of trapped energetic particles. No data were obtained due to experiment failure. Failure analysis was used to assist in the design of a similar experiment for the Long Duration Exposure Facility (LDEF).

f. NRL-802 (Shuttle Effects on Plasma in Space)

1. Sponsor - US Navy
2. Carrier - STP Engineering Support Structure
3. Wt - 8 lbs, Vol - 0.32 cu ft, Power - 6 W
4. The objective of NRL-802 was to determine the impact of contamination on plasma experiments. The experiment was successful. The data were used as a data base in planning future experiments.

g. SD-101 (Solar Aspect Sensor)

1. Sponsor - US Air Force
2. Carrier - STP Engineering Support Structure
3. Wt - information not available, Vol - information not available, Power - information not available
4. The objective of SD-101 was to measure the sun position relative to the mission payload. The experiment was successful and provided a backup source of orbiter/sun angle data.

Mission S81-1

(mission information classifed)

GRAPHIC NOT AVAILABLE

1. Launch Date: Not Available
2. Launch Vehicle: Not Available
3. Launch Site: Not Available
4. Mission Duration: 7 months
5. Orbital Parameters: Not Available
6. Contractor: Not Available
7. Cost: Not Available
8. List of Experiments:

   a. ONR-804 (Stimulated Emission of Energetic Particles)
   b. ONR-602 (Solar Flares)

9. Experiment Summary:

a. ONR-804 (Stimulated Emission of Energetic Particles)

1. Sponsor - US Navy
2. Wt - 22 lbs, Vol - 0.47 cu ft, Power - 10 W.
3. The objective of ONR-804 was to investigate precipitating particles in the ionosphere. The experiment was 100 percent successful and contributed to the data base on effects of precipitating particles on VLF communications.

b. SAMSO-508 (Space Sextant)

1. Sponsor - US Air Force
2. Carrier - STP Engineering Support Structure
3. Wt - 182 lbs, Vol - 6.0 cu ft, Power - 195 W
4. The objective of SAMSO-508 was to investigate an onboard autonomous spacecraft navigation capability. The experiment was successful. The data were used to further autonomous spacecraft navigation technology.

c. AFGL-801A (HUP)

1. Sponsor - US Air Force
2. Carrier - STP Engineering Support Structure
3. Wt - 40 lbs, Vol - 1.0 cu ft, Power - 12 W
4. The objective of AFGL-801A was to measure the earth's horizon profile in several ultraviolet wavelengths and to develop new horizon sensors for spacecraft. The experiment was 100 percent successful. The data were provided to missile defense and remote sensing activities, including SDIO.

d. AFGL-804 (Sheath, Wake, and Charging)

1. Sponsor - US Air Force
2. Carrier - STP Engineering Support Structure
3. Wt - 53.5 lbs, Vol - 0.5 cu ft, Power - 29 W
4. The objective of AFGL-804 was to measure actual environmental plasma disturbance on test bodies. The experiment was 100 percent successful. The data were used to model plasma/large body interactions for future space missions.

e. CRL-258 (Passive Cosmic Ray Detector)

1. Sponsor - US Air Force
2. Carrier - STP Engineering Support Structure
3. Wt - 1 lbs, Vol - 0.0017 cu ft, Power - N\A
4. The objective of CRL-258 was to measure composition, flux, and energy of trapped energetic particles. No data were obtained due to experiment failure. Failure analysis was used to assist in the design of a similar experiment for the Long Duration Exposure Facility (LDEF).

f. NRL-802 (Shuttle Effects on Plasma in Space)

1. Sponsor - US Navy
2. Carrier - STP Engineering Support Structure
3. Wt - 8 lbs, Vol - 0.32 cu ft, Power - 6 W
4. The objective of NRL-802 was to determine the impact of contamination on plasma experiments. The experiment was successful. The data were used as a data base in planning future experiments.

g. SD-101 (Solar Aspect Sensor)

1. Sponsor - US Air Force
2. Carrier - STP Engineering Support Structure
3. Wt - information not available, Vol - information not available, Power - information not available
4. The objective of SD-101 was to measure the sun position relative to the mission payload. The experiment was successful and provided a backup source of orbiter/sun angle data.

Mission S81-1

(mission information classifed)

GRAPHIC NOT AVAILABLE

1. Launch Date: Not Available
2. Launch Vehicle: Not Available
3. Launch Site: Not Available
4. Mission Duration: 7 months
5. Orbital Parameters: Not Available
6. Contractor: Not Available
7. Cost: Not Available
8. List of Experiments:

   a. ONR-804 (Stimulated Emission of Energetic Particles)
   b. ONR-602 (Solar Flares)

9. Experiment Summary:

a. ONR-804 (Stimulated Emission of Energetic Particles)

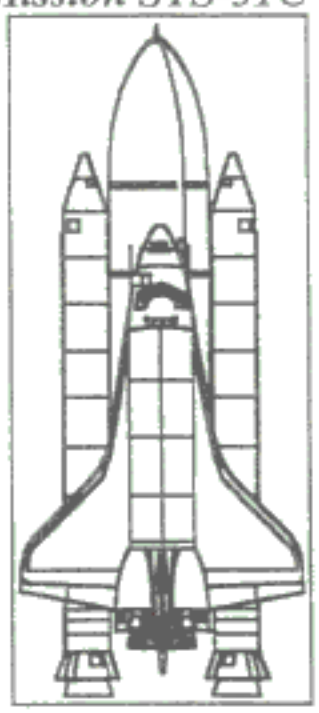
1. Sponsor - US Navy
2. Wt - 22 lbs, Vol - 0.47 cu ft, Power - 10 W.
3. The objective of ONR-804 was to investigate precipitating particles in the ionosphere. The experiment was 100 percent successful and contributed to the data base on effects of precipitating particles on VLF communications.

b. ONR-602 (Solar Flares)

1. Sponsor - US Navy
2. Wt - 41 lbs, Vol - 1.7 cu ft, Power - 11.5 W
3. The objective of ONR-602 was to study the effects of solar flares on communications. The experiment was 100 percent successful and contributed to the data base on effects of solar flares on VLF communications.

1983 MISSIONS

Mission STS-31C



1. Launch Date: 18 June 1983
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 5 days
5. Orbital Parameters: Alt 160 NM, Inclination 28.5°
6. Contractor: NASA Goddard Space Flight Center
7. Cost: $0.017 million
8. List of Experiments:

   a. NRL-904A (Space Ultraviolet Radiation Environment/SURE-1)

9. Experiment Summary:

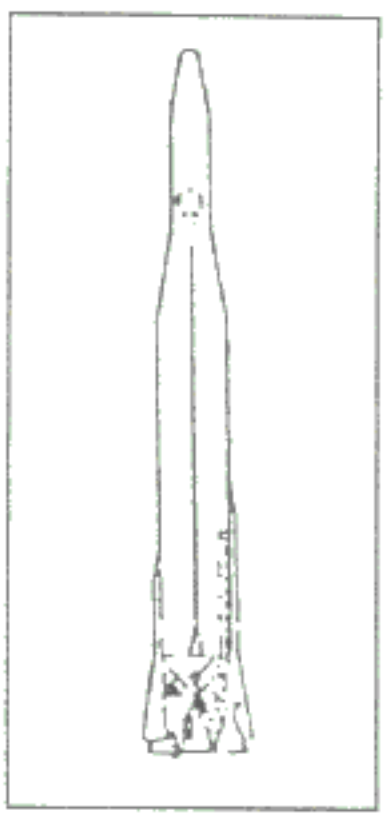
   a. NRL-904A (SURE-1)

      1. Sponsor - US Navy
      2. Carrier - Get-Away Special (GAS) Can with opening lid
      3. Wt - 167 lbs, Vol - 5 cu ft, Power - N\A
      4. The objective of NRL-904A was the observation and description of the ultraviolet spectrum, including spatial variation and temporal behavior. The experiment was partially successful and was used to plan future missions.

c. ONR-302 (Plasma Interaction)

1. Sponsor - US Navy
2. Wt - 72 lbs, Vol - 0.8 cu ft, Power - 36.0 W
3. The objective of ONR-302 was to study naturally occurring and artificially stimulated wave particle interactions in the magnetospheric plasma. The experiment was 100 percent successful. The data contributed to the data base on particle interactions in the magnetosphere.

Mission P78-1



1. Launch Date: 24 February 1979
2. Launch Vehicle: Atlas F
3. Launch Site: WTR
4. Mission Duration: 6 years
5. Orbital Parameters: 320 NM circular, Inclination 97.8°
6. Contractor: Ball Aerospace Corporation
7. Cost: $21.0 million
8. List of Experiments:

   a. ARPA-301 (Gamma Ray Spectrometer)
   b. CRLS-229 (Solar X-Ray Spectroheliograph)
   c. CRL-251 (High Latitude Particles)
   d. ECOM-721 (XUV Spectrometer)
   e. NRL-401 (Solar Wind)
   f. ONR-601 (Aerosol Measurement II)
   g. NRL-608 (X-Ray Monitoring)
   h. NRL-128 (Solar Flare X-Ray Spectrometer)
   i. NRL-126 (Course Spectroheliograph)
   j. NRL-304 (Solar Photometer for XUV)

9. Experiment Summary:

a. ARPA-301 (Gamma Ray Spectrometer)

1. Sponsor - DOD (ARPA)
2. Wt - 322 lbs, Vol - information not available, Power - information not available
3. The objective of ARPA-301 was to investigate gamma radiation in the atmosphere. The experiment was 100 percent successful and contributed to the background radiation data base.

b. CRLS-229 (Solar X-Ray Spectroheliograph)

1. Sponsor - US Air Force
2. Wt - 50 lbs, Vol - 3.7 cu ft, Power - 15 W
3. The objective of CRLS-229 was to obtain a spectroheliogram of the solar corona. The experiment was 100 percent successful. The data were used to aid in solar flare research.

c. CRL-251 (High Latitude Particles)

1. Sponsor - US Air Force
2. Wt - 71 lbs, Vol - 1.7 cu ft, Power - 17 W
3. The objective of CRL-251 was to measure the flux of particles precipitating from the high-latitude polar caps. The experiment was 100 percent successful and was used to plan communications in polar regions.

d. ECOM-721 (XUV Spectrometer)

1. Sponsor - US Army
2. Wt - 13 lbs, Vol - 0.2 cu ft, Power - 4.3 W
3. The objective of ECOM-721 was to measure extreme ultraviolet (EUV) radiation in the upper atmosphere. The experiment was 100 percent successful and contributed to the EUV data base.

e. NRL-401 (Solar Wind)

1. Sponsor - US Navy
2. Wt - 135 lbs, Vol - 2.1 cu ft, Power - 14 W
3. The objective of NRL-401 was to measure the plasma in the solar wind. The experiment was 100 percent successful and contributed to the solar wind data base.

f. ONR-601 (Aerosol Measurement II)

1. Sponsor - US Navy
2. Wt - 3 lbs, Vol - 0.02 cu ft, Power - 0.2 W
3. The objective of ONR-601 was to measure aerosol and ozone in the earth's stratosphere. The experiment was 100 percent successful and provided a data base on concentration and vertical distribution of aerosol and ozone.

g. NRL-608 (X-Ray Monitoring)

1. Sponsor - US Navy
2. Wt - 10 lbs, Vol - 0.5 cu ft, Power - 6.0 W
3. The objective of NRL-608 was to monitor X-ray activity in auroral regions. The experiment was 100 percent successful and provided a data base on X-ray burst activity and a map of auroral X-ray activity.

h. NRL-128 (Solar Flare X-Ray Spectrometer)

1. Sponsor - US Navy
2. Wt - 76 lbs, Vol - 1.6 cu ft, Power - 7.5 W
3. The objective of NRL-128 was to measure solar X-ray emissions. The experiment was 100 percent successful and provided a data base for solar flare studies.

i. NRL-126 (Course Spectroheliograph)

1. Sponsor - US Navy
2. Wt - 12 lbs, Vol - 0.2 cu ft, Power - 1.0 W
3. The objective of NRL-126 was to measure solar X-ray emissions. The experiment was 100 percent successful and provided input to a solar flare data base.

j. NRL-304 (Solar Photometer for XUV)

1. Sponsor - US Navy
2. Wt - 12 lbs, Vol - 0.1 cu ft, Power - 1.0 W
3. The objective of NRL-304 was to measure brightness in the XUV range. The experiment acquired no useful data.

Mission S78-1

GRAPHIC NOT AVAILABLE

1. Launch Date: Not Available
2. Launch Vehicle: Not Available
3. Launch Site: Not Available
4. Mission Duration: Information not available
5. Orbital Parameters: Information not available
6. Contractor: Lockheed Missiles and Space Company
7. Cost: $0.1 million
8. List of Experiments:

a. DMA-501 (NAVPAC-3)

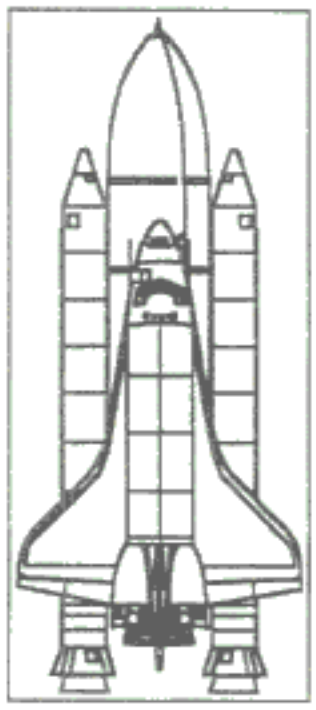
9. Experiment Summary:

a. DMA-501 (NAVPAC-3)

1. Sponsor - DOD (Defense Mapping Agency)
2. Wt - 70 lbs, Vol - information not available, Power - information not available
3. Objective not available.

1982 MISSIONS

STS-4
(mission information classified)



1. Launch Date: Not Available
2. Launch Vehicle: Not Available
3. Launch Site: Not Available
4. Mission Duration: Not Available
5. Orbital Parameters: Not Available
6. Contractor: Lockheed Missiles and Space Company
7. Cost: $34.4 million
8. List of Experiments:

   a. AFGL-201 (Cryogenic Infrared Radiance Instrument for Shuttle/CIRRIS)
   b. SAMSO-508 (Space Sextant)
   c. AFGL-801A (Horizon Ultraviolet Program/HUP)
   d. AFGL-804 (Sheath, Wake, and Charging)
   e. CRL-258 (Passive Cosmic Ray Detector)
   f. NRL-802 (Effects on Plasma in Space)
   g. SD-101 (Solar Aspect Sensor)

9. Experiment Summary:

a. AFGL-201 (CIRRIS)

1. Sponsor - US Air Force
2. Carrier - STP Engineering Support Structure
3. Wt - 3600 lbs, Vol - 89.2 cu ft, Power - 500 W

4. The objective of AFGL-201 was to take high-resolution measurements of the optical contamination environment self-induced by the Shuttle and to collect earth limb background and foreground data.

b. SAMSO-508 (Space Sextant)

1. Sponsor - US Air Force
2. Carrier - STP Engineering Support Structure
3. Wt - 182 lbs, Vol - 6.0 cu ft, Power - 195 W
4. The objective of SAMSO-508 was to investigate an onboard autonomous spacecraft navigation capability. The experiment was successful. The data were used to further autonomous spacecraft navigation technology.

c. AFGL-801A (HUP)

1. Sponsor - US Air Force
2. Carrier - STP Engineering Support Structure
3. Wt - 40 lbs, Vol - 1.0 cu ft, Power - 12 W
4. The objective of AFGL-801A was to measure the earth's horizon profile in several ultraviolet wavelengths and to develop new horizon sensors for spacecraft. The experiment was 100 percent successful. The data were provided to missile defense and remote sensing activities, including SDIO.

d. AFGL-804 (Sheath, Wake, and Charging)

1. Sponsor - US Air Force
2. Carrier - STP Engineering Support Structure
3. Wt - 53.5 lbs, Vol - 0.5 cu ft, Power - 29 W
4. The objective of AFGL-804 was to measure actual environmental plasma disturbance on test bodies. The experiment was 100 percent successful. The data were used to model plasma/large body interactions for future space missions.

e. CRL-258 (Passive Cosmic Ray Detector)

1. Sponsor - US Air Force
2. Carrier - STP Engineering Support Structure
3. Wt - 1 lbs, Vol - 0.0017 cu ft, Power - N\A
4. The objective of CRL-258 was to measure composition, flux, and energy of trapped energetic particles. No data were obtained due to experiment failure. Failure analysis was used to assist in the design of a similar experiment for the Long Duration Exposure Facility (LDEF).

f. NRL-802 (Shuttle Effects on Plasma in Space)

1. Sponsor - US Navy
2. Carrier - STP Engineering Support Structure
3. Wt - 8 lbs, Vol - 0.32 cu ft, Power - 6 W
4. The objective of NRL-802 was to determine the impact of contamination on plasma experiments. The experiment was successful. The data were used as a data base in planning future experiments.

g. SD-101 (Solar Aspect Sensor)

1. Sponsor - US Air Force
2. Carrier - STP Engineering Support Structure
3. Wt - information not available, Vol - information not available, Power - information not available
4. The objective of SD-101 was to measure the sun position relative to the mission payload. The experiment was successful and provided a backup source of orbiter/sun angle data.

Mission S81-1

(mission information classifed)

GRAPHIC NOT AVAILABLE

1. Launch Date: Not Available
2. Launch Vehicle: Not Available
3. Launch Site: Not Available
4. Mission Duration: 7 months
5. Orbital Parameters: Not Available
6. Contractor: Not Available
7. Cost: Not Available
8. List of Experiments:

   a. ONR-804 (Stimulated Emission of Energetic Particles)
   b. ONR-602 (Solar Flares)

9. Experiment Summary:

a. ONR-804 (Stimulated Emission of Energetic Particles)

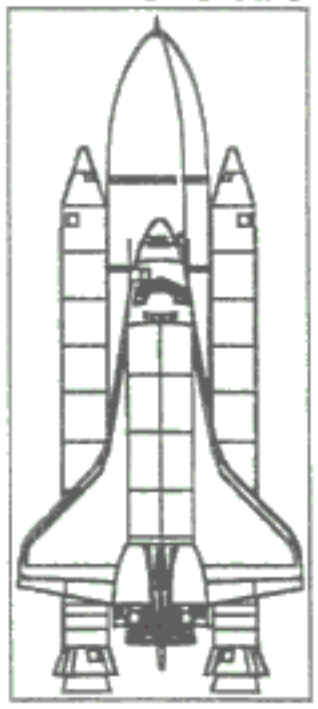
1. Sponsor - US Navy
2. Wt - 22 lbs, Vol - 0.47 cu ft, Power - 10 W.
3. The objective of ONR-804 was to investigate precipitating particles in the ionosphere. The experiment was 100 percent successful and contributed to the data base on effects of precipitating particles on VLF communications.

b. ONR-602 (Solar Flares)

1. Sponsor - US Navy
2. Wt - 41 lbs, Vol - 1.7 cu ft, Power - 11.5 W
3. The objective of ONR-602 was to study the effects of solar flares on communications. The experiment was 100 percent successful and contributed to the data base on effects of solar flares on VLF communications.

1983 MISSIONS

Mission STS-31C



1. Launch Date: 18 June 1983
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 5 days
5. Orbital Parameters: Alt 160 NM, Inclination 28.5°
6. Contractor: NASA Goddard Space Flight Center
7. Cost: $0.017 million
8. List of Experiments:

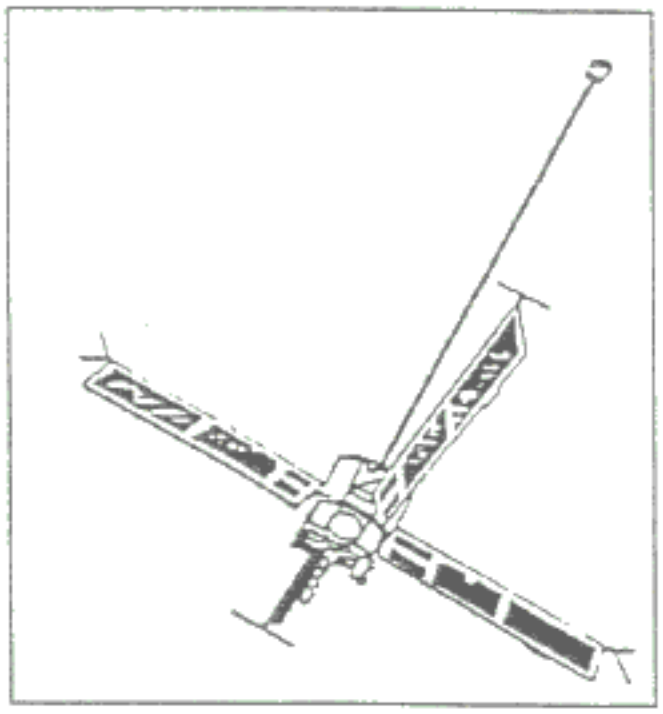
   a. NRL-904A (Space Ultraviolet Radiation Environment/SURE-1)

9. Experiment Summary:

   a. NRL-904A (SURE-1)

      1. Sponsor - US Navy
      2. Carrier - Get-Away Special (GAS) Can with opening lid
      3. Wt - 167 lbs, Vol - 5 cu ft, Power - N\A
      4. The objective of NRL-904A was the observation and description of the ultraviolet spectrum, including spatial variation and temporal behavior. The experiment was partially successful and was used to plan future missions.

Mission P83-1



1. Launch Date: 27 June 1983
2. Launch Vehicle: Scout/Transit
3. Launch Site: WTR
4. Mission Duration: 6 years
5. Orbital Parameters: apogee: 504 NM, perigee: 500 NM, inclination 82.0°
6. Contractor: Applied Physics Lab
7. Cost: $3.1 million
8. List of Experiments
   a. AFGL-101 (Auroral Ionospheric Mapper/AIM)
   b. DNA-101 (Scientec Beacon)
   c. Thermal Plasma Experiment
   d. Electron Spectrometer
   e. Magnetometer

9. Experiment Summary:

a. AFGL-101 (AIM)

1. Sponsor - US Air Force
2. Wt - 21 lbs, Vol - 1.1 cu ft, Power - 11.9 W
3. The objective of AFGL-101 was to obtain images of the aurora. The experiment was 100 percent successful and contributed to the data base for the measurement of aurora.

b. DNA-101 (Scientec Beacon)

1. Sponsor - DOD (Defense Nuclear Agency)
2. Wt - 12.7 lbs, Vol - 0.1 cu ft, Power - 20 W
3. The objective of DNA-101 was to demonstrate the use of auroral images for ionospheric specifications. The experiment was 100 percent successful and contributed to the data base for the measurement of aurora.

c. Thermal Plasma Experiment

1. Sponsor - US Air Force
2. Wt - 12.3 lbs, Vol - information not available, Power - 4.5 W
3. The objective of the thermal plasma experiment was to measure electron density. The experiment was 100 percent successful and contributed to the data base for ionospheric specifications.

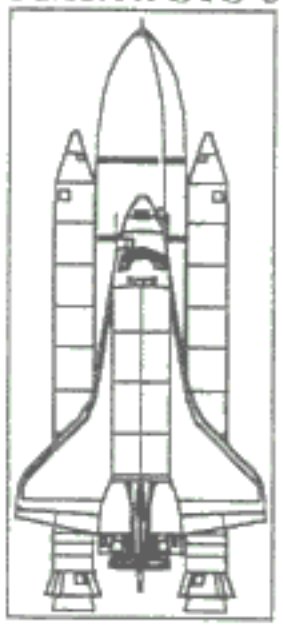
d. Electron Spectrometer

1. Sponsor - US Air Force
2. Wt - 8 lbs, Vol - information not available, Power - 0.43 W
3. The objective of the electron spectrometer experiment was to measure particle flux in the ionosphere. The experiment was 100 percent successful and contributed to the data base for ionospheric specifications.

e. Magnetometer

1. Sponsor - DOD (Defense Nuclear Agency)
2. Wt - 5 lbs, Vol - information not available, Power - 0.7 W
3. The objective of the magnetometer was to measure the magnetic field and to contribute to the spacecraft attitude control. The magnetic field measurement was successful and contributed to the data base for ionospheric specifications. The attitude control function of the magnetometer was only about 25 percent successful.

Mission STS-31D



1. Launch Date: 30 August 1983
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 6 days
5. Orbital Parameters: Alt 160 NM, Inclination 28.5°
6. Contractor: Martin Marietta Corporation
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

   **a. AFTAC-301 (Radiation Monitoring Equipment/RME)
   b. Classified experiment

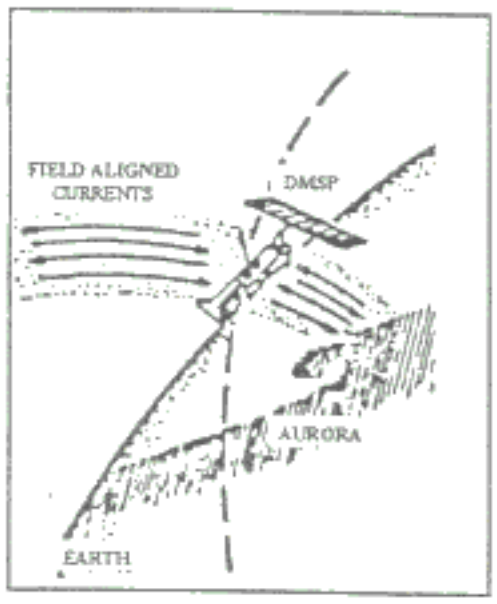
9. Experiment Summary:

a. AFTAC-301 (RME)

See Mission STS-64 (1994)

b. Classified experiment (information classified)

Mission S82-1



1. Launch Date: 17 November 1983
2. Launch Vehicle: Atlas E
3. Launch Site: WTR
4. Mission Duration: 2 years
5. Orbital Parameters: Alt 500 NM, Inclination 98.7°
6. Contractor: RCA
7. Cost: $0.350 million
8. List of Experiments:

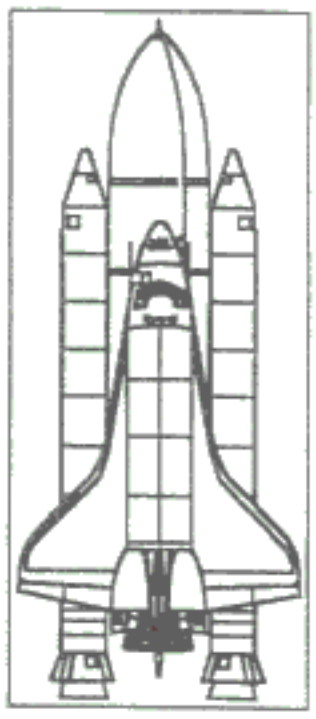
   a. AFGL-902 (Ionospheric Current Systems and Auroras/ICSA)

9. Experiment Summary:

AFGL-902 (ICSA)

1. Sponsor - US Air Force
2. Wt - 5 lbs, Vol - 0.3 cu ft, Power - 5 W
3. The objective of AFGL-902 was to make current and image measurements of coupled auroral particles. The experiment was 100 percent successful and demonstrated an improved USAF space forecasting capability.

Mission STS-41A



1. Launch Date: 28 November 1983
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 6 days
5. Orbital Parameters: Alt 160 NM, Inclination 28.5°
6. Contractor: Martin Marietta Corporation
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

   **a. AFGL-308 (Auroral Photography Experiment/APE-A)

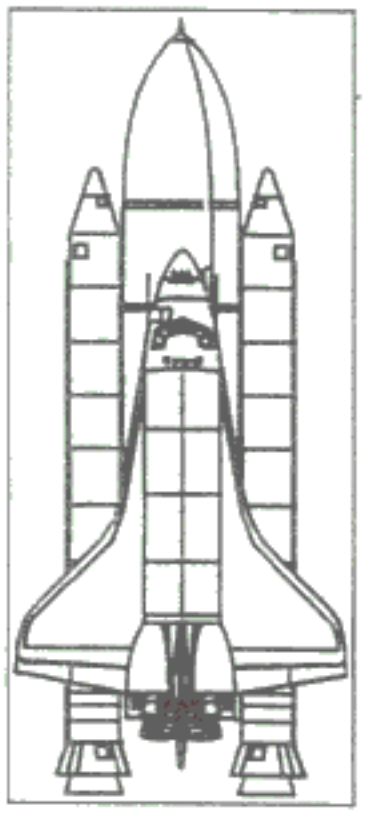
9. Experiment Summary:

a. AFGL-308 (APE-A)

See Mission STS-62 (1994)

1984 MISSIONS

Mission STS-41B



1. Launch Date: 3 February 1984
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 8 days
5. Orbital Parameters: Alt 165 NM, Inclination 28.5°
6. Contractor: CRUX-1 (NASA Goddard Space Flight Center)
7. Cost: CRUX-1 ($0.010 million); also see cost discussion, Page IV-2
8. List of Experiments:

   a. SD-301 (Cosmic Ray Upset Experiment/CRUX-1)

   **b. AFTAC-301 (Radiation Monitoring Equipment/RME)

9. Experiment Summary:

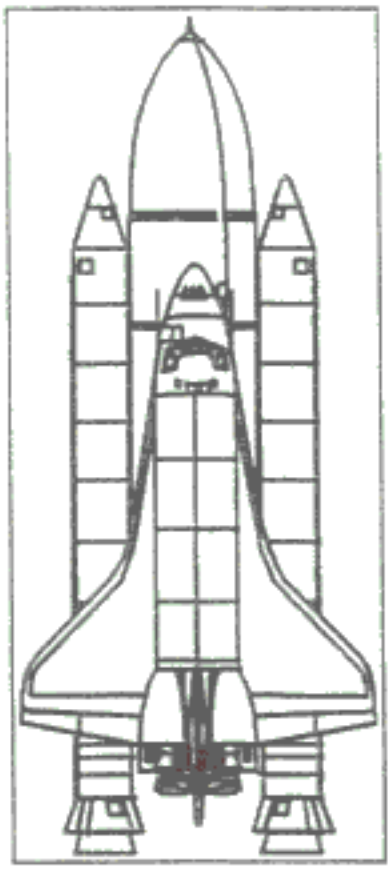
a. SD-301 (CRUX-1)

1. Sponsor - US Air Force
2. Carrier - GAS Can
3. Wt - 180 lbs, Vol - 5 cu ft, Power - N\A
4. The objective of CRUX-1 was to determine the cosmic ray induced error rate in a memory integrated circuit (IC). The experiment achieved some experiment objectives. The data were used to determine the validity of the analytical model.

b. AFTAC-301 (RME)

See Mission STS-64 (1994)

Mission STS-32



1. Launch Date: 6 April 1984
2. Launch Vehicle: Space Shuttle/LDEF
3. Launch Site: KSC
4. Mission Duration: 6 years
5. Orbital Parameters: Alt 250 NM, Inclination 28.5°
6. Contractor: NASA Langley Research Center (Integrator)
7. Cost: LDEF ($0.695 million); also see cost discussion, Page IV-2
8. List of Experiments:

    a. LDEF (Long Duration Exposure Facility)

        (1) AFWL-701 (Fiber Optics in Space)
        (2) CRL-258 (Trapped Proton Energy Spectrum)
        (3) NRL-702 (Heavy Ions in Space)
        (4) SD-802 (Spacecraft Materials)
        (5) AFTAC-201 (Space Effects)

    **b. AFTAC-301 (Radiation Monitoring Equipment/RME)

9. Experiment Summary:

    a. LDEF

        (1) AFWL-701 (Fiber Optics in Space)

            (a) Sponsor - US Air Force
            (b) Wt - 92 lbs, Vol - 4 cu ft, Power - 495 W
            (c) The objective of AFWL-701 was to test the performance of fiber optic systems in space. The test was 100 percent successful and made a major contribution to plans to use fiber optics on the Space Station Freedom.

(2) CRL-258 (Trapped Proton Energy Spectrum)

(a) Sponsor - US Air Force
(b) Wt - 50 lbs, Vol - 0.5 cu ft, Power - N\A
(c) The objective of CRL-258 was to investigate surface changes due to exposure in space, including distribution of exposure in small samples of tissue. The experiment was 100 percent successful and contributed to the data base for the use of both materials and man in space.

(3) NRL-702 (Heavy Ions in Space)

(a) Sponsor - US Navy
(b) Wt - 264 lbs, Vol - 3.5 cu ft, Power - N\A
(c) The objective of NRL-702 was to survey the space radiation environment. The experiment was 100 percent successful. The data were included in the spacecraft model prepared by the Naval Research Laboratory.

(4) SD-802 (Spacecraft Materials)

(a) Sponsor - US Air Force
(b) Wt - 44 lbs, Vol - 3 cu ft, Power - 14 W
(c) The objective of SD-802 was to measure the effects of space on spacecraft materials and coatings. The experiment was 100 percent successful. The data were distributed through Air Force Space Division for use in spacecraft design.

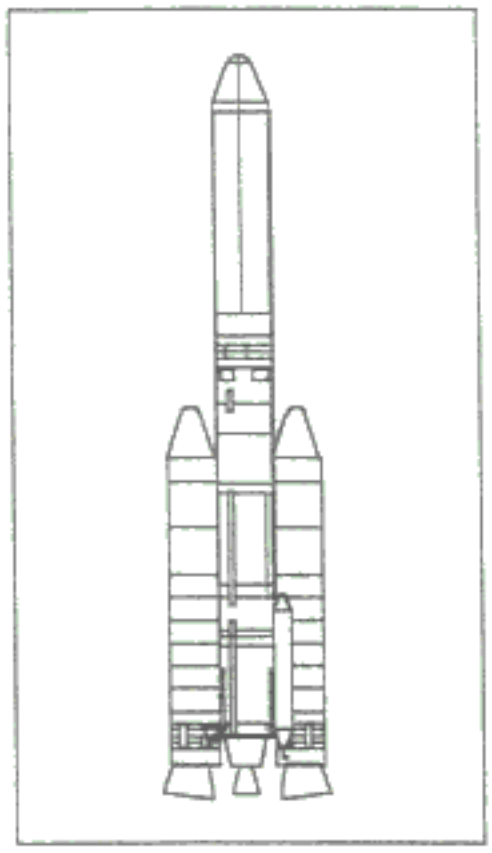
(5) AFTAC-201 (Space Effects)

(a) Sponsor - US Air Force
(b) Wt - 20 lbs, Vol - 0.5 cu ft, Power - N\A
(c) The objective of AFTAC-201 was to determine the space environmental effects on electro-optical sensor components.

b. AFTAC-301 (RME)

See Mission STS-64 (1994)

Mission S85-1



1. Launch Date: 25 June 1984
2. Launch Vehicle: Titan 34D
3. Launch Site: WTR
4. Mission Duration: 4 months
5. Orbital Parameters: apogee: 143 NM, perigee: 105 NM, inclination 96.1°
6. Contractor: Lockheed Missiles and Space Company
7. Cost: $1.2 million
8. List of Experiments:

   a. ONR-901 (Polar Ozone and Aerosol Measurements/POAM)
   b. CRLS-505 (Upper Atmosphere Composition Spectrometers/UACS)

9. Experiment Summary:

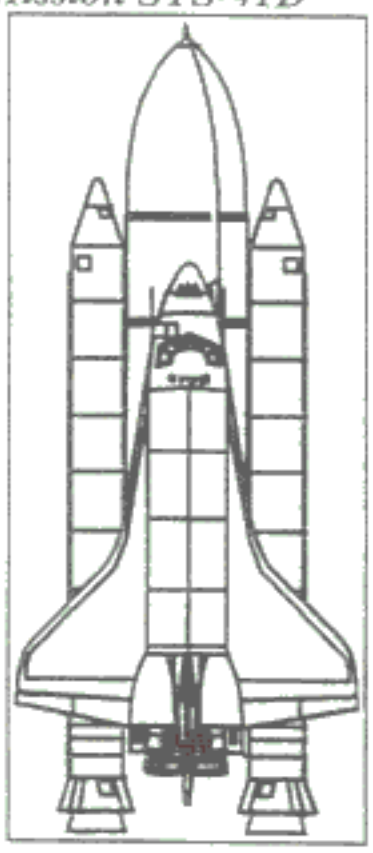
a. ONR-901 (POAM)

1. Sponsor - US Navy
2. Wt - 8 lbs, Vol - 0.14 cu ft, Power - 5 W
3. The objective of ONR-901 was to measure variations in polar ozone and aerosol concentrations. The experiment was 10 percent successful. The data were to be used to validate a follow-on experiment.

b. CRLS-505 (UACS)

1. Sponsor - US Air Force
2. Wt - 30 lbs, Vol - 1.0 cu ft, Power - 6.2 W
3. The objective of CRLS-505 was to measure atmospheric composition as a function of solar activity, latitude, etc. The experiment was 100 percent successful. The data were used to improve the data base on winds in the upper atmosphere.

Mission STS-41D



1. Launch Date: 30 August 1984
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 6 days
5. Orbital Parameters: Alt 162 NM, Inclination 28.5°
6. Contractor: Martin Marietta Corporation
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

   **a. AWS-301 (Cloud Logic to Optimize Use of Defense Systems/CLOUDS)
   **b. AMD-201 (Visual Function Test in Space/VFT-1)
   **c. AFTAC-301 (Radiation Monitoring Equipment/RME)
   **d. GL-503 (Air Force Maui Optical Site/AMOS)

9. Experiment Summary:

   a. AWS-301 (CLOUDS)

      See Mission STS-64 (1994)

   b. AMD-201 (VFT-1)

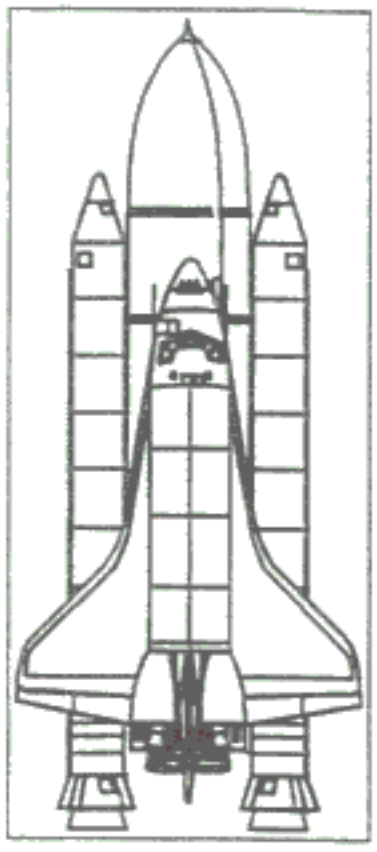
      See Mission STS-44 (1991)

   c. AFTAC-301 (RME)

      See Mission STS-64 (1994)

   d. GL-503 (AMOS)

      See Mission STS-64 (1994)



1. Launch Date: 5 October 1984
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 8 days
5. Orbital Parameters: Alt 190 NM, Inclination 57.0°
6. Contractor: TRIS-1 (NASA Goddard Space Flight Center)
7. Cost: TRIS-1 ($0.01 million);
   also see cost discussion, Page IV-2
8. List of Experiments:

   **a. GL-308 (Auroral Photography Experiment/APE-A)
   b. NRL-905 (Trapped Ions in Space/TRIS-1)
   **c. AMD-201 (Visual Function Test in Space/VFT-1)
   **d. AFTAC-301 (Radiation Monitoring Equipment/RME)

9. Experiment Summary:

a. GL-308 (APE-A)

See Mission STS-62 (1994)

b. NRL-905 (TRIS-1)

1. Sponsor - US Navy
2. Carrier - GAS Can
3. Wt - 200 lbs, Vol - 5 cu ft, Power - N\A
4. The objective of NRL-905 was to measure the spatial distribution of heavy ions in low earth orbit. The experiment was 100 percent successful. The data will be used to model the space radiation environment and to prepare a standard for spacecraft reliability.

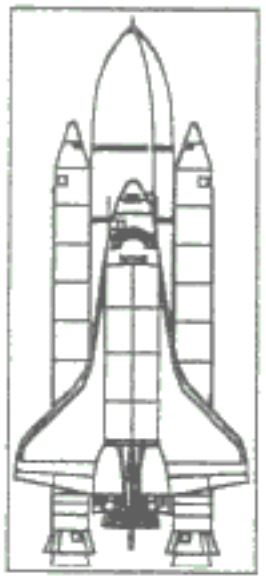
c. AMD-201 (VFT-1)

See Mission STS-44 (1991)

d. AFTAC-301 (RME)

See Mission STS-64 (1994)

Mission STS-51A



1. Launch Date: 8 November 1984
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 7 days
5. Orbital Parameters: Alt 190 NM, Inclination 28.5°
6. Contractor: Martin Marietta Corporation
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

   **a. AFTAC-301 (Radiation Monitoring Equipment/RME)

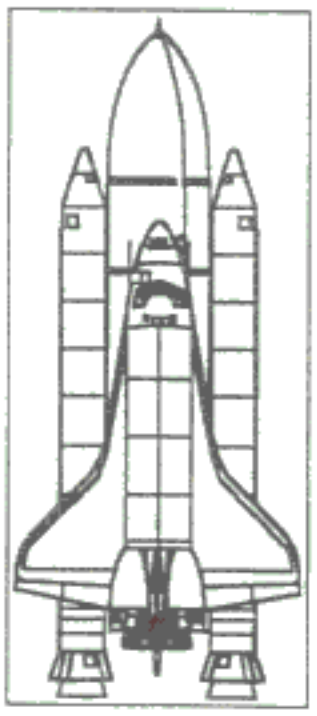
9. Experiment Summary:

   a. AFTAC-301 (RME)

   See Mission STS-64 (1994)

1985 MISSIONS

Mission STS-51C



1. Launch Date: 24 January 1985
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 3 days
5. Orbital Parameters: Not Available
6. Contractor: Martin Marietta Corporation
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

   a. OASIS* [Orbiter Experiment (OEX) Autonomous Supporting Instrumentation System]
   **b. SFMD (Storable Fluids Management Demonstration)
   **c. AMD-101 (Visual of Autogenic Feedback Techniques/VAFT)
   **d. AMD-201 (Visual Function Test in Space/VFT-1)

**e. AWS-301 (Cloud Logic to Optimize Use of Defense Systems/CLOUDS-1)

**f. NSSA-301 (Photograph of Ocean Wave Forms/OCEANS)

9. Experiment Summary:

a. OASIS*

b. SFMD

1. Sponsor - US Air Force
2. Carrier - Middeck Locker
3. Wt - 268 lb, Vol - 5 Lockers, Power - 42 W
4. The objective of the SFMD experiment was to evaluate the fluid transfer characteristics and fluid slosh behavior of receiver tanks. The experiment was successful. The data were used to define a more comprehensive follow-on experiment.

c. AMD-101 (VAFT)

1. Sponsor - US Air Force
2. Carrier - Middeck Locker
3. Wt - 11 lb, Vol - 2 cu ft, Power - none
4. The objective of AMD-101 was to validate autogenic feedback training in enabling astronauts to suppress space sickness. The experiment was successful and contributed to an understanding of space sickness.

d. AMD-201 (VFT-1)

See Mission STS-44 (1991)

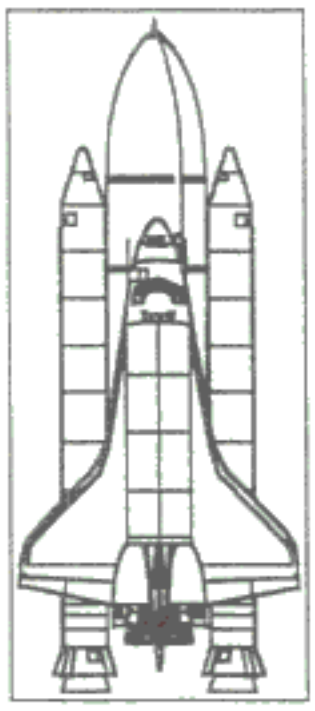
e. AWS-301 (CLOUDS-1)

See Mission STS-53 (1992)

f. NSSA-301 (OCEANS)

1. Sponsor - US Navy
2. Carrier - Middeck Locker
3. Wt - 35 lb, Vol - 1.5 Lockers, Power - information not available
4. The objective of NSSA-301 was to investigate ocean wave forms. The experiment was 100 percent successful. The data were used to prepare subsequent experiments.

Mission STS-51B



1. Launch Date: 29 April 1985
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 7 days
5. Orbital Parameters: Alt 190 NM, Inclination 57.0°
6. Contractor: GLOMR (NASA Goddard Space Flight Center)
7. Cost: GLOMR ($0.035 million); See cost discussion, Page IV-2 "General"
8. List of Experiments:

   a. DARPA-401 (Global Low Orbiting Message Relay/GLOMR)

   **b. GL-503 (Air Force Maui Optical Site/AMOS)

9. Experiment Summary:

   a. DARPA-401 (GLOMR)

      1. Sponsor - DOD (DARPA)
      2. Carrier - GAS Can with ejection mechanism
      3. Wt - 160 lb, Vol - 5 cu ft, Power - none
      4. The objective of DARPA-401 was to demonstrate the feasibility of building and operating a small, low-cost communications satellite and to demonstrate its military value. The experiment was unsuccessful due to the failure of the experiment container opening lid to operate properly.

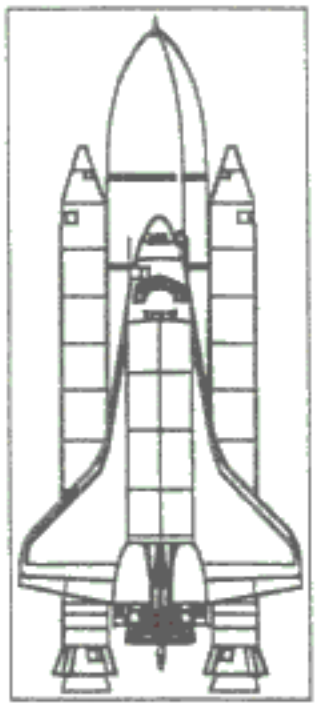
   b. GL-503 (AMOS)

      See Mission STS-64 (1994)

10. Unique Mission Characteristics

The GLOMR mission was the first use of the NASA Get-Away Special (GAS) Can as a launch system to inject a payload into orbit from the Space Shuttle.

Mission STS-51G



1. Launch Date: 17 June 1985
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 7 days
5. Orbital Parameters: Alt 190 NM, Inclination 28.511°
6. Contractor: SURE II (NASA Goddard Space Flight Center)
7. Cost: SURE II ($0.017 million); See cost discussion, Page IV-2
8. List of Experiments:

   a. NRL-904B (Space Ultraviolet Radiation Environment/SURE II)

   **b. SDIO-501 (High Precision Tracking Experiment/HPTE)

9. Experiment Summary:

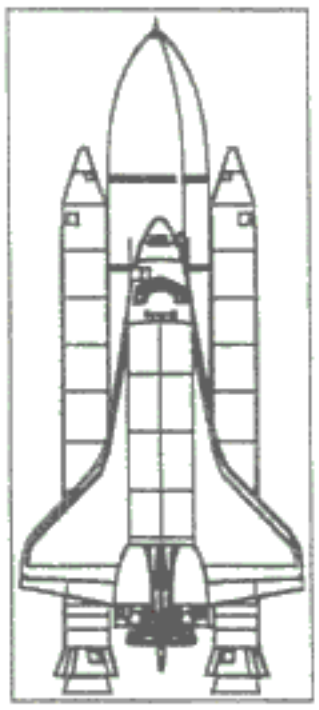
   a. NRL-904B (SURE II)

      1. Sponsor - US Navy
      2. Carrier - GAS Can with opening lid
      3. Wt - 167 lb, Vol - 5 cu ft, Power - none
      4. The objective of NRL-904B was the observation and description of the ultraviolet spectrum, including spatial variation and temporal behavior. The experiment was not successful due to an electronic failure. No useful data were obtained.

   b. SDIO-501 (HPTE)

      1. Sponsor - DOD (SDIO)
      2. Carrier - Middeck Locker
      3. Wt - 8 lb, Vol - 2 cu ft, Power - none
      4. The objective of SDIO-501 was to acquire from the ground and track a retroreflector mounted on the Shuttle. The experiment was successful. The data were used to prepare for other experiments.

Mission STS-51J



1. Launch Date: 3 October 1985
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 4 days
5. Orbital Parameters: Alt 254 NM, Inclination 28.5°
6. Contractor: Martin Marietta Corporation
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

**a. AFGL-407 (Measurement of Atmospheric Radiance Camera-Day/Night//MARC-DN)
**b. AMD-304 (Contrast Sensitivity Tester/CST)
**c. WINCON (Hatch Window Contamination Study)
**d. AMD-302 (Reaction Time and Time Perception Analyzer/RTPA)
**e. OASIS* (OEX Autonomous Supporting Instrumentation System)
**f. AWS-301 (Cloud Logic to Optimize Use of Defense Systems/CLOUDS II)
**g. GL-503 (Air Force Maui Optical Site/AMOS)
**h. AMD-201 (Visual Function Test in Space/VFT-1)
**i. AMD-501 (Visual Function Test in Space/VFT-2)

9. Experiment Summary:

a. AFGL-407 (MARC-DN)

1. Sponsor - US Air Force
2. Carrier - Middeck Locker
3. Wt - 15 lb, Vol - 0.5 cu ft, Power - none
4. Information on the objective of the experiment was not available.

b. AMD-304 (CST)

1. Sponsor - US Air Force
2. Carrier - Middeck Locker
3. Wt - 15 lb, Vol - 1 cu ft, Power - none
4. The objective of AMD-304 was to measure changes during spaceflight in static contrast sensitivity. No useful flight data were obtained.

c. WINCON

1. Sponsor - information not available
2. Carrier - information not available
3. Wt - information not available, Vol - information not available, Power - information not available
4. The objective of WINCON was to investigate the contamination that builds up on the Shuttle windows and affects visibility. The experiment was only 15-20 percent successful due to poor design. The data were used to design a follow-on experiment.

d. AMD-302 (RTPA)

1. Sponsor - US Air Force
2. Carrier - Middeck Locker
3. Wt - 9 lb, Vol - 2 cu ft, Power - none
4. The objective of AMD-302 was to collect information related to changes in decision time and perception of the passage of time during spaceflight. The experiment was 100 percent successful and contributed to the spaceflight data base.

e. OASIS*

f. AWS-301 (CLOUDS II)

See Mission STS-53 (1992)

g. GL-503 (AMOS)

See Mission STS-64 (1994)

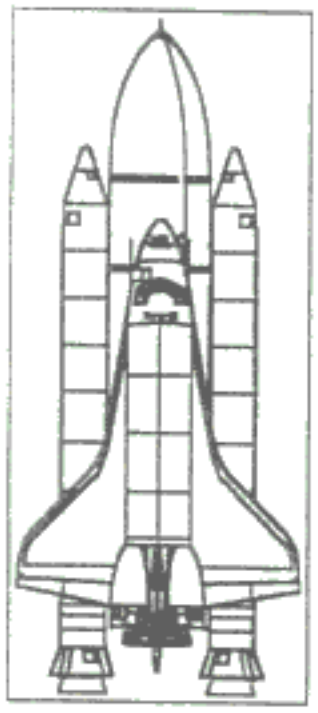
h. AMD-201 (VFT-1)

See Mission STS-44 (1991)

i. AMD-501 (VFT-2)

See Mission STS-53 (1992)

Mission STS-51J



1. Launch Date: 3 October 1985
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 4 days
5. Orbital Parameters: Alt 254 NM, Inclination 28.5°
6. Contractor: Martin Marietta Corporation
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

**a. AFGL-407 (Measurement of Atmospheric Radiance Camera-Day/Night//MARC-DN)
**b. AMD-304 (Contrast Sensitivity Tester/CST)
**c. WINCON (Hatch Window Contamination Study)
**d. AMD-302 (Reaction Time and Time Perception Analyzer/RTPA)
**e. OASIS* (OEX Autonomous Supporting Instrumentation System)
**f. AWS-301 (Cloud Logic to Optimize Use of Defense Systems/CLOUDS II)
**g. GL-503 (Air Force Maui Optical Site/AMOS)
**h. AMD-201 (Visual Function Test in Space/VFT-1)
**i. AMD-501 (Visual Function Test in Space/VFT-2)

9. Experiment Summary:

a. AFGL-407 (MARC-DN)

1. Sponsor - US Air Force
2. Carrier - Middeck Locker
3. Wt - 15 lb, Vol - 0.5 cu ft, Power - none
4. Information on the objective of the experiment was not available.

b. AMD-304 (CST)

1. Sponsor - US Air Force
2. Carrier - Middeck Locker
3. Wt - 15 lb, Vol - 1 cu ft, Power - none
4. The objective of AMD-304 was to measure changes during spaceflight in static contrast sensitivity. No useful flight data were obtained.

c. WINCON

1. Sponsor - information not available
2. Carrier - information not available
3. Wt - information not available, Vol - information not available, Power - information not available
4. The objective of WINCON was to investigate the contamination that builds up on the Shuttle windows and affects visibility. The experiment was only 15-20 percent successful due to poor design. The data were used to design a follow-on experiment.

d. AMD-302 (RTPA)

1. Sponsor - US Air Force
2. Carrier - Middeck Locker
3. Wt - 9 lb, Vol - 2 cu ft, Power - none
4. The objective of AMD-302 was to collect information related to changes in decision time and perception of the passage of time during spaceflight. The experiment was 100 percent successful and contributed to the spaceflight data base.

e. OASIS*

f. AWS-301 (CLOUDS II)

See Mission STS-53 (1992)

g. GL-503 (AMOS)

See Mission STS-64 (1994)

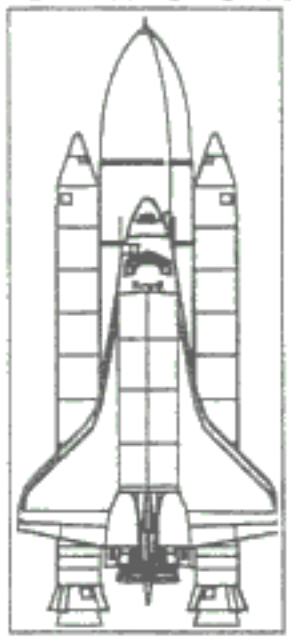
h. AMD-201 (VFT-1)

See Mission STS-44 (1991)

i. AMD-501 (VFT-2)

See Mission STS-53 (1992)

Mission STS-61A



1. Launch Date: 30 October 1985
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 7 days
5. Orbital Parameters: Alt 175 NM, Inclination 57°
6. Contractor: NASA Goddard Space Flight Center
7. Cost: $0.035 million
8. List of Experiments:

    a. DARPA-401 (Global Low Orbiting Message Relay/GLOMR)

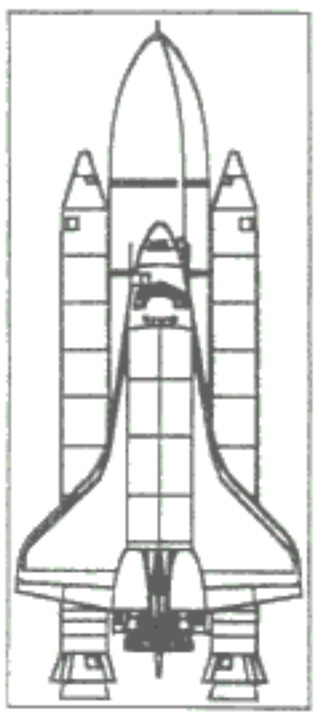
9. Experiment Summary:

    a. DARPA-401 (GLOMR)

        1. Sponsor - DOD (DARPA)
        2. Carrier - GAS Can with ejection mechanism
        3. Wt - 160 lb, Vol - 5 cu ft, Power - none
        4. The objective of DARPA-401 was to demonstrate the feasibility of building and operating a small, low-cost communications satellite and its military value. The experiment was 100 percent successful and has led to a number of continuing investigations into the military use of small, low-cost satellites.

1986 MISSIONS

Mission STS-61C



1. Launch Date: 12 January 1986
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 6 days
5. Orbital Parameters: Alt 175 NM, Inclination 28.5°
6. Contractor: NASA Goddard Space Flight Center
7. Cost: FLEX BEAM ($0.010 million)
8. List of Experiments:

    a. AFA-301 (Flexible Beam Experiment/ FLEXBEAM)
    b. AFGL-402 (Particle Analysis Camera For /PACS)

9. Experiment Summary:

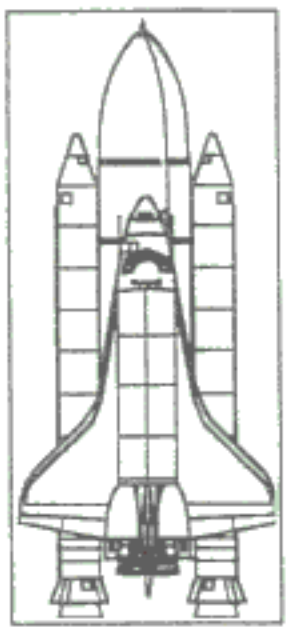
a. AFA-301 (FLEX BEAM)

1. Sponsor - US Air Force
2. Carrier - GAS Can
3. Wt - 200 lb, Vol - 5 cu ft, Power - none
4. The objective of AFA-301 was to support research for large structures in space by measuring structural vibrations and properties. The experiment was only 25 percent successful. The data are being used to design more rigorous follow-on experiments.

b. AFGL-402 (PACS)

1. Sponsor - US Air Force
2. Carrier - Hitchhiker G
3. Wt - 99 lb, Vol - 8 cu ft, Power - 21 W
4. The objective of AFGL-402 was to measure the Shuttle's particulate environment. The experiment was 80 percent successful. The data are being used to help design Shuttle IR and optical experiments.

Mission STS-51L



1. Launch Date: 28 January 1986
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: N/A (launch vehicle failure)
5. Orbital Parameters: N/A (launch vehicle failure)
6. Contractor: Martin Marietta Corporation
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

**a. AFTAC-301 (Radiation Monitoring Equipment/RME)

9. Experiment Summary:

AFTAC-301 (RME)

1. See Mission STS-64 (1994)
2. Due to the loss of Space Shuttle Challenger, no data were obtained.

Mission S86-1

GRAPHIC NOT AVAILABLE

1. Launch Date: Not Available
2. Launch Vehicle: Not Available
3. Launch Site: Not Available
4. Mission Duration: Not Available
5. Orbital Parameters: Not Available
6. Contractor: Lockheed Missiles and Space Company
7. Cost: $0.805 million
8. List of Experiments:

    a. RADC-801 (Ducted Ionosphere)

9. Experiment Summary:

    a. RADC-801 (Ducted Ionosphere)

        1. Sponsor - US Air Force
        2. Wt - 35 lb, Vol - 1.2 cu ft, Power - 18 W
        3. The objective of RADC-801 was to make direct measurements of HF radio propagation in elevated ionospheric ducts. Due to the loss of the host vehicle, no experimental data were obtained.

Mission P87-1

1. Launch Date: 13 November 1986
2. Launch Vehicle: Scout
3. Launch Site: WTR
4. Mission Duration: 4 years
5. Orbital Parameters: 540 NM circular, Inclination 90°
6. Contractor: Johns Hopkins Applied Physics Lab
7. Cost: $12.4 million (booster not included)
8. List of Experiments:

    a. AFGL-401 (Auroral/Ionospheric Remote Sensor//AIRS)
    b. RADC-301 (MATS)
    c. DNA-301 (BEACON)

9. Experiment Summary:

a. AFGL-401 (AIRS)

1. Sponsor - US Air Force
2. Wt - 20 lb, Vol - 2.2 cu ft, Power - 17 W
3. The objective of AFGL-401 was to obtain images of ionospheric features -- aurora and airglow -- using selected ultraviolet wavelength bands. The experiment was successful and provided an option for the Defense Meteorological Satellite Program (DMSP) to incorporate UV sensors in their plans for the late 1990s.

b. RADC-301 (MATS)

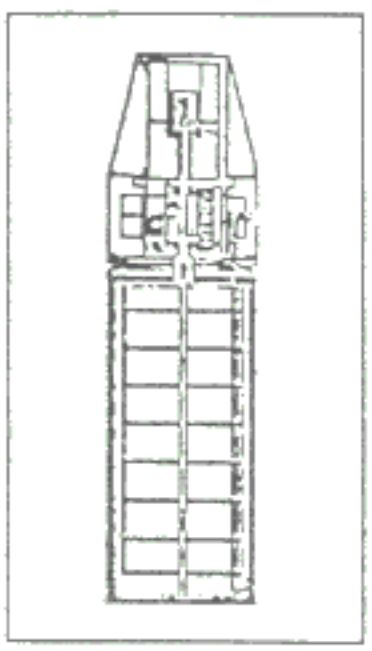
1. Sponsor - US Air Force
2. Wt - 26 lb, Vol - 0.2 cu ft, Power - 5.5 W
3. The objective of RADC-301 was to prove the feasibility of communicating with a ground-based sensor from a satellite. The experiment was 90 percent successful. The data were used to determine requirements for future upgrades of the concept.

c. DNA-301 (BEACON)

1. Sponsor - US Navy
2. Wt - 7 lb, Vol - 0.07 cu ft, Power - 14 W
3. The objective of DNA-301 was to investigate multiband RF propagation in the ionosphere. The experiment was 95 to 100 percent successful. The data were used to develop better nuclear weapons effects models and to develop natural environment scintillation models.

1988 MISSIONS

Mission P87-3



1. Launch Date: 7 January 1988
2. Launch Vehicle: Balloon
3. Launch Site: McMurdo Station, Antarctica
4. Mission Duration: 1 week
5. Orbital Parameters: apogee: 110,000 ft (18.1 NM)
6. Contractor: National Science Foundation and University of Florida
7. Cost: $1.318 million
8. List of Experiments:

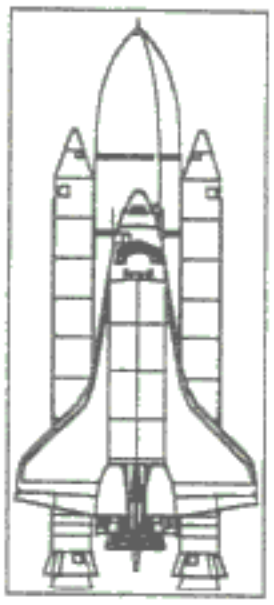
   a. DARPA-701 (Gamma Ray Advanced Detector/GRAD)

9. Experiment Summary:

a. DARPA-701 (GRAD)

1. Sponsor - DOD (DARPA)
2. Wt - 150 lb, Vol - 5.0 cu ft, Power - 20 W
3. The objective of DARPA-701 was to evaluate the performance of new gamma ray detector materials in space. The experiment was 100 percent successful. The data were used to check out concepts regarding radiation of space objects. The data also provided good information about the supernova.

Mission STS-26



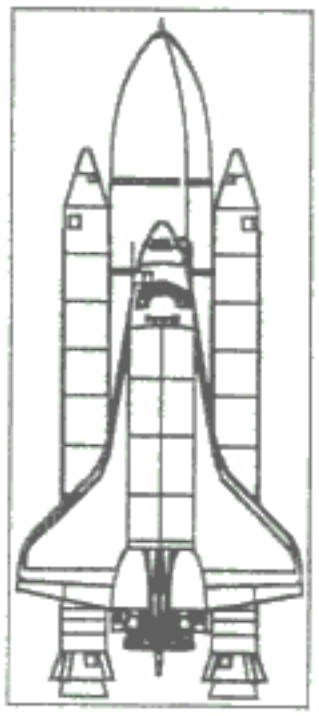
1. Launch Date: 29 September 1988
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 4 days
5. Orbital Parameters: Alt 160 NM, Inclination 28.5°
6. Contractor: Rockwell International
7. Cost: Information not available
8. List of Experiments:

   a. OASIS* (OEX Autonomous Supporting Instrumentation System)

9. Experiment Summary:

   a. OASIS*

Mission STS-27



1. Launch Date: 2 December 1988
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 4 days
5. Orbital Parameters: Alt 270 NM, Inclination 57°
6. Contractor: CRUX-A (NASA Goddard Space Flight Center)
7. Cost: CRUX-A ($0.010 million), Also see cost discussion, Page IV-2
8. List of Experiments:

   a. SD-301 (Cosmic Ray Upset Experiment/CRUX-A)

**b. GL-308 (Auroral Photography Experiment/APE-A)
**c. AFTAC-301 (Radiation Monitoring Equipment/RME)
**d. AWS-301 (Cloud Logic to Optimize Use of Defense Systems/CLOUDS-1A)
**e. GL-503 (Air Force Maui Optical Site/AMOS)
**f. AMD-501 (Visual Function Test in Space/VFT-2)
g. OASIS* (OEX Autonomous Supporting Instrumentation System)
h. IOCM* (Interim Operational Contamination Monitor)
i. Secure TV*

9. Experiment Summary:

a. SD-301 (CRUX-A)

1. Sponsor - US Air Force
2. Carrier - GAS Can
3. Wt - 225 lb, Vol - 5 cu ft, Power - 12 W
4. The objective of SD-301 (second flight) was to continue efforts to determine the cosmic ray induced error rate in a memory integrated chip. The experiment was partially successful. The data were used to determine the validity of an analytical model.

b. GL-308 (APE-A)

See Mission STS-62 (1994)

c. AFTAC-301 (RME)

See Mission STS-64 (1994)

d. AWS-301 (CLOUDS-1A)

See Mission STS-53 (1992)

e. GL-503 (AMOS)

See Mission STS-64 (1994)

f. AMD-501 (VFT-2)

See Mission STS-53 (1992)

g. OASIS*

h. IOCM*

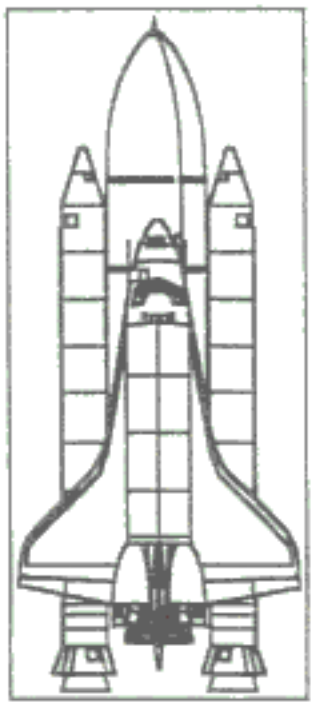
i. Secure TV*

9. Experiment Summary:

a. GL-503 (AMOS)

See Mission STS-64 (1994)

Mission STS-28



1. Launch Date: 8 August 1989
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 6 days
5. Orbital Parameters
6. Contractor: HEIN-LO (NASA Goddard Space Flight Center)
7. Cost: (MPEC and HEIN-LO $0.052 million); also see cost discussion, Page IV-2
8. List of Experiments:

**a. NAVSPACECOM-701 (Latitude-Longitude Locator/L^3)
**b. SDIO-902 (Shuttle Activation Monitor/ SAM I)
c. AFTAC-402 (Heavy Ion Environment at Low Altitude/HEIN-LO)
**d. AFTAC-301 (Radiation Monitoring Equipment/RME)
**e. AWS-301 (Clouds Logic to Optimize Use of Defense Systems/CLOUDS-1A)
**f. GL-503 (Air Force Maui Optical Site/AMOS)

**g. AMD-501 (Visual Function Test in Space/VFT-2)
h. APM* (Ascent Particle Monitor)
i. IOCM* (Interim Operational Contamination Monitor)
j. Secure TV*
k. MPEC (Multi-Purpose Experiment Canister)
l. Classified experiment
m. Classified experiment
n. Classified experiment
o. Classified experiment
p. Classified experiment

9. Experiment Summary:

a. NAVSPACECOM-701 (L^3)

1. Sponsor - US Navy
2. Carrier - Middeck Locker
3. Wt - 12 lb, Vol - 1 cu ft, Power - 115V AC Shuttle provided
4. The objective of NAVSPACECOM-701 was to test and evaluate a system to locate, from space, surface targets to within 10 NM. The experiment was 100 percent successful. The data will be used to support the DOD MMIS initiatives.

b. SDIO-902 (SAM I)

1. Sponsor - DOD (SDIO)
2. Carrier - Middeck Locker
3. Wt - 52 lb, Vol - 2 cu ft, Power - 26 W
4. The objective of SDIO-902 was to measure radiation with a view toward modeling induced activity of extended masses, i.e., spacecraft. The experiment was successful and will be used to prepare an experiment to obtain higher quality data.

c. AFTAC-402 (HEIN-LO)

1. Sponsor - US Air Force
2. Carrier - GAS Can with opening lid
3. Wt - 170 lb, Vol - 5 cu ft, Power - information not available
4. The objective of AFTAC-402 was to measure fluxes and spectra of energetic ions at low orbital altitudes and at various inclinations. The experiment was 25 percent successful. The data were used in evaluating detector performance for free flyer missions.

d. AFTAC-301 (RME)

See Mission STS-64 (1994)

e. AWS-301 (CLOUDS-1A)

See Mission STS-53 (1992)

f. GL-503 (AMOS)

See Mission STS-64 (1994)

g. AMD-501 (VFT-2)

See Mission STS-53 (1992)

h. APM*

i. IOCM*

j. Secure TV*

k. MPEC

See Mission STS-39 (1991)

l. Classified experiment (information classified)

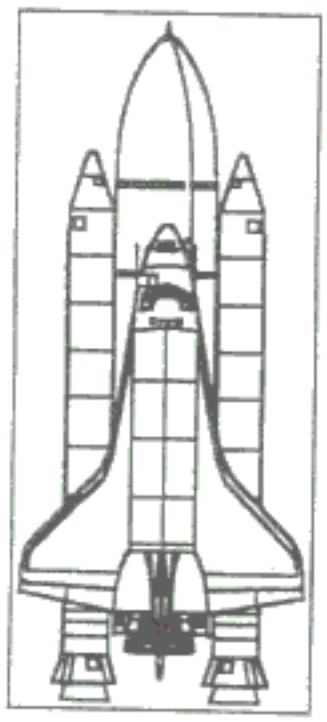
m. Classified experiment (information classified)

n. Classified experiment (information classified)

o. Classified experiment (information classified)

p. Classified experiment (information classified)

Mission STS-34



1. Launch Date: 18 October 1989
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 7 days
5. Orbital Parameters: Alt 160 NM, Inclination 34.3°
6. Contractor: Rockwell International
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

a . OASIS* (OEX Autonomous Supporting Instrumentation Systems)

**b. AFTAC-704/Sensor Technology Experiment/STEX)

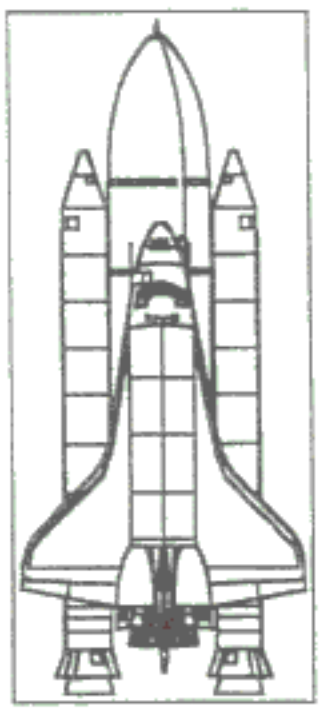
9 Experiment Summary:

a. OASIS*

b. AFTAC-704 (STEX)

See Mission STS-41 (1990)

Mission STS-33



1. Launch Date: 22 November 1989
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 6 days
5. Orbital Parameters: Not Available
6. Contractor: CRUX-B (NASA Goddard Space Flight Center)
7. Cost: CRUX-B ($0.010 million); also see cost discussion, Page IV-2
8. List of Experiments:

**a. AWS-301 (Cloud Logic to Optimize Use of Defense Systems/CLOUDS 1-A)
b. SD-301 (Cosmic Ray Upset Experiment/ CRUX-B)
**c. AFTAC-301 (Radiation Monitoring Equipment/RME)
**d. GL-308 (Auroral Photography Experiment/APE-B)
**e. GL-503 (Air Force Maui Optical Site/AMOS)
**f. AMD-201 (Visual Function Test in Space/VFT-1)

9. Experiment Summary:

a. AWS-301 (CLOUDS 1-A)

See Mission STS-53 (1992)

b. SD-301 (CRUX-B)

1. Sponsor - US Air Force
2. Carrier - GAS Can
3. Wt - 180 lb, Vol - 5 cu ft, Power - information not available
4. The objective of SD-301 was to continue the investigation of the cosmic ray induced error rate in memory integrated chips. The experiment was successful. The data were used to determine the validity of the analytical model.

c. AFTAC-301 (RME)

See Mission STS-64 (1994)

d. GL-308 (APE-B)

See Mission STS-62 (1994)

e. GL-503 (AMOS)

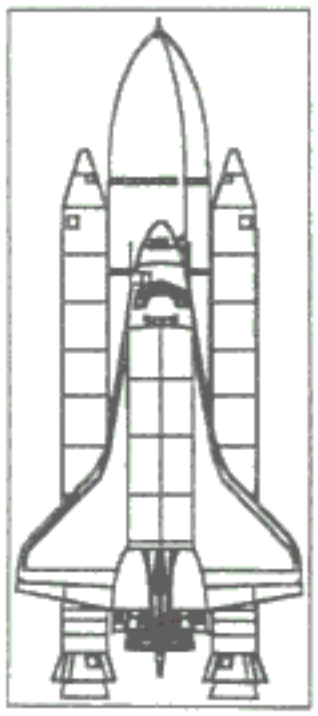
See Mission STS-64 (1994)

f. AMD-201 (VFT-1)

See Mission STS-44 (1991)

1990 MISSIONS

Mission STS-32



1. Launch Date: 9 January 1990
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 10 days
5. Orbital Parameters: Alt 190 NM, Inclination 28.5°
6. Contractor: Rockwell International
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

**a. NAVSPACECOM-701 (Latitude/ Longitude Locator/L^3)
**b. GL-503 (Air Force Maui Optical Site/AMOS)
c. IOCM* (Interim Operational Contamination Monitor)

9. Experiment Summary:

a. NAVSPACECOM-701 (L^3)

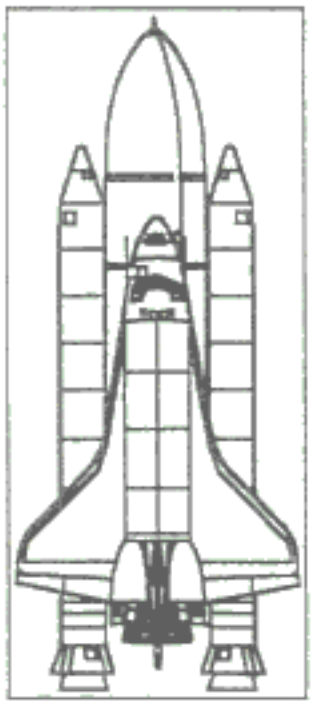
1. Sponsor - US Navy
2. Carrier - Middeck Locker
3. Wt - 40 lb, Vol - 1 Locker, Power - 115V AC Shuttle provided
4. The objective of NAVSPACECOM-701 was to test and evaluate a space sextant/camera system to geolocate surface targets to within 10 NM. The experiment was successful and provides a system to support DOD MMIS and NASA earth observation programs.

b. GL-503 (AMOS)

See Mission STS-64 (1994)

c. IOCM*

Mission STS-36



1. Launch Date: 28 February 1990
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC .
4. Mission Duration: 5 days
5. Orbital Parameters: Alt 135 NM, Inclination 62°
6. Contractor: Rockwell International
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

**a. AMD-201 (Visual Function Test in Space/VFT-1)
**b. AMD-501 (Visual Function Test in Space/VFT-2)
**c. AFTAC-301 (Radiation Monitoring Equipment/RME)

9. Experiment Summary:

a. AMD-201 (VFT-1)

See Mission STS-44 (1991)

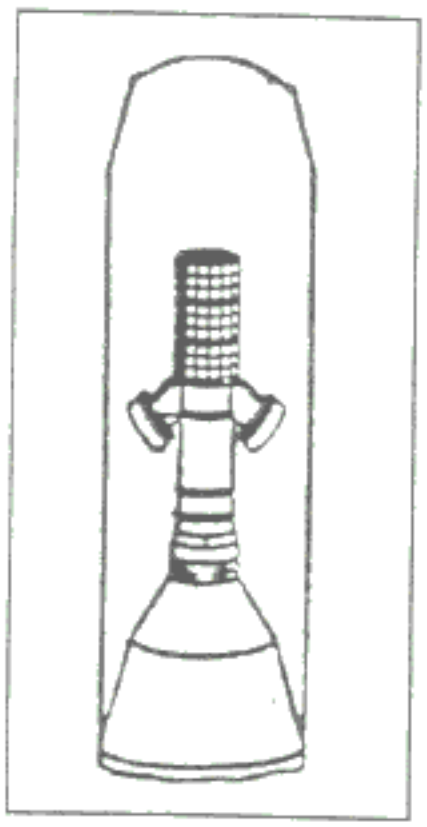
b. AMD-501 (VFT-2)

See Mission STS-53 (1994)

c. AFTAC-301 (RME)

See Mission STS-64 (1994)

Mission P87-2



1. Launch Date: 11 April 1990
2. Launch Vehicle: Atlas E/Altair
3. Launch Site: WTR
4. Mission Duration: Not completed
5. Orbital Parameters: apogee: 406 NM, perigee: 3[illegible]47 NM, inclination 89.9°
6. Contractor: Defense Systems Inc.
7. Cost: $22.0 million
8. List of Experiments:

   a. RADC-501 (Transceiver Experiment/TEX)
   b. NSSA-602 (Selective Communications Experiment/SCE)
   c. NOC-602 (Polar Orbiting Geomagnetic Survey/POGS)
   d. STC-701 (Solid State Recorder/SSR)
   e. SD-701 (Prototype Deployment Device/PDD)

9. Experiment Summary:

   a. RADC-501 (TEX)

      1. Sponsor - US Air Force
      2. Wt - information not available, Vol - information not available, Power - information not available
      3. The objective of RADC-501 was to prove the feasibility of communicating with a ground-based sensor. The experiment was 90 percent successful. The data were used to check the performance of the equipment inside the sensor.

b. NSSA-602 (SCE)

1. Sponsor - US Navy
2. Wt - information not available, Vol - information not available, Power - information not available
3. NSSA-602 is fully operational and successfully demonstrating store and forward communications.

c. NOC-601 (POGS)

1. Sponsor - US Navy
2. Wt - 11 lb, Vol - 0.2 cu ft, Power - 2 W
3. The objective of NOC-601 is to provide data for the world magnetic model, which is prepared every 5 years. The overall mission is successful and has provided substantial data.

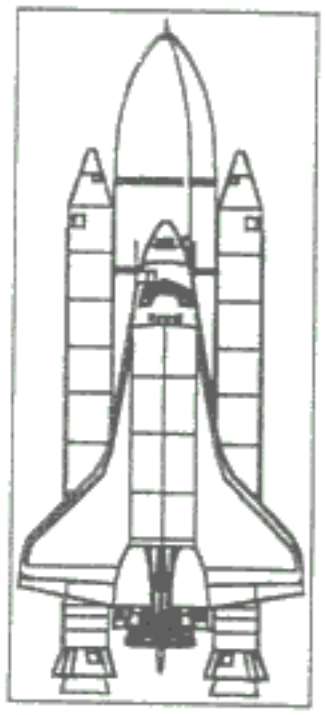
d. STC-701 (SSR)

1. Sponsor - US Air Force
2. Wt - 5.1 lb, Vol - 0.7 cu ft, Power - 4 W
3. The objective of STC-701 is to demonstrate a solid state recorder as a viable alternative to magnetic storage devices. The experiment has been fully successful to date. The SSR has operated normally and free of errors.

e. SD-701 (PDD)

1. Sponsor - US Air Force
2. Wt - information not available, Vol - information not available, Power - information not available
3. The objective of SD-701 was to test a new deployment latching device. The experiment was 100 percent successful and demonstrated that the latch can be used with fairly heavy secondary payloads.

Mission STS-31



1. Launch Date: 24 April 1990
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 6 days
5. Orbital Parameters: Alt 330 NM, Inclination 28.5°
6. Contractor: Rockwell International
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

   **a. GL-503 (Air Force Maui Optical Site/AMOS)
   **b. AFTAC-301 (Radiation Monitoring Equipment/RME)
   c. APM* (Ascent Particle Monitor)

9. Experiment Summary:

   a. GL-503 (AMOS)

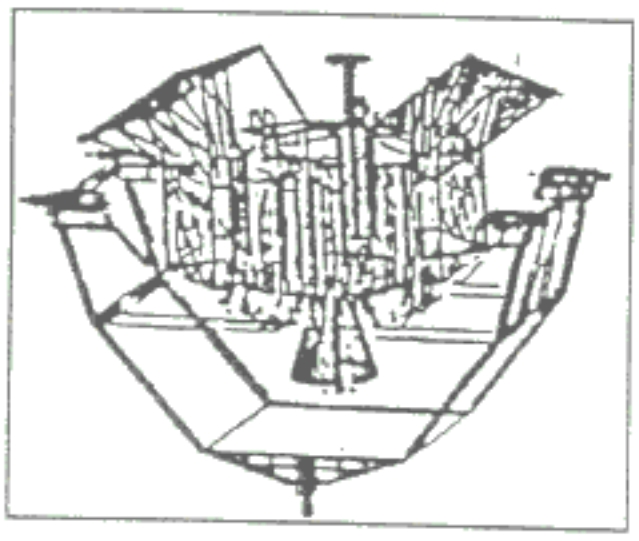
      See Mission STS-64 (1994)

   b. AFTAC-301 (RME)

      See Mission STS-64 (1994)

   c. APM*

Mission P86-1



1. Launch Date: 25 July 1990
2. Launch Vehicle: Atlas/Centaur
3. Launch Site: ETR
4. Mission Duration: 3 years (estimated)
5. Orbital Parameters: apogee: 22,350 NM, perigee: 218 NM, inclination 18°
6. Contractor: Ball Space Systems Division
7. Cost: $97.0 million
8. List of Experiments:

   a. AFGL-701 (Space Radiation/SPACERAD)
   b. ONR-307 (Energetic Particles and Ion Composition/EPIC)

c. ONR-604 (Isotopes in Solar Flares/SOLAR FLARES II)
d. AFAPL-801 (High Efficiency Solar Panels/HESP)
e. NRL-701 (Low Altitude Satellite Studies of Ionospheric Irregularities/LASSII)

9. Experiment Summary:

a. AFGL-701 (SPACERAD)

1. Sponsor - US Air Force
2. Wt - 225 lb, Vol - 3.3 cu ft, Power - 75 W
3. The objectives of AFGL-701 were to space qualify and test advanced microelectronics in space and to define the radiation environment. The experiment was fully successful. The data will be used to improve radiation models, to predict anomalies in systems, and to protect man in space.

b. ONR-307 (EPIC)

1. Sponsor - US Navy
2. Wt - 25 lb, Vol - 0.8 cu ft, Power - 6 W
3. The objective of ONR-307 was to characterize the dynamic behavior of the radiation belts by measuring intensity and energy spectra of energetic electrons, protons, and ions. All instruments have functioned normally. The data will be used to make models and support communications research.

c. ONR-604 (SOLAR FLARES II)

1. Sponsor - US Navy
2. Wt - 32 lb, Vol - 1.2 cu ft, Power - 5.3 W
3. The objective of ONR-604 was to measure isotropic and chemical composition and energy spectra in solar flare accelerated nuclei and in interplanetary charged particle radiation. The experiment was successful and will contribute to the data base for solar flare studies.

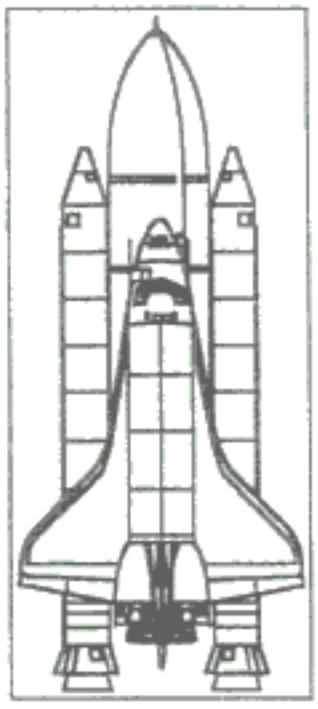
d. AFAPL-801 (HESP)

1. Sponsor - US Air Force
2. Wt - 14 lb, Vol - 0.14 cu ft, Power - 15 W
3. The objective of AFAPL-801 was to demonstrate and evaluate in space a high-efficiency solar panel. The experiment was 100 percent successful. Data from the experiment will be used to prepare a design handbook.

e. NRL-701 (LASSII)

1. Sponsor - US Navy
2. Wt - 39 lb, Vol - information not available, Power - 38 W
3. The objective of NRL-701 was to study the naturally occurring and artificially created irregularities in the ionosphere. The experiment was 100 percent successful and will make a major improvement in the ionospheric data base.

Mission STS-41



1. Launch Date: 6 October 1990
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 4 days
5. Orbital Parameters: Alt 160 NM, Inclination 28.5°
6. Contractor: Rockwell International
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

**a. AFTAC-704 (Sensor Technology Experiment/STEX)
**b. GL-503 (Air Force Maui Optical Site/AMOS)
**c. AFTAC-301 (Radiation Monitoring Equipment/RME)

9. Experiment Summary:

a. AFTAC-704 (STEX)

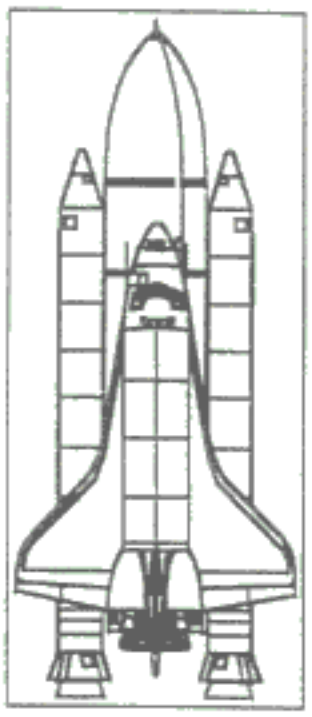
1. Sponsor - US Air Force
2. Carrier - Middeck Locker
3. Wt - 36 lb, Vol - 2 cu ft, Power - N\A

b. GL-503 (AMOS)

See Mission STS-64 (1994)

c. AFTAC-301 (RME)

See Mission STS-64 (1994)



1. Launch Date: 15 November 1990
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 5 days
5. Orbital Parameters: Not Available
6. Contractor: Rockwell International
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

**a. AMD-201 (Visual Function Test in Space/VFT-1)
**b. GL-308 (Auroral Photography Experiment/APE-B)
**c. GL-503 (Air Force Maui Optical Site/AMOS)
**d. AFTAC-301 (Radiation Monitoring Equipment/RME)
e. APM* (Ascent Particle Monitor)
**f. HSD-701 (Spaceborne Direct View Optical System I/SpaDVOS-1)

9. Experiment Summary:

a. AMD-201 (VFT-1)

See Mission STS-44 (1991)

b. GL-308 (APE-B)

See Mission STS-62 (1994)

c. GL-503 (AMOS)

See Mission STS-64 (1994)

d. AFTAC-301 (RME)

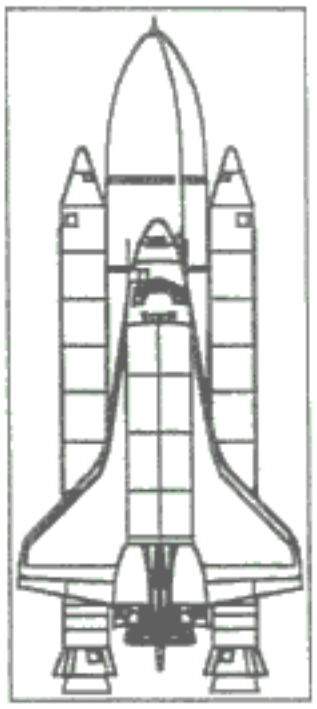
See Mission STS-64 (1994)

e. APM*

f. HSD-701 (SpaDVOS-1)

1. Sponsor - US Air Force
2. Carrier - Middeck Locker
3. Wt - 45 lb, Vol - 1.5 Lockers, Power - 11 W
4. The objective of HSD-701 was to determine observer performance levels for space to ground viewing using a direct view optical system. After an initial flight, the SpaDVOS project was terminated.

Mission STS-35



1. Launch Date: 2 December 1990
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 8 days
5. Orbital Parameters: Alt 190 NM, Inclination 28.5°
6. Contractor: Rockwell International
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

**a. GL-503 (Air Force Maui Optical Site/AMOS).
**b. AFTAC-301(Radiation Monitoring Equipment/RME)

9. Experiment Summary:

a. GL-503 (AMOS)

See Mission STS-64 (1994)

b. AFTAC-301 (RME)

See Mission STS-64 (1994)

g. AFGL-804A (Quadruple Ion/Neutral Mass Spectrometer//QINMS) [AFP-675]
h. AFTAC-801 (Uniformly Redundant Arrays/URA) [AFP-675]
i. AIS* (Arizona Imager Spectrograph) [IBSS*]
j. CIV* (Critical Ionization Velocity) [IBSS*]
k. CRO* (Chemical Release Observation) [IBSS*]
l. IRS* (Infrared Sensor) [IBSS*]
m. L^3TV* (Low Light Level TV) [IBSS*]
n. NRL-904 (Ultraviolet Limb Imaging Experiment/UVLIM) [STP-1]
o. SD-602 (Advanced Liquid Feed Experiment/ALFE) [STP-1]
p. AFGL-501 (Spacecraft Kinetic Infrared Test/SKIRT) [STP-1]
q. APM* -- 2 units (Ascent Particle Monitor) [STP-1]
r. DSE* (Data Systems Experiment) [STP-1]
s. MPEC (Multi-Purpose Experiment Canister)

9. Experiment Summary:

a. SSD-105 (CLOUDS-1A)

See Mission STS-53 (1992)

b. RME

See Mission STS-64 (1994)

c. UVPI*

d. AFGL-201 (CIRRIS 1A)

1. Sponsor - US Air Force
2. Carrier - Experiment Support System
3. Wt - 3600 lb, Vol - 74 cu ft, Power - 250 W
4. The objective of AFGL-201 was to measure with high precision the medium and long wavelength IR auroral and airglow background. The experiment was 100 percent successful. The data will be used to optimize surveillance and engagement sensors for space defense and upgrade high-altitude atmospheric models.

e. NRL-803 (FAR UV)

1. Sponsor - US Navy
2. Carrier - Experiment Support System
3. Wt - 550 lb, Vol - 38.2 cu ft, Power - 60 W
4. The objective of NRL-803 was to obtain imagery and photometry of emission phenomena in far UV wavelengths. The experiment was 80 percent successful. The data will be provided to the background data base sponsored by SDIO.

f. AFGL-801 (HUP)

1. Sponsor - US Navy
2. Carrier - Experiment Support System
3. Wt - 55 lb, Vol - 3.8 cu ft, Power - 14 W
4. The objective of AFGL-801 was to establish the value and variability of the atmospheric brightness in the UV when viewing the horizon from space. Data will be used to evaluate horizon track for pointing/control and the use of UV for surveillance. Due to tape recorder failure, only 50 percent of planned data were obtained. The data will be provided to the SDIO sensor data base.

g. AFGL-804 (QINMS)

1. Sponsor - US Air Force
2. Carrier - Experiment Support System
3. Wt - 20 lb, Vol - 0.3 cu ft, Power - 15 W
4. The objective of AFGL-804 was to measure contamination such as H_2O and CO_2 in the vicinity of the CIRRIS infrared telescope. The experiment was 80 percent successful. The data will be used to evaluate the effect of contamination on the CIRRIS instrument.

h. AFTAC-801 (URA)

1. Sponsor - US Air Force
2. Carrier - Experiment Support System
3. Wt - 75 lb, Vol - 4.6 cu ft, Power - 10 W
4. Objective not available.

i. AIS*

j. CIV*

k. CRO*

l. IRS*

m. L^3TV*

n. NRL-904 (UVLIM)

1. Sponsor - US Navy
2. Carrier - Hitchhiker M
3. Wt - 360 lb, Vol - 7 cu ft, Power - 56 W
4. The objective of NRL-904 was to characterize the F2 layer of the ionosphere by observing EUV emissions at Shuttle altitudes. The experiment was 100 percent successful. The data will be used to build a map of the ionosphere to support the development of remote sensing and sensors.

o. SD-602 (ALFE)

1. Sponsor - US Air Force
2. Carrier - Hitchhiker M
3. Wt - 280 lb, Vol - 1 cu ft, Power - 500 W
4. The objective of SD-602 was to evaluate an advanced liquid feed system. The experiment was 100 percent successful. The data will be used to evaluate the feasibility and performance of the system.

p. AFGL-501 (SKIRT)

1. Sponsor - US Air Force
2. Carrier - Hitchhiker M
3. Wt - 330 lb, Vol - 2.6 cu ft, Power - 50 W
4. The objective of AFGL-501 was to measure infrared emissions produced by spacecraft optical surfaces in low earth orbit. The experiment was 100 percent successful. The data will be used to optimize surveillance and engagement sensors for space defense.

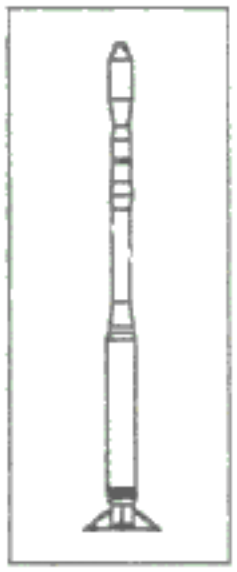
q. APM* (2 units)

r. DSE* (NASA Experiment)

s. MPEC

MPEC is a classified cargo bay experiment. The carrier is a modified GAS Can. Deployment of the experiment was successful. No other information is available.

Mission P89-1A



1. Launch Date: 29 June 1991
2. Launch Vehicle: Scout
3. Launch Site: WTR
4. Mission Duration: information not available
5. Orbital Parameters: apogee: 470 NM, perigee: 420 NM, inclination Polar
6. Contractor: Defense Systems Inc.
7. Cost: $3.3 million
8. List of Experiments:

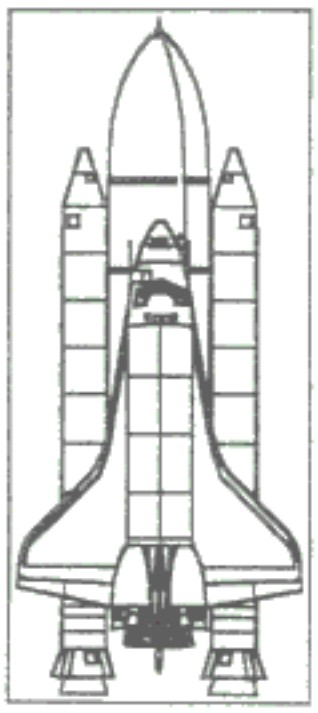
   a. RADC-802 (Radiation Experiment/REX)

9. Experiment Summary:

   a. RADC-802 (REX)

   1. Sponsor - US Air Force
   2. Wt - 175 lb (spacecraft), Vol - information not available, Power - 8.0 W
   3. The objective of RADC-802 is to study the effects of electron density irregularities on transionospheric radio signals. The experiment has been 100 percent successful to date. The data will be used to support improvements in military communications.

Mission STS-43



1. Launch Date: 2 August 1991
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 9 days
5. Orbital Parameters: Alt 160 NM, Inclination 28.5°
6. Contractor: Rockwell International
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

   **a. GL-503 (Air Force Maui Optical Site/AMOS)
   **b. GL-308 (Auroral Photography Experiment/APE-B)
   **c. UVPI* (Ultraviolet Plume Imager/Instrument)

9. Experiment Summary:

a. GL-503 (AMOS)

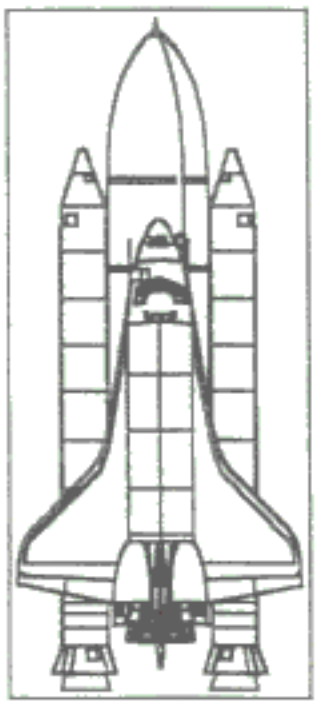
See Mission STS-64 (1994)

b. GL-308 (APE-B)

See Mission STS-62 (1994)

c. UVPI*

Mission STS-48



1. Launch Date: 12 September 1991
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 6 days
5. Orbital Parameters: Alt 292 NM, Inclination 57°
6. Contractor: Rockwell International
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

**a. GL-503 (Air Force Maui Optical Site/AMOS)
**b. SDIO-904 (Cosmic Radiation Effects and Activation Monitor/CREAM)
**c. SDIO-902 (Shuttle Activation Monitor/ SAM I)
**d. AFTAC-301 (Radiation Monitoring Equipment/RME)
e. APM* (Ascent Particle Monitor)

9. Experiment Summary:

a. GL-503 (AMOS)

See Mission STS-64 (1994)

b. SDIO-904 (CREAM)

See Mission STS-68 (1994)

c. SDIO-902 (SAM I)

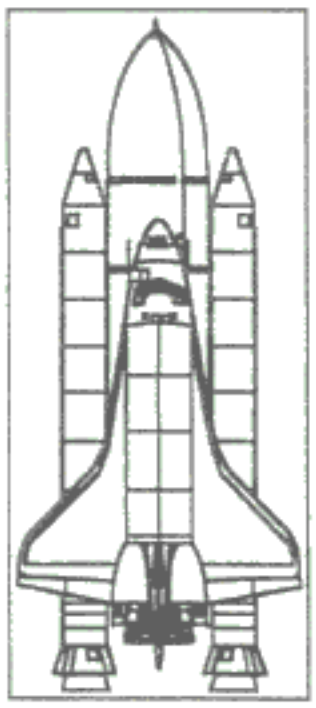
See Mission STS-44 (1991)

d. AFTAC-301 (RME)

See Mission STS-64 (1994)

e. APM*

Mission STS-44



1. Launch Date: 24 November 1991
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 7 days
5. Orbital Parameters: Alt 195 NM, Inclination 28.5°
6. Contractor: Rockwell International
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

**a. USAIC-101 (TERRA SCOUT)
**b. AFSPACECOM-702 (BATTLEVIEW) [M88-1 reflight]
**c. OPNAV-701 (Maritime Observation Experiments in Space/MOSES) [M88-1 reflight]
**d. GL-503 (Air Force Maui Optical Site/AMOS) [also known as AMOS Calibration Test/ACT]
**e. SDIO-904 (Cosmic Radiation Effects and Activation Monitor/CREAM)
**f. AFTAC-301 (Radiation Monitoring Equipment/RME) [also known as HSD-101]
**g. SDIO-902 (Shuttle Activation Monitor/ SAM I)
**h. AMD-201 (Visual Function Test in Space/VFT-1) also known as HSD-201 (Visual Function Tester, Version 1/VFT-1)]
**i. UVPI* (Ultraviolet Plume Imager/Instrument)
**j. IOCM* (Interim Operational Contamination Monitor)
k. APM* (Ascent Particle Monitor)

l. Classified experiment

9. Experiment Summary:

a. USAIC-101 (TERRA SCOUT)

1. Sponsor - US Army
2. Carrier - Middeck Locker

b. AFSPACECOM-702 (BATTLEVIEW)

1. Sponsor - US Air Force
2. Carrier - Middeck Locker
3. Wt - information not available, Vol - information not available, Power - information not available

c. OPNAV-701 (MOSES)

1. Sponsor - US Navy
2. Carrier - Middeck Locker
3. Wt - information not available, Vol - 1 Locker, Power - none

d. GL-503 (AMOS/ACT)

See Mission STS-64 (1994)

e. SDIO-904 (CREAM)

See Mission STS-68 (1994)

f. AFTAC-301 (RME)

See Mission STS-64 (1994)

g. SDIO-902 (SAM I)

1. Sponsor - Strategic Defense Initiative Organization (SDIO)
2. Carrier - Middeck Locker
3. Wt - 52.8 lbs, Vol - 2 cu ft, Power - 26 W
4. The objective of the SAM I series of experiments was to measure background gamma ray flux in the 0.2-0.8 MV spectral range on Orbiter flights to characterize variance versus fixed parameters. The experiments have been 100 percent successful to date. The data will contribute to manned spacecraft radiation models.

h. AMD-201 (VFT-1)

1. Sponsor - US Air Force
2. Carrier - Middeck Locker
3. Wt - 6.6 lb, Vol - 1 cu ft, Power - none
4. The objective of the VFT-1 series of experiments was to determine the effects of microgravity on several vision parameters. The experiments have been 100 percent successful to date. The data will be used to establish a baseline for the ability of man in space to see objects.

i. UVPI*

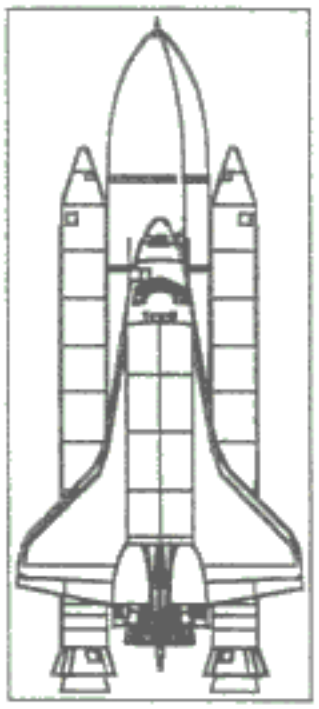
j. IOCM*

k. APM*

l. Classified experiment (information classified)

1992 MISSIONS

Mission STS-42



1. Launch Date: 22 January 1992
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 7 days
5. Orbital Parameters: Alt 162 NM, Inclination 57°
6. Contractor: Rockwell International
7. Cost: NPS-603 ($10 Thousand), AFGL-502 ($17 Thousand); also see cost discussion, Page IV-2
8. List of Experiments:

**a. HSD-101 (Radiation Monitoring Equipment III/RME III)
b. UVPI* (Ultraviolet Plume Imager/Instrument)
c. NPS-603 (Space Thermo-Acoustic Refrigerator/STAR)
d. AFGL-502 (Visual Photometric Experiment/VIPER)

9. Experiment Summary:

**a. HSD-101 (RME)

See Mission STS-64 (1994)

b. UVPI*

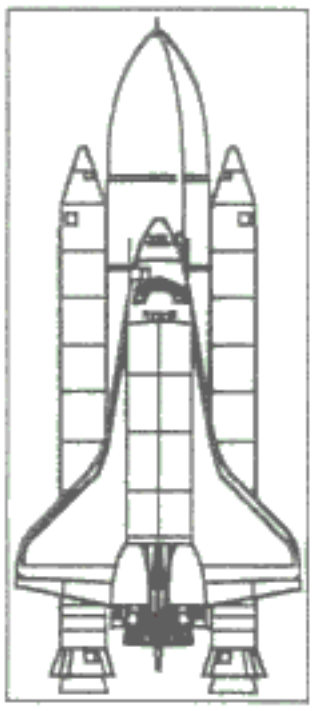
c. NPS-603 (STAR)

1. Sponsor - US Navy
2. Carrier - GAS Can
3. Wt - 199 lb, Vol - 2 cu ft, Power - 700 W-hr or work provided by experiment
4. The objective of NPS-603 was to demonstrate a refrigerator that uses sound to produce cooling in a closed cycle without sliding seals. The experiment was 75 percent successful. Lessons learned and components of the experiment will go into two follow-on experiments.

d. AFGL-502 (VIPER)

1. Sponsor - US Air Force
2. Carrier - GAS Can with opening lid
3. Wt - information not available, Vol - 5 cu ft, Power - internal batteries
4. The objective of AFGL-502 was to measure emissions of faint background objects, i.e., GALAXIES, at various wavelengths. The experiment was 50 percent successful. Data will be used in a modeling effort to create visual scenes of the sky.

Mission STS-45



1. Launch Date: 24 March 1992
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 9 days
5. Orbital Parameters: Alt 160 NM, Inclination 57°
6. Contractor: Rockwell International
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

**a. SSD-105 (Cloud Logic to Optimize Use of Defense Systems/CLOUDS-1A)
**b. HSD-101 (Radiation Monitoring Equipment/ RME III)
**c. ASPWS-701 (Space Tissue Loss Model/STL)
d. UVPI* (Ultraviolet Plume Imager/Instrument)
**e. AMD-501 (Visual Function Test in Space/VFT-2) [also known as HSD-501 (Visual Function Tester, Version 2/VFT-2)]

9. Experiment Summary:

**a. SSD-105 (CLOUDS-1A)

See Mission STS-53 (1992)

**b. HSD-101 (RME III)

See Mission STS-64 (1994)

**c. ASPWS-701 (STL)

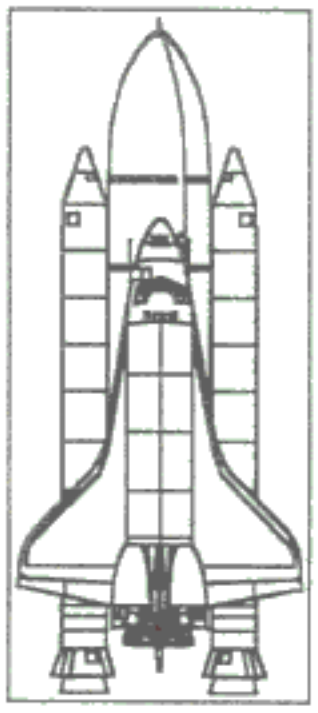
See Mission STS-66 (1994)

d. UVPI*

**e. AMD-501 (VFT-2)

See Mission STS-53 (1992)

Mission STS-49



1. Launch Date: 7 May 1992
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 7 days
5. Orbital Parameters: Alt 183 NM, Inclination 28.4°
6. Contractor: Rockwell International
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

**a. GL-503 (Air Force Maui Optical Site/AMOS)
b. UVPI* (Ultraviolet Plume Imager/Instrument)

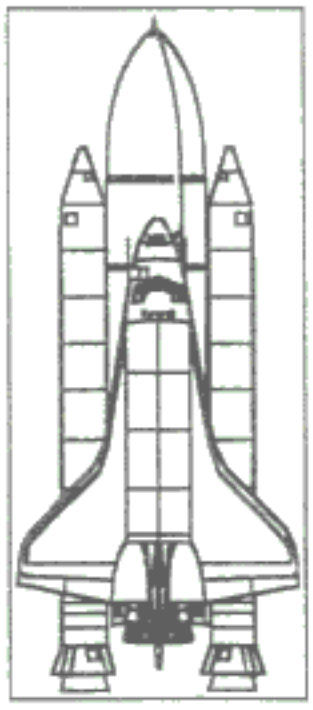
9. Experiment Summary:

**a. GL-503 (AMOS)

See Mission STS-66 (1994)

b. UVPI*

Mission STS-50



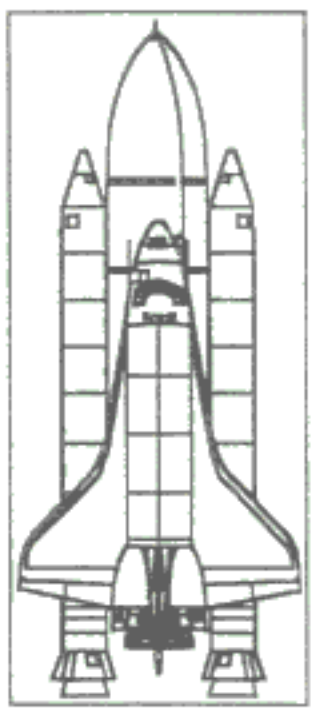
1. Launch Date: 25 June 1992
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 14 Days
5. Orbital Parameters: Alt 160 NM, Inclination 28.5°
6. Contractor: Rockwell International
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

    a. UVPI* (Ultraviolet Plume Imager/Instrument)

9. Experiment Summary:

UVPI*

Mission STS-46



1. Launch Date: 31 July 1992
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 8 days
5. Orbital Parameters: Alt 230 NM, Inclination 28.5°
6. Contractor: Rockwell International
7. Cost: $1.051 Million; also see cost discussion, Page IV-2
8. List of Experiments:

    a. UVPI* (Ultraviolet Plume Imager/Instrument)
    b. AFGL-703 (Shuttle Potential and Return Electron Experiment/SPREE)

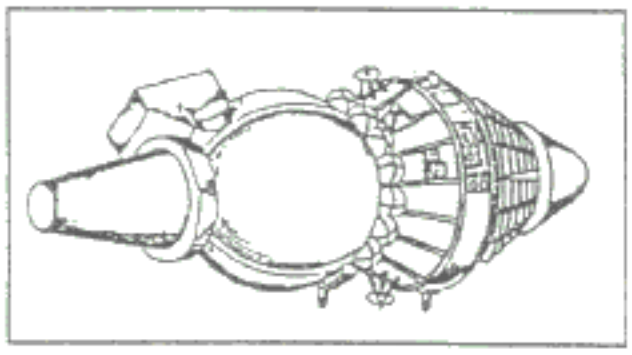
9. Experiment Summary:

    a. UVPI*

b. AFGL-703 (SPREE)

1. Sponsor - US Air Force
2. Carrier - MPESS (Mission Peculiar Experiment Support Structure)
3. Wt - 80 lb, Vol - 4.7 cu ft, Power - 73 W
4. The objective of AFGL-703 was to determine Space Shuttle charging levels during deployment and operation of the electrodynamic satellite on the Shuttle and to measure electron return currents to the Shuttle during tether operations. The experiment was partially successful despite the inability of the tether to deploy completely as planned. The experiment provided useful data for evaluating the feasibility of a space tether.

Mission S92-2



1. Launch Date: 14 August 1992
2. Launch Vehicle: Russian RESURS-F1
3. Launch Site: Plesetsk, Russia
4. Mission Duration: 14 days
5. Orbital Parameters: apogee: 126 NM, perigee: 117 NM, inclination 82.57°
6. Contractor: INTEX Inc. and Moscow State University
7. Cost: $0.18 million
8. List of Experiments:

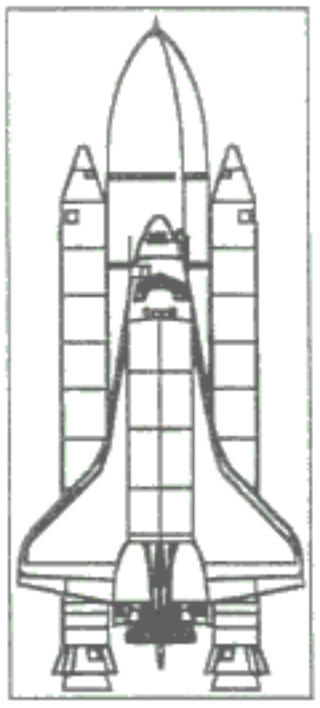
   a. NRL-200 Be^7 Distribution in the Upper Atmosphere/BINRAD)

9. Experiment Summary:

a. NRL-200 (BINRAD)

1. Sponsor - US Navy
2. Wt - 6.6 lb, Vol - 0.25 cu ft, Power - 50 W max
3. The objective of NRL-200 was to obtain upper atmosphere patterns using Be^7 trace elements. The BINRAD experiment failed to deploy due to premature closure during launch of the lid to the Scientific Equipment Container. No useful experiment data were obtained.

Mission STS-53



1. Launch Date: 2 December 1992
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 4 days
5. Orbital Parameters: Alt 200 NM, Inclination 57°
6. Contractor:

    a. Middeck Lockers - Rockwell International
    b. Hitchhikers - NASA Goddard Space Flight Center

7. Cost:

    a. Middeck Lockers - See cost discussion, Page IV-2
    b. Hitchhikers - $0.935 million

8. List of Experiments:

    **a. C2NVEO-101 (Battlefield Laser Acquisition Test/BLAST)
    **b. SSD-105 (Cloud Logic to Optimize Use of Defense Systems/CLOUDS-1A)
    **c. SDIO-904 (Cosmic Radiation Effects and Activation Monitor/CREAM)
    **d. NAVSPACECOM-901 (Hand-held, earth-oriented, -time, Cooperative, User-friendly, Location-targeting, and Environmental System/ HERCULES)
    **e. IDR-501 (Microencapsulation of Drugs in the Microgravity Environment of the Space Shuttle I/MICROCAPS I or Microcapsules in Space/MIS-1)
    **f. HSD-101 (Radiation Monitoring Equipment/ RME III)
    **g. ASPWS-701 (Space Tissue Loss/STL)
    **h. AMD-501 (Visual Function Test in Space/VFT-2)
    i. WRDC-001 (Cryogenic Heat Pipe Experiment/CRYOHP)
    j. GL-601 (Shuttle Glow/GLO)

9. Experiment Summary:

a. C2NVEO-101 (BLAST)

1. Sponsor - US Navy
2. Carrier - Middeck Locker
3. Wt - 75 lb, Vol - 2 Lockers, Power - battery-powered
4. The objective of C2NVEO-101 was to evaluate the concept of utilizing a spaceborne laser receiver to detect laser energy and to provide a laser communications uplink for transmitting Global Positioning System (GPS) information from specific ground-based test locations. The experiment was approximately 20 percent successful. Data obtained were used to prepare a follow-on experiment.

b. SSD-105 (CLOUDS-1A)

1. Sponsor - US Air Force
2. Carrier - Middeck locker
3. Wt - 20 lb, Vol - 0.7 cu ft, Power - none
4. The objective of the CLOUDS series of experiments is to quantify the variation in apparent cloud cover as a function of the angle at which the clouds are viewed. The experiments to date have been 100 percent successful. Experiment data will go into the data bank for the next generation DMSP. In the interim, experiment data will be placed in the DMSP data archives where they will be available for civilian or military use.

c. SDIO-904 (CREAM)

See Mission STS-68 (1994)

d. NAVSPACECOM-901 (HERCULES)

See Mission STS-56 (1993)

e. IDR-501 (MIS-1)

1. Sponsor - US Army
2. Carrier - Middeck Locker
3. Wt - 119 lb, Vol - 2.0 cu ft, Power - 50-100 W
4. The objective of IDR-501 was to evaluate the effects of microgravity on methods used to encapsulate drugs within biodegradable polymers. The experiment was 100 percent successful and provided significant useful data. The experiment results will be used to design a more comprehensive experiment related to microencapsulation of drugs in space.

f. HSD-101 (RME III)

See Mission STS-64 (1994)

g. ASPWS-701 (STL)

See Mission STS-66 (1994)

h. AMD-501 (VFT-2)

1. Sponsor - US Air Force
2. Carrier - Middeck Locker
3. Wt - 8 lb, Vol - 0.2 cu ft, Power - none
4. The objective of the VFT-2 series of experiments is to determine the effects of microgravity on vision contract thresholds and to investigate other researcher claims that contrast sensitivity is affected while in space. The experiment was approximately 80 percent successful primarily due to problems with comparative ground data. The data will be provided to DOD organizations including organizations attempting to verify foreign researcher claims regarding visual activity in space.

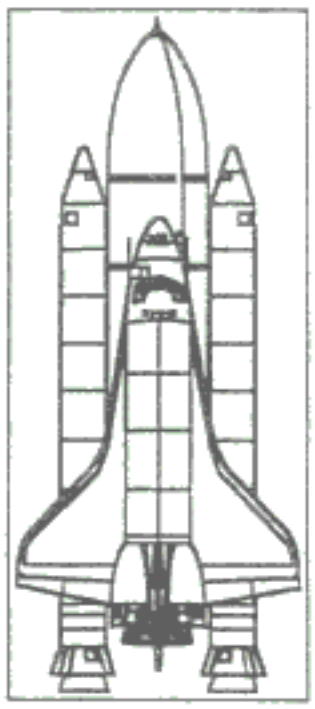
i. WRDC-001 (CRYOHP)

1. Sponsor - US Air Force
2. Carrier - Hitchhiker G
3. Wt - 400 lb, Vol - 6.4 cu ft, Power - 450 W
4. The objective of WRDC-001 was to demonstrate the operation of oxygen heat pipes in microgravity and to obtain data to extrapolate 1-g heat pipe data to zero-g performance. The experiment was 100 percent successful. The data have been provided to potential users of the technology, both government and industry.

j. GL-601 (GLO)

1. Sponsor - US Air Force
2. Carrier - Hitchhiker G
3. Wt - 204 lb, Vol - 8.8 cu ft, Power - 100 W
4. The objective of GL-601 was to measure and model the optical emissions that are observed on the surface of low-altitude spacecraft, including the Space Shuttle. The experiment was 100 percent successful. The data will be included in the DOD satellite signatures code.

Mission STS-56



1. Launch Date: 8 April 1993
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 9 Days
5. Orbital Parameters: Alt 160 NM, Inclination 57.0°
6. Contractor: Muniz Engineering Inc.
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

**a. GL-503 (Air Force Maui Optical Site/AMOS)
**b. SDIO-904 (Cosmic Radiation Effects and Activation Monitor/CREAM)
**c. NAVSPACECOM-901 (Hand-Held, earth-Oriented Real-Time, Cooperative, User-Friendly, Location, Targeting, and Environmental System/HERCULES)
**d. HSD-101 (Radiation Monitoring Equipment/RME)
**e. ASPWS-701 (Space Tissue Loss/STL)

9. Experiment Summary

**a. GL-503 (AMOS)

See Mission STS-64 (1994)

b. SDIO-904 (CREAM)

See Mission STS-68 (1994)

c. NAVSPACECOM-901 (HERCULES)

1. Sponsor - US Navy and US Army, supported by ARPA and NASA
2. Carrier - Middeck Locker
3. Wt - 53.9 lb, Vol - 3 Lockers, Power - 70 W
4. The objective of the NAVSPACECOM-901 series of experiments is to test and evaluate a CCD/Locator system that will determine the surface location, to within two nautical miles, of oceanographic and meteorological phenomena that are observed and photographed by the Space Shuttle crew. Experiments to date have been 100 percent successful and indicate the technical and operational feasibility of such a system.

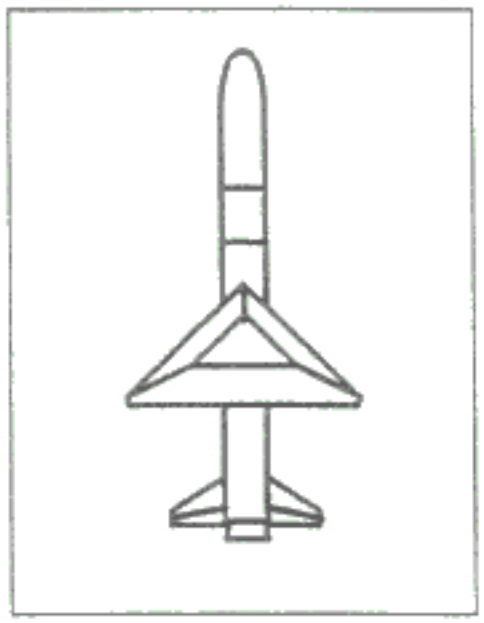
d. HSD-101 (RME)

See Mission STS-64 (1994)

e. ASPWS-701 (STL)

See Mission STS-66 (1994)

Mission P89-1B



1. Launch Date: 25 April 1993
2. Launch Vehicle: Pegasus
3. Launch Site: Cape Canaveral Air Force Station
4. Mission Duration: 1 year design, 3 years goal
5. Orbital Parameters: apogee: 450 NM, perigee: 403 NM, inclination 69.7°
6. Contractor: Defense Systems Incorporated - Integration, Aero-Astro
7. Cost: $7.0 million
8. List of Experiments:

   a. LANL-801 (Array of Low Energy X-ray Imaging Sensors/ALEXIS)
   b. LANL-802 (Blackbeard)
   c. NSSA-201 (VHF Spectrum Utilization Measurement Experiment/VSUME)

9. Experiment Summary

   a. LANL-801 (ALEXIS) and LANL-802 (Blackbeard)

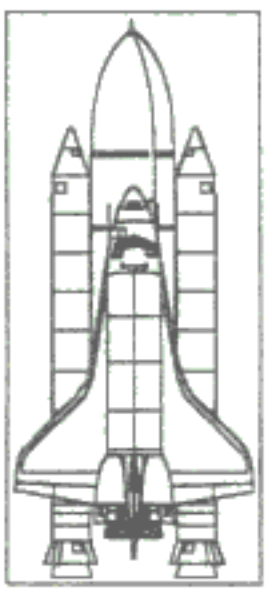
      1. Sponsor - US Air Force
      2. Carrier - Free Flyer Spacecraft
      3. Wt - 102 lb, Vol - 15 cu ft, Power - 30 W
      4. The objective of the Alexis and Blackbeard experiments is to research x-ray burst detection and to study natural versus man made RF signatures. The Blackbreard experiment has been 100 percent successful. After some initial communication problems the Alexis experiment has also been successful and has obtained approximately 90 percent of the desired data. The data from the Alexis and Blackbeard experiments are being made available for the design of improved space sensors.

   b. LANL-802 (Blackbeard) (No information available)

c. NSSA-201 (VSUME)

1. Sponsor - US Navy
2. Carrier - Free Flyer Spacecraft
3. Wt - 40.5 lb, Vol - 0.5 cu ft, Power - none
4. The objective of the VSUME experiment is to research VHF usage and densities in specified military frequencies. The experiment has been 100 percent successful. The data will be used in frequency spectrum management.

Mission STS-57



1. Launch Date: 21 June 1993
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 7 Days
5. Orbital Parameters: Alt 250 NM, Inclination 28.5°
6. Contractor: Muniz Engineering Inc.
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

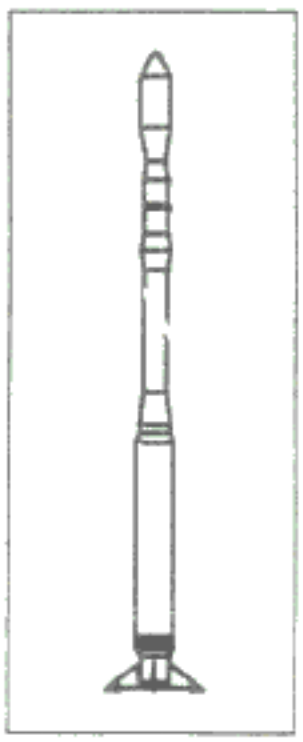
**a. GL-503 (Air Force Maui Optical Site/AMOS)

9. Experiment Summary

a. GL-503 (AMOS)

See Mission STS-64 (1994)

Mission P92-1



1. Launch Date: 25 June 1993
2. Launch Vehicle: Scout
3. Launch Site: WTR
4. Mission Duration: 1 year required, 3 years desired
5. Orbital Parameters: Alt 450 NM Circular, Inclination 90°
6. Contractor: Defense Systems Inc.
7. Cost: $3.94 million
8. List of Experiments:

a. WTR-101 (Radar Calibration/RADCAL)
b. PL-207 (Small Satellite Power System Regulator/SSPSR)

9. Experiment Summary

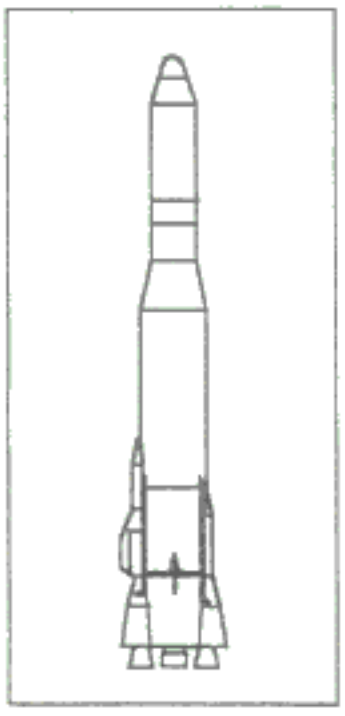
a. WTR-101 (RADCAL)

1. Sponsor - Air Force Western Test Range
2. Carrier - Free Flyer Spacecraft (Goodard X-SAT)
3. Wt - 9.3 lb, Vol - 0.1 cu ft, Power - 19 W
4. The objective of the WTR-101 experiment was to provide in orbit a pair of C-band transponders to be used to calibrate radars. The experiment was 100 percent successful and is being used to calibrate radars.

b. PL-207 (SSPSR)

1. Sponsor - US Air Force
2. Carrier - Free Flyer Spacecraft (Goddard X-SAT)
3. Wt - 12 oz, Vol - .01 cu ft, Power - 1 W
4. The objective of the PL-207 experiment was to demonstrate a new technology in satellite power system regulation that will increase the overall efficiency of a satellite power system and prolong satellite life. The experiment was 100 percent successful. Aerospace Corporation has publicized the results and provided data to spacecraft designers in order for them to incorporate the new technology in new spacecraft designs.

Mission S86-7



1. Launch Date: 9 August 1993
2. Launch Vehicle: Atlas E
3. Launch Site: WTR
4. Mission Duration: N\A
5. Orbital Parameters: apogee: 470 nm, perigee: 464 NM. inclination 98.7°
6. Contractor: GE Astrospace
7. Cost: $3.0 million
8. List of Experiments:

   a. ONR-401 (Magnetospheric Atmospheric X-ray Experiment/MAXIE)
   b. ONR-301 (Energetic Heavy Ion Composition/EHIC)

9. Experiment Summary

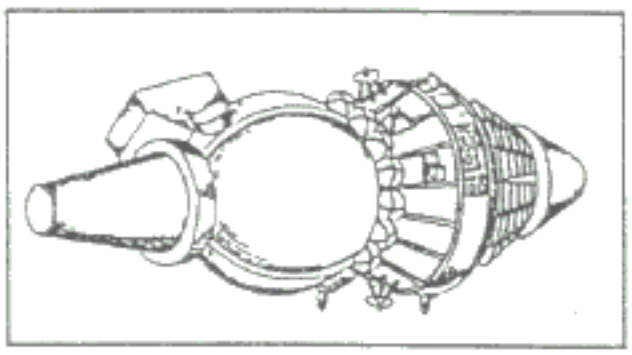
a. ONR-401 (MAXIE)

1. Sponsor - US Navy
2. Carrier - Free Flyer Spacecraft/Piggyback on NOAA-I
3. Wt - 60 lb, Vol - 4.4 cu ft, Power - 10 W
4. The objective of the ONR-401 experiment was to measure the spatial distribution and temporal variations of x-ray emissions produced by energetic electrons entering the atmosphere. Due to loss of communications with the spacecraft, no useful data were obtained.

b. ONR-301 (EHIC)

1. Sponsor - US Navy
2. Carrier - Free Flyer Spacecraft/Piggyback on NOAA-I
3. Wt - 23 lb, Vol - 1.5 cu ft, Power - 6 W
4. The objective of the ONR-301 experiment was to measure the high-energy composition of particles of solar and galactic origin entering the polar regions of the magnetosphere. Due to loss of communications with the spacecraft, no useful data were obtained.

Mission S93-2



1. Launch Date: 25 August 1993
2. Launch Vehicle: Russian PROTON
3. Launch Site: Plesetsk, Russia
4. Mission Duration: N\A
5. Orbital Parameters: apogee: 126 NM, perigee: 117 NM, inclination 82.57°
6. Contractor: INTEX Inc. and Moscow State University
7. Cost: $0.09 million
8. List of Experiments:

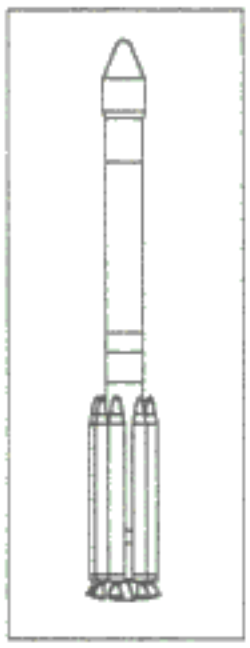
a. NRL-200 (Be^7 Distribution in the Upper Atmosphere/BINRAD)

9. Experiment Summary

a. NRL-200 (BINRAD)

1. Sponsor - US Navy
2. Carrier - Russian Spacecraft RESURS-F1
3. Wt - 6.6 lb, Vol - 0.25 cu ft, Power - 50 W max
4. The objective of NRL-200 was to obtain upper atmosphere distribution patterns using Be^7 tracer elements. This mission was a repeat of the BINRAD mission launched on 14 August 1992. As in the case of the 1992 mission, the BINRAD experiment failed to deploy due to premature closure of the lid to the scientific equipment container during launch. No useful experiment data were obtained.

Mission S93-2



1. Launch Date: 30 August 1993
2. Launch Vehicle: Delta II
3. Launch Site: WTR
4. Mission Duration: 1 year required, 7 years desired
5. Orbital Parameters: 10,998 NM circular, Inclination 55°
6. Contractor: Rockwell International
7. Cost: $0.049 million for the current and a subsequent flight
8. List of Experiments:

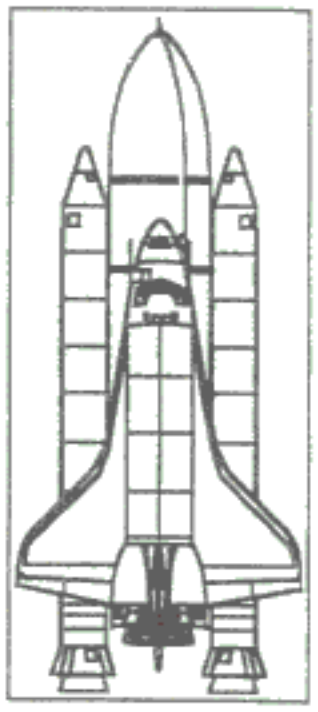
   a. NCST-801 (Advanced Clock Ranging Experiment/ACRE)

9. Experiment Summary

   a. NCST-801 (ACRE)

   See Mission S93-2 (1994)

Mission STS-51



1. Launch Date: 12 September 1993
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 10 Days
5. Orbital Parameters: Alt 160 NM, Inclination 28.45°
6. Contractor: Muniz Engineering Inc.
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

   **a. GL-503 (Air Force Maui Optical Site/AMOS)
   **b. GL-308 (Auroral Photography Experiment/APE-B)
   **c. HSD-101 (Radiation Monitoring Equipment/RME)
   **d. NRL-502A (High Resolution Shuttle Glow Spectrograph/ HRSGS-A)

9. Experiment Summary

**a. GL-503 (AMOS)

See Mission STS-64 (1994)

b. GL-308 (APE-B)

See Mission STS-62 (1994)

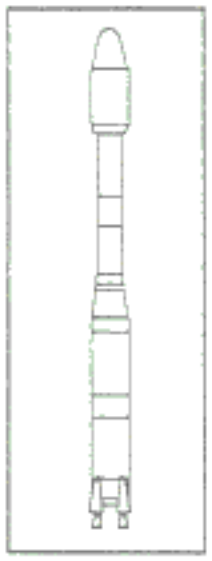
c. HSD -101 (RME)

See Mission STS-64 (1994)

d. NRL-502A (HRSGS-A)

1. Sponsor - US Navy
2. Carrier - Middeck Locker
3. Wt - 22 lb, Vol - 2.9 cu ft, Power - 15 W
4. The objective of the NRL-502A experiment was to obtain high-resolution spectra of Shuttle surface glow in the 4,000 - 8,000 A wavelength range by viewing the glow on the vertical tail through the aft deck window. The experiment was 100 percent successful. The data will be made available for the design of systems for surveillance and tracking of orbiting and reentering space vehicles.

Mission S88-1



1. Launch Date: 25 September 1993
2. Launch Vehicle: Ariane (AR-40)
3. Launch Site: Kourou, French Guiana
4. Mission Duration: Minimum Desired - 1 year
5. Orbital Parameters: Alt 44 NM, Inclination 99.0°
6. Contractor: French Space Agency (CNES)
7. Cost: $5.2 million
8. List of Experiments:

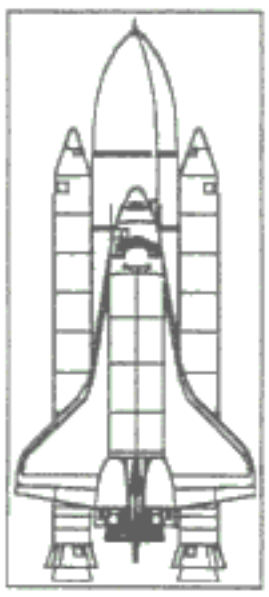
   a. ONR-603 (Polar Ozone Aerosol Measurement II/POAM II)

9. Experiment Summary

   a. ONR-603 (POAM II)

      1. Sponsor - US Navy
      2. Carrier - French Spacecraft SPOT-3
      3. Wt - 41.8 lb, Vol - 0.6 cu ft, Power - 25 W
      4. The objective of the ONR-603 experiments is to measure the vertical profiles of extinction due to aerosols, ozone, water vapor, and nitrogen oxide in the polar atmosphere. The experiment has been 100 percent successful to date. The data will be used to characterize the optical properties of the polar middle atmosphere.

Mission STS-61



1. Launch Date: 2 December 1993
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 11 Days
5. Orbital Parameters: Alt 330 NM, Inclination 28.5°
6. Contractor: Muniz Engineering Inc.
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

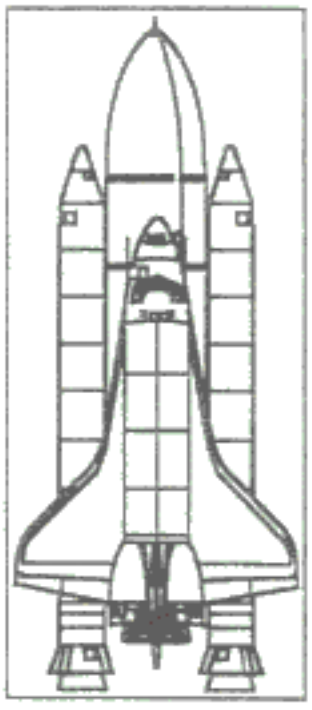
   **a. GL-503 (Air Force Maui Optical Site/AMOS)

9. Experiment Summary

   a. GL-503 (AMOS)

      See Mission STS-64- (1994)

Mission STS-60



1. Launch Date: 3 February 1994
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 8 Days
5. Orbital Parameters: Alt 190 NM, Inclination 57.0°
6. Contractor: Muniz Engineering Inc.
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

**a. CERL-501 (Containerless Coating Process/CONCOP-1)
**b. AFGL-308(Auroral Photography Experiment/APE-B)

9. Experiment Summary

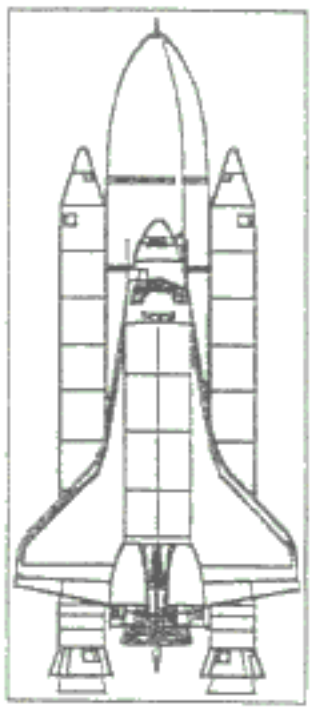
a. CERL-501 (CONCOP-1)

1. Sponsor - US Army
2. Wt - 200 lbs, Vol - 3.5 cu ft, Power - 400 W
3. Carrier - Hitchhiker G
4. The objective of the CONCOP-1 experiment was to investigate "containerless coating" processes designed to produce contaminant free protective coatings on surfaces used in extra-terrestrial construction. Due to equipment problems, particularly in transmission of data, the primary experiment objective was not attained. Some useful secondary mission objectives were achieved.

b. AFGL-308 (APE-B)

See STS-62 (1994)

Mission STS-62



1. Launch Date: 4 March 1994
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 14 Days
5. Orbital Parameters: Alt 160 NM, Inclination 39.0°
6. Contractor: Muniz Engineering Inc.
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

   **a. PL-302 ([redacted] Thermal Storage Unit/ BETSU)

   **b. GL-503 (Air Force Maui Optical Site/AMOS)

   **c. AFGL-308 (Auroral Photography Experiment/ APE-B)

9. Experiment Summary

a. PL-302 (BETSU)

1. Sponsor - US Air Force
2. Wt - 367 lbs, Vol - 5.8 cu ft, Power - 250 W
3. Carrier - Hitchhiker G
4. The BETSU experiment was a demonstration of a heat sink which was a solid/liquid phase change material to keep critical sensors operating at normal temperature. The experiment was 100% successful and will advance heat sink technology. [redacted]

(b)(

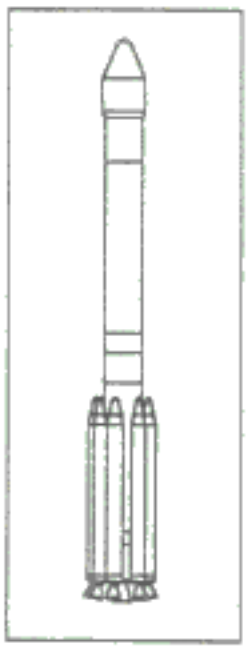
b. G-503 (AMOS)

See Mission STS-64 (1994)

c. AFGL-308 (APE-B)

1. Sponsor - US Air Force
2. Carrier - Middeck Locker
3. Wt - 18.9 lbs, Vol - 0.4 cu ft, Power - N\A
4. The objective of the APE series of experiments is to characterize optical emissions induced by the space environment on spacecraft surfaces. The experiments have been 100% successful. The spectra obtained are used to validate the DOD satellite signature code.

Mission S93-2



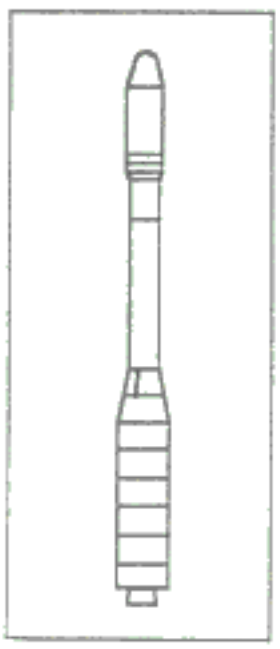
1. Launch Date: 9 March 1994
2. Launch Vehicle: Delta II
3. Launch Site: KSC
4. Mission Duration: 1-3 years planned
5. Orbital Parameters: Alt 10,998 NM, Inclination 55.0 deg
6. Contractor: Rockwell International
7. Cost: $0.049 million for this flight and the flight of 30 August 1993
8. List of Experiments:

   **a. NCST-901 (Advanced Clock Ranging Experiment/ACRE)

9. Experiment Summary

a. NCST-901 (ACRE)

1. Sponsor - US Navy
2. Wt - 4.4 lbs, Vol - 0.15 cu ft, Power - 2 W
3. The objective of the ACRE experiment is to investigate global positioning system (GPS) errors with an independent system and to provide a proof of concept for a method to improve GPS accuracy. The experiment has provided excellent data to date and data will continue to be collected as long as possible. The data will be used in ground processing of GPS measurements to improve the accuracy of the GPS system.



1. Launch Date: 13 March 1994
2. Launch Vehicle: Taurus
3. Launch Site: VAFB
4. Mission Duration: 1 year planned
5. Orbital Parameters: apogee: 450 NM, perigee: 333 NM, inclination 105.0°
6. Contractor: TRW/Defense Systems Inc..
7. Cost: $20 million
8. List of Experiments:

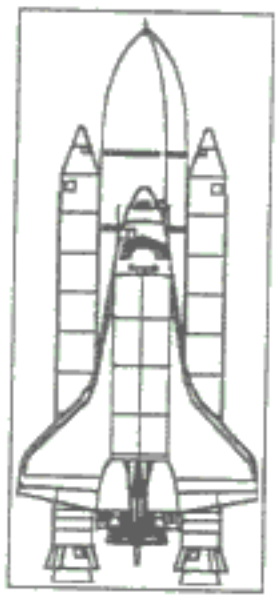
   a. STC-001 (Technology for Autonomous Operational Survivability/TAOS)

9. Experiment Summary

a. STC-001 (TAOS)

1. Sponsor - US Air Force
2. Wt - 1247 lbs (incl STEP Spacecraft), Vol - 33.0 cu ft, Power - Exp(150 W) S/C (90 W)
3. The objective of the TAOS experiment is to advance the technology for autonomous space navigation. After an initial period of successful operation the spacecraft experienced failure of its inertial momentum unit which in turn disabled the attitude control system. New software was uploaded to the spacecraft in September 1994 and some experiments were resumed. Data obtained from the TAOS experiment will be included in the technology base for autonomous space navigation.

Mission STS-59



1. Launch Date: 9 April 1994
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 11 Days
5. Orbital Parameters: Alt 120 NM, Inclination 57°
6. Contractor: Muniz Engineering Inc.
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

   a. ASPWS-701 (Space Tissue Loss A&B/ STL-A,B)
   b. HSD-903 (Visual Function Tester/VFT-4)

9. Experiment Summary

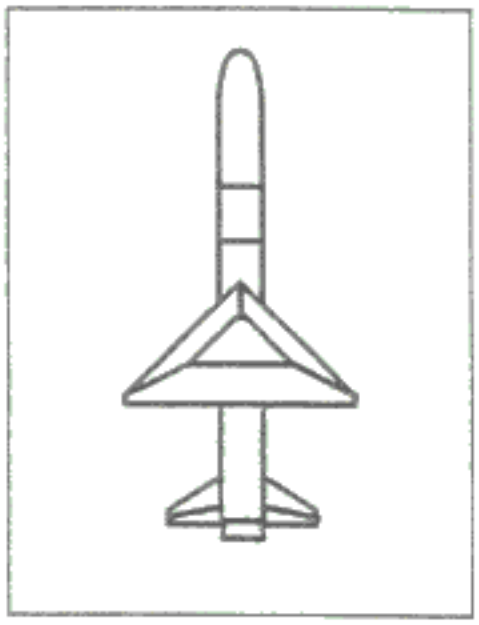
a. ASPWS-701 (STL-A,B)

See Mission STS-66 (1994)

b. HSD-903 (VFT-4)

1. Sponsor - US Air Force
2. Carrier - Middeck Locker
3. Wt - 34 lbs, Vol - 0.5 cu ft, Power - 7.5 W
4. The objective of the VFT-4 experiment is to investigate reports of on-orbit near vision changes and to quantify effects of microgravity on visual near point. Although limited by the small number of test subjects (2), the experiment was successful. The data will benefit all who use man-in-microgravity including the Space Shuttle crew and military experiments related to observations from space.

Mission P91-2



1. Launch Date: 19 May 1994
2. Launch Vehicle: Pegasus
3. Launch Site: Edwards AFB
4. Mission Duration: 12 months required
5. Orbital Parameters: apogee: 457 NM, perigee: 332 NM, inclination 82.0°
6. Contractor: TRW/DSI
7. Cost: $14.2 million
8. List of Experiments:

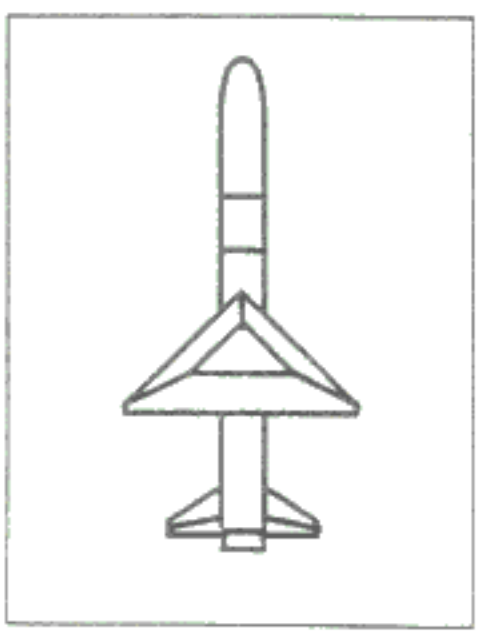
    a) RADC-701 (Signal Identification Experiment/SIDEX)

9. Experiment Summary

    a) RADC-701 (SIDEX)

        1. Sponsor - U S Air Force
        2. Carrier - STEP Free Flyer Spacecraft
        3. Wt - 76 lbs, Vol - 8.0 cu ft, Power - 20 W
        4. The objective of the SIDEX experiment is to test and evaluate existing and new small-signal detection methods and modulation techniques for reliable signaling in a dense signal environment. Injection into an non-optimum orbit and spacecraft problems have impacted the experiment over the first few months of its operation; however, significant useful data has been obtained and will be used to help overcome the problems which exist in the communication and detection of weak signals.

Mission P90-1



1. Launch Date: 27 June 1994
2. Launch Vehicle: Pegasus
3. Launch Site: VAFB
4. Mission Duration: N/A: Destroyed During Launch
5. Orbital Parameters: N/A
6. Contractor: TRW/DSI
7. Cost: $12.0 million
8. List of Experiments:

    a. RADC-801 (Ionospheric Ducted Mode Experiment/DUCTED)

b. NRL-302 (Coupling of High Altitude Magnetospheric Processes into the Ionosphere/CHAMPION)
c. AERO-802 (Plasma Environment Analyzer/PEA)
d. AFGL-705 (Atmospheric Density Specification/ADS)

9. Experiment Summary

a. RADC-801 (DUCTED)

1. Sponsor - U S Air Force
2. Wt - 35.2 lbs, Vol - 1.0 cu ft, Power - 9W(Min) - 22W (Max)
3. The objective of the DUCTED experiment was to determine the feasibility of exploiting long range duct propagation for surveillance and survivable long range low-loss communication systems. Due to the loss of the spacecraft on launch no data was obtained.

b. NRL-302 (CHAMPION)

1. Sponsor - US Navy
2. Wt - 38.5 lbs, Vol - 1.0 cu ft, Power - 20W
3. The objective of the CHAMPION experiment was to measure the global-scale distribution of high-latitude electron density irregularities. Due to the loss of the spacecraft on launch no data was obtained.

c. AERO-802 (PEA)

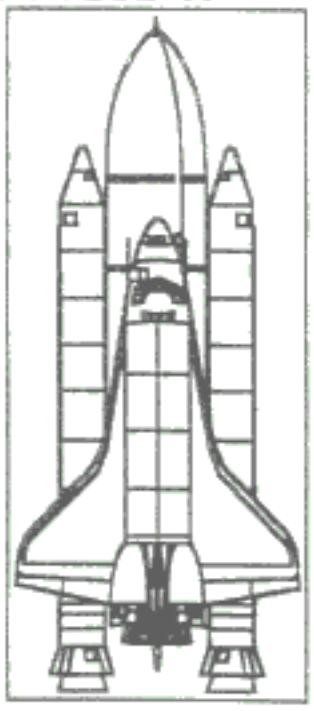
1. Sponsor - US Air Force
2. Wt - 19.3 lbs, Vol - 1.3 cu ft, Power -6.5W
3. The objective of the PEA experiment was to measure the plasma density in the outer plasmasphere using passive RF techniques. Space systems such as the GPS require an accurate model of the plasmasphere to assess it's impact on timing signals. Due to the loss of the spacecraft on launch no data was obtained.

d PL-705 (ADS)

1. Sponsor - US Air Force
2. Wt - 90.8 lbs, Vol - 7.6 cu ft, Power -53W
3. The objective of the ADS experiment was to obtain coordinated measurements of aerodynamic drag, density, neutral and ionospheric composition, winds and temperature to develop new, more accurate operational satellite drag models and to meet Air Force requirements [redacted] Due to loss of the spacecraft no data was obtained.

(b)(1)

Mission STS-65



1. Launch Date: 8 July 1994
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 15 Days
5. Orbital Parameters: Alt 160 NM, Inclination 28.4°
6. Contractor: Muniz Engineering Inc.
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

   **a. GL-503 (Air Force Maui Optical Site/AMOS)
   **b. NIC-201 (Military Application of Ship Tracks/MAST)

9. Experiment Summary

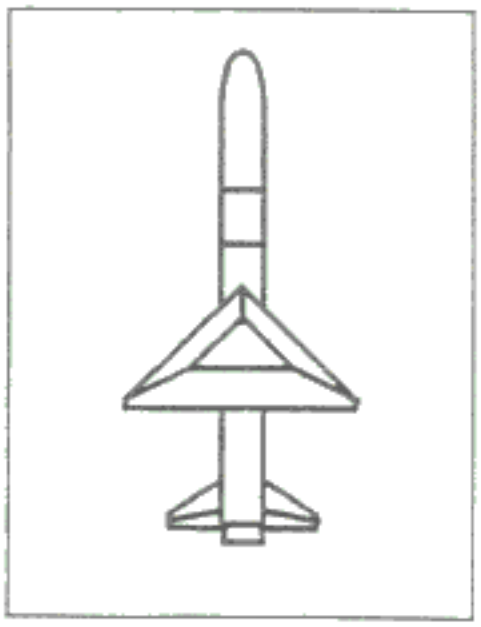
   a. GL-503 (Air Force Maui Optical Site/AMOS)

      See Mission STS-64 (1994)

   b. NIC-201 (Military Application of Ship Tracks/MAST)

      See Mission STS-68 (1994)

Mission P90-6



1. Launch Date: 3 August 1994
2. Launch Vehicle: Pegasus
3. Launch Site: Edwards AFB
4. Mission Duration: 24 months required
5. Orbital Parameters: apogee: 1,382 NM, perigee: 190 NM, inclination 70°
6. Contractor: Orbital Sciences Corporation
7. Cost: $9.6 million
8. List of Experiments:

   a. GL-803 (Photovoltaic Array Space Power Plus Diagnostics/PASP PLUS)

b. NPS-001 (Space Evaluation of Ferroelectric Materials/FERRO)
c. SSD-001 (Cosmic Ray Upset Experiment/CRUX)

9. Experiment Summary

a. GL-803 (PASP PLUS)

1. Sponsor - US Air Force
2. Carrier - STEP Spacecraft
3. Wt - 143 lbs, Vol - 14.0 cu ft, Power - 90 W
4. The objective of the PASP PLUS Experiment is to determine operating voltage and performance limits of advanced solar array designs operating under hazardous space environmental conditions. In 1994 PASP PLUS achieved three months of successful experiment operations prior to a spacecraft battery charging malfunction in November 1994. New software uploaded to the spacecraft restored the experiment to full operation in January 1995. PASP PLUS will demonstrate survivable photovoltaic space power technology; a critical technology for future space systems.

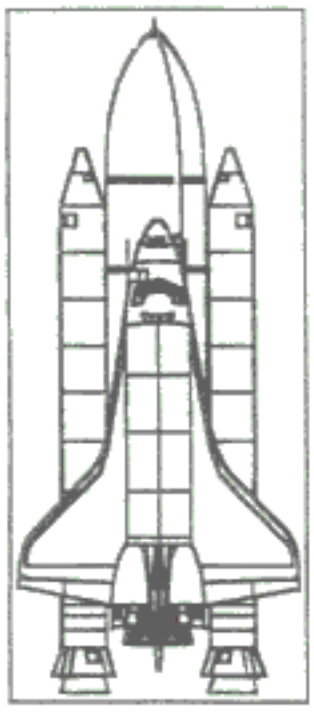
b. NPS-001 (FERRO)

1. Sponsor - US Navy
2. Carrier - STEP Spacecraft
3. Wt 4.4 lbs, Vol - 0.1 cu ft, Power - 2.5 W
4. The objective of the FERRO experiment is to evaluate ferroelectric material properties and device performance in actual space operating conditions. After three months of successful operations the experiment was degraded by a spacecraft power failure. Successful elimination of the power failure restored the experiment to full operation in January 1995. A fully successful experiment will provide the potential for low power, non-volatile, radiation-hardened memories for space applications.

c. SSD-001 (CRUX)

1. Sponsor - US Air Force
2. Carrier - STEP Spacecraft
3. Wt - 25.0 lbs, Vol - 0.5 cu ft, Power - 20 W
4. The objective of the CRUX experiment is to validate by testing in a high inclination orbit the modeling which describes the upset mechanism of cosmic rays in microcircuits. The experiment achieved three months of successful operation in 1994. Successful completion of the experiment will allow continued use of the upset predication models in spacecraft design.

Mission STS-64



1. Launch Date: 9 September 1994
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 11 Days
5. Orbital Parameters: Alt 140 NM, Inclination 57°
6. Contractor: Muniz Engineering Inc.
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

   **a. GL-503 (Air Force Maui Optical Site/AMOS)
   **b. NIC-201 (Military Application of Ship Tracks/MAST)
   **c. HSD-101 (Radiation Monitoring Equipment/RME)
   d. LITE-1 (LIDAR In-Space Technology Experiment)

9. Experiment Summary

a. GL-503 (AMOS)

1. Sponsor - US Air Force
2. Carrier - N\A
3. Wt - N\A, Vol - N\A, Power - N\A
4. The objective of the GL-503 series of experiments is to measure the signature of a spacecraft when interacting with the atmosphere and to calibrate the optical site at Maui. Except for a limited number of missed observations because of Shuttle scheduling and travel restrictions the experiments have been 100% successful. The data from the experiment are provided to the Plume Data Center.

b. NIC-201 (MAST)

See Mission STS-68 (1994)

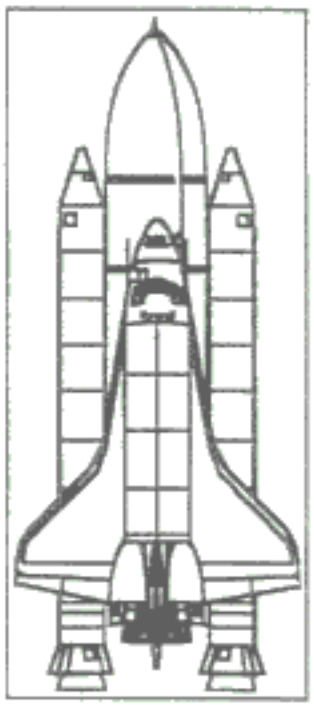
c. HSD-101 (RME)

The objective of the RME series of experiments is to provide real-time monitoring of the radiation environment in the orbits traversed by the Space Shuttle. The experiments have been 100% successful and will contribute to radiation models for manned spacecraft.

d. LITE

1. Sponsor - NASA (Langley Research Center)
2. Carrier - N\A
3. Wt - N\A, Vol - N\A, Power - N\A
4. The objective of LITE is to study clouds and aerosols (suspended particles) in the sub-troposhpere atmosphere. It is the first experiment to use lasers in space for the study of the atmosphere, using short laser pulses to attain very high vertical an horizontal resolution.

Mission STS-68



1. Launch Date: 30 September 1994
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 11 Days
5. Orbital Parameters: Alt 120 NM, Inclination 57.0°
6. Contractor: Muniz Engineering Inc.
7. Cost: See cost discussion, Page IV-2
8. List of Experiments:

**a. SDIO-904 (Cosmic Radiation Effects and Activation Monitor/CREAM)
**b. NIC-201 (Military Application of Ship Tracks/MAST)

9. Experiment Summary

a. SDIO-904 (CREAM)

1. Sponsor - Space Defense Initiative Organization
2. Carrier - Middeck Locker
3. Wt - 9.2 lbs, Vol - 0.5 cu ft, Power - 5.0W
4. The objective of the SDIO-904 series of experiments is to measure cosmic ray and earth's trapped radiation energy depositions and induced radioactivity inside crew compartments of manned spacecraft. Except for a limited number of equipment failures the experiments have been 100% successful to date. The data will contribute to radiation models for manned spacecraft.

b. NIC-201 (MAST)

1. Sponsor - US Navy
2. Carrier - Middeck locker
3. Wt - 22.0 lbs, Vol - 1 locker, Power - 0
4. The objective of the MAST series of experiments is to conduct a series of observations [redacted] on a word-wide basis. The series of experiments to date has produced approximately 50% of the required data and additional experiments are planned. The data will be used to evaluate [redacted] observations from space.

(b)(1)

Mission S91-4

1. Launch Date: 1 November 1994
2. Launch Vehicle: Delta II
3. Launch Site Cape Canaveral Air Force Station
4. Mission Duration: 1-3 years required
5. Orbital Parameters: L_1 Point
6. Contractor.
7. Cost:
8. List of Experiments

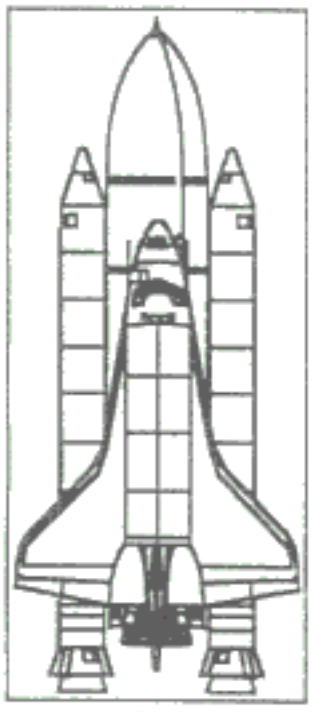
a) AFGL-804 (Solar Wind Interplanetary Measurements/SWIM)

9 Experiment Summary

a) AFGL-804 (SWIM)

1. Sponsor - US Air Force
2. Carrier - NASA Spacecraft for WIND Experiment
3. Wt - 44.0 lbs, Vol - 0.8 cu ft, Power - 21W
4. The objective of the SWIM experiment is to demonstrate that measurements of solar initiated interplanetary parameters can make a significant improvement in the ability to forecast disturbances in the magnetosphere and near-earth environment and to obtain interplanetary data for research efforts to specify and model the energy and momentum coupling mechanisms between solar emissions and the earth's magnetosphere. The experiment has acquired excellent data to date. The data will be provided to the 50th Weather Squadron to assist in forecasting interplanetary hazards

Mission STS-66



1. Launch Date: 3 November 1994
2. Launch Vehicle: Space Shuttle
3. Launch Site: KSC
4. Mission Duration: 11 Days
5. Orbital Parameters: Alt 164 NM, Inclination 57.0°
6. Contractor: NRL-501 (Deutsch Aerospace)
   ASPWS-701 (Muniz Engineering Inc.)
7. Cost: NRL-501 ($185 thousand)
   ASPWS-701 (See cost discussion, Page IV-2)
8. List of Experiments:

   a. NRL-501 (Middle Atmosphere High Resolution Spectrograph Investigation/ MAHRSI)
   b. ASPWS-701 (Space Tissue Loss/STL-A)

9. Experiment Summary

a. NRL-501 (MAHRSI)

1. Sponsor - US Navy
2. Carrier - SPAS Platform Deployed from Space Shuttle
3. Wt - 187 lbs, Vol - 8.0 cu ft, Power - 60 W
4. The objective of the MAHRSI experiment is to measure the ultraviolet emissions of active trace species such as OH, NO, N_2^+, and Mg^+ in the middle atmosphere. The experiment was 100% successful. the data will be provided to the military data base for possible applications to the low frequency military communications and space based surveillance systems. In addition the data will be provided to the "Mission to Planet Earth" data base.

b. ASPWS-701 (STL-A)

1. Sponsor - US Army
2. Carrier - Middeck Locker
3. Wt - 61 lbs, Vol - 1 locker, Power - 100W
4. The objective of the ASPWS-701 series of experiments is to develop models of cytoplasmic and structural tissue loss induced by microgravity stress and to test tissue loss antagonists. Flight experiments to date have been highly successful. Data will be used to understand and manage bone and tissue problems in space and hopefully will contribute to management of bone and tissue problems on earth. NASA is participating with DOD in this series of experiments.

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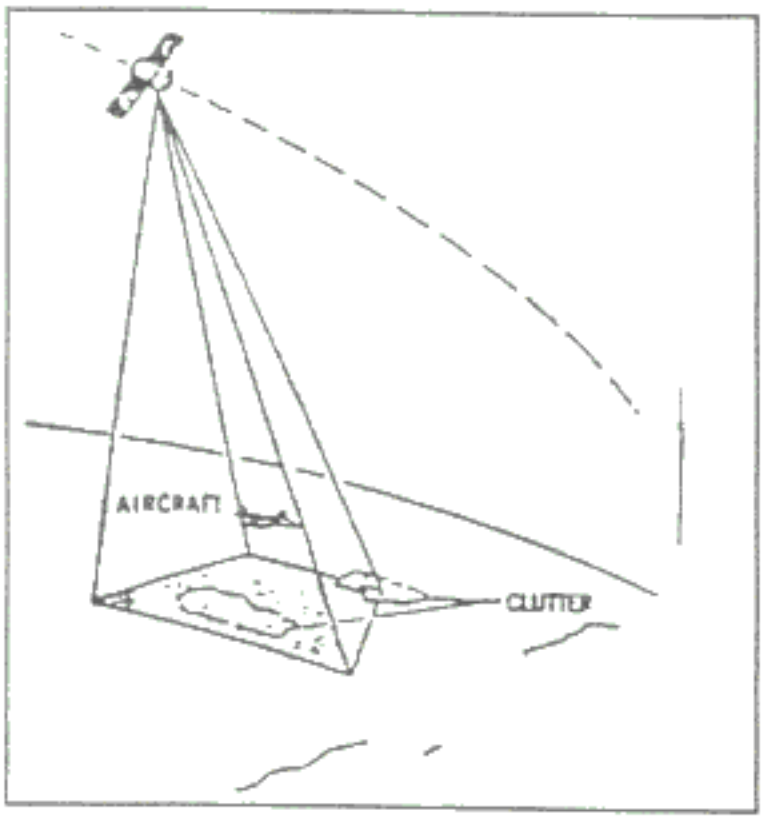
V. CANCELED/DROPPED MISSIONS

During the conduct of the Space Test Program (STP), a number of approved missions or major experiments have had to be canceled prior to flight. Generally these missions or experiments were canceled because STP was not able to obtain enough funding to support them while at the same time maintaining a balanced DOD-wide flight program. On other occasions, the experimenters themselves experienced funding problems and had to withdraw from missions. In some cases, the missions in question were comprised of multiple interdependent experiments, and the withdrawal of one prevented the remainder from flying. The following section describes several of these canceled missions or experiments.

Mission P80-1 (TEAL RUBY)



Objective:

The primary purpose of mission P80-1 was to fly experiment DARPA-601 (TEAL RUBY). The TEAL RUBY experiment used a multi-spectral infrared mosaic focal plane to measure earth background and aircraft signatures. Additional experiments included ECOM-501, Extreme Ultra-Violet Mapping of Celestial Background; NASA-601, Millipound Mercury Ion Auxiliary Propulsion System for Satellite Station Keeping; and ONR-101, Two Color Refractometer for Stellar Horizon Atmospheric Dispersion Measurements.

Program History:

Mission P80-1 was initially planned as a free flyer spacecraft to be launched by an expendable launch vehicle. The mission was placed under contract in early 1978. Early in the development, the mission was redesignated AFP-888and reconfigured for launch by the Space Shuttle in 1986. The Challenger accident delayed any launch opportunity for AFP-888 until the Shuttle began flying again in 1988. In 1988, AFP-888 was officially manifested on the Space Shuttle STS-39 with planned launch in late 1990 or early 1991; however, Congress did not provide funds for the payload. In 1989, AFP-888 was demanifested from STS-39 and placed in storage. Experiments were removed and returned to the experimenters.

Mission P86-2 (STARSCAN)

Objective:

The objective of the STARSCAN mission was to demonstrate new technology for remote detection and inspection of nuclear material in space. The mission was planned as a free flyer spacecraft mission to be launched by a Titan II launch vehicle.

Program History:

The contract for the STARSCAN spacecraft was awarded to Ball Aerospace Systems Division in July 1987 with planned launch in 1991. Due to substantial reduction in the FY 88 Space Test Program budget, funding was not available to carry the STARSCAN mission through FY 88. A stop work order was issued to Ball Aerospace Systems Division in February 1988.

Mission P90-2 (PROFILE)

Objective:

The objective of the ONR-801 Passive Radio Frequency Interference Locator Equipment (PROFILE) mission was to geolocate sources of radio frequency interference to the Navy's Fleet Satellite Communications (FLTSATCOM). The mission was planned as a free flyer spacecraft mission to be launched by a Scout launch vehicle in 1991 with an estimated program cost of $6.23 million (including launch).

Program History:

A program to fly the PROFILE experiment was established in 1989 as the number 1 priority STP experiment. Planning continued for this mission with changes occurring in identifying PROFILE's companion experiments. Months before PROFILE's scheduled launch in 1991, the experiment was terminated due to experimenter funding problems.

VI. CURRENT STP EXPERIMENT PRIORITY LIST

SUMMARY OF EXPERIMENTS

There were 37 experiments proposed to the Space Experiment Review Board (SERB) at the 2-4 May 1995 SERB meeting. The Board approved the experiments listed below, in the prioritized order in which they are shown, declining approval to 8 of the original 37 experiments. In addition, the DOD added one classified experiment during its review of the final prioritized list, for a total of 30 approved experiments.

1. PL-406 65 Degree Kelvin Joule Thomson Cryocooler (COOLLAR-1). Validate zero-g performance of a closed-cycle cryocooler system that uses a unique oil-lubricated compressor and gas purification.

2. NRL-202 Microelectronics & Photonics Testbed (MPTB). Evaluate performance in the space radiation environment of fiber optics, sensors, CCDs, and other microelectronics and photonics planned for next generation operational spacecraft.

3. PL-504 60 Kelvin Thermal Storage Unit (CRYOTSU). Validate zero-g performance of a thermal buffer system, used to lower the time-average load on a cyrocooler.

4. PL-503 Cryogenic Flexible Diode Heat Pipe (CRYOFD). Validate zero-g performance of cyrogenic heat transfer system.

5. NRL-401 Remote Atmospheric & Ionospheric Detection System (RAIDS). Monitor atmospheric emissions from 550 A to 8700 A to determine composition and temperature of the upper atmosphere and ionosphere.

6. RADC-702 Optical Reflection Experiment (OPREX). Classified Experiment.

7. PL-404 Optical Precision Platform Experiment (OPPEX). Validate advanced vibration suppression platform concept to allow easing of overall spacecraft mechanical noise limitations.

8. SDIO-904 Cosmic Radiation Effects & Activation Monitor (CREAM). Monitor radiation energy-deposition spectra in silicon.

9. NRL-307 Newcomb Astrometric Satellite (NAS). Use interferometric observations of stars to develop improved optical reference frame and star catalog.

10. IDR-801 Microencapsulation of Drugs in the Microgravity Environment of the U.S. Shuttle (MICROCAPSULES IN SPACE). Evaluate the potential for using on-orbit microgravity to produce microencapsulated, controlled-dosage pharmaceuticals.

11. PL-401 Compact Environmental Anomaly Sensor (CEASE). Develop and demonstrate a spacecraft-mounted radiation environment sensor to warn operators during conditions of potential surface charging, deep dielectric charging and single-event upsets.

12. NRL-305 Thermospheric Temperature And Nitric Oxide Spectrograph (TtANOS). Photometer measures solar X-ray fluctuations while high resolution UV spectrograph measures the resulting airglow/limb-profile emissions.

13. GL-503 Air Force Maui Optical Station (AMOS) Calibration Tests (ACT). Collect imagery and spectral data on the Shuttle using Air Force Maui optical site sensor.

14. NRL-505 Coherent Electromagnetic Radio Tomography (CERTO) Determination of atmospheric electron density through ground-monitoring of a free-flying radio beacon satellite.

15. BMDO-404 Hall Effect Advanced Thruster System (HEATS). Investigate spacecraft integration issues for an advanced Hall effect electric propulsion system.

16. NRL-301 Total & Ultraviolet Irradiance Radiometer (TUVIR). Measure total solar radiative output variations and simultaneous solar ultraviolet radiation as drivers of changes in Earth climate change, the ozone layer, and the upper atmosphere.

17. PL-501 Atmospheric Density Specification (ADS). Integrate several sensor technologies to measure upper atmospheric density [redacted] and to coordinate various other upper atmospheric measurements to improve satellite drag models.

18. NRL-405 Polar Ozone & Aerosol Measurement III (POAM III). Use solar occultation to measure ozone and other constituents of stratosphere.

19. NRL-201 Global Imaging Monitor of Ozone Layer (GIMOL). Use stellar occultation to measure ozone.

20. GL-802 Solar Mass Ejection Imager (SMEI). Image solar ejecta to predict (up to two days in advance) solar-produced environmental disturbance that can degrade or impair DOD space systems.

21. NRL-502 High-Resolution Shuttle Glow Spectroscopy (HRSGS-C). Obtain high-resolution spectra of Shuttle re-entry glow in the 2000 A to 4000 A wavelength range.

22. NRL-306 Silicon X-ray Imager (SIXI). Demonstrate navigation of satellites through X-ray observations of stars.

23. BMDO-401 Plume Light Using MSX Emission Sensors (PLUMES). Use the MSX satellite to track and observe Shuttle rocket motor plumes to investigate plume phenomenology.

24. NVESD-401 Hand-held Earth-oriented Real-time Cooperative User-friendly Location, Targeting & Environmental System -- Latitude/Longitude Multispectral Imager (HERCULES/MSI). Test and evaluate CCD locator system for determining surface locations of oceanographic and land-based phenomena as seen from Shuttle.

25. ASPWS-701 Space Tissue Loss Model (STL). Expose tissue cultures to microgravity to determine effects on the cellular level.

26. HSC-101 Radiation Monitoring Equipment III (RME III). Correlate Shuttle internal radiation environment with current space radiation models, geographic location, altitude, shielding, and orientation, and attempt to correlate the environment with occurrence of single event upsets.

27. NRL-402 Shuttle Ionospheric Modification with Pulsed Localized Exhaust (SIMPLEX). Determine the source of VHF radar echoes from Shuttle exhaust by measuring backscatter from the plumes with existing ground radar assets.

28. NRL-506 Ionospheric Magnetospheric and Geocoronal Experiment (IMAGE). Monitor space weather through global imaging of the ionosphere, magnetosphere, and the geocorona from space.

29. PL-202 Auto-Calibrating EUV Spectrometers (ACES). Measure the solar flux in the extreme ultraviolet (EUV) over a significant part of the solar cycle.

30. NOAA-501 Solar Hard X-Ray Spectroscopy for Proton Flare Prediction (Solar Flare Prediction) Monitor solar hard-X-ray spectra to warn of solar proton flare events.

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APPENDIX A

INDEX OF SPACE TEST PROGRAM EXPERIMENTS

A BRIEF HISTORY OF THE DOD SPACE TEST PROGRAM

NOTES:

- Experiments that have flown on more than once are shown only in the year of first flight.
- No test missions were flown in 1973, 1980, 1981, or 1987.

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