INTERNATIONAL AEROSPACE DIVISION NOTE
IADN 94-2

# A BRIEF HISTORY OF THE DOD SPACE TEST PROGRAM (U)

December 1993

By
[redacted]
(b)(6)

Approved by
[redacted]
Division Manager

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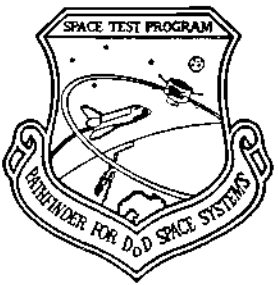
PREFACE (U)




(U) This division note is a brief history of the DOD Space Test Program from its inception in 1966 through 1992. The history includes a description of the organization and management, space missions, a summary of the experiments, and a compilation of experiment results and the uses of the results in support of DOD systems and technology. The history was prepared under the guidance of [redacted] SAF/AQSL. (b) (c)

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CONTENTS (U)

(U) Technology demonstrated under non-STP missions was of complementary interest to collateral DOD/NASA organizations and integral to the broad technology base being developed under STP participation. Funding was provided by the non-STP applicant; STP specialized management and integration methods and procedures were utilized to effectively execute the most cost-effective test approach for a mutually beneficial experiment.

(U) The space experiments conducted by STP generally fall into three categories. The first category includes those experiments related to systems or subsystems. The second category of experiments provides measurements of the space environment. The third category of experiments explores the benefits of using military man in space. Figure 2 lists the major categories of experiments and the types of experiments which have been conducted by STP in each category. Figure 2 also indicates the number of experiments of each type that have been conducted by STP.

Figure 2
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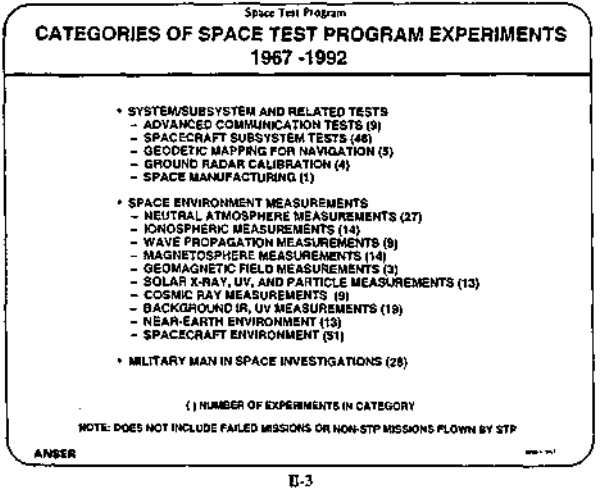


(U) System and subsystem tests of spacecraft components are necessary to develop improved components. Such tests are generally directed toward improving the performance of a component or making the component more reliable or more survivable.

(U) 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. Nine separate experiments have supported communications. Spacecraft subsystem tests have led to more reliable and survivable subsystems. Forty-eight experiments have supported spacecraft subsystem tests. Experiments related to navigation have been successful in improving geodetic survey worldwide and have demonstrated critical hardware for the Global Positioning System (GPS). Five experiments have been directed toward navigation equipment and geodetic mapping for navigation. STP has conducted four experiments that provided different sizes and shapes of space objects for the calibration of ground radar. These experiments have obvious value to ballistic missile defense. Experiments related to manufacturing products in space, e.g., pharmaceuticals, can lead to improved and less expensive products. STP has conducted one experiment in this area.

(U) The results of measurements of the space environment are more difficult to correlate directly with a beneficial military use. This difficulty in tracking results from the measurements of the environment is frequently caused by the fact that experimental results are used in making environmental models or atmospheric standards which in turn are used in military activities.

(U) Measurements of the upper atmosphere are important to the understanding of the upper atmospheric chemistry, the formation of the ionosphere, the behavior of upper altitude nuclear explosions, and the prediction of orbits for low-altitude satellites. Twenty-seven experiments have measured the constituents and densities of the upper atmosphere.

(U) The ionosphere plays a very important role in radio propagation below Ultra High Frequencies (UHF). Therefore, an understanding of its properties and behavior is vital to the understanding of the reliability of many military communications systems. Fourteen STP experiments have been flown to measure properties and behavior of the ionosphere.

(U) Wave propagation measurements are important to communications since they constitute direct measurements of propagation properties or channel characteristics such as electromagnetic noise and antenna impedance. Nine STP experiments have made measurements related to wave propagation.

(U) The magnetospheric region of space is of interest because this is where many of the long-lived satellites operate. It is necessary to understand the environment and perturbations in this region such as those caused by solar activity in order to take necessary precautions to protect the health of the satellite. Fourteen STP experiments have measured the particle population in the Earth's magnetosphere.

(U) The Earth's magnetic field is non-uniform and is undergoing continuous change, both ambient and as distorted by solar activity. This field has a direct impact on both terrestrial and space magnetic related measurement techniques. STP has conducted three geomagnetic field experiments directed toward a better understanding of the field anomalies.

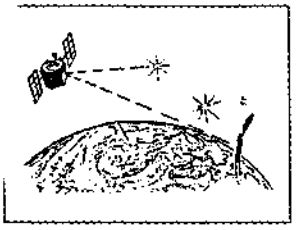
(U) The amount and kind of solar radiation striking the Earth has wide influence on the Earth, its weather, and communications. For example, solar flares can cause worldwide communications blackouts in certain frequency bands. Experiment objectives related to solar flares are to improve forecasting techniques. Thirteen 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.

(U) Cosmic ray backgrounds are required for proper operation of nuclear detonation detection satellites and estimation of damage to components of spacecraft in orbit for long periods of time. Nine STP experiments have contributed to knowledge of cosmic rays, including two very successful experiments that improved measurement techniques.

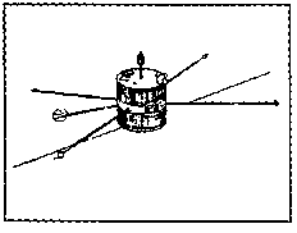
(U) The proper operation of various surveillance satellites requires a thorough knowledge of the background. Nineteen STP experiments gathered data on Earth and celestial background radiation in the infrared (IR), visible, and UV regions of the spectrum. Measurements in the IR region were particularly successful and contributed to the design parameters of several military satellite surveillance systems.

(U) The near Earth environment can be considered to include the regions of cloud formation and the oceans. STP has carried out 13 experiments related to cloud formation and ocean current and wave heights.

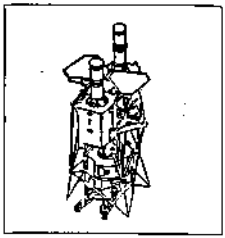
(U) Knowledge of the environment within a spacecraft, whether it be the cargo bay of the Space Shuttle or the experiment compartment on a free flyer spacecraft, is important in planning for the survival and proper operation of the payload. STP has carried out 51 experiments related to spacecraft environment. Key experiments in this area include a major investigation of spacecraft charging at geosynchronous orbit and a monitoring system for the Space Shuttle cargo bay. The latter is flown regularly on both NASA and DOD Shuttle missions.



(U) STP has flown a number of experiments to obtain background data for operations in space. These experiments measured background in spectral regions from the ultraviolet to infrared. A particularly valuable series of missions, flown in the 1967 to 1971 time period, acquired excellent data on the spectral variation in the IR background and mapped the celestial IR background. This data were used to determine the design parameters for a number of military satellite surveillance systems.

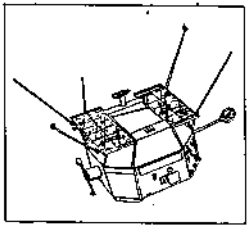


(U) One of the hazards associated with the operation of a spacecraft in orbit is the phenomenon known as spacecraft charging. Spacecraft charging results from different electric potentials being built upon various spacecraft surfaces. The different potentials cause arcing and can disable a spacecraft. In 1979, STP launched the SCATHA satellite, which carried out 14 experiments related to spacecraft charging. SCATHA has operated in geosynchronous orbit for over 10 years and has returned a wealth of useful data. SCATHA has provided the data base for analyzing spacecraft anomalies and has been the primary source of data for military standards related to spacecraft charging.



Mission
P74-1

(U) STP made a major contribution to a second generation tactical communications system with the launch of LES-8 and 9 in 1976. LES-8 and 9 [redacted] communications on a worldwide basis and was the prototype for [redacted] communications system. (b)



Mission
P86-1

(U) The Combined Release and Radiation Effects Satellite (CRRES) mission launched by STP in 1990 carried out two particularly useful experiments in support of military operations in space. First, CRRES demonstrated and evaluated a new high efficiency solar panel. The experiment will contribute to improved space power systems. CRRES also tested and space qualified advanced microelectronic components in space. This experiment will contribute to improved military space systems.

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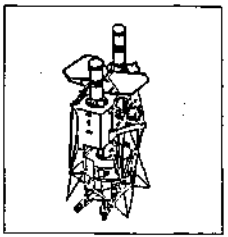

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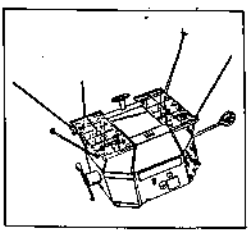

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# SECTION III

# ORGANIZATION AND MANAGEMENT (U)

## III. ORGANIZATION AND MANAGEMENT (U)

### A. (U) Authority

(U) The Space Test Program was established in 1966 as a Department of Defense 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.

(U) The initial responsibility of the Space Test Program as prescribed by a memorandum from the Director of Defense Research and Engineering (DDR&E) to the Assistant Secretary of the Air Force (R&D) on 15 July 1966 was 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 the Assistant Secretary for R&D of each of the three military departments. A third memorandum, dated 3 October 1978, from DDR&E to the Assistant Secretary (R&D) for each of the military departments set forth as an objective of the Space Test Program "to use 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.

### B. (U) Organization

(U) The organization for executing the DOD Space Test Program and for integrating experiments related to military man in space 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 management of the DOD Space Test Program. The Deputy Chief of Staff, Plans and Operations, U.S. Air Force, (AF/XO) is responsible for the overall management of the Military Man In Space (MMIS) program. Planning and execution of the flight program for the DOD Space Test Program, including flying the MMIS program experiments, are the responsibilities of the Space Test Program Office.

### C. (U) Procedure For Obtaining Spaceflight

(U) DOD space experiments normally originate in DOD laboratories or in research institutions supporting the DOD. To obtain spaceflight for the experiment, the principal investigator prepares a Request for Spaceflight Form DD 1721 (DD 1721-1 for Shuttle crew cabin experiments) and submits the form through channels to SAF/AQS. Once per year, generally in May, SAF/AQS convenes a Tri-Service board to review and place in priority the free flyer and Shuttle cargo bay experiments which have been submitted for flight during that

(U--Continued) year. Concurrently, AF/XO, with SAF/AQS, convenes a Tri-Service board to review and place in priority all Shuttle crew cabin experiments that have been submitted for flight during the year. SAF/AQS then forwards both prioritized lists of experiments to the Space Test Program Office for planning and execution of the flight program. Generally, an experiment that is submitted to SAF/AQS between prioritization board meetings is ranked at the bottom of the current priority list until the next board meeting. In exceptional cases, however, such an experiment may be given a higher priority by authority of SAF/AQS.

Figure 3
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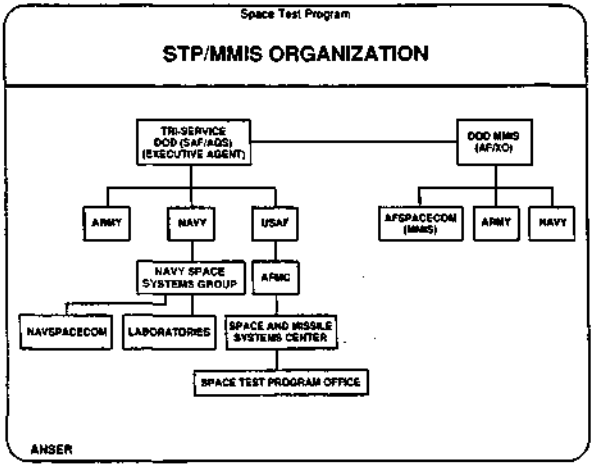

(U) Figure 4 depicts the STP experiment cycle from the initial submission of the experiment for flight until the data are returned to the experimenter for evaluation and use.

Figure 4
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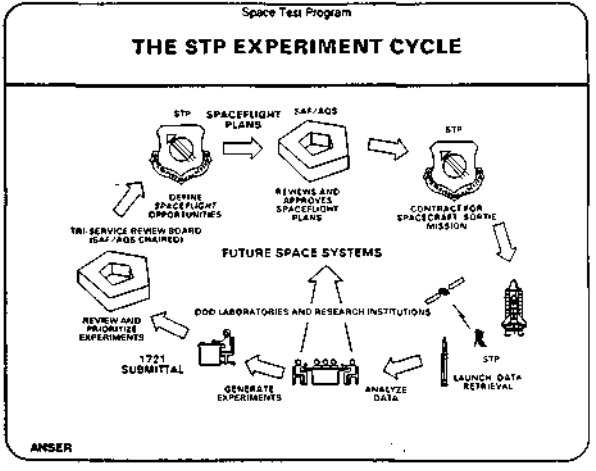


# SECTION IV

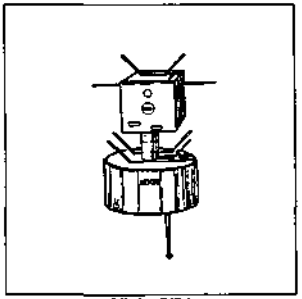
# MISSION SUMMARY AND EXPERIMENT RESULTS (U)

## IV. MISSION SUMMARY AND EXPERIMENT RESULTS (U)

### A. (U) General

(U) The following paragraphs summarize the missions and experiments that have been carried out by the Space Test Program from 1967 through 1992. There were no test missions flown in 1973, 1980, 1981, and 1987. The costs indicated are the cost of the mission to the Space Test Program. This cost normally includes mission planning and integration. It may also include the cost of a spacecraft and, in some cases, the cost of a launch vehicle. An experiment marked with a * is a Non-STP experiment flown by STP. Experiments marked with a "*" are Space Shuttle crew cabin experiments. Prior to 1987, the cost of these experiments was included in a general Air Force Space Shuttle cost line item. Beginning in 1987, the cost of crew cabin experiments has been charged to the Space Test Program on a consolidated basis. The consolidated cost of these experiments from 1987 through 1992 is estimated at a total cost of $2.63 million. Experiment results have been defined as the percentage achieved of the planned experiment objectives. The percentage is based on the judgment of the principal investigator.

### B. (U) 1967 MISSIONS



Mission P67-1

1. (U) Launch Date: 29 June 1967
2. (U) Launch Vehicle: Thor-Burner II
3. (U) Launch Site: WTR
4. (U) Mission Duration: 15 months
5. (U) Orbital Parameters: A3946 km, P3803 km, Inclination 89.8°
6. (U) Contractor: Cubic Corporation
7. (U) Cost: $250,000
8. (U) List of Experiments:
   a. (U) OCE-701 (SECOR 9)
   b. (U) ONR-801 (AURORA 1)

9. (U) Experiment Summary:

a. (U) OCE-701 (SECOR 9)

1. (U) Sponsor - US Army

2. (U) Wt - 39 lbs, Vol - 1 cu ft, Power - 36 W

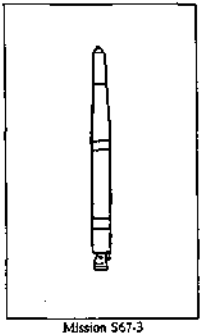
3. (U) OCE-701 was the first experiment in a series whose objective was to improve geodetic survey accuracy worldwide. The experiment was 100 percent successful and provided data for military target location and mapping.

b. (U) ONR-801 (AURORA 1)

1. (U) Sponsor - US Navy

2. (U) Wt - 47 lbs, Vol - 2.3 cu ft, Power - 3.5 W

3. (U) 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. (U) Launch Date: 7 August 1967
2. (U) Launch Vehicle: LTTAT-Agena (host vehicle)
3. (U) Launch Site: WTR
4. (U) Mission Duration: 2 months
5. (U) Orbital Parameters: A354 km, P187 km, Inclination 80.0°
6. (U) Contractor: Lockheed
7. (U) Cost: $130,000
8. (U) List of Experiments:

a. (U) SSD-701 (RM-15)

b. (U) SSD-702 (RM-12)

9. (U) Experiment Summary:

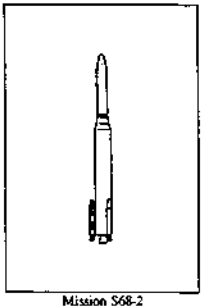
a&b. (U) SSD-701 (RM-15) and SSD-702 (RM-12)

1. (U) Sponsor - US Air Force

2. (U) 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. (U) 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.

C. (U) 1968 MISSIONS



Mission S68-2

1. (U) Launch Date: 18 May 1968
2. (U) Launch Vehicle: Thorad-Agena D (host vehicle)
3. (U) Launch Site: WTR
4. (U) Mission Duration: None (booster failed)
5. (U) Orbital Parameters: None
6. (U) Contractor: Cubic Corporation
7. (U) Cost: $80,000
8. (U) List of Experiments:

a. (U) OCE-704 (SECOR 10)

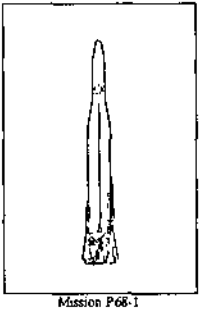
9. (U) Experiment Summary:

a. (U) OCE-704 (SECOR 10)

1. (U) Sponsor - US Army

2. (U) Wt - 39 lbs, Vol - 1 cu ft, Power - information not available

3. (U) 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. (U) Launch Date: 16 August 1968
2. (U) Launch Vehicle: Atlas-Burner II
3. (U) Launch Site: WTR
4. (U) Mission Duration: None (launch vehicle failed)
5. (U) Orbital Parameters: None
6. (U) Contractor: Boeing, GD/Convair
7. (U) Cost: $8.5 million
8. (U) List of Experiments:

   a. (U) OCE-801 (SECOR)

   b. (U) OCE-802 (SECOR)

   c. (U) RTD-701 (Lincoln Calisphere #3)

   d. (U) SSD-827 (RM-18)

   e. (U) SSD-801 (Earth Limb Measurement)

   f. (U) NAS-801 (ORBISCAL 1)

   g. (U) NAS-804 (*LIDOS*)

   h. (U) RPL-902 (Vacuum Friction)

   i. (U) AVL-802 (Grid Sphere Drag)

   j. (U) RTD-802 (RADCAT)

9. (U) Experiment Summary:

(U) 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. (U) OCE-801 (SECOR) and OCE-802 (SECOR)

1. (U) Sponsor - US Army

2. (U) Wt - 39 lbs, Vol - 1 cu ft for each, Power - 3.0 W

3. (U) The objective of OCE-801 and OCE-802 was to improve geodetic mapping.

c. (U) RTD-701 (Lincoln Calisphere #3)

1. (U) Sponsor - US Army

2. (U) Wt - 84 lbs, Vol - 8.6 cu ft, Power - None

3. (U) The objective of RTD-701 was to provide a target for ground radar calibration.

d. (U) SSD-827 (RM-18)

1. (U) Sponsor - US Air Force

2. (U) Wt - 91 lbs, Vol - 0.9 cu ft, Power - 59 W

3. (U) The objective of SSD-827 was to obtain a background data base.

e. (U) SSD-801 (Earth Limb Measurements)

1. (U) Sponsor - US Air Force

2. (U) Wt - 40 lbs, Vol - 3.3 cu ft, Power - 17 W

3. (U) The objective of SSD-801 was to obtain background data at the Earth's limb.

f. (U) NAS-801 (ORBISCAL I)

1. (U) Sponsor - US Navy

2. (U) Wt - 66 lbs, Vol - 5.3 cu ft, Power - information not available

3. (U) The objective of NAS-801 was to determine the occurrence of hyper-efficient propagation paths for ionospheric communications.

g. (U) NAS-804 (LIDOS)

1. (U) Sponsor - US Navy

2. (U) Wt - 123 lbs, Vol - 34.8 cu ft, Power - 25 W

3. (U) The objective of NAS-804 was to carry out geodetic and gravitational measurements, including the Earth's mass gravitational constant.

h. (U) RPL-902 (Vacuum Friction)

1. (U) Sponsor - US Air Force

2. (U) Wt - 26 lbs, Vol - 0.7 cu ft, Power - None

3. (U) The objective of RPL-902 was to measure friction in the vacuum of space.

i. (U) AVL-802 (Grid Sphere Drag)

1. (U) Sponsor - US Air Force

2. (U) Wt - 99 lbs, Vol - 117 cu ft, Power - self-contained

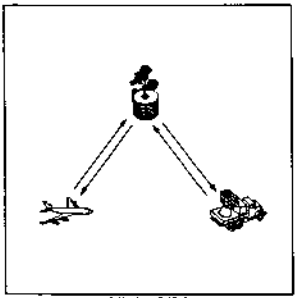
3. (U) The objective of AVL-802 was to place a sphere at acquisition altitude for calibration of ground radar.

j. (U) RTD-802 (RADCAT)

1. (U) Sponsor - US Air Force

2. (U) Wt - 395 lbs, Vol - 120 cu ft, Power - information not available

3. (U) The objective of RTD-802 was to provide a target for ground radar calibration.



Mission P67-2

1. (U) Launch Date: 26 September 1968
2. (U) Launch Vehicle: Titan IIIC
3. (U) Launch Site: ETR
4. (U) Mission Duration: 18 days
5. (U) Orbital Parameters: A35,831 km, P35,130 km, Inclination 2.9°
6. (U) Contractor: Lincoln Laboratories
7. (U) Cost: $1.2 million
8. (U) List of Experiments:
   a. (U) SSD-601 (Electron Flux)
   b. (U) SSD-602 (Particle Spectrometer)
   c. (U) SSD-605 (Very High Energy Particles)
   d. (U) SSD-606 (Low Energy Particles)
   e. (U) SSD-607 (Low Energy Spectrometer)
   f. (U) SSD-609 (Angular Distribution of Electrons)
   g. (U) SSD-610 (VLF Signals)
   h. (U) SSD-651 (Lyman Alpha)
   i. (U) CRLF-602 (Geomagnetic Field)
   j. (U) CRLF-726 (Magnetic Storms)

k. (U) CRLF-735 (Communications)

l. (U) CRLS-743 (Particle Flux Spectra)

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

n. (U) RTD-704 (Lincoln Experimental Satellite No. 6/LES-6)

9. (U) Experiment Summary:

a. (U) SSD-601 (Electron Flux)

1. (U) Sponsor - US Air Force

2. (U) Wt - 6 lbs, Vol - 0.2 cu ft, Power - 2 W

3. (U) The objective of SSD-601 was to measure electron flux. The experiment was only 20 percent successful.

b. (U) SSD-602 (Particle Spectrometer)

1. (U) Sponsor - US Air Force

2. (U) Wt - 12 lbs, Vol - 0.25 cu ft, Power - 3 W

3. (U) 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. (U) SSD-605 (Very High Energy Particles)

1. (U) Sponsor - US Air Force

2. (U) Wt - 12 lbs, Vol - 0.25 cu ft, Power - information not available

3. (U) The objective of SSD-605 was to measure cosmic rays in the magnetosphere. No useful data were obtained from this experiment.

d. (U) SSD-606 (Low Energy Particles)

1. (U) Sponsor - US Air Force

2. (U) Wt - 2.5 lbs, Vol - 0.1 cu ft, Power - information not available

3. (U) 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 the Air Force research program.

e. (U) SSD-607 (Low Energy Spectrometer)

1. (U) Sponsor - US Air Force

2. (U) Wt - 6 lbs, Vol - 0.1 cu ft, Power - information not available

3. (U) The objective of SSD-607 was to measure the spectrum of low energy particles in the magnetosphere. The experiment obtained no useful data.

f. (U) SSD-609 (Angular Distribution of Electrons)

1. (U) Sponsor - US Air Force

2. (U) Wt - 4 lbs, Vol - 0.1 cu ft, Power - information not available

3. (U) The objective of SSD-609 was to measure the angular distribution of electrons in the magnetosphere. The experiment was approximately 25 percent successful.

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

1. (U) Sponsor - US Air Force

2. (U) Wt - 7 lbs, Vol - 0.1 cu ft, Power - information not available

3. (U) 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. (U) SSD-651 (Lyman Alpha)

1. (U) Sponsor - US Air Force

2. (U) Wt - 20 lbs, Vol - 0.3 cu ft, Power - information not available

3. (U) 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. (U) CRLF-602 (Geomagnetic Field) and CRLF-726 (Magnetic Storms)

1. (U) Sponsor - US Air Force

2. (U) Wt - 18 lbs, Vol - 0.5 cu ft, Power - 1.0 W

3. (U) 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 failed (5 percent success) due to problems with the magnetometer mounting booms.

k. (U) CRLF-735 (Communications)

1. (U) Sponsor - US Air Force

2. (U) Wt - 5 lbs, Vol - 0.1 cu ft, Power - 10 W

3. (U) The objective of CRLF-735 was communications technology. The experiment was only 10 percent successful.

l. (U) CRLS-743 (Particle Flux Spectra)

1. (U) Sponsor - US Air Force

2. (U) Wt - 21.5 lbs, Vol - information not available, Power - 1.2 W

3. (U) The objective of CRLS-743 was to measure solar radiation. The experiment was only 20 percent successful.

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

1. (U) Sponsor - US Air Force

2. (U) Wt - 28 lbs, Vol - 1.0 cu ft, Power - None

3. (U) The objective of RPL-733 was to test a zero gravity cryogenic for liquid propellant rocket motors. The experiment was 100 percent successful and contributed significantly to restartable upper stages.

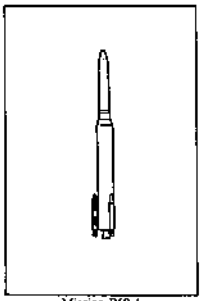
n. (U) RTD-704 (LES-6)

1. (U) Sponsor - US Air Force

2. (U) Wt - 330 lbs, Vol - 72 cu ft, Power - 150 W

3. (U) 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.

D. (U) 1969 MISSIONS



Mission P69-1

1. (U) Launch Date: 18 March 1969
2. (U) Launch Vehicle: Atlas F
3. (U) Launch Site: WTR
4. (U) Mission Duration: 2 days
5. (U) Orbital Parameters: Three selected orbits initiated from a single bus. (1) A469 km, P398 km, Inclination 99.1°, (2) A583 km, P465 km, Inclination 98.8°, (3) A5783 km, P467 km, Inclination 104.7°
6. (U) Contractor: General Dynamics/Convair
7. (U) Cost: $1.1 million
8. (U) List of Experiments:

   a. (U) CRLUS-830 (Solar Radiation Monitor)-(1)

   b. (U) ML-901 (Stability of Thermal Materials)-(1)

   c. (U) NAS-905 (Atmospheric Electric Field)-(1)

d. (U) ARX-901 [Test Cadmium Sulfide (CdS) Cells]-(1)

e. (U) CRL-001 (Meteor Trail Calibration)-(1)

f. (U) WL-802 (Radiobiological Observatory)-(2)

g. (U) SSD-850 [Radio Frequency Interference (RFI) in Orbit]-(2)

h. (U) ARPA-819 (Ion Density Gradient)-(2)

i. (U) NAS-906 (Atmospheric Electric Field)-(2)

j. (U) CRLFS-802 (Radiation Belt Monitoring)-(3)

k. (U) NAS-801 (ORBISCAL 2)-(3)

9. (U) Experiment Summary:

a. (U) CRLUS-830 (Solar Radiation Monitor)

1. (U) Sponsor - US Air Force

2. (U) Wt - 123 lbs, Vol - 4.4 cu ft, Power - 33 W

3. (U) 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. (U) ML-901 (Stability of Thermal Materials)

1. (U) Sponsor - US Air Force

2. (U) Wt - 2 lbs, Vol - 0.05 cu ft, Power - 0.5 W

3. (U) The objective of ML-901 was to investigate the stability of thermal materials in space. The experiment acquired no useful data.

c. (U) NAS-905 (Atmospheric Electric Field)

1. (U) Sponsor - US Navy

2. (U) Wt - 2 lbs, Vol - 0.1 cu ft, Power - 3 W

3. (U) 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. (U) ARX-901 (Test CdS Cells)

1. (U) Sponsor - US Air Force

2. (U) Wt - 2 lbs, Vol - 0.02 cu ft, Power - 3.5 W

3. (U) 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. (U) CRL-001 (Meteor Trail Calibration)

1. (U) Sponsor - US Air Force

2. (U) Wt - 6 lbs, Vol - 0.05 cu ft, Power - 5 W

3. (U) The objective of CRL-001 was to calibrate ground-based antennas which measure elevation and azimuth angles of radar meteor trail returns. Results not available.

f. (U) WL-802 (Radiological Observatory)

1. (U) Sponsor - US Air Force

2. (U) Wt - 15 lbs, Vol - 0.15 cu ft, Power - 7.5 W

3. (U) 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. (U) SSD-850 (RFI in Orbit)

1. (U) Sponsor - US Air Force

2. (U) Wt - 31 lbs, Vol - 2.5 cu ft, Power - information not available

3. (U) The objective of SSD-850 was to investigate radio frequency interference in orbit. No useful data were obtained from this experiment.

h. (U) ARPA-819 (Ion Density Gradient)

1. (U) Sponsor - DOD (ARPA)

2. (U) Wt - 22 lbs, Vol - 1 cu ft, Power - 7.5 W

3. (U) 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. (U) NAS-906 (Atmospheric Electric Field)

1. (U) Sponsor - US Navy

2. (U) Wt - 2 lbs, Vol - 0.1 cu ft, Power - 3 W

3. (U) NAS-906 was a companion experiment to NAS-905, c. above, and was also 100 percent successful.

j. (U) CRLFS-820 (Radiation Belt Monitoring)

1. (U) Sponsor - US Air Force

2. (U) Wt - 82 lbs, Vol - 3.9 cu ft, Power - 38 W

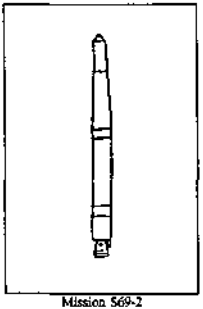
3. (U) The objective of CRLFS-820 was to measure the intensity of radiation in the radiation belts. The experiment was 85 percent successful and contributed to the design of satellites for survivability in the radiation belts.

k. (U) NAS-801 (ORBISCAL 2)

1. (U) Sponsor - US Navy

2. (U) Wt - 22 lbs, Vol - 5.3 cu ft, Power - information not available

3. (U) 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. (U) Launch Date: 14 April 1969
2. (U) Launch Vehicle: Thorad-Agena D
3. (U) Launch Site: WTR
4. (U) Mission Duration: 1 year
5. (U) Orbital Parameters: A1132 km, P1061 km, Inclination 99.9°
6. (U) Contractor: Cubic Corp and ITT Federal Labs
7. (U) Cost: $0.05 million
8. (U) List of Experiments:

   a. (U) OCE-902 (SECOR 13)

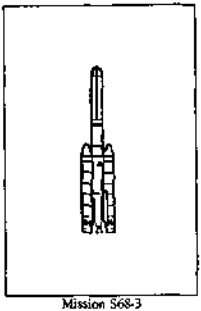
9. (U) Experiment Summary:

(U) OCE-902 (SECOR 13)

1. (U) Sponsor - US Army

2. (U) Wt - 39 lbs, Vol - 1 cu ft, Power - 3.0 W

3. (U) 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. (U) Launch Date: 23 May 1969
2. (U) Launch Vehicle: Titan IIIC
3. (U) Launch Site: ETR
4. (U) Mission Duration: 6 months
5. (U) Orbital Parameters: A111,652 km, P17,020 km, Inclination 32.8°
6. (U) Contractor: TRW Systems
7. (U) Cost: $1.0 million
8. (U) List of Experiments:

   a. (U) CRLF-736 (VLF Plasma Waves)

   b. (U) CRLF-821 (Solar Flare Monitor)

   c. (U) CRLFS-829 (Solar Flare Monitor)

9. (U) Experiment Summary:

a. (U) CRLF-736 (VLF Plasma Waves)

1. (U) Sponsor - US Air Force

2. (U) Wt - 4 lbs, Vol - 0.15 cu ft, Power - 2 W

3. (U) 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. (U) CRLF-821 (Solar Flare Monitor)

1. (U) Sponsor - US Air Force

2. (U) Wt - 26 lbs, Vol - 2.0 cu ft, Power - information not available

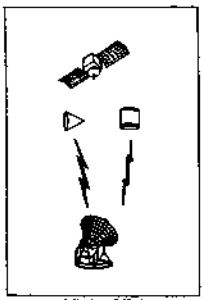
3. (U) The objective of CRLF-821 was to obtain data on X-rays and high-energy protons and electrons emitted during solar flares. The experiment was 100 percent successful and contributed to the data base for understanding and predicting solar flares.

c. (U) CRLFS-829 (Solar Flare Monitor)

1. (U) Sponsor - US Air Force

2. (U) Wt - 18 lbs, Vol - 0.25 cu ft, Power - 2 W

3. (U) The objective of CRLFS-829 was to further understand the solar flare phenomena. The experiment was 30 percent successful.



Mission S69-4

1. (U) Launch Date: 30 September 1969
2. (U) Launch Vehicle: Thorad-Agena D
3. (U) Launch Site: WTR
4. (U) Mission Duration: 270 days
5. (U) Orbital Parameters: A943 km, P926 km, Inclination 70.7°
6. (U) Contractor: information not available
7. (U) Cost: $0.03 million
8. (U) List of Experiments:

   a. (U) NRL-101 (SOICAL-3)

9. (U) Experiment Summary:

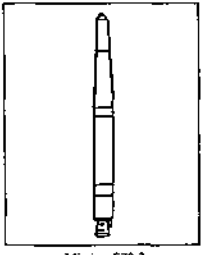
a. (U) NRL-101 (SOICAL-3)

1. (U) Sponsor - US Navy

2. (U) Wt - 13 lbs, Vol - 8.2 cu ft, Power - information not available

3. (U) 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 percent successful.

E. (U) 1970 MISSIONS



Mission S70-3

1. (U) Launch Date: 8 April 1970
2. (U) Launch Vehicle: Thor-Agena (NASA)
3. (U) Launch Site: WTR
4. (U) Mission Duration: 1 year
5. (U) Orbital Parameters: A1108 km, P1093 km, Inclination 107.0°
6. (U) Contractor: Cubic Corporation
7. (U) Cost: $0.05 million
8. (U) List of Experiments:

   a. (U) TPCOM-101 (TOPO A)

9. (U) Experiment Summary:

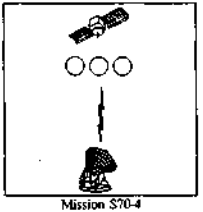
   a. (U) TPCOM-101 (TOPO A)

      1. (U) Sponsor - US Army

      2. (U) Wt - 39 lbs, Vol - 0.1 cu ft, Power - 3 W

      3. (U) TPCOM-101 demonstrated a new concept in geodetic mapping. The experiment was 100 percent successful.

F. (U) 1971 MISSIONS



Mission S70-4

1. (U) Launch Date: 17 February 1971
2. (U) Launch Vehicle: Thor-Burner II
3. (U) Launch Site: WTR
4. (U) Mission Duration: information not available
5. (U) Orbital Parameters: A834 km, P765 km, Inclination 98.8°
6. (U) Contractor: information not available
7. (U) Cost: $0.05 million
8. (U) List of Experiments:

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

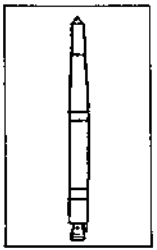
9. (U) Experiment Summary:

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

1. (U) Sponsor - US Navy

2. (U) Wt - 5 lbs, Vol - 1.5 cu ft, Power - information not available

3. (U) 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. (U) Launch Date: 8 June 1971
2. (U) Launch Vehicle: Long Tank Thorad-Agenda D
3. (U) Launch Site: WTR
4. (U) Mission Duration: 2 months
5. (U) Orbital Parameters: A581 km, P546 km, Inclination 90.22°
6. (U) Contractor: Boeing Corporation
7. (U) Cost: $3.1 million
8. (U) List of Experiments:

a. (U) SAMSO-001 (Celestial IR)

b. (U) SAMSO-203 (Attitude Sensing)

9. (U) Experiment Summary:

a. (U) SAMSO-001 (Celestial IR)

1. (U) Sponsor - US Air Force

2. (U) Wt - 148 lbs, Vol - 8 cu ft, Power - 80 W

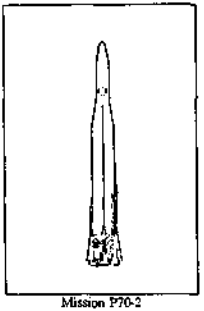
3. (U) The objective of SAMSO-001 was to measure the spectral variation in the IR background. The experiment was 40 percent successful and contributed data to the design of surveillance satellites.

b. (U) SAMSO-203 (Attitude Sensing)

1. (U) Sponsor - US Air Force

2. (U) Wt - 4.5 lbs, Vol - 0.1 cu ft, Power - 3.5 W

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

   a. (U) CRLU-928 (Cannonball 2)

   b. (U) SSD-975 (Plasma Resonance)

   c. (U) SAMSO-132 (Proton Analyzer)

   d. (U) CRL-210 (Velocity Mass Spectrometer)

   e. (U) NASC-117 (VLF Impedance)

   f. (U) SSD-980 (Neutral Atmosphere Composition)

   g. (U) OAR-901 (Atmospheric Density "Musketball")

   h. (U) AVL-802 (Grid Sphere Drag #2)

i. (U) RTD-701 (Calibration Sphere #4)

9. (U) Experiment Summary:

a. (U) CRLU-928 (Cannonball 2) - A2254 km, P154 km, Inclination 92.0°

1. (U) Sponsor - US Air Force

2. (U) Wt - 160 lbs, Vol - 0.6 cu ft, Power - 15 W

3. (U) 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. (U) SSD-975 (Plasma Resonance) - A1971 km, P134 km, Inclination 92.01°

1. (U) Sponsor - US Air Force

2. (U) Wt - 4.6 lbs, Vol - 0.05 cu ft, Power - 5 W

3. (U) 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. (U) SAMSO-132 (Proton Analyzer) - A1971 km, P134 km, Inclination 92.01°

1. (U) Sponsor - US Air Force

2. (U) Wt - 32 lbs, Vol - 1.1 cu ft, Power - 26 W

3. (U) 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. (U) CRL-210 (Velocity Mass Spectrometer) - A884 km, P137 km, Inclination 87.61°

1. (U) Sponsor - US Air Force

2. (U) Wt - 10.5 lbs, Vol - 0.05 cu ft, Power - 10 W

3. (U) 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. (U) NASC-117 (VLF Impedance) - A884 km, P137 km, Inclination 87.61°

1. (U) Sponsor - US Air Force

2. (U) Wt - 52 lbs, Vol - 0.7 cu ft, Power - 32.5 W

3. (U) 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. (U) SSD-980 (Neutral Atmosphere Composition) - A884 km, P137 km, Inclination 87.6°

1. (U) Sponsor - US Air Force

2. (U) Wt - 6.1 lbs, Vol - 0.15 cu ft, Power - 2 W

3. (U) The objective of SSD-980 was to measure neutral atmosphere composition. The experiment was only 20 percent successful.

g. (U) OAR-901 (Atmospheric Density "Musketball") - A1051 km, P916 km, Inclination 87.62°

1. (U) Sponsor - US Air Force

2. (U) Wt - 800 lbs, Vol - 5.4 cu ft, Power - None

3. (U) 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. (U) AVL-802 (Grid Sphere Drag #2) - A895 km, P1053 km, Inclination 87.61°

1. (U) Sponsor - US Air Force

2. (U) Wt - 97 lbs, Vol - 9.2 cu ft, Power - 14.0 W

3. (U) The objective of AVL-802 was to provide a space target for ground

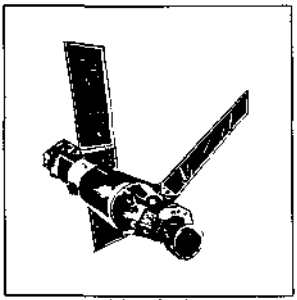
(U--Continued) radar calibration. No useful data were acquired.

i. (U) RTD-701 (Calibration Sphere #4) - A914 km, P1045 km, Inclination 87.62°

1. (U) Sponsor - US Army

2. (U) Wt - 82.4 lbs, Vol - 28 cu ft, Power - 0 W

3. (U) 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. (U) Launch Date: 17 October 1971
2. (U) Launch Vehicle: Thorad-Agena D
3. (U) Launch Site: WTR
4. (U) Mission Duration: 14 months
5. (U) Orbital Parameters: A803 km, P773 km, Inclination 92.72°
6. (U) Contractor: Lockheed Missiles and Space Company
7. (U) Cost: $18.1 million
8. (U) List of Experiments:

   a. (U) ONR-001 (Energetic Particles)

   b. (U) RTD-806 (Solar Array)

   c. (U) SAMSO-002 (Celestial IR)

   d. (U) NSA-001 (Communications)

9. (U) Experiment Summary:

   a. (U) ONR-001 (Energetic Particles)

      1. (U) Sponsor - US Navy

2. (U) Wt - 84 lbs, Vol - 9.4 cu ft, Power - 38 W

3. (U) 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. (U) RTD-806 (Solar Array)

1. (U) Sponsor - US Air Force

2. (U) Wt - 250 lbs, Vol - 3.2 cu ft, Power - 75 W

3. (U) The objective of RTD-806 was to demonstrate in space a flexible "roll-up" type solar cell power system. The experiment was 100 percent successful. The technology from the experiment was used in the NASA Hubble Telescope design.

c. (U) SAMSO-002 (Celestial IR)

1. (U) Sponsor - US Air Force

2. (U) Wt - 128 lbs, Vol - 11 cu ft, Power - 544 W

3. (U) 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.

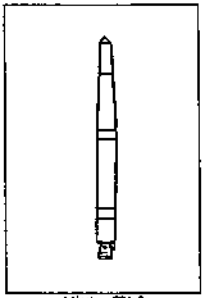
d. (U) NSA-001 (Communications)

1. (U) Sponsor - National Security Agency

2. (U) Wt - 17 lbs, Vol - 0.5 cu ft, Power - information not available

3. (U) The objective of NSA-001 was to conduct tests on secure communications links. The experiment was 100 percent successful and demonstrated an anti-jam secure communications link.

G. (U) 1972 MISSIONS



Mission 571-3

1. (U) Launch Date: 19 April 1972
2. (U) Launch Vehicle: Thorad-Agena
3. (U) Launch Site: WTR
4. (U) Mission Duration: 2.5 days
5. (U) Orbital Parameters: A277 km, P155 km, Inclination 81.5°
6. (U) Contractor: Aerospace Corporation Labs
7. (U) Cost: $0.15 million
8. (U) List of Experiments:

   a. (U) CRLS-235 (Ion Gauge)

   b. (U) SSD-987 (Night Glow)

9. (U) Experiment Summary:

a. (U) CRLS-235 (Ion Gauge)

1. (U) Sponsor - US Air Force

2. (U) Wt - 5.5 lbs, Vol - 0.2 cu ft, Power - 2.0 W

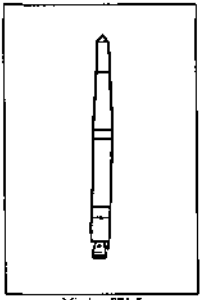
3. (U) The objective of CRLS-235 was to obtain data for orbit prediction. The experiment was 80 percent successful and contributed to short-term, low altitude orbit prediction.

b. (U) SSD-987 (Night Glow)

1. (U) Sponsor - US Air Force

2. (U) Wt - 12 lbs, Vol - 0.25 cu ft, Power - 4.5 W

3. (U) 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. (U) Launch Date: 25 May 1972
2. (U) Launch Vehicle: Thorad-Agena
3. (U) Launch Site: WTR
4. (U) Mission Duration: 2.5 days
5. (U) Orbital Parameters: A3305 km, P158 km, Inclination 96.3°
6. (U) Contractor: Aerospace Corporation Labs
7. (U) Cost: $0.08 million
8. (U) List of Experiments:

   a. (U) CRL-237 (Density Gauge)

   b. (U) CRLS-228 (Atmosphere Density and Composition)

9. (U) Experiment Summary:

a. (U) CRL-237 (Density Gauge)

1. (U) Sponsor - US Air Force

2. (U) Wt - 9 lbs, Vol - 0.12 cu ft, Power - 5 W

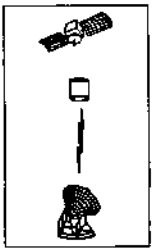
3. (U) The objective of CRL-237 was to measure atmospheric density. The experiment was only 5 percent successful and contributed little useful data.

b. (U) CRLS-228 (Atmospheric Density and Composition)

1. (U) Sponsor - US Air Force

2. (U) Wt - 16 lbs, Vol - 0.35 cu ft, Power - 8 W

3. (U) The objective of CRLS-228 was to measure atmospheric density and composition. The experiment acquired no useful data.



Mission P72-1

1. (U) Launch Date: 2 October 1972
2. (U) Launch Vehicle: Atlas F
3. (U) Launch Site: WTR
4. (U) Mission Duration: 12 years
5. (U) Orbital Parameters: A762 km, P742 km, Inclination 98.4°
6. (U) Contractor: Boeing Company, General Dynamics/Convair
7. (U) Cost: $9.2 million
8. (U) List of Experiments:
   a. (U) ARPA-501 (Gamma Spectrometer)
   b. (U) RTD-802 (RADCAT Cylinder #2)
   c. (U) ML-101 (Stability of Thermal Materials)
   d. (U) NRL-114 (Extreme UV Radiation)
   e. (U) SSD-988 (Low-Altitude Particles)

9. (U) Experiment Summary:

   a. (U) ARPA-501 (Gamma Spectrometer)

      1. (U) Sponsor - DOD (ARPA)

      2. (U) Wt - 415 lbs, Vol - 7.8 cu ft, Power - 34 W

      3. (U) 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. (U) RTD-802 (RADCAT Cylinder #2)

1. (U) Sponsor - DOD (ARPA)

2. (U) Wt - 448 lbs, Vol - 127 cu ft, Power - 0 W

3. (U) 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. (U) ML-101 (Stability of Thermal Materials)

1. (U) Sponsor - US Air Force

2. (U) Wt - 2 lbs, Vol - 0.06 cu ft, Power - 0.5 W

3. (U) 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. (U) NRL-114 (Extreme UV Radiation)

1. (U) Sponsor - US Navy

2. (U) Wt - 20 lbs, Vol - 5.9 cu ft, Power - 2.4 W

3. (U) 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.

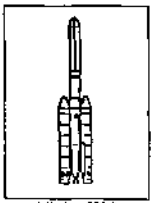
e. (U) SSD-988 (Low Altitude Particles)

1. (U) Sponsor - US Air Force

2. (U) Wt - 39 lbs, Vol - 1 cu ft, Power - 20 W

3. (U) 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.

## H. (U) 1974 MISSIONS



Mission S73-7

1. (U) Launch Date: 29 October 1974
2. (U) Launch Vehicle: Titan IIID
3. (U) Launch Site: WTR
4. (U) Mission Duration: None (no additional information available)
5. [redacted] (b)(1)
6. (U) Contractor: Space Data Corporation
7. (U) Cost: $0.8 million
8. (U) List of Experiments:
   a. (U) ARPA-101 (Calibration Satellite)

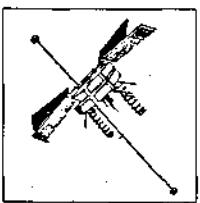
9. (U) Experiment Summary:

a. (U) ARPA-101 (Calibration Satellite)

1. (U) Sponsor - DOD (ARPA)

2. (U) Wt - 125 lbs, Vol - information not available, Power - information not available

3. (U) 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. (U) Launch Date: 14 July 1974
2. (U) Launch Vehicle: Atlas F
3. (U) Launch Site: WTR
4. (U) Mission Duration: 6 months
5. (U) Orbital Parameters: A13,475 km, P13,474 km, Inclination 125.1°
6. (U) Contractor: Fairchild Space and Electronics Company
7. (U) Cost: $5.6 million

8. (U) List of Experiments:

   a. (U) NRL-115 (TIMATION III)

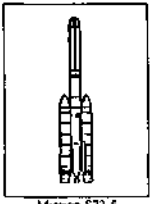
9. (U) Experiment Summary:

   a. (U) NRL-115 (TIMATION III)

      1. (U) Sponsor - US Navy

      2. (U) Wt - 440 lbs, Vol - 3.5 cu ft, Power - 21 W

      3. (U) 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. (U) Launch Date: 29 October 1974
2. (U) Launch Vehicle: Titan IIID
3. (U) Launch Site: WTR
4. (U) Mission Duration: 6 months
5. (U) Orbital Parameters: A3828 km, P107 km, Inclination 96.69°
6. (U) Contractor: Boeing Aerospace Company
7. (U) Cost: $4.3 million
8. (U) List of Experiments:

   a. (U) CRLS-211 (Low Altitude Density)

   b. (U) CRLS-213 (Atmospheric Heating)

   c. (U) CRL-212 (Thermosphere Composition)

9. (U) Experiment Summary:

a. (U) CRLS-211 (Low Altitude Density)

1. (U) Sponsor - US Air Force

2. (U) Wt - 38 lbs, Vol - 0.7 cu ft, Power - 20 W

3. (U) 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. (U) CRLS-213 (Atmospheric Heating)

1. (U) Sponsor - US Air Force

2. (U) Wt - 31 lbs, Vol - 1.3 cu ft, Power - 20 W

3. (U) 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.

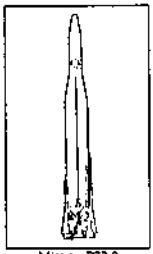
c. (U) CRL-212 (Thermosphere Composition)

1. (U) Sponsor - US Air Force

2. (U) Wt - 55 lbs, Vol - 1.5 cu ft, Power - 43 W

3. (U) 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.

1. (U) 1975 MISSIONS



Mission P72-2

1. (U) Launch Date: 12 April 1975
2. (U) Launch Vehicle: Atlas F
3. (U) Launch Site: WTR
4. (U) Mission Duration: None (booster failed)
5. (U) Orbital Parameters: None (booster failed)
6. (U) Contractor: Rockwell International
7. (U) Cost: $20.1 million
8. (U) List of Experiments:
   a. (U) DNA-002 (Wide Band Radio Propagation)
   b. (U) SAMSO-206 (UV Horizon)
   c. (U) ONR-123 (Aerosol Monitor)
   d. (U) SAMSO-207 (IR Mapping)

9. (U) Experiment Summary:

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

a. (U) DNA-002 (Wide Band Radio Propagation)

1. (U) Sponsor - Defense Nuclear Agency (Defense Atomic Support Agency)

2. (U) Wt - 14 lbs, Vol - 0.3 cu ft, Power - 36 W

3. (U) The objective of DNA-002 was to investigate radio propagation.

b. (U) SAMSO-206 (UV Horizon)

1. (U) Sponsor - US Air Force

2. (U) Wt - 76 lbs, Vol - 3.8 cu ft, Power - 17 W

3. (U) The objective of SAMSO-206 was to map the UV spectrum at the Earth's horizon.

c. (U) ONR-123 (Aerosol Monitor)

1. (U) Sponsor - US Navy

2. (U) Wt - 2 lbs, Vol - 0.02 cu ft, Power - 0.2 W

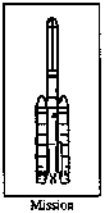
3. (U) The objective of ONR-123 was to measure the concentration and vertical distribution of aerosols in the stratosphere.

d. (U) SAMSO-207 (IR Mapping)

1. (U) Sponsor - US Air Force

2. (U) Wt - 450 lbs, Vol - 15.6 cu ft, Power - 550 W

3. (U) The objective of SAMSO-107 was to map the celestial sphere at IR frequencies.



Mission
S75-1

1. (U) Launch Date: 4 December 1975
2. (U) Launch Vehicle: Titan 3D
3. (U) Launch Site: WTR
4. (U) Mission Duration: 30 Days
5. (U) Orbital Parameters: A354 km, P123 km, Inclination 96.4°
6. (U) Contractor: Lockheed Missiles and Space Company
7. (U) Cost: $0.15 million
8. (U) List of Experiments:

a. (U) SAMSO-263 (Vehicle Velocity Sensor)

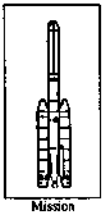
9. (U) Experiment Summary:

a. (U) SAMSO-263 (Vehicle Velocity Sensor)

1. (U) Sponsor - US Air Force

2. (U) Wt - 5 lbs, Vol - 0.1 cu ft, Power - 1.0 W

3. (U) 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. (U) Launch Date: 4 December 1975
2. (U) Launch Vehicle: Titan 3D
3. (U) Launch Site: WTR
4. (U) Mission Duration: 6 months
5. (U) Orbital Parameters: A840 km, P131 km, Inclination 96.2°
6. (U) Contractor: Boeing Corporation
7. (U) Cost: $4.4 million
8. (U) List of Experiments:

   a. (U) CRL-219 (Polar Atmosphere Dynamics)

   b. (U) CRLS-224 (Low Altitude Trapped Radiation)

   c. (U) CRL-234 (Accelerometer)

   d. (U) CRLS-223 (Density Variations)

   e. (U) CRL-226 (Atmosphere Measurements)

   f. (U) CRL-221 (Density Variations)

   g. (U) CRL-222 (Neutral Atmosphere)

9. (U) Experiment Summary:

   a. (U) CRL-219 (Polar Atmosphere Dynamics)

      1. (U) Sponsor - US Air Force

      2. (U) Wt - 32 lbs, Vol - 1.3 cu ft, Power - 16 W

3. (U) 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. (U) CRLS-224 (Low Altitude Trapped Radiation)

1. (U) Sponsor - US Air Force

2. (U) Wt - 35 lbs, Vol - 1.5 cu ft, Power - 6.1 W

3. (U) 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. (U) CRL-234 (Accelerometer)

1. (U) Sponsor - US Air Force

2. (U) Wt - 3 lbs, Vol - 0.03 cu ft, Power - 5 W

3. (U) 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. (U) CRLS-223 (Density Variations)

1. (U) Sponsor - US Air Force

2. (U) Wt - 7 lbs, Vol - 0.25 cu ft, Power - 2 W

3. (U) 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. (U) CRL-226 (Atmosphere Measurements)

1. (U) Sponsor - US Air Force

2. (U) Wt - 55 lbs, Vol - 0.8 cu ft, Power - 12 W

3. (U) 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

(U--Continued) electric field data. The experiment was 85 percent successful and contributed to the understanding of space charging for satellite survivability.

f. (U) CRL-221 (Density Variations)

1. (U) Sponsor - US Air Force

2. (U) Wt - 21 lbs, Vol - 0.3 cu ft, Power - 12 W

3. (U) 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. (U) CRL-222 (Neutral Atmosphere)

1. (U) Sponsor - US Air Force

2. (U) Wt - 22 lbs, Vol - 0.53 cu ft, Power - 21 W

3. (U) 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.

J. (U) 1976 MISSIONS (b)(1)

Mission P76-1

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

   a. (U) NRL-111 (SOLRAD)

   b. (U) LL-208 (Lincoln Experimental Satellite No. 8 and 9//LES 8/9)

9. (U) Experiment Summary:

a. (U) NRL-111 (SOLRAD) - A119.252 km, P117.985 km, Inclination 26.5°

1. (U) Sponsor - US Navy

2. (U) Wt - 1206 lbs, Vol - 15 cu ft, Power - information not available

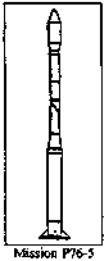
3. (U) The objective of NRL-111 was to measure a wide range of solar radiation through the use of multiple instruments. The experiment was 90 percent successful and contributed to Air Force weather prediction and real-time communications management.

b. (U) LL-208 (LES 8/9) - A35,787 km, P35,787 km, Inclination 25.0°

1. (U) Sponsor - US Air Force

2. (U) Wt - 1059 lbs, Vol - 450 cu ft, Power - 280 W (each spacecraft)

3. (U) The objective of LL-208 was to demonstrate in space a second generation tactical communications system which 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. (U) Launch Date: 22 May 1976
2. (U) Launch Vehicle: Scout
3. (U) Launch Site: WTR
4. (U) Mission Duration: 3 years
5. (U) Orbital Parameters: A1060 km, P994 km, Inclination 99.6°
6. (U) Contractor: John Hopkins Applied Physics Lab
7. (U) Cost: $3.8 million
8. (U) List of Experiments:

a. (U) DNA-002 (Wideband Radio)

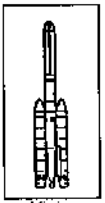
9. (U) Experiment Summary:

a. (U) DNA-002 (Wideband Radio)

1. (U) Sponsor - DOD (DNA)

2. (U) Wt - 15 lbs, Vol - 10 cu ft, Power - 46 W

3. (U) DNA-002 was a propagation experiment for a multifrequency beacon, 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. (U) Launch Date: July 1976
2. (U) Launch Vehicle: Titan 3D
3. (U) Launch Site: WTR
4. (U) Mission Duration: 6 months
5. (U) Orbital Parameters: A7972 km, P237 km, Inclination 97.5°
6. (U) Contractor: Boeing Aerospace Company
7. (U) Cost: $4.4 million
8. (U) List of Experiments:

   a. (U) CRLS-217 (Energetic Electron Environment)

   b. (U) CRLS-216 (ELF/VLF)

   c. (U) CRL-214 (Trapped Protons)

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

   e. (U) ONR-118 (Low Energy Spectrometer)

   f. (U) ONR-104 (Electric Field)

   g. (U) CRLS-218 (Electron Spectrometer)

9. (U) Experiment Summary:

   a. (U) CRLS-217 (Energetic Electron Environment)

      1. (U) Sponsor - US Air Force

2. (U) Wt - 8 lbs, Vol - 0.1 cu ft, Power - 2 W

3. (U) 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. (U) CRLS-216 (ELF/VLF)

1. (U) Sponsor - US Air Force

2. (U) Wt - 7 lbs, Vol - 0.06 cu ft, Power - 8 W

3. (U) The objective of CRLS-216 was to investigate the feasibility of low frequency communications. The experiment was only 5 percent successful.

c. (U) CRL-214 (Trapped Protons)

1. (U) Sponsor - US Air Force

2. (U) Wt - 16 lbs, Vol - 0.4 cu ft, Power - 7 W

3. (U) 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. (U) CRL-215 (Electric Fields/Ion Drift)

1. (U) Sponsor - US Air Force

2. (U) Wt - 15 lbs, Vol - 0.56 cu ft, Power - 11 W

3. (U) 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. (U) ONR-118 (Low Energy Spectrometer)

1. (U) Sponsor - US Navy

2. (U) Wt - 7 lbs, Vol - 0.12 cu ft, Power - 2 W

3. (U) 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. (U) ONR-104 (Electric Field)

1. (U) Sponsor - US Navy

2. (U) Wt - 16 lbs, Vol - 0.8 cu ft, Power - 4 W

3. (U) 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.

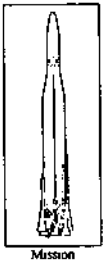
g. (U) CRLS-218 (Electron Spectrometer)

1. (U) Sponsor - US Air Force

2. (U) Wt - 8 lbs, Vol - 0.14 cu ft, Power - 7 W

3. (U) 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.

K. (U) 1977 MISSIONS



Mission P76-4

1. (U) Launch Date: 23 June 1977
2. (U) Launch Vehicle: Atlas-F
3. (U) Launch Site: WTR
4. (U) Mission Duration: Indefinite (NAVSTAR Prototype)
5. (U) Orbital Parameters: A20,236 km, P20,121 km, Inclination 64°
6. (U) Contractor: Fairchild Space and Electronics Company
7. (U) Cost: $6.1 million
8. (U) List of Experiments:

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

9. (U) Experiment Summary:

a. (U) NRL-116 (NTS-2)

1. (U) Sponsor - US Navy

2. (U) Wt - 450 lbs, Vol - 110 cu ft, Power - 100 W

3. (U) 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.

[redacted] (b)(1)

6. (U) Contractor: Lockheed Missiles and Space Company
7. (U) Cost: $1.55 million
8. (U) List of Experiments:

a. (U) DMA-501 (NAVPAC-1)

9. (U) Experiment Summary:

a. (U) DMA-501 (NAVPAC-1)

1. (U) Sponsor - DOD (Defense Mapping Agency)

2. (U) Wt - 70 lbs, Vol - information not available, Power - information not available (b)(1)

3. [redacted]

L. (U) 1978 MISSIONS

[redacted]

4. (U) Mission Duration: Information not available
5. (U) Orbital Parameters: information not available
6. (U) Contractor: Aerojet Electro-Systems
7. (U) Cost: $0.1 million
8. (U) List of Experiments:

   a. (U) DMA-501 (NAVPAC-2)

(b)(1)

9. (U) Experiment Summary:

   a. (U) DMA-501 (NAVPAC-2)

      1. (U) Sponsor - DOD (Defense Mapping Agency)

      2. (U) Wt - 70 lbs, Vol - information not available, Power - information not available

      3. [redacted]

(b)(1)

[redacted]

4. (U) Mission Duration: 172 days
5. (U) Orbital Parameters: A265 km, P165 km, Inclination Polar
6. (U) Contractor: Lockheed Missiles and Space Company
7. (U) Cost: $0.94 million
8. (U) List of Experiments:

   a. (U) CRL-246 (Vacuum UV)

b. (U) CRL-247 (Global Atmospheric Structure)

c. (U) NRL-607 (Pulsed Plasma Probe)

d. (U) ONR-305 (Galactic Proton Modulations)

9. (U) Experiment Summary:

a. (U) CRL-246 (Vacuum UV)

1. (U) Sponsor - US Air Force

2. (U) Wt - 51 lbs, Vol - 3 cu ft, Power - 13 W

3. (U) The objective of CRL-246 was to investigate UV background in the vacuum of space. The experiment was 100 percent successful and contributed to the data base on UV emissions from the Earth's surface and the solar atmosphere.

b. (U) CRL-247 (Global Atmospheric Structure)

1. (U) Sponsor - US Air Force

2. (U) Wt - 36 lbs, Vol - 0.06 cu ft, Power - 18.5 W

3. (U) The objective of CRL-247 was to measure variations in the density of the neutral atmosphere. The experiment was 100 percent successful and contributed to the neutral atmosphere data base.

c. (U) NRL-607 (Pulsed Plasma Probe)

1. (U) Sponsor - US Navy

2. (U) Wt - 5 lbs, Vol - 0.12 cu ft, Power - 7 W

3. (U) The objective of NRL-607 was to measure instabilities in the ionospheric plasma. The experiment was 100 percent successful and contributed to an understanding of radio-radar disturbance.

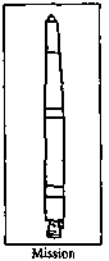
d. (U) ONR-305 (Galactic Proton Modulations)

1. (U) Sponsor - US Navy

2. (U) Wt - 6.2 lbs, Vol - 0.2 cu ft, Power - 1.5 W

3. (U) 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.

M. (U) 1979 MISSIONS



Mission P78-1

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

   a. (U) ARPA-301 (Gamma Ray Spectrometer)

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

   c. (U) CRL-251 (High Latitude Particles)

   d. (U) ECOM-721 (XUV Spectrometer)

   e. (U) NRL-401 (Solar Wind)

   f. (U) ONR-601 (Aerosol Measurement II)

   g. (U) NRL-608 (X-Ray Monitoring)

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

   i. (U) NRL-126 (Course Spectroheliograph)

j. (U) NRL-304 (Solar Photometer for XUV)

9. (U) Experiment Summary:

a. (U) ARPA-301 (Gamma Ray Spectrometer)

1. (U) Sponsor - DOD (ARPA)

2. (U) Wt - 322 lbs, Vol - information not available, Power - information not available

3. (U) 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. (U) CRLS-229 (Solar X-Ray Spectroheliograph)

1. (U) Sponsor - US Air Force

2. (U) Wt - 50 lbs, Vol - 3.7 cu ft, Power - 15 W

3. (U) 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. (U) CRL-251 (High Latitude Particles)

1. (U) Sponsor - US Air Force

2. (U) Wt - 71 lbs, Vol - 1.7 cu ft, Power - 17 W

3. (U) 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. (U) ECOM-721 (XUV Spectrometer)

1. (U) Sponsor - US Army

2. (U) Wt - 13 lbs, Vol - 0.2 cu ft, Power - 4.3 W

3. (U) The objective of ECOM-721 was to measure Extreme Ultra Violet (EUV) radiation in the upper atmosphere. The experiment was 100 percent successful and contributed to the EUV data base.

e. (U) NRL-401 (Solar Wind)

1. (U) Sponsor - US Navy

2. (U) Wt - 135 lbs, Vol - 2.1 cu ft, Power - 14 W

3. (U) 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. (U) ONR-601 (Aerosol Measurement II)

1. (U) Sponsor - US Navy

2. (U) Wt - 3 lbs, Vol - 0.02 cu ft, Power - 0.2 W

3. (U) 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. (U) NRL-608 (X-Ray Monitoring)

1. (U) Sponsor - US Navy

2. (U) Wt - 10 lbs, Vol - 0.5 cu ft, Power - 6.0 W

3. (U) 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. (U) NRL-128 (Solar Flare X-Ray Spectrometer)

1. (U) Sponsor - US Navy

2. (U) Wt - 76 lbs, Vol - 1.6 cu ft, Power - 7.5 W

3. (U) 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. (U) NRL-126 (Course Spectroheliograph)

1. (U) Sponsor - US Navy

2. (U) Wt - 12 lbs, Vol - 0.2 cu ft, Power - 1.0 W

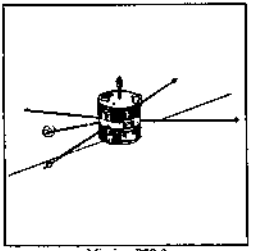
3. (U) The objective of NRL-126 was to measure solar X-ray emissions. The experiment was 100 percent successful and provided input to a solar flare data base.

j. (U) NRL-304 (Solar Photometer for XUV)

1. (U) Sponsor - US Navy

2. (U) Wt - 12 lbs, Vol - 0.1 cu ft, Power - 1.0 W

3. (U) The objective of NRL-304 was to measure brightness in the XUV range. The experiment acquired no useful data.



Mission P78-2
SCATHA

1. (U) Launch Date: 30 January 1979
2. (U) Launch Vehicle: Delta
3. (U) Launch Site: ETR
4. (U) Mission Duration: 12 years
5. (U) Orbital Parameters: A23,347 nm, P14,847 nm, Inclination 7.9°
6. (U) Contractor: Martin Marietta Corp.
7. (U) Cost: $29.0 million
8. (U) List of Experiments:
   a. (U) ML-902 (Thermal Control Coatings)
   b. (U) SAMSO-402 (Spacecraft Charging)
   c. (U) ONR-302 (Plasma Interaction)

9. (U) Experiment Summary:

a. (U) ML-902 (Thermal Control Coatings)

1. (U) Sponsor - US Air Force

2. (U) Wt - 3 lbs, Vol - 0.1 cu ft, Power - 1.2 W

3. (U) 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. (U) SAMSO-402 (Spacecraft Charging)

1. (U) Sponsor - US Air Force

2. (U) Wt - 147 lbs, Vol - 2.7 cu ft, Power - 34.5 W

3. (U) 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. (U) ONR-302 (Plasma Interaction)

1. (U) Sponsor - US Navy

2. (U) Wt - 72 lbs, Vol - 0.8 cu ft, Power - 36.0 W

3. (U) 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.

[redacted] (b)(1)

4. (U) Mission Duration: information not available
5. (U) Orbital Parameters: information not available
6. (U) Contractor: Lockheed Missiles and Space Company
7. (U) Cost: $0.1 million
8. (U) List of Experiments:

   a. (U) DMA-501 (NAVPAC-3)

9. (U) Experiment Summary:

(U) DMA-501 (NAVPAC-3)

1. (U) Sponsor - DOD (Defense Mapping Agency)

b. (U) SAMSO-402 (Spacecraft Charging)

1. (U) Sponsor - US Air Force

2. (U) Wt - 147 lbs, Vol - 2.7 cu ft, Power - 34.5 W

3. (U) 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. (U) ONR-302 (Plasma Interaction)

1. (U) Sponsor - US Navy

2. (U) Wt - 72 lbs, Vol - 0.8 cu ft, Power - 36.0 W

3. (U) 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.

[redacted] (b)(1)

4. (U) Mission Duration: information not available
5. (U) Orbital Parameters: information not available
6. (U) Contractor: Lockheed Missiles and Space Company
7. (U) Cost: $0.1 million
8. (U) List of Experiments:

   a. (U) DMA-501 (NAVPAC-3)

9. (U) Experiment Summary:

(U) DMA-501 (NAVPAC-3)

1. (U) Sponsor - DOD (Defense Mapping Agency)

2. (U) Wt - 70 lbs, Vol - information not available, Power - information not available

[redacted]

(b)(1)

N. (U) **1982 MISSIONS**

[redacted]

(b)(1)

6. (U) Contractor: Lockheed Missiles and Space Company
7. (U) Cost: $34.4 million
8. (U) List of Experiments:

   a. (U) AFGL-201 (Cryogenic Infrared Radiance Instrument for Shuttle/CIRRIS)

   b. (U) SAMSO-508 (Space Sextant)

   c. (U) AFGL-801A (Horizon Ultraviolet Program/HUP)

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

   e. (U) CRL-258 (Passive Cosmic Ray Detector)

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

   g. (U) SD-101 (Solar Aspect Sensor)

9. (U) Experiment Summary:

a. (U) AFGL-201 (CIRRIS)

1. (U) Sponsor - US Air Force

2. (U) Carrier - STP Engineering Support Structure

3. (U) Wt - 3600 lbs, Vol - 89.2 cu ft, Power - 500 W

4. (U) 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. The experiment failed and no useful data were obtained.

b. (U) SAMSO-508 (Space Sextant)

1. (U) Sponsor - US Air Force

2. (U) Carrier - STP Engineering Support Structure

3. (U) Wt - 182 lbs, Vol - 6.0 cu ft, Power - 195 W

4. (U) 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. (U) AFGL-801A (HUP)

1. (U) Sponsor - US Air Force

2. (U) Carrier - STP Engineering Support Structure

3. (U) Wt - 40 lbs, Vol - 1.0 cu ft, Power - 12 W

4. (U) 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. (U) AFGL-804 (Sheath, Wake, and Charging)

1. (U) Sponsor - US Air Force

2. (U) Carrier - STP Engineering Support Structure

3. (U) Wt - 53.5 lbs, Vol - 0.5 cu ft, Power - 29 W

4. (U) The objective of AFGL-804 was to measure actual environmental plasma disturbance on the Shuttle and other test bodies. The experiment was 100 percent successful. The data were used to model plasma/large body interactions for future space missions.

e. (U) CRL-258 (Passive Cosmic Ray Detector)

1. (U) Sponsor - US Air Force

2. (U) Carrier - STP Engineering Support Structure

3. (U) Wt - 1 lbs, Vol - 0.0017 cu ft, Power - None

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

1. (U) Sponsor - US Navy

2. (U) Carrier - STP Engineering Support Structure

3. (U) Wt - 8 lbs, Vol - 0.32 cu ft, Power - 6 W

4. (U) The objective of NRL-802 was to determine the impact of Shuttle-borne contamination on plasma experiments. The experiment was successful. The data were used as a data base in planning future experiments.

g. (U) SD-101 (Solar Aspect Sensor)

1. (U) Sponsor - US Air Force

2. (U) Carrier - STP Engineering Support Structure

3. (U) Wt - information not available, Vol - information not available, Power - information not available

4. (U) The objective of SD-101 was to measure the sun position relative to the P-269 payload pallet. The experiment was successful and provided a backup source of orbiter/sun angle data.

[redacted] (b)(1)

4. (U) Mission Duration: 7 months

[redacted]

7. (U) Cost: $2.050 million
8. (U) List of Experiments:

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

b. (U) ONR-602 (Solar Flares)

9. (U) Experiment Summary:

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

1. (U) Sponsor - US Navy

2. (U) Wt - 22 lbs, Vol - 0.47 cu ft, Power - 10 W

3. (U) 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.

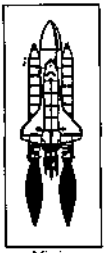
b. (U) ONR-602 (Solar Flares)

1. (U) Sponsor - US Navy

2. (U) Wt - 41 lbs, Vol - 1.7 cu ft, Power - 11.5 W

3. (U) 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.

O. (U) **1983 MISSIONS**



Mission
STS-31C

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

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

9. (U) Experiment Summary:

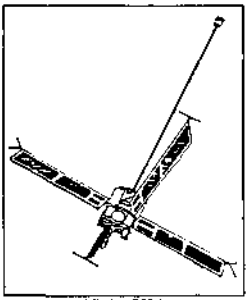
   a. (U) NRL-904A (SURE-1)

      1. (U) Sponsor - US Navy

      2. (U) Carrier - Get-Away Special (GAS) Can with opening lid

      3. (U) Wt - 167 lbs, Vol - 5 cu ft, Power - None

      4. (U) 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
HILAT

1. (U) Launch Date: 27 June 1983
2. (U) Launch Vehicle: Scout/Transit
3. (U) Launch Site: WTR
4. (U) Mission Duration: 6 years
5. (U) Orbital Parameters: A504 nm, P500 nm, Inclination 82.0°
6. (U) Contractor: Applied Physics Lab
7. (U) Cost: $3.1 million
8. (U) List of Experiments:
   a. (U) AFGL-101 (Auroral Ionospheric Mapper/AIM)
   b. (U) DNA-101 (Scientec Beacon)
   c. (U) Thermal Plasma Experiment
   d. (U) Electron Spectrometer
   e. (U) Magnetometer

9. (U) Experiment Summary:

a. (U) AFGL-101 (AIM)

1. (U) Sponsor - US Air Force

2. (U) Wt - 21 lbs, Vol - 1.1 cu ft, Power - 11.9 W

3. (U) 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. (U) DNA-101 (Scientec Beacon)

1. (U) Sponsor - DOD (Defense Nuclear Agency)

2. (U) Wt - 12.7 lbs, Vol - 0.1 cu ft, Power - 20 W

3. (U) 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. (U) Thermal Plasma Experiment

1. (U) Sponsor - US Air Force

2. (U) Wt - 12.3 lbs, Vol - information not available, Power - 4.5 W

3. (U) 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. (U) Electron Spectrometer

1. (U) Sponsor - US Air Force

2. (U) Wt - 8 lbs, Vol - information not available, Power - 0.43 W

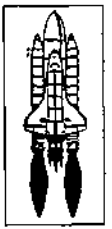
3. (U) The objective of the electron spectrometer experiment was to measure particle flux in the ionosphere. The experiment was 100 percent successful and contributed to the data base for ionospheric specifications.

e. (U) Magnetometer

1. (U) Sponsor - DOD (Defense Nuclear Agency)

2. (U) Wt - 5 lbs, Vol - information not available, Power - 0.7 W

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

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

[redacted]

9. (U) Experiment Summary:

(b)(1)

a. (U) AFTAC-301 (RME)

(U) See Mission STS-44 (1991)

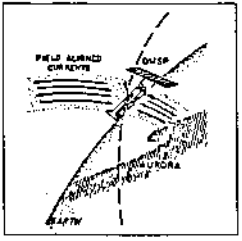
[redacted]

1. (U) Sponsor - information not available

2. (U) Carrier - information not available

3. (U) Wt - information not available, Vol - information not available, Power - information not available

[redacted] (b)(1)




Mission S82-1

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

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

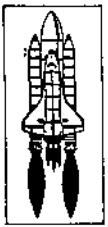
9. (U) Experiment Summary:

(U) AFGL-902 (ICSA)

1. (U) Sponsor - US Air Force

2. (U) Wt - 5 lbs, Vol - 0.3 cu ft, Power - 5 W

3. (U) 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.



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

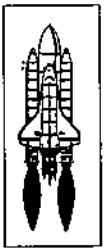
**a. (U) AFGL-308 (Auroral Photography Experiment/APE-A)

9. (U) Experiment Summary:

a. (U) AFGL-308 (APE-A)

(U) See Mission STS-43 (1991)

P. (U) 1984 MISSIONS



Mission
STS-32
(S80-1) LDEF
(RME)

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

a. (U) LDEF (Long Duration Exposure Facility)

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

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

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

(4) (U) SD-802 (Spacecraft Materials)

(5) (U) AFTAC-201 (Space Effects)

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

9. (U) Experiment Summary:

a. (U) LDEF

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

(a) (U) Sponsor - US Air Force

(b) (U) Wt - 92 lbs, Vol - 4 cu ft, Power - 495 W

(c) (U) 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) (U) CRL-258 (Trapped Proton Energy Spectrum)

(a) (U) Sponsor - US Air Force

(b) (U) Wt - 50 lbs, Vol - 0.5 cu ft, Power - None

(c) (U) 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) (U) NRL-702 (Heavy Ions in Space)

(a) (U) Sponsor - US Navy

(b) (U) Wt - 264 lbs, Vol - 3.5 cu ft, Power - None

(c) (U) 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) (U) SD-802 (Spacecraft Materials)

(a) (U) Sponsor - US Air Force

(b) (U) Wt - 44 lbs, Vol - 3 cu ft, Power - 14 W

(c) (U) 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) (U) AFTAC-201 (Space Effects)

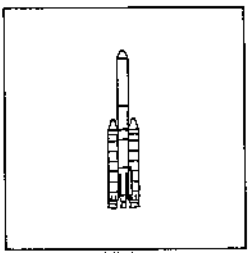
(a) (U) Sponsor - US Air Force

(b) (U) Wt - 20 lbs, Vol - 0.5 cu ft, Power - None

(c) (U) The objective of AFTAC-201 was to determine the space environmental effects on electro-optical sensor components.

b. (U) AFTAC-301 (RME)

(U) See Mission STS-53 (1992)



Mission
585-1

1. (U) Launch Date: 25 June 1984
2. (U) Launch Vehicle: Titan 34D
3. (U) Launch Site: WTR
4. (U) Mission Duration: 4 months
5. (U) Orbital Parameters: A230 km, P170 km, Inclination 96.1°
6. (U) Contractor: Lockheed Missiles and Space Company
7. (U) Cost: $1.2 million
8. (U) List of Experiments:

   a. (U) ONR-901 (Polar Ozone and Aerosol Measurements/POAM)

   b. (U) CRLS-505 (Upper Atmosphere Composition Spectrometers/ UACS)

9. (U) Experiment Summary:

a. (U) ONR-901 (POAM)

1. (U) Sponsor - US Navy

2. (U) Wt - 8 lbs, Vol - 0.14 cu ft, Power - 5 W

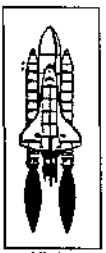
3. (U) The objective of ONR-901 was to measure variations in polar ozone and aerosol concentrations. The experiment was 10 percent successful. The data were used to validate a follow-on experiment.

b. (U) CRLS-505 (UACS)

1. (U) Sponsor - US Air Force

2. (U) Wt - 30 lbs, Vol - 1.0 cu ft, Power - 6.2 W

3. (U) 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-41B

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

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

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

9. (U) Experiment Summary:

   a. (U) SD-301 (CRUX-1)

      1. (U) Sponsor - US Air Force

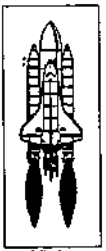
      2. (U) Carrier - GAS Can

      3. (U) Wt - 180 lbs, Vol - 5 cu ft, Power - None

      4. (U) 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. (U) AFTAC-301 (RME)

(U) See Mission STS-53 (1992)



Mission
STS-41D

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

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

**b. (U) AMD-201 (Visual Function Test in Space/VFT-1)

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

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

9. (U) Experiment Summary:

a. (U) AWS-301 (CLOUDS)

(U) See Mission STS-53 (1992)

b. (U) AMD-201 (VFT-1)

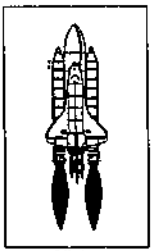
(U) See Mission STS-44 (1991)

c. (U) AFTAC-301 (RME)

(U) See Mission STS-53 (1992)

d. (U) GL-503 (AMOS)

(U) See Mission STS-49 (1992)



Mission
STS-41G

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

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

b. (U) NRL-905 (Trapped Ions in Space/TRIS-1)

**c. (U) AMD-201 (Visual Function Test in Space/VFT-1)

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

9. (U) Experiment Summary:

a. (U) GL-308 (APE-A)

(U) See Mission STS-43 (1991)

b. (U) NRL-905 (TRIS-1)

1. (U) Sponsor - US Navy
2. (U) Carrier - GAS Can
3. (U) Wt - 200 lbs, Vol - 5 cu ft, Power - None

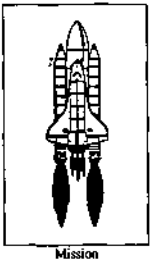
4. (U) The objective of NRL-905 was to measure the spatial distribution of heavy ions in low Earth orbit. The experiment was 100 percent successful. The data will be used to model the space radiation environment and to prepare a standard for spacecraft reliability.

c. (U) AMD-201 (VFT-1)

(U) See Mission STS-44 (1991)

d. (U) AFTAC-301 (RME)

(U) See Mission STS-53 (1992)



Mission
STS-51A

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

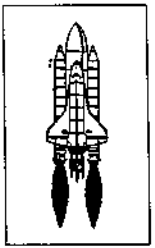
**a. (U) AFTAC-301 (Radiation Monitoring Equipment/RME)

9. (U) Experiment Summary:

a. (U) AFTAC-301 (RME)

(U) See Mission STS-53 (1992)

Q. (U) 1985 MISSIONS



Mission
STS-51C

1. (U) Launch Date: 24 January 1985
2. (U) Launch Vehicle: Space Shuttle
3. (U) Launch Site: KSC
4. (U) Mission Duration: 3 days
5. [redacted] (b)(1)
6. (U) Contractor: Martin Marietta Corporation
7. (U) Cost: See Para A, Page IV-2
8. (U) List of Experiments:
   a. (U) OASIS* [Orbiter Experiment (OEX) Autonomous Supporting Instrumentation System]
   **b. (U) SFMD (Storable Fluids Management Demonstration)
   **c. (U) AMD-101 (Visual of Autogenic Feedback Techniques/VAFT)
   **d. (U) AMD-201 (Visual Function Test in Space/VFT-1)
   **e. (U) AWS-301 (Cloud Logic to Optimize Use of Defense Systems/CLOUDS-1)
   **f. (U) NSSA-301 (Photograph of Ocean Wave Forms/ OCEANS)

9. (U) Experiment Summary:

   a. (U) OASIS*

b. (U) SFMD

1. (U) Sponsor - US Air Force

2. (U) Carrier - Middeck Locker

3. (U) Wt - 268 lbs, Vol - 5 Lockers, Power - 42.0 W

4. (U) 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. (U) AMD-101 (VAFT)

1. (U) Sponsor - US Air Force

2. (U) Carrier - Middeck Locker

3. (U) Wt - 11 lbs, Vol - 2 cu ft, Power - None

4. (U) 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. (U) AMD-201 (VFT-1)

(U) See Mission STS-53 (1992)

e. (U) AWS-301 (CLOUDS-1)

(U) See Mission STS-53 (1992)

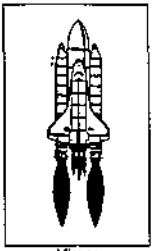
f. (U) NSSA-301 (OCEANS)

1. (U) Sponsor - US Navy

2. (U) Carrier - Middeck Locker

3. (U) Wt - 35 lbs, Vol - 1.5 Lockers, Power - information not available

4. (U) 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. (U) Launch Date: 29 April 1985
2. (U) Launch Vehicle: Space Shuttle
3. (U) Launch Site: KSC
4. (U) Mission Duration: 7 days
5. (U) Orbital Parameters: 190 nm, Inclination 57.0°
6. (U) Contractor: GLOMR (NASA Goddard Space Flight Center)
7. (U) Cost: GLOMR ($0.035 million), Also See Para A, Page IV-2
8. (U) List of Experiments:

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

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

9. (U) Experiment Summary:

   a. (U) DARPA-401 (GLOMR)

      1. (U) Sponsor - DOD (DARPA)

      2. (U) Carrier - GAS Can with ejection mechanism

      3. (U) Wt - 160 lbs, Vol - 5 cu ft, Power - None

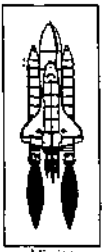
      4. (U) The objective of DARPA-401 was to demonstrate the feasibility of building and operating a small, low cost communications satellite and to demonstrate its military value. The experiment was unsuccessful due to the failure of the experiment container opening lid to operate properly.

   b. (U) GL-503 (AMOS)

      (U) See Mission STS-49 (1992)

10. (U) Unique Mission Characteristics

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

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

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

9. (U) Experiment Summary:

   a. (U) NRL-904B (SURE II)

      1. (U) Sponsor - US Navy

      2. (U) Carrier - GAS Can with opening lid

      3. (U) Wt - 167 lbs, Vol - 5 cu ft, Power - None

      4. (U) The objective of NRL-904B was the observation and description of the ultraviolet spectrum, including spatial variation, and temporal behavior. The experiment failed due to an electronic failure. No useful data were obtained.

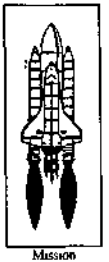
   b. (U) SDIO-501 (HPTE)

      1. (U) Sponsor - DOD (SDIO)

      2. (U) Carrier - Middeck Locker

      3. (U) Wt - 8 lbs, Vol - 2 cu ft, Power - None

4. (U) 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. (U) Launch Date: 3 October 1985
2. (U) Launch Vehicle: Space Shuttle
3. (U) Launch Site: KSC
4. (U) Mission Duration: 4 days
5. (U) Orbital Parameters: 254 nm (515 km) circular, Inclination 28.5°
6. (U) Contractor: Martin Marietta Corporation
7. (U) Cost: See Para A, Page IV-2
8. (U) List of Experiments:

**a. (U) AFGL-407 (Measurement of Atmospheric Radiance Camera-Day/Night//MARC-DN)

**b. (U) AMD-304 (Contrast Sensitivity Tester/CST)

**c. (U) WINCON (Hatch Window Contamination Study)

**d. (U) AMD-302 (Reaction Time and Time Perception Analyzer/RTPA)

**e. (U) OASIS* (OEX Autonomous Supporting Instrumentation System)

**f. (U) AWS-301 (Cloud Logic to Optimize Use of Defense Systems/CLOUDS II)

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

**h. (U) AMD-201 (Visual Function Test in Space/VFT-1)

i. (U) AMD-501 (Visual Function Test in Space/VFT-2).

9. (U) Experiment Summary:

a. (U) AFGL-407 (MARC-DN)

1. (U) Sponsor - US Air Force

2. (U) Carrier - Middeck Locker

3. (U) Wt - 15 lbs, Vol - 0.5 cu ft, Power - None (b)(1)

[redacted]

b. (U) AMD-304 (CST)

1. (U) Sponsor - US Air Force

2. (U) Carrier - Middeck Locker

3. (U) Wt - 15 lbs, Vol - 1 cu ft, Power - None

4. (U) The objective of AMD-304 was to measure changes during spaceflight in static contrast sensitivity. No useful flight data were obtained.

c. (U) WINCON

1. (U) Sponsor - information not available

2. (U) Carrier - information not available

3. (U) Wt - information not available, Vol - information not available, Power - information not available

4. (U) The objective of WINCON was to investigate the contamination which 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 current experiment.

d. (U) AMD-302 (RTPA)

1. (U) Sponsor - US Air Force

2. (U) Carrier - Middeck Locker

3. (U) Wt - 9 lbs, Vol - 2 cu ft, Power - None

4. (U) 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. (U) OASIS*

f. (U) AWS-301 (CLOUDS II)

(U) See Mission STS-53 (1992)

g. (U) GL-503 (AMOS)

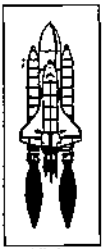
(U) See Mission STS-49 (1992)

h. (U) AMD-201 (VFT-1)

(U) See Mission STS-44 (1991)

i. (U) AMD-501 (VFT-2)

(U) See Mission STS-53 (1992)



Mission
STS-61A

1. (U) Launch Date: 30 October 1985
2. (U) Launch Vehicle: Space Shuttle
3. (U) Launch Site: KSC
4. (U) Mission Duration: 7 days
5. (U) Orbital Parameters: Alt 175 nm, Inclination 57.0°
6. (U) Contractor: NASA Goddard Space Flight Center
7. (U) Cost: $0.035 million
8. (U) List of Experiments:

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

9. (U) Experiment Summary:

a. (U) DARPA-401 (GLOMR)

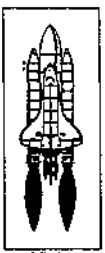
1. (U) Sponsor - DOD (DARPA)

2. (U) Carrier - GAS Can with ejection mechanism

3. (U) Wt - 160 lbs, Vol - 5 cu ft, Power - None

4. (U) 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 100 percent successful and has led to a number of continuing investigations into the military use of small, low cost satellites.

R. (U) **1986 MISSIONS**



Mission
STS-61C

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

   a. (U) AFA-301 (Flexible Beam Experiment/FLEX BEAM)

   b. (U) AFGL-402 (Particle Analysis Camera For Shuttle/PACS)

9. (U) Experiment Summary:

   a. (U) AFA-301 (FLEX BEAM)

      1. (U) Sponsor - US Air Force

      2. (U) Carrier - GAS Can

      3. (U) Wt - 200 lbs, Vol - 5 cu ft, Power - None

      4. (U) 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.

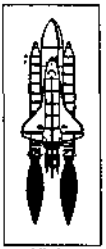
b. (U) AFGL-402 (PACS)

1. (U) Sponsor - US Air Force

2. (U) Carrier - Hitchhiker G

3. (U) Wt - 99 lbs, Vol - 8 cu ft, Power - 21 W

4. (U) 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. (U) Launch Date: 28 January 1986
2. (U) Launch Vehicle: Space Shuttle
3. (U) Launch Site: KSC
4. (U) Mission Duration: None (launch vehicle failure)
5. (U) Orbital Parameters: None (launch vehicle failure)
6. (U) Contractor: Martin Marietta Corporation
7. (U) Cost: See Para A, Page IV-2
8. (U) List of Experiments:

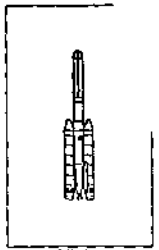
**a. (U) AFTAC-301 (Radiation Monitoring Equipment/RME)

9. (U) Experiment Summary:

(U) AFTAC-301 (RME)

1. (U) See Mission STS-53 (1992)

2. (U) Due to the loss of Space Shuttle Challenger, no data were obtained.



Mission
S86-1

[redacted] (b)(1)

6. (U) Contractor: Lockheed Missiles and Space Company
7. (U) Cost: $0.805 million
8. (U) List of Experiments:

   a. (U) RADC-801 (Ducted Ionosphere)

9. (U) Experiment Summary:

   a. (U) RADC-801 (Ducted Ionosphere)

      1. (U) Sponsor - US Air Force

      2. (U) Wt - 35 lbs, Vol - 1.2 cu ft, Power - 18 W

      3. (U) 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
POLAR BEAR

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

   a. (U) AFGL-401 (Auroral/Ionospheric Remote Sensor//AIRS)

b. (U) RADC-301 (MATS)

c. (U) DNA-301 (BEACON)

9. (U) Experiment Summary:

a. (U) AFGL-401 (AIRS)

1. (U) Sponsor - US Air Force

2. (U) Wt - 20 lbs, Vol - 2.2 cu ft, Power - 17 W

3. (U) 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. (U) RADC-301 (MATS)

1. (U) Sponsor - US Air Force

2. (U) Wt - 26 lbs, Vol - 0.2 cu ft, Power - 5.5 W

3. (U) 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.

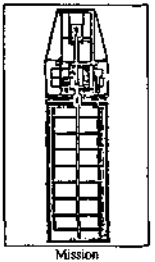
c. (U) DNA-301 (BEACON)

1. (U) Sponsor - US Navy

2. (U) Wt - 7 lbs, Vol - 0.07 cu ft, Power - 14 W

3. (U) 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.

5. (U) 1988 MISSIONS



Mission
P87-3

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

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

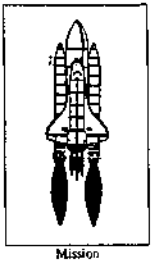
9. (U) Experiment Summary:

a. (U) DARPA-701 (GRAD)

1. (U) Sponsor - DOD (DARPA)

2. (U) Wt - 150 lbs, Vol - 5.0 cu ft, Power - 20 W

3. (U) 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.



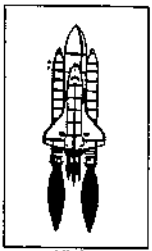
Mission
STS-26

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

   a. (U) OASIS* (OEX Autonomous Supporting Instrumentation System)

9. (U) Experiment Summary:

a. (U) OASIS*



Mission
STS-27

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

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

   **b. (U) GL-308 (Auroral Photography Experiment/APE-A)

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

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

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

   **f. (U) AMD-501 (Visual Function Test in Space/VFT-2)

   g. (U) OASIS* (OEX Autonomous Supporting Instrumentation System)

   h. (U) IOCM* (Interim Operational Contamination Monitor)

   i. (U) Secure TV*

9. (U) Experiment Summary:

a. (U) SD-301 (CRUX-A)

1. (U) Sponsor - US Air Force

2. (U) Carrier - GAS Can

3. (U) Wt - 225 lbs, Vol - 5 cu ft, Power - 12 W

4. (U) The objective of SD-301 (second flight) was to continue efforts to determine the cosmic ray induced error rate in a memory IC. The experiment was partially successful. The data were used to determine the validity of an analytical model.

b. (U) GL-308 (APE-A)

(U) See Mission STS-43 (1991)

c. (U) AFTAC-301 (RME)

(U) See Mission STS-53 (1992)

d. (U) AWS-301 (CLOUDS-1A)

(U) See Mission STS-53 (1992)

e. (U) GL-503 (AMOS)

(U) See Mission STS-49 (1992)

f. (U) AMD-501 (VFT-2)

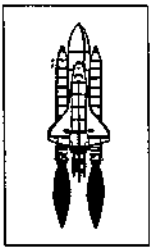
(U) See Mission STS-53 (1992)

g. (U) OASIS*

h. (U) IOCM*

i. (U) Secure TV*

T. (U) 1989 MISSIONS



Mission
STS-29

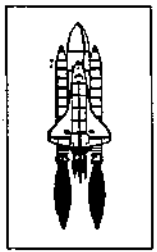
1. (U) Launch Date: 13 March 1989
2. (U) Launch Vehicle: Space Shuttle
3. (U) Launch Site: KSC
4. (U) Mission Duration: 5 days
5. (U) Orbital Parameters: Alt 163 nm, Inclination 28.5°
6. (U) Contractor: Rockwell International
7. (U) Cost: See Para A, Page IV-2
8. (U) List of Experiments:

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

9. (U) Experiment Summary:

a. (U) GL-503 (AMOS)

(U) See Mission STS-49 (1992)



Mission
STS-30

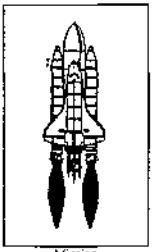
1. (U) Launch Date: 4 May 1989
2. (U) Launch Vehicle: Space Shuttle
3. (U) Launch Site: KSC
4. (U) Mission Duration: 4 days
5. (U) Orbital Parameters: Alt 161 nm, Inclination 28.9°
6. (U) Contractor: Rockwell International
7. (U) Cost: See Para A, Page IV-2
8. (U) List of Experiments:

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

9. (U) Experiment Summary:

a. (U) GL-503 (AMOS)

(U) See Mission STS-49 (1992)



Mission
STS-28

1. (U) Launch Date: 8 August 1989
2. (U) Launch Vehicle: Space Shuttle
3. (U) Launch Site: KSC
4. (U) Mission Duration: 6 days

[redacted]

6. (U) Contractor: HEIN-LO (NASA Goddard Space Flight Center)
7. (U) Cost: (MPEC and HEIN-LO $0.052 million), Also See Para A, Page IV-2
8. (U) List of Experiments:

(b)(1)

**a. (U) NAVSPACECOM-701 (Latitude-Longitude Locator/L$^3$)

**b. (U) SDIO-902 (Shuttle Activation Monitor/SAM I)

c. (U) AFTAC-402 (Heavy Ion Environment at Low Altitude/HEIN-LO)

[redacted]

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

**f. (U) AWS-301 (Clouds Logic to Optimize Use of Defense Systems/CLOUDS-1A)

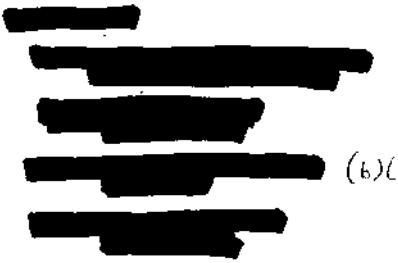
**g. (U) GL-503 (Air Force Maui Optical Site/AMOS)

**h. (U) AMD-501 (Visual Function Test in Space/VFT-2)

i. (U) APM* (Ascent Particle Monitor)

j. (U) IOCM* (Interim Operational Contamination Monitor)

l. (U) MPEC (Multi-Purpose Experiment Canister)




9. (U) Experiment Summary:

a. (U) NAVSPACECOM-701 ($L^3$)

1. (U) Sponsor - US Navy

2. (U) Carrier - Middeck Locker

3. (U) Wt - 12 lbs, Vol - 1 cu ft, Power - 115V AC Shuttle provided

4. (U) 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. (U) SDIO-902 (SAM I)

1. (U) Sponsor - DOD (SDIO)

2. (U) Carrier - Middeck Locker

3. (U) Wt - 52 lbs, Vol - 2 cu ft, Power - 26 W

4. (U) 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. (U) AFTAC-402 (HEIN-LO)

1. (U) Sponsor - US Air Force

2. (U) Carrier - GAS Can with opening lid

3. (U) Wt - 170 lbs, Vol - 5 cu ft, Power - information not available

4. (U) 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.

(b)(1)

[redacted]

e. (U) AFTAC-301 (RME)

(U) See Mission STS-53 (1992)

f. (U) AWS-301 (CLOUDS-1A)

(U) See Mission STS-53 (1992)

g. (U) GL-503 (AMOS)

(U) See Mission STS-49 (1992)

h. (U) AMD-501 (VFT-2)

(U) See Mission STS-53 (1992)

i. (U) APM*

j. (U) IOCM*

k. (U) Secure TV*

l. (U) MPEC

(U) See Mission STS-39 (1991)

[redacted]

(1) [redacted] (b)(1)

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(2) [redacted]

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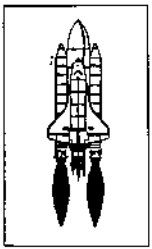
(3) [redacted]

[redacted]

(4) [redacted]

[redacted]



Mission
STS-34

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

   a. (U) OASIS* (OEX Autonomous Supporting Instrumentation Systems)

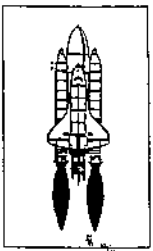
   **b. (U) AFTAC-704/Sensor Technology Experiment/STEX)

9. (U) Experiment Summary:

   a. (U) OASIS*

   b. (U) AFTAC-704 (STEX)

      (U) See Mission STS-41 (1990)



Mission
STS-33

1. (U) Launch Date: 22 November 1989
2. (U) Launch Vehicle: Space Shuttle
3. (U) Launch Site: KSC
4. (U) Mission Duration: 6 days

(b)(1)

[redacted]

6. (U) Contractor: CRUX-B (NASA Goddard Space Flight Center)
7. (U) Cost: CRUX-B ($0.010 million), Also See Para A, Page IV-2
8. (U) List of Experiments:

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

   b. (U) SD-301 (Cosmic Ray Upset Experiment CRUX-B)

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

**d. (U) GL-308 (Aurora) Photography Experiment/ APE-B)

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

**f. (U) AMD-201 (Visual Function Test in Space/ VFT-1)

9. (U) Experiment Summary:

a. (U) AWS-301 (CLOUDS 1-A)

(U) See Mission STS-53 (1992)

b. (U) SD-301 (CRUX-B)

1. (U) Sponsor - US Air Force

2. (U) Carrier - GAS Can

3. (U) Wt - 180 lbs, Vol - 5 cu ft, Power - information not available

4. (U) The objective of SD-301 was to continue the investigation of the cosmic ray induced error rate in a memory IC. The experiment was successful. The data were used to determine the validity of the analytical model.

c. (U) AFTAC-301 (RME)

(U) See Mission STS-53 (1992)

d. (U) GL-308 (APE-B)

(U) See Mission STS-43 (1991)

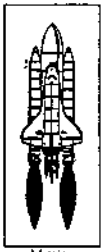
e. (U) GL-503 (AMOS)

(U) See Mission STS-49 (1992)

f. (U) AMD-201 (VFT-1)

(U) See Mission STS-53 (1992)

U. (U) 1990 MISSIONS



Mission
STS-32

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

**a. (U) NAVSPACECOM-701 (Latitude/Longitude Locator/$L^2$)

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

c. (U) IOCM* (Interim Operational Contamination Monitor)

9. (U) Experiment Summary:

a. (U) NAVSPACECOM-701 ($L^2$)

1. (U) Sponsor - US Navy

2. (U) Carrier - Middeck Locker

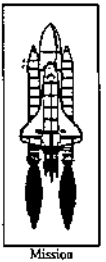
3. (U) Wt - 40 lbs, Vol - 1 Locker, Power - 115V AC Shuttle provided

4. (U) 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. (U) GL-503 (AMOS)

(U) See Mission STS-49 (1992)

c. (U) IOCM*



Mission
STS-36

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

**a. (U) AMD-201 (Visual Function Test in Space/VFT-1)

**b. (U) AMD-501 (Visual Function Test in Space/VFT-2)

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

9. (U) Experiment Summary:

a. (U) AMD-201 (VFT-1)

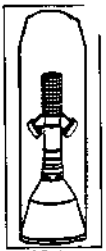
(U) See Mission STS-44 (1991)

b. (U) AMD-501 (VFT-2)

(U) See Mission STS-53 (1992)

c. (U) AFTAC-301 (RME)

(U) See Mission STS-53 (1992)



Mission
P87-2
STACKSAT

1. (U) Launch Date: 11 April 1990
2. (U) Launch Vehicle: Atlas E/Altair
3. (U) Launch Site: WTR
4. (U) Mission Duration: Not completed
5. (U) Orbital Parameters: A406 nm, P3347 nm, Inclination 89.9°
6. (U) Contractor: Defense Systems Inc.
7. (U) Cost: $22.0 million
8. (U) List of Experiments:

   a. (U) RADC-501 (Transceiver Experiment/TEX)

   b. (U) NSSA-602 (Selective Communications Experiment/SCE)

   c. (U) NOC-602 (Polar Orbiting Geomagnetic Survey/POGS)

   d. (U) STC-701 (Solid State Recorder/SSR)

   e. (U) SD-701 (Prototype Deployment Device/PDD)

9. (U) Experiment Summary:

a. (U) RADC-501 (TEX)

1. (U) Sponsor - US Air Force

2. (U) Wt - information not available, Vol - information not available, Power - information not available

3. (U) 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. (U) NSSA-602 (SCE)

1. (U) Sponsor - US Navy

2. (U) Wt - information not available, Vol - information not available, Power - information not available

3. (U) NSSA-602 is fully operational and successfully demonstrating store and forward communications.

c. (U) NOC-601 (POGS)

1. (U) Sponsor - US Navy

2. (U) Wt - 11 lbs, Vol - 0.2 cu ft, Power - 2 W

3. (U) 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. (U) STC-701 (SSR)

1. (U) Sponsor - US Air Force

2. (U) Wt - 5.1 lbs, Vol - 0.7 cu ft, Power - 4 W

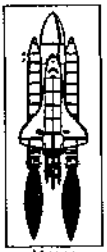
3. (U) The objective of STC-701 is to demonstrate a solid state recorder as a viable alternative to magnetic storage devices. The experiment has been fully successful to date. The SSR has operated normally and free of errors.

e. (U) SD-701 (PDD)

1. (U) Sponsor - US Air Force

2. (U) Wt - information not available, Vol - information not available, Power - information not available

3. (U) The objective of SD-701 was to test a new 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. (U) Launch Date: 24 April 1990
2. (U) Launch Vehicle: Space Shuttle
3. (U) Launch Site: KSC
4. (U) Mission Duration: 6 days
5. (U) Orbital Parameters: Alt 330 nm, Inclination 28.5°
6. (U) Contractor: Rockwell International
7. (U) Cost: See Para A, Page IV-2
8. (U) List of Experiments:

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

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

c. (U) APM* (Ascent Particle Monitor)

9. (U) Experiment Summary:

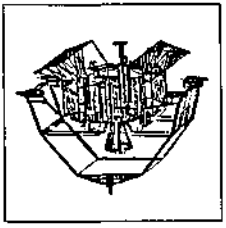
a. (U) GL-503 (AMOS)

(U) See Mission STS-49 (1992)

b. (U) AFTAC-301 (RME)

(U) See Mission STS-53 (1992)

c. (U) APM*



Mission P86-1
CRRES

1. (U) Launch Date: 25 July 1990
2. (U) Launch Vehicle: Atlas/Centaur
3. (U) Launch Site: ETR
4. (U) Mission Duration: 3 years (est)
5. (U) Orbital Parameters: A22,350 nm, P218 nm, Inclination 18°
6. (U) Contractor: Ball Space Systems Division
7. (U) Cost: $97.0 million
8. (U) List of Experiments:

a. (U) AFGL-701 (Space Radiation/ SPACERAD)

b. (U) ONR-307 (Energetic Particles and Ion Composition/EPIC)

c. (U) ONR-604 (Isotopes in Solar Flares/SOLAR FLARES II)

d. (U) AFAPL-801 (High Efficiency Solar Panels/HESP)

e. (U) NRL-701 (Low Altitude Satellite Studies of Ionospheric Irregularities/LASSII)

9. (U) Experiment Summary:

a. (U) AFGL-701 (SPACERAD)

1. (U) Sponsor - US Air Force

2. (U) Wt - 225 lbs, Vol - 3.3 cu ft, Power - 75 W

3. (U) 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. (U) ONR-307 (EPIC)

1. (U) Sponsor - US Navy

2. (U) Wt - 25 lbs, Vol - 0.8 cu ft, Power - 6 W

3. (U) 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. (U) ONR-604 (SOLAR FLARES II)

1. (U) Sponsor - US Navy

2. (U) Wt - 32 lbs, Vol - 1.2 cu ft, Power - 5.3 W

3. (U) 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. (U) AFAPL-801 (HESP)

1. (U) Sponsor - US Air Force

2. (U) Wt - 14 lbs, Vol - 0.14 cu ft, Power - 15 W

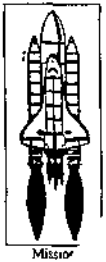
3. (U) The objective of AFAPL-801 was to demonstrate and evaluate in space a high efficiency solar panel. The experiment was 100 percent successful. Data from the experiment will be used to prepare a design handbook.

e. (U) NRL-701 (LASSII)

1. (U) Sponsor - US Navy

2. (U) Wt - 39 lbs, Vol - information not available, Power - 38 W

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

**a. (U) AFTAC-704 (Sensor Technology Experiment/STEX)

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

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

9. (U) Experiment Summary:

a. (U) AFTAC-704 (STEX)

1. (U) Sponsor - US Air Force

2. (U) Carrier - Middeck Locker

3. (U) Wt - 36 lbs, Vol - 2 cu ft, Power - None

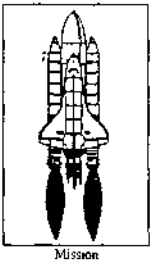
4. [redacted] (b)(1)

b. (U) GL-503 (AMOS)

(U) See Mission STS-49 (1992)

c. (U) AFTAC-301 (RME)

(U) See Mission STS-53 (1992)



Mission STS-38

1. (U) Launch Date: 15 November 1990
2. (U) Launch Vehicle: Space Shuttle
3. (U) Launch Site: KSC
4. (U) Mission Duration: 5 days
5. [redacted] (b)(6)
6. (U) Contractor: Rockwell International
7. (U) Cost: See Para A, Page IV-2
8. (U) List of Experiments:

**a. (U) AMD-201 (Visual Function Test in Space/VFT-1)

**b. (U) GL-308 (Auroral Photography Experiment/APE-B)

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

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

e. (U) APM* (Ascent Particle Monitor)

**f. (U) HSD-701 (Spaceborne Direct View Optical System I/SpaDVOS-1)

9. (U) Experiment Summary:

a. (U) AMD-201 (VFT-1)

(U) See Mission STS-44 (1991)

b. (U) GL-308 (APE-B)

(U) See Mission STS-44 (1991)

c. (U) GL-503 (AMOS)

(U) See Mission STS-49 (1992)

d. (U) AFTAC-301 (RME)

(U) See Mission STS-53 (1992)

e. (U) APM*

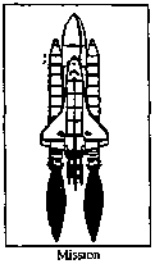
f. (U) HSD-701 (SpaDVOS-1)

1. (U) Sponsor - US Air Force

2. (U) Carrier - Middeck Locker

3. (U) Wt - 45 lbs, Vol - 1.5 Lockers, Power - 11 W

4. (U) The objective of HSD-701 was to determine observer performance levels for space to ground viewing using a direct view optical system. After an inital flight, the SpaDVOS project was terminated.



Mission
STS-35

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

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

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

9. (U) Experiment Summary:

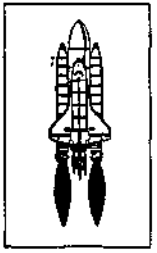
   a. (U) GL-503 (AMOS)

      (U) See Mission STS-49 (1992)

   b. (U) AFTAC-301 (RME)

      (U) See Mission STS-53 (1992)

V. (U) 1991 MISSIONS



Mission
STS-37

1. (U) Launch Date: 5 April 1991
2. (U) Launch Vehicle: Space Shuttle
3. (U) Launch Site: KSC
4. (U) Mission Duration: 6 days
5. (U) Orbital Parameters: Alt 243 nm, Inclination 28.5°
6. (U) Contractor: Rockwell International
7. (U) Cost: See Para A, Page IV-2
8. (U) List of Experiments:

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

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

c. (U) APM* (Ascent Particle Monitor)

9. (U) Experiment Summary:

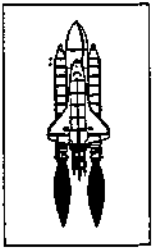
a. (U) GL-503 (AMOS)

(U) See Mission STS-49 (1992)

b. (U) AFTAC-301 (RME)

(U) See Mission STS-53 (1992)

c. (U) APM*



Mission
STS-39

1. (U) Launch Date: 28 April 1991
2. (U) Launch Vehicle: Space Shuttle
3. (U) Launch Site: KSC
4. (U) Mission Duration: 8 days
5. (U) Orbital Parameters: Alt 140 nm, Inclination 57°
6. (U) Contractor:
   a. (U) Middeck Lockers - Rockwell International
   b. (U) Air Force Program-675 - Lockheed Missiles and Space Company
   c. (U) SDIO Infrared Background Signature Survey (IBSS*) STP (managing); Messerschmitt-Bölkow-Blohn GMBH; Defense Systems Inc.; Physical Science Inc.
   d. (U) Space Test Payload-1 (STP-1) - NASA Goddard Space Flight Center
7. (U) Cost:
   **a. (U) Middeck Lockers - See Para A, Page IV-2
   b. (U) AFP-675 - $97.0 million
   c. (U) IBSS* - N/A (full SDIO funding; STP managing mission)

d. (U) STP-1 - $4.0 million

8. (U) List of Experiments:

**a. (U) SSD-105 (Cloud Logic to Optimize Use of Defense Systems/CLOUDS-1A)

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

**c. (U) UVPI* (Ultraviolet Plume Imager/Instrument)

d. (U) AFGL-201 (Cryogenic Infrared Radiance Instrument for Shuttle/CIRRIS 1A) [AFP-675]

e. (U) NRL-803 (Far Ultraviolet Imaging and Photometry or Far Ultraviolet Camera/FAR UV) [AFP-675]

f. (U) AFGL-801A (Horizon Ultraviolet Program/HUP) [AFP-675]

g. (U) AFGL-804A (Quadruple Ion/Neutral Mass Spectrometer//QINMS) [AFP-675]

h. (U) AFTAC-801 (Uniformly Redundant Arrays/URA) [AFP-675]

i. (U) AIS* (Arizona Imager Spectrograph) [IBSS*]

j. (U) CIV* (Critical Ionization Velocity) [IBSS*]

k. (U) CRO* (Chemical Release Observation) [IBSS*]

l. (U) IRS* (Infrared Sensor) [IBSS*]

m. (U) L³TV* (Low Light Level TV) [IBSS*]

n. (U) NRL-904 (Ultraviolet Limb Imaging Experiment/UVLIM) [STP-1]

o. (U) SD-602 (Advanced Liquid Feed Experiment/ALFE) [STP-1]

p. (U) AFGL-501 (Spacecraft Kinetic Infrared Test/SKIRT) [STP-1]

q. (U) APM* -- 2 units (Ascent Particle Monitor) [STP-1]

r. (U) DSE* (Data Systems Experiment) [STP-1]

s. (U) MPEC (Multi-Purpose Experiment Canister)

9. (U) Experiment Summary:

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

(U) See Mission STS-53 (1992)

b. (U) RME

(U) See Mission STS-53 (1992)

c. (U) UVPI*

d. (U) AFGL-201 (CIRRIS 1A)

1. (U) Sponsor - US Air Force

2. (U) Carrier - Experiment Support System

3. (U) Wt - 3600 lbs, Vol - 74 cu ft, Power - 250 W

4. (U) 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. (U) NRL-803 (FAR UV)

1. (U) Sponsor - US Navy

2. (U) Carrier - Experiment Support System

3. (U) Wt - 550 lbs, Vol - 38.2 cu ft, Power - 60 W

4. (U) 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. (U) AFGL-801 (HUP)

1. (U) Sponsor - US Navy

2. (U) Carrier - Experiment Support System

3. (U) Wt - 55 lbs, Vol - 3.8 cu ft, Power - 14 W

4. (U) 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. (U) AFGL-804 (OINMS)

1. (U) Sponsor - US Air Force

2. (U) Carrier - Experiment Support System

3. (U) Wt - 20 lbs, Vol - 0.3 cu ft, Power - 15 W

4. (U) 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

(U--Continued) percent successful. The data will be used to evaluate the effect of contamination on the CIRRIS instrument.

h. (U) AFTAC-801 (URA)

1. (U) Sponsor - US Air Force

2. (U) Carrier - Experiment Support System

3. (U) Wt - 75 lbs, Vol - 4.6 cu ft, Power - 10 W (b)(1)

4. [redacted]

i. (U) AIS*

j. (U) CIV*

k. (U) CRO*

l. (U) IRS*

m. (U) L$^3$TV*

n. (U) NRL-904 (UVLIM)

1. (U) Sponsor - US Navy

2. (U) Carrier - Hitchhiker M

3. (U) Wt - 360 lbs, Vol - 7 cu ft, Power - 56 W

4. (U) 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. (U) SD-602 (ALFE)

1. (U) Sponsor - US Air Force

2. (U) Carrier - Hitchhiker M

3. (U) Wt - 280 lbs, Vol - 1 cu ft, Power - 500 W

4. (U) 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. (U) AFGL-501 (SKIRT)

1. (U) Sponsor - US Air Force

2. (U) Carrier - Hitchhiker M

3. (U) Wt - 330 lbs, Vol - 2.6 cu ft, Power - 50 W

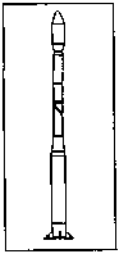
4. (U) The objective of AFGL-501 was to measure infrared emissions produced by spacecraft optical surfaces in low Earth orbit. The experiment was 100 percent successful. The data will be used to optimize surveillance and engagement sensors for space defense.

q. (U) APM* (2 units)

r. (U) DSE* (NASA Experiment)

s. (U) MPEC

(U) 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. (U) Launch Date: 29 June 1991
2. (U) Launch Vehicle: Scout
3. (U) Launch Site: WTR
4. (U) Mission Duration: information not available
5. (U) Orbital Parameters: A470 nm, P420 nm, Inclination Polar
6. (U) Contractor: Defense Systems Inc.
7. (U) Cost: $3.3 million
8. (U) List of Experiments:
   a. (U) RADC-802 (Radiation Experiment/REX)

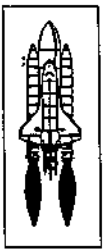
9. (U) Experiment Summary:

a. (U) RADC-802 (REX)

1. (U) Sponsor - US Air Force

2. (U) Wt - 175 lbs (spacecraft), Vol - information not available, Power - 8.0 W

3. (U) 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. (U) Launch Date: 2 August 1991
2. (U) Launch Vehicle: Space Shuttle
3. (U) Launch Site: KSC
4. (U) Mission Duration: 9 days
5. (U) Orbital Parameters: 160 nm, Inclination 28.5°
6. (U) Contractor: Rockwell International
7. (U) Cost: See Para A, Page IV-2
8. (U) List of Experiments:

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

**b. (U) GL-308 (Auroral Photography Experiment/APE-B)

**c. (U) UVPI* (Ultraviolet Plume Imager/Instrument)

9. (U) Experiment Summary:

a. (U) GL-503 (AMOS)

(U) See Mission STS-49 (1992)

b. (U) GL-308 (APE-B)

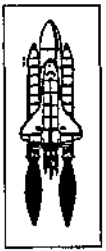
1. (U) Sponsor - US Air Force

2. (U) Carrier - Middeck Locker

3. (U) Wt - 18.9 lbs, Vol - 0.4 cu ft, Power - None

4. (U) 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 percent successful. The spectra obtained are used to validate the DOD satellite signature code.

c. (U) UVPI*



Mission
STS-48

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

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

**b. (U) SDIO-904 (Cosmic Radiation Effects and Activation Monitor/CREAM)

**c. (U) SDIO-902 (Shuttle Activation Monitor/SAM I)

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

e. (U) APM* (Ascent Particle Monitor)

9. (U) Experiment Summary:

a. (U) GL-503 (AMOS)

(U) See Mission STS-49 (1992)

b. (U) SDIO-904 (CREAM)

(U) See Mission STS-53 (1992)

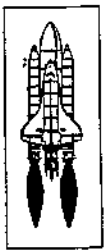
c. (U) SDIO-902 (SAM I)

(U) See Mission STS-44 (1991)

d. (U) AFTAC-301 (RME)

(U) See Mission STS-53 (1992)

e. (U) APM*



Mission
STS-44

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

**a. (U) USAIC-101 (TERRA SCOUT)

**b. (U) AFSPACECOM-702 (BATTLEVIEW) [M88-1 reflight]

**c. (U) OPNAV-701 (Maritime Observation Experiments in Space/MOSES) [M88-1 reflight]

**d. [redacted] (b)(1)

**e. (U) GL-503 (Air Force Maui Optical Site/AMOS) [also known as AMOS Calibration Test/ACT]

**f. (U) SDIO-904 (Cosmic Radiation Effects and Activation Monitor/CREAM)

**g. (U) AFTAC-301 (Radiation Monitoring Equipment/RME) [also known as HSD-101]

**h. (U) SDIO-902 (Shuttle Activation Monitor/SAM I)

**i. (U) AMD-201 (Visual Function Test in Space/VFT-1) [also known as HSD-201 (Visual Function Tester, Version 1/VFT-1)]

**j. (U) UVPI* (Ultraviolet Plume Imager/Instrument)

**k. (U) IOCM* (Interim Operational Contamination Monitor)

l. (U) APM* (Ascent Particle Monitor)

9. (U) Experiment Summary:

a. (U) USAIC-101 (TERRA SCOUT)

1. (U) Sponsor - US Army

2. (U) Carrier - Middeck Locker

3. [redacted]

4. [redacted] (b)(1)

b. (U) AFSPACECOM-702 (BATTLEVIEW)

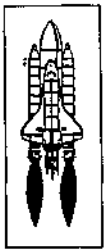
1. (U) Sponsor - US Air Force

2. (U) Carrier - Middeck Locker

3. (U) Wt - information not available, Vol - information not available, Power - information not available

4. [redacted]

e. (U) APM*



Mission
STS-44

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

**a. (U) USAIC-101 (TERRA SCOUT)

**b. (U) AFSPACECOM-702 (BATTLEVIEW) [M88-1 reflight]

**c. (U) OPNAV-701 (Maritime Observation Experiments in Space/MOSES) [M88-1 reflight]

**d. [redacted] (b)(1)

**e. (U) GL-503 (Air Force Maui Optical Site/AMOS) [also known as AMOS Calibration Test/ACT]

**f. (U) SDIO-904 (Cosmic Radiation Effects and Activation Monitor/CREAM)

**g. (U) AFTAC-301 (Radiation Monitoring Equipment/RME) [also known as HSD-101]

**h. (U) SDIO-902 (Shuttle Activation Monitor/SAM I)

**i. (U) AMD-201 (Visual Function Test in Space/VFT-1) [also known as HSD-201 (Visual Function Tester, Version 1/VFT-1)]

**j. (U) UVPI* (Ultraviolet Plume Imager/Instrument)

**k. (U) IOCM* (Interim Operational Contamination Monitor)

l. (U) APM* (Ascent Particle Monitor)

9. (U) Experiment Summary:

a. (U) USAIC-101 (TERRA SCOUT)

1. (U) Sponsor - US Army

2. (U) Carrier - Middeck Locker

3. [redacted]

4. [redacted] (b)(1)

b. (U) AFSPACECOM-702 (BATTLEVIEW)

1. (U) Sponsor - US Air Force

2. (U) Carrier - Middeck Locker

3. (U) Wt - information not available, Vol - information not available, Power - information not available

4. [redacted]

c. (U) OPNAV-701 (MOSES)

1. (U) Sponsor - US Navy

2. (U) Carrier - Middeck Locker

3. (U) Wt - information not available, Vol - 1 Locker, Power - None

4. [redacted]

d. [redacted] (b)(1)

1. (U) Sponsor - US Navy

2. (U) Carrier - Middeck Locker

3. (U) Wt - information not available, Vol - information not available, Power - information not available

4. [redacted]

e. (U) GL-503 (AMOS/ACT)

(U) See Mission STS-49 (1992)

f. (U) SDIO-904 (CREAM)

(U) See Mission STS-53 (1992)

g. (U) AFTAC-301 (RME)

(U) See Mission STS-53 (1992)

h. (U) SDIO-902 (SAM I)

1. (U) Sponsor - Strategic Defense Initiative Organization (SDIO)

2. (U) Carrier - Middeck Locker

3. (U) Wt - 24 kg, Vol - 2 cu ft, Power - 26 W

4. (U) 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 set parameters. The experiments have been 100 percent successful to date. The data will contribute to manned spacecraft radiation models.

i. (U) AMD-201 (VFT-1)

1. (U) Sponsor - US Air Force

2. (U) Carrier - Middeck Locker

3. (U) Wt - 6.6 lbs, Vol - 1 cu ft, Power - None

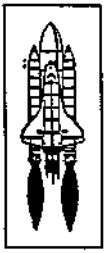
4. (U) The objective of the VFT-1 series of experiments was to determine the effects of microgravity on several vision parameters. The experiments have been 100 percent successful to date. The data will be used to establish a baseline for the ability of man in space to see objects.

j. (U) UVPI*

k. (U) IOCM*

l. (U) APM*

W. (U) 1992 MISSIONS



Mission
STS-42

1. (U) Launch Date: 22 January 1992
2. (U) Launch Vehicle: Space Shuttle
3. (U) Launch Site: KSC
4. (U) Mission Duration: 7 days
5. (U) Orbital Parameters: Alt 162 nm, Inclination 57°
6. (U) Contractor: Rockwell International
7. (U) Cost: (See Para A, Page IV-2), NPS-603 ($10.0 Thousand), AFGL-502 ($17.0 Thousand)
8. (U) List of Experiments:
   a. (U) HSD-101 (Radiation Monitoring Equipment III/RME III)
   b. (U) UVPI* (Ultraviolet Plume Imager/Instrument)
   c. (U) NPS-603 (Sapce Thermo-Acoustic Refrigerator/STAR)
   d. (U) AFGL-502 (Visual Photometric Experiment/VIPER)

9. (U) Experiment Summary:

**a. (U) HSD-101 (RME)

(U) See Mission STS-53 (1992)

b. (U) UVPI*

c. (U) NPS-603 (STAR)

1. (U) Sponsor - US Navy
2. (U) Carrier - GAS Can
3. (U) Wt - 199 lbs, Vol - 2 cu ft, Power - 700 W-hr provided by experiment

4. (U) The objective of NPS-603 was to demonstrate a refrigerator which 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.

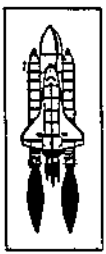
d. (U) AFGL-502 (VIPER)

1. (U) Sponsor - US Air Force

2. (U) Carrier - GAS Can with opening lid

3. (U) Wt - information not available, Vol - 5 cu ft, Power - internal batteries

4. (U) The objective of AFGL-502 was to measure emmissions 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. (U) Launch Date: 24 March 1992
2. (U) Launch Vehicle: Space Shuttle
3. (U) Launch Site: KSC
4. (U) Mission Duration: 9 days
5. (U) Orbital Parameters: Alt 160 nm, Inclination 57°
6. (U) Contractor: Rockwell International
7. (U) Cost: See Para A, Page IV-2
8. (U) List of Experiments:

**a. (U) SSD-105 (Cloud Logic to Optimize Use of Defense Systems/CLOUDS-1A)

**b. (U) HSD-101 (Radiation Monitoring Equipment/RME III)

**c. (U) ASPWS-701 (Space Tissue Loss Model/STL)

d. (U) UVPI* (Ultraviolet Plume Imager/Instrument)

**e. (U) AMD-501 (Visual Function Test in

Space/VFT-2) [also known as HSD-501 (Visual Function Tester, Version 2 (VFT-2)]

9. (U) Experiment Summary:

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

(U) See Mission STS-53 (1992)

**b. (U) HSD-101 (RME III)

(U) See Mission STS-53 (1992)

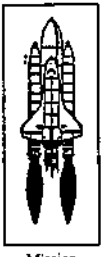
**c. (U) ASPWS-701 (STL)

(U) See Mission STS-53 (1992)

d. (U) UVPI*

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

(U) See Mission STS-53 (1992)



Mission STS-49

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

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

b. (U) UVPI* (Ultraviolet Plume Imager/Instrument)

9. (U) Experiment Summary:

**a. (U) GL-503 (AMOS)

1. (U) Sponsor - US Air Force

2. (U) Carrier - Mideck Locker

3. (U) Wt - None, Vol - None, Power - None

4. (U) The objective of the AMOS 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, the experiments have been 100% successful. The data are provided to the Plume Data Center.

b. (U) UVPI*

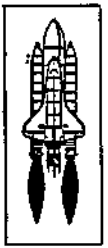
Mission
STS-50

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

   a. (U) UVPI* (Ultraviolet Plume Imager/Instrument)

9. (U) Experiment Summary:

(U) UVPI*



Mission
STS-46

1. (U) Launch Date: 31 July 1992
2. (U) Launch Vehicle: Space Shuttle
3. (U) Launch Site: KSC
4. (U) Mission Duration: 8 days
5. (U) Orbital Parameters: Alt 230 nm, Inclination 28.5°
6. (U) Contractor: Rockwell International
7. (U) Cost: $1.051 Million, Also See Para A, Page IV-2
8. (U) List of Experiments:

   a. (U) UVPI* (Ultraviolet Plume Imager/Instrument)

   b. (U) AFGL-703 (Shuttle Potential and Return Electron Experiment/SPREE)

9. (U) Experiment Summary:

   a. (U) UVPI*

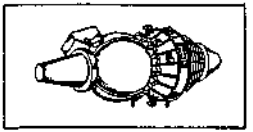
   b. (U) AFGL-703 (SPREE)

      1. (U) Sponsor - US Air Force

      2. (U) Carrier - MPESS (Mission Peculiar Experiment Support Structure)

      3. (U) Wt - 80 lbs, Vol - 4.7 cu ft, Power - 73 W

      4. (U) 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.



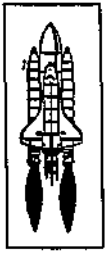
Mission
S92-2

1. (U) Launch Date: 14 August 1992
2. (U) Launch Vehicle: Russian RESURS-F1
3. (U) Launch Site: Plesetsk, Russia
4. (U) Mission Duration: 14 days
5. (U) Orbital Parameters: A126 nm, P117 nm, Inclination 82.57°
6. (U) Contractor: INTEX Inc. and Moscow State University
7. (U) Cost: $180,000
8. (U) List of Experiments:

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

9. (U) Experiment Summary:

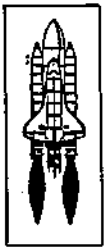
(U) The BINRAD experiment failed to deploy due to premature closure during launch of the lid to the Scientific Equipment Container. No useful experiment data were obtained.



Mission
STS-53

1. (U) Launch Date: 2 December 1992
2. (U) Launch Vehicle: Space Shuttle
3. (U) Launch Site: KSC
4. (U) Mission Duration: 4 days
5. (U) Orbital Parameters: Alt 200 nm, Inclination 57°
6. (U) Contractor:
   a. (U) Middeck Lockers - Rockwell International
   b. (U) Hitchhikers - NASA Goddard Space Flight Center
7. (U) Cost:
   a. (U) Middeck Lockers - See Para A, Page IV-2
   b. (U) Hitchhikers - $935,000
8. (U) List of Experiments:

**a. (U) C2NVEO-101 (Battlefield Laser Acquisition Test/BLAST)



Mission
STS-46

1. (U) Launch Date: 31 July 1992
2. (U) Launch Vehicle: Space Shuttle
3. (U) Launch Site: KSC
4. (U) Mission Duration: 8 days
5. (U) Orbital Parameters: Alt 230 nm, Inclination 28.5°
6. (U) Contractor: Rockwell International
7. (U) Cost: $1.051 Million, Also See Para A, Page IV-2
8. (U) List of Experiments:
   a. (U) UVPI* (Ultraviolet Plume Imager/Instrument)
   b. (U) AFGL-703 (Shuttle Potential and Return Electron Experiment/SPREE)

9. (U) Experiment Summary:

a. (U) UVPI*

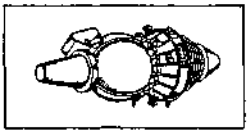
b. (U) AFGL-703 (SPREE)

1. (U) Sponsor - US Air Force

2. (U) Carrier - MPESS (Mission Peculiar Experiment Support Structure)

3. (U) Wt - 80 lbs, Vol - 4.7 cu ft, Power - 73 W

4. (U) 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.



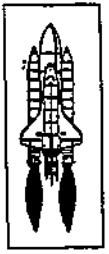
Mission
S92-2

1. (U) Launch Date: 14 August 1992
2. (U) Launch Vehicle: Russian RESURS-F1
3. (U) Launch Site: Plesetsk, Russia
4. (U) Mission Duration: 14 days
5. (U) Orbital Parameters: A126 nm, P117 nm, Inclination 82.57°
6. (U) Contractor: INTEX Inc. and Moscow State University
7. (U) Cost: $180,000
8. (U) List of Experiments:

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

9. (U) Experiment Summary:

(U) 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. (U) Launch Date: 2 December 1992
2. (U) Launch Vehicle: Space Shuttle
3. (U) Launch Site: KSC
4. (U) Mission Duration: 4 days
5. (U) Orbital Parameters: Alt 200 nm, Inclination 57°
6. (U) Contractor:
   a. (U) Middeck Lockers - Rockwell International
   b. (U) Hitchhikers - NASA Goddard Space Flight Center
7. (U) Cost:
   a. (U) Middeck Lockers - See Para A, Page IV-2
   b. (U) Hitchhikers - $935,000
8. (U) List of Experiments:

   **a. (U) C2NVEO-101 (Battlefield Laser Acquisition Test/BLAST)

**b. (U) SSD-105 (Cloud Logic to Optimize Use of Defense Systems/CLOUDS-1A)

**c. (U) SDIO-904 (Cosmic Radiation Effects and Activation Monitor/CREAM)

**d. (U) NAVSPACECOM-901 (Hand-held, Earth-oriented, Real-time, Cooperative, User-friendly, Location-targeting, and Environmental System/HERCULES)

**e. (U) IDR-501 (Microencapsulation of Drugs in the Microgravity Environment of the Space Shuttle I/MICROCAPS I or Microcapsules in Space/MIS-1)

Letter dropped

**f. (U) HSD-101 (Radiation Monitoring Equipment/RME III)

**h (U) AMD-501 (Visual Function Test in Space/VFT-2)

i. (U) WRDC-001 (Cryogenic Heat Pipe Experiment/CRYOHP)

j. (U) GL-601 (Shuttle Glow/GLO)

(u) ASPWS-701 (Space Tissue Loss)

9. (U) Experiment Summary:

a. (U) C2NVEO-101 (BLAST)

1. (U) Sponsor - US Navy

2. (U) Carrier - Middeck Locker

3. (U) Wt - 75 lbs, Vol - 2 Lockers, Power - battery-powered

4. (U) 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. (U) SSD-105 (CLOUDS-1A)

1. (U) Sponsor - US Air Force

2. (U) Carrier - Middeck locker

3. (U) Wt - 20 lbs, Vol - 0.7 cu ft, Power - None

4. (U) 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 it will be available for civilian or military use.

c. (U) SDIO-904 (CREAM)

1. (U) Sponsor - DOD (Strategic Defense Initiative Organization)

2. (U) Carrier - Middeck Locker

3. (U) Wt - 9.2 lbs, Vol - 0.5 cu ft, Power - 5 W

4. (U) The objective of the CREAM series of experiments is to measure cosmic ray and Earth's trapped radiation energy depositions and induced radioactivity inside crew compartments of manned spacecraft. The experiments to date have been 100 percent successful and will contribute to radiation models for manned spacecraft.

d. (U) NAVSPACECOM-901 (HERCULES)

1. (U) Sponsor - US Navy and US Army, Supported by ARPA and NASA

2. (U) Carrier - Middeck Locker

3. (U) Wt - 53.9 lbs, Vol - 3 Lockers, Power - 70 W

4. (U) The objective of the HERCULES series of experiments is to test and evaluate a CCD/Locator system which will determine the surface location, to within one nautical mile, of oceanographic and meteorological phenomena which are observed and photographed by Space Shuttle crew. The expeiment was 100 percent successful and demonstrated a geolocation capability to 2.5 nm.

e. (U) IDR-501 (MIS-1)

1. (U) Sponsor - US Army

2. (U) Carrier - Middeck Locker

3. (U) Wt - 119 lbs, Vol - 2.0 cu ft, Power - 50-100 W

4. (U) The objective of IDR-501 was to evaluate the effects of microgravity on methods used to encapsulate drugs within biodegradable polymers. The experimet 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. (U) HSD-101 (RME III)

1. (U) Sponsor - US Air Force

2. (U) Carrier - Middeck Locker

3. (U) Wt - 10 lbs, Vol - 0.13 cu ft, Power - None

4. 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 percent successful and will contribute to radiation models for manned spacecraft.

g. (U) ASPWS-701 (STL)

1. (U) Sponsor - US Army

2. (U) Carrier - Middeck Locker

3. (U) Wt - 61 lbs, Vol - 1 Locker, Power - 100 W

4. (U) The objective of ASPWS-701 was 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 100 percent 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.

h. (U) AMD-501 (VFT-2)

1. (U) Sponsor - US Air Force

2. (U) Carrier - Middeck Locker

3. (U) Wt - 8 lbs, Vol - 0.2 cu ft, Power - None

4. (U) 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. (U) WRDC-001 (CRYOHP)

1. (U) Sponsor - US Air Force

2. (U) Carrier - Hitchhiker G

3. (U) Wt - 400 lbs, Vol - 6.4 cu ft, Power - 450 W

4. (U) 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. (U) GL-601 (GLO)

1. (U) Sponsor - US Air Force

2. (U) Carrier - Hitchhiker G

3. (U) Wt - 204 lbs, Vol - 8.8 cu ft, Power - 100 W

4. (U) The objective of GL-601was 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.

# SECTION V

## CANCELED/DROPPED

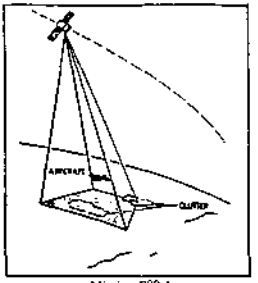
## MISSIONS OR EXPERIMENTS (U)

## V. CANCELED/DROPPED MISSIONS (U)

### A. (U) General

(U) During the conduct of the Space Test Program over the past 26 years, a number of approved missions or major experiments have had to be canceled prior to flight. Generally these missions or experiments were canceled because the Space Test Program was not able to obtain enough funding to carry out the flight of these missions or experiments and at the same time maintain a balanced DOD-wide flight program. On other occasions, experimenters experienced funding problems and have had to withdraw from missions, thereby canceling missions in some cases. The following sections describe a representative number of these canceled missions or experiments.

### B. (U) Objective



Mission P80-1

(U) The primary purpose of mission P80-1 was to fly experiment DARPA-601 (TEAL RUBY). The TEAL RUBY experiment used a multispectral 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.

(U) Program History:

(U) 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-888 and 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.

C. (U) Objective

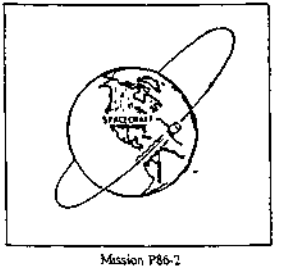
[redacted]

(b)(1)

(U) Program History:

[redacted]

D. (U) Objective



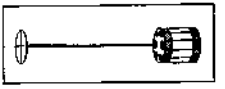

Mission P86-2
STARSCAN

(U) 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.

(U) Program History:

(U) 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 1988 Space Test Program budget, funding was not available to carry the STARSCAN mission through FY 1988. A stop work order was issued to Ball Aerospace Systems Division in February 1988.

E. (U) Objective



P90-2
Profile

(U) 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).

(U) Program History:

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

# SECTION VI

# CURRENT STP EXPERIMENT PRIORITY LIST (U)

## VI. CURRENT STP EXPERIMENT PRIORITY LIST (U)

A. (U) Free Flyer/Shuttle Cargo Bay Experiments

Thirty-five Free Flyer/Shuttle Bay experiments were proposed to the Tri-Service Experiment Review Panel at the 4-5 May 1993 Experiment Review Meeting. After hearing the presentations, the panel established the following priority for the proposed experiments:

1. (U) AFTAC-101 (Array of Low Energy X-Ray Imaging Sensors II/Fast On-Orbit Recording of Transient Events//ALEXIS II/FORTE). Develop and demonstrate technologies to enhance capability of existing nuclear detonation sensors.

2. (U) ARPA-301 (Lightweight Reaction Wheel/LRW). Demonstrate the ability of a lightweight high speed reaction wheel to control space vehicle momentum through use of a magneticaly suspended rotor assembly.

3. (U) GL-902 (Infrared Interactions Imager/IRIM). Measure the short/midwave infrared emissions from surfaces and contaminant clouds of low-altitude spacecraft.

4. (U) NCST-801 (Advanced Clock Ranging Experiment/ACRE). Separation of orbital position and velocity errors from precise atomic clock errors in the Global Positioning System and investigation of Kalman estimation in precise positioning satellite system parameters.

5. (U) NRL-205 (Orbiting Ozone and Aerosol Measurement/OOAM). Use proven visible solar occultation technology to measure ozone and constituents important in stratosphere ozone photochemistry.

6. (U) GL-702 (Atmospheric Ultraviolet Radiance Analyzer/AURA). Test new approaches for ionospheric remote sensing based on passive imaging of ultraviolet emissions from airglow and the aurora.

7. (U) PL-103 (Inflatable Torus Solar Array Technology Demonstration/ITSAT DEMO). Demonstrate packaging, deployment, operation, and life of an inflatable torus solar array.

8. (U) NRL-202 (Microelectronics and Photonics Test Bed/MPTB). Evaluate the performance of microelectronic components planned for the next generation operational spacecraft in the space radiation environment.

9. (U) PL-302 (Brilliant Eyes Thermal Storage Unit/BETSU). Demonstrate stable and predictable operations of a phase change material lightweight heat storage device.

10. (U) RADC-702 (Optical Reflection Experiment/OPREX). Measure and calibrate the amount of absorbed energy in the lamient layers between a space-based $CO_2$ laser illuminator energy source and the Earth's surface.

11. (U) NRL-304 (Trapped Anomalous and Solar Ion Experiment/TASI). Extend trapped anomalous cosmic ray and solar energetic ion measurements to additional elemental species and to higher energies capable of satellite penetration and reaching internal electronic components.

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

13. (U) PL-205 (Sodium-Sulfur Technology Flight Experiment/NaSTEC). Verify zero-gravity operations and evaluate performance of sodium-sulfur battery cells.

14. (U) NRL-200 (Beryllium Induced Radiation/BINRAD). Investigate distribution of $Be^7$ nuclei at low Earth orbit altitudes.

15. (U) NRL-305 (Thermospheric Temperature and Nitric Oxide Spectrograph/ TANOS). High resolution (UV) measurements of airglow emissions for limb profiles and photometer measurements of solar X-ray fluctuations.

16. (U) NPS-901 (Petite Amateur Navy Satellite/PANSAT). Demonstrate a quick-reaction, low-cost, ditect sequence spread spectrum packet communications satellite.

17. (U) PL-201 (Modular Laser Crosslink/LITE-2). Demonstrate high-data rate, coherent optical communications link between a small modular laser communications package in high Earth orbit (HEO) and one or more ground sites.

18. (U) PL-206 (Liquid Metal Test Experiment/LiTE). Observe the behavior of liquid metal heat pipes in space to determine the technical feasibility of space reactor power systems.

19. (U) ARPA-302 (Flexible Heat Transport System for Small Satellites/FLEXHTS). Demonstrate capability of flexible devices to transport spacecraft waste heat to a deployed thermal radiator for rejection to space.

20. (U) NRL-201 (Global Imaging Monitor of the Ozone Layer/GIMOL). Obtain ultraviolet images of stars, as they are occulted by the Earth's atmosphere, to measure the vertical distribution of the ozone.

21. (U) PL-701 (Tandem Laser-Ranged Geodynamic Satellite Experiment III/LAGEOS III). Establish a laser-ranging satellite to provide enhanced Earth rotation parameters and establish a more precise terrestrial reference frame.

22. (U) NRL-203 (Orbiting High Frequency Radio Interference Monitor/OHFRIM). Fly a radio interference monitor in low Earth orbit (LEO) to improve model and quantify the spectral and temporal properties of present day radio frequency interference in the near-Earth environment and the effectiveness of ionospheric shielding in providing protection from it.

23. (U) AL-901 (Space Surveillance Track and Autonomous Reposition Experiment/SSTAR). Formerly known as Electric Insertion Transfer Experiment/Space Surveillance Initiative (ELITE/SSI). Demonstrate a fully integrated electric orbit transfer vehicle to prove feasibility of solar electric propulsion systems for orbit raising and maneuvering applications unique to space surveillance.

24. (U) SSD-203 (Miniature Satellite Threat Reporting Systems/MSTRS). Demonstrate modular affordable lightweight satellite with the capability to detect and report directed energy and kinetic energy attacks on space platforms.

25. (U) USAFA-301 (Joint Air Force Academy-Weber State Satellite/JAWSAT). Provide cadets hands-on experience with lightsat communications and astrodynamics.

26. (U) NRL-401 [Total and Ultraviolet (UV) Irradiance Radiometer/TUVIR]. Monitor and understand total solar radiative output variations and simultaneous solar ultraviolet radiation from 200 to 300 nm to monitor solar forcing of climatic change and ozone layer.

27. (U) PL-301 (Precision Optical Bench Experiment/PROBE). Integration of active/passive control technologies to create a vibration isolated optical bench platform.

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

29. (U) PL-305 (Carbon-Carbon Radiator Space Flight Experiment/C-C RAD). Demonstrate technology maturity and investigate adverse environmental interactions on carbon-carbon radiators.

30. (U) PL-303 [Ultraviolet (UV) SEnsor for Tactical Warning and Attack Assessment//UV/TWAA]. Demonstrate ultraviolet sensors to confirm foreign missile launch.

31. (U) NRL-204 (Gamma-Ray Transient Experiment/GATE). Provide proof-of-concept for a system of sensors to monitor manmade and natural phenomena that produce nuclear gamma rays.

32. (U) SMC-301 (High Resolution Ozone Imager/HIROIG). Measure perturbations to stratospheric chemistry (including ozone loss) created by launch vehicle exhaust plumes.

33. (U) GL-802 (Solar Mass Ejection Imager/SMEI). Develop the capability to predict solar-produced environmental disturbances that can degrade or impair DOD orbital systems.

34. (U) NRL-306 (Silicon X-Ray Imager/SIXI). Continue development of new satellite navigation approaches based on X-ray sensors.

35. (U) PL-304 (Synoptic Monitoring of Orbital Debris/SYNMOD). Measure location, direction, and time of impact of orbital debris for model development and monitoring system.

B. (U) MMIS/Middeck Locker Experiments

(U) Thirteen experiments were proposed to the Tri-Service Experiment Review Panel at the 6 May 1993 MMIS/Middeck Locker Experiment Review Meeting. After hearing the presentations, the panel established the following priority for the proposed experiments:

1. (U) NIC-201 (Military Applications [redacted] MAST). Conduct observations [redacted] on a worldwide basis [redacted] (b)(3)

2. (U) GL-503 (Air Force Maui Optical Site (AMOS) Calibration Tests/ACT). Collect imagery/signature data on the Shuttle using the Air Force Maui Optical Site.

3. (U) NAVSPACECOM-901 (Hand-held Earth-oriented Real-time Cooperative User-friendly Location, targeting and Environmental System/HERCULES). Test and evaluate the CCD/Locator system capability to determine surface locations of oceanographic and meteorological phenomena as seen from the Shuttle.

4. (U) GL-901 (Shuttle Side Hatch Window Experiment/WINDEX). Obtain wideband spectra of environmentally induced optical emissions to validate phenomenology models.

5. (U) NRL-502C (High Resolution Shuttle Glow Spectroscopy - Part C/HRSGS-C). Obtain high-resolution spectra of Shuttle surface glow in the 2,000-4,000 A wavelength range during reentry.

6. (U) HSD-903 (Visual Function Tester, Version 4/VFT-4). Determine the effect of microgravity on visual accommodative functions.

7. (U) SDIO-904 (Cosmic Radiation Effects and Activation Monitor/CREAM). Measure cosmic ray and Earth's trapped radiation energy depositions, and induced radioactivity inside crew compartments onboard manned spacecraft.

8. (U) HSD-101 (Radiation Monitoring Equipment III/RME III). Correlate the Shuttle internal radiation environment with current space radiation models, geographic location, altitude, shielding, and orientation, and characterize the environment with occurrence of single-event upsets.

9. (U) IDR-801 (Microencapsulation of Drugs in the Microgravity Environment of the United States Space Shuttle II/MICROCAPS II). Evaluate the potential for producing various types of microencapsulated pharmaceuticals in space. Follow-on to IDR-501.

10. ξ (U) USAIC-101 (TERRA SCOUT II). Determine the utility of a hyperspectral sensor for particular intelligence requirements.

11. (U) ASPWS-701 (Space Tissue Loss Model/STL). Develop models of cytoplasmic and structural loss induced by microgravity; test tissue-loss pharmacologic antagonists.

12. (U) SDIO-901 (Visual Investigation Program on Orbiter Operations/VIPOR). Perform measurements and imagery on SDIO targets and study Shuttle cabin conditions detrimental to optical data collection.

13. (U) SDCDE-201 (Neutral Particle Beam Cesium Space Experiment/NPBCSE). Demonstrate reliable delivery of cesium vapor within a simulated ion source.

ξ MMIS Experiments

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# APPENDIX A

## INDEX OF SPACE TEST PROGRAM EXPERIMENTS (U)

## A BRIEF HISTORY OF THE DOD SPACE TEST PROGRAM (U)

NOTE:

Experiments which have flown on more than one flight are shown in the year of first flight.

# INDEX OF SPACE TEST PROGRAM EXPERIMENTS (U)

INDEX OF SPACE TEST PROGRAM EXPERIMENTS (Continued) (U)

INDEX OF SPACE TEST PROGRAM EXPERIMENTS (Continued) (U)

INDEX OF SPACE TEST PROGRAM EXPERIMENTS (Continued) (U)

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INDEX OF SPACE TEST PROGRAM EXPERIMENTS (Continued) (U)

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# APPENDIX B

## BIBLIOGRAPHY FOR CLASSIFIED DATA (U)

A BRIEF HISTORY OF THE DOD SPACE TEST PROGRAM (U)

BIBLIOGRAPHY FOR CLASSIFIED DATA (U)

(b)(1)

1. [redacted]
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14. [redacted]
15. [redacted]

16. [redacted] (b)(1)
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24. [redacted]
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27. [redacted]

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# APPENDIX C

## PRIMARY DISTRIBUTION LIST FOR JADN 94-2 (U)

## A BRIEF HISTORY OF THE DOD SPACE TEST PROGRAM (U)

PRIMARY DISTRIBUTION LIST FOR IADN 94-2 (U)

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| Navy Space Systems Group (NRaD 762)<br>[redacted]<br>2420 Vela Way<br>Los Angeles AFB, CA 90245 | 1 |
| Chief of Naval Operations<br>[redacted]<br>Department of the Navy<br>The Pentagon<br>Washington, DC 20350-2000 | 1 |
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| HODA/ODCSOPS (Attn: DAMO-FDW)<br>[redacted]<br>[redacted]<br>400 Army Pentagon<br>Washington, DC 20310-0460 | 1<br>1 |
| HQ AFSPACECOM<br>[redacted]<br>150 Vandenberg Street<br>Suite STE 1105<br>Peterson AFB, CO 80914-4610 | 1 |
| HQ AFMC/STC<br>[redacted]<br>[redacted]<br>4375 Chidlaw Road, Suite 6<br>Wright Patterson AFB, OH 45433-5006 | 1<br>1 |
| SMC/CUL<br>[redacted]<br>[redacted]<br>Suite 1536A<br>160 Skynet Street<br>Los Angeles AFB, CA 90245-4683 | 1<br>1 |
| SMC/CUC<br>[redacted]<br>Suite 1536A<br>160 Skynet Street<br>Los Angeles AFB, CA 90245-4683 | 1 |

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| [redacted] | 1 |
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| AGENCY USE ONLY (Leave blank) | 2. REPORT DATE | 3. REPORT TYPE AND DATES COVERED |
|---|---|---|
| | December 1993 | Final 3/93 - 9/93 |

**4. TITLE AND SUBTITLE**
A Brief History of the DOD Space Test Program

**5. FUNDING NUMBERS**
F49620-91-C-0031
PE: FAQ1
PR: SL05
TA: STPS

**6. AUTHOR(S)**
[redacted] (b)(6)

**7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)**
IWSER
1215 Jefferson Davis Highway
Suite 800
Arlington, VA 22202-3251

**8. PERFORMING ORGANIZATION REPORT NUMBER**
IADN 94-2

**9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)**
SAF/AQQX
1060 Air Force Pentagon
Washington, DC 20330-1060

**10. SPONSORING/MONITORING AGENCY REPORT NUMBER**

**11. SUPPLEMENTARY NOTES**

**12a. DISTRIBUTION/AVAILABILITY STATEMENT**
ALL DISTRIBUTION LIMITED. Further dissemination only as directed by SAF/AQQX, December 1993.

**12b. DISTRIBUTION CODE**

**13. ABSTRACT** (Maximum 200 words)

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**14. SUBJECT TERMS**
Space Test Program
Space Testing
History

**15. NUMBER OF PAGES**
176

**16. PRICE CODE**

| 17. SECURITY CLASSIFICATION OF REPORT | 18. SECURITY CLASSIFICATION OF THIS PAGE | 19. SECURITY CLASSIFICATION OF ABSTRACT | 20. LIMITATION OF ABSTRACT |
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