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GODDARD NEWS

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Goddard, AURA sign $40 million contract for Space Telescope Institute

On June 17, 1981, a brief ceremony was held to mark the signing of an important contract between Goddard and the Association of Universities for Research in Astronomy for the establishment and operation of a Space Telescope Science Institute at Johns Hopkins University.

The contract for approximately $40 million will cover a six-year period. Under the contract, signed by Dr. Arthur Code, acting director of the Institute, and Donna Throne, the project contracting officer, Goddard will be responsible for management of the onboard science instrumentation and telescope operations and will provide the operations control center for the spacecraft.

The Institute will establish Space Telescope science observation schedules; fund United States user participation and provide direct technical support to observers; support research necessary for efficient use of the telescope; and evaluate the scientific performance of the spacecraft. It will also advise NASA on the instrument status of the spacecraft and will process, archive, and publicize the telescope's findings.

Principal speaker for the event was Baltimore Mayor William Donald Schaefer, who emphasized the advances that will be realized in astronomy through the operation of the Space Telescope and forecast that the Institute would become the "world capital of astronomy" over the next two decades. Other speakers were Center Director A. Thomas Young, and Dr. Code.

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Young receives SBA "Advocate of the Year" award

Director A. Thomas Young (left) receives from Management Operations Director Benita Sidwell (right) an "Advocate of the Year" award presented to Mr. Young by the Small Business Administration's Philadelphia District office. The award, given to agencies which show outstanding support for the success of the small business community of Pennsylvania, Delaware, Maryland, Virginia, West Virginia and the District of Columbia, recognizes the Center's leadership role in contracting to small and minority businesses in 1981. The award takes particular note of Goddard's most recent support: a two contract award to Republic Management Systems of Trevose, PA, for $3.5 million of computer support services over two years and $6.7 million of operational support services over three years. The contracts serve the Applications and Sciences Directorates and were arranged by Art Wolter, minority business specialist in Goddard's Industrial Assistance and Procurement Analysis Branch.

Charles Vermillion (Code 945) receives 1981 Moe I. Schneebaum award

Mr. Charles H. Vermillion, code 945, received this year's Moe I. Schneebaum Award June 15 for his leadership and contributions to the development of low cost, direct spacecraft-to-ground terminals for the realtime acquisition of remotely sensed data.

The award notes Mr. Vermillion's dedication and accomplishment in working with users in NASA and other government agencies to understand needs and to develop terminals for weather satellites, both geosynchronous and in low earth orbit, for ocean sensors, for LANDSAT, and for data collection platforms.

In 1980, his work could be recognized in the following achievements: (1) Approximately 120 countries use APT (Automatic picture transmission) terminals for forecasting. (2) Direct readout of satellite imagery on marine vessels was accomplished for the first time providing real

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Charles H. Vermillion

Directorate Notes: *Minitrack, first U.S. Tracking Network, shuts down*

After nearly 25 years of spacecraft tracking, Minitrack, America's first operational satellite tracking network, was phased out at the end of 1980. The end of Minitrack marked the end of an era when tracking facilities evolved when satellites were but a dream, and achieving goals was beset by the many challenges of a pioneering age.

There were many reasons for Minitracks phasing down. Prominent among them was that the network frequencies interfered with radio frequency operations of several other nations.

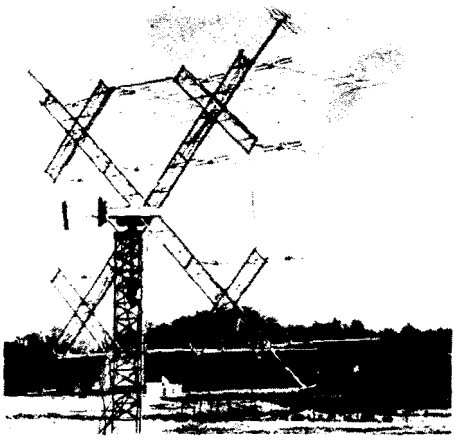
Initially, Minitrack was conceived for use in tracking of unmanned missions. Eventually, the tracking network was augmented to include data acquisition and command capabilities and came under the aegis of the Space Tracking and Data Acquisition Network (STADAN).

In the early days, spacecraft tracking was all theory and projection, there were no rules to act as guidelines, and no experienced leadership for planning. In spite of the challenges, Minitrack kept pace with the many new developments with constant improvements, and provided America and the world with continuous service to a multitude of spacecraft.

As research and development progressed, NASA graduated from simple satellites which recorded just a few things, to satellites that were highly versatile, capable of investigating the space environment, and the characteristics of the earth.

These observatory class satellites had what are called "eccentric orbits" – orbits that swing very far away from the earth, and were beyond Minitrack's capabilities. Therefore NASA introduced other forms of tracking to meet the ever growing demands of higher accuracy and greater quantities of information. The innovations did not replace Minitrack, but supplemented it by providing increased tracking capability when needed.

The evolution of Minitrack is adequately described by a former Brigadier General. "It (spaceflight tracking) is like peeling an onion – each layer uncovers yet another." Every breakthrough uncovered yet another unexplored area of which little or nothing was known. The Minitrack network laid the framework for what is now the most sophisticated spacecraft support system in the world.



Pictured above is an experimental 16 element Yagi antenna at Blossom Point, Maryland, one of the first receiving stations of the Minitrack Network.

However, Minitrack's phase-out was inevitable. As the complexity and magnitude of both manned and unmanned missions grew, ground station technology developed to keep pace. It was this technological growth that dictated the consolidation of the two networks into one – STDN.

In addition, STDN began to adopt other ways of tracking spacecraft, using new methods, different frequencies, and better equipment, among many other modifications. Eventually, as the number missions requiring Minitrack support diminished, OAO and Nimbus 5 & 6 became the prime users of Minitrack. With OAO's mission completed at the end of 1980, the Minitrack Network no longer had reason to continue support operations.

Today STDN is a world-wide complex of stations used to provide communications with both manned and unmanned spacecraft. It is operated primarily in direct support of NASA's earth – orbiting scientific and applications satellites and manned spaceflight programs; may also be used in support of other NASA programs and sounding rockets. Additionally, the network can support programs of other U. S. agencies and organizations as well as international space projects.

The Minitrack system employed the radio interferometer technique, used before its application to space tracking as an effective instrument in radio astronomy and in certain test phases in the development of the world's first giant rocket, the German V-2.

Interferometer systems operate on the principle that the phase angle of a signal received by two separate fixed antennas will vary between the baseline of the two antennas and the transmitting source. By measuring the phase difference of the signal received, the angle can thus be computed.

The radio interferometer antennas, aligned along east-west and north-south baselines, provided coverage for both equatorial and polar orbits. The antenna pairs measured angular position by phase comparison between multiple pairs of antennas of known separated distances.

It may sound complicated, but actually it is as simple as understanding how a person's ears work to tell him the direction of a sound. According to Shirley Thomas, author of Satellite Tracking Facilities, "A pair of precisely spaced antennas, are the ears of Minitrack stations. They pick up the radio signal from a satellite, and the exact measurement of the signal's angular direction gives the data from which the satellite can be tracked."

It is quite obvious that spacecraft tracking is one of the major factors in a successful space program. Not knowing where a spacecraft is for the smallest amount of time could cause many problems for engineers and technicians.

Much gratitude and recognition is directed to those individuals responsible for the early years of successful operation and maintenance of the Minitrack system. For those who are continuing the ongoing job of maintaining STDN and who are confronted repeatedly with the unknown challenge of "The Space Age," "Keep up the good work."

136.5 megacycle Minitrack Antenna at Blossom Point

KEY APPOINTMENTS

Effective May 24, 1981, Mr. Roger L. Jenkin is appointed Chief, Personnel Division (Code 220, 344-5025). Mr. Jenkin joined NASA at the Johnson Space Center in 1966, and comes to Goddard from the position of Chief, Personnel Management Branch at that Center.

Mr. Kenneth F. Jacobs, Chief, Technical Information and Administrative Support Division (Code 250), has been the Acting Chief of the Personnel Division since December 1980, and now returns to his permanent position. Mr. Charles P. Boyle, who has been substituting for Mr. Jacobs within Code 250, returns to his position of Special Programs Officer within the Management Operations Directorate.

Mission & Data Operations Directorate

Effective May 17, 1981, Mr. John T. Koslosky is appointed Head, Equipment Section, Control Center Systems Branch, Mission Operations Division (Code 511.1, 344-6836).

Engineering Directorate

Effective May 17, 1981, Mr. Warner H. Miller is appointed Head, Digital Signal Processing Section, Instrument Electronic Systems Branch, Instrument Division (Code 728.2, 344-8183).

Effective April 19, 1981, Mr. Thomas J. Budney is appointed Head, Rocket Systems Section, Attitude Control & Stabilization Branch, Sounding Rocket Division (Code 745.3, 344-6069).

Shaping, polishing of Space Telescope primary mirror completed

Shaping and polishing of the 94-inch-diameter (2.4-meter) primary mirror for NASA's Space Telescope has been completed at the Danbury, Conn., facility of the Perkin-Elmer Corp.

The mirror surface has been completed to a perfection that deviates, at any point on the surface, less than one-millionth of an inch from an ideally perfect surface.

The primary mirror is the main optical component of the Optical Telescope Assembly (OTA), a major element of the Space Telescope. The Space Telescope Project is managed by NASA's Marshall Space Flight Center, Huntsville, Ala. Perkin-Elmer is associate contractor for the Optical Telescope Assembly.

The 12-ton unmanned telescope will be placed in circular Earth orbit in early 1985 by the Space Shuttle and will have an initial altitude of 600 kilometers (370 miles) putting it well above the interfering haze of Earth's atmosphere. It will enable man to gaze seven times farther into space than now possible – as much as 14 billion light-years – and to observe some 350 times more volume of visible space. The telescope will be able to see stars and galaxies which are as much as 50 times fainter than can now be observed from Earth-based telescopes.

To take full advantage of this undistorted view of space, the telescope optics had to be polished to a much higher accuracy than those used in Earth-bound telescopes. Space Telescope's primary mirror was polished to specifications finer than for any previous telescope mirror its size, according to Perkin-Elmer.

The Space Telescope is of an optical design known as Ritchey-Chretien, a folded system with a secondary mirror in front of the primary mirror and the image plane behind the primary mirror.

Manufacture of the primary mirror blank began at Corning Glass Works, Corning, N.Y., in October 1977.

The blank was delivered to Perkin-Elmer from the Corning plant in Decem-

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Vermillion

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time sea surface temperature. (3) The Naval Environmental Research Prediction Facility incorporated direct readout for Naval Operations. (4) The USGS and NOAA approved and funded development of a major system in Hawaii to provide real time access to hydrology and meteorology data from the vast areas of the Pacific Ocean. (5) The Agency for International Development and NOAA approved and funded development of a cyclone and flood detection system for the country of Bangladesh.

The Moe I. Schneebaum Award is given annually to a Goddard employee for outstanding personal contribution in advancing and extending the use of space systems through creative engineering.

The award is given in memory of Moe I. Schneebaum, who served with distinction as Chief of the Earth Observations Systems and Systems Engineering Division. Noted for creative engineering and an unusual vision into the future, Schneebaum played a significant role in the development of sensing instruments for the meteorology and earth observations satellite programs.

Furthermore, he was instrumental in the development of the Multispectral Scanner (MSS), the Return Beam Vidicon Camera (RBV), and the Wide Ban Video Tape Recorder (WBVTR).

Mirror

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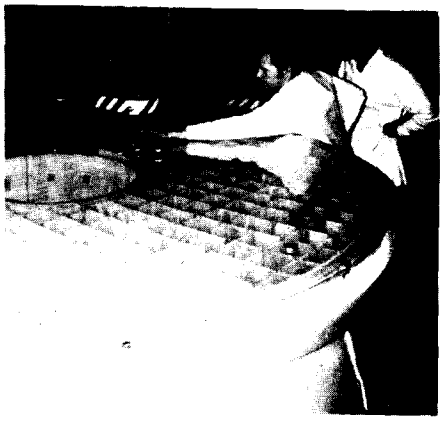
ber 1978. Optical fabrication began with rough grinding of the front and back surfaces and of the inside and outside edges of the mirror shape. This was followed by fine polishing of the mirror front surface, using a specially developed computer controlled polisher and extensive data reduction computer software, which began in August 1980.

In the next stage of fabrication, the primary mirror will have two extremely thin, yet uniform, coatings applied to its polished surface. First, a reflective layer of pure aluminum 650 Angstroms (65 nanometers) thick will be applied and then a protective layer of magnesium fluoride 275 Angstroms (27.5 nanometers) thick which will prevent oxidation of the aluminum.

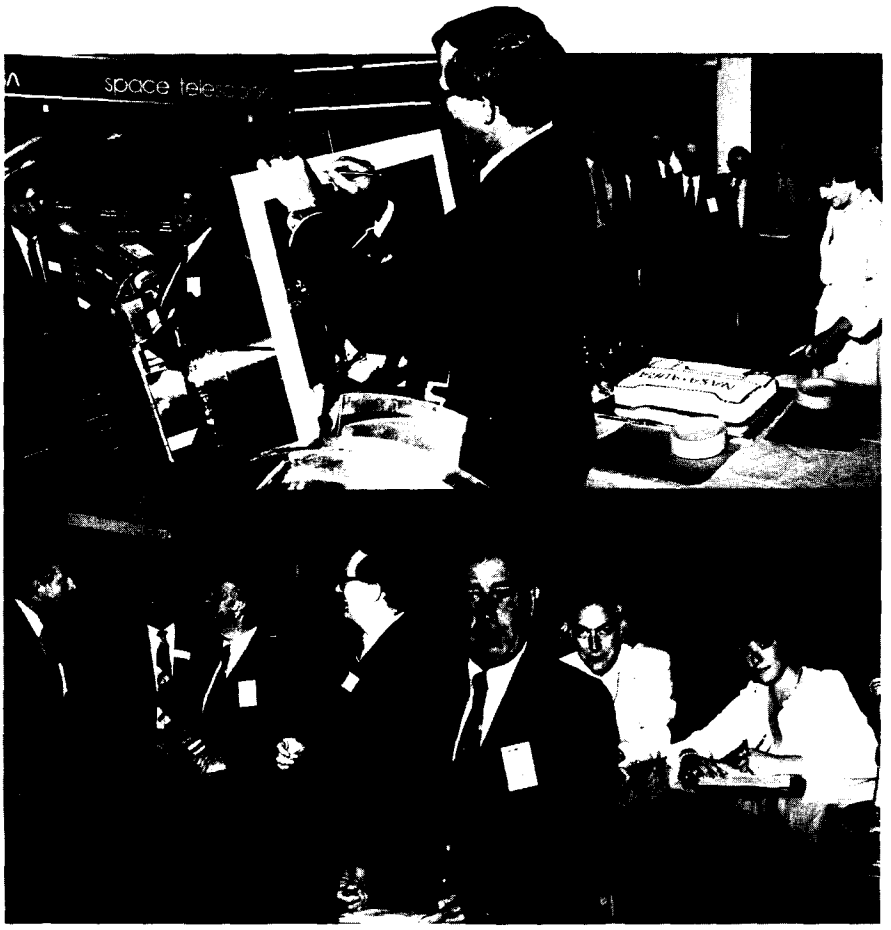
The coating operation will take place at Perkin-Elmer in a specially designed all stainless-steel vacuum chamber constructed by Mill Lane Engineering Co. of Burlington, Mass. It is the largest chamber of its kind in the world and operates at a vacuum very near that of space.

After coating, the mirror will be installed in the Optical Telescope Project and aligned to the secondary mirror, focal plane, scientific instruments and fine guidance sensors. The completed Optical Telescope project will then be integrated into the Support Systems Module, another major element of the Space Telescope, being built by Lockheed Space and Missiles Company.



The Primary mirror for NASA's Space Telescope undergoes final inspection by technicians following completion of shaping and polishing at the Danbury, Conn., facility of the Perkin-Elmer Corp. The mirror will become a principal component of the 10-ton unmanned observatory scheduled to be launched into Earth orbit in early 1985 by the Space Shuttle.

Goddard, AURA celebrate signing of $40 million contract



Clockwise: Center Director A. Thomas Young and Baltimore Mayor William Donald Schaefer discuss model and exhibit of the Space Telescope; Mr. Young autographs a picture of the ST Science Institute; Donnal Throne, project contracting officer, cuts the cake celebrating the agreement; Dr. Arthur Code, acting k director of the Institute, and Throne sign the ST contract. Mayor Schaefer makes remarks as the guest speaker; (l-r) James Fanseen from H.Q., Center Deputy Director John H. McElroy, Baltimore Mayor William Donald Schaefer, and Center Director A. Thomas Young.

People

Goddard employees receive AIAA awards

Dr. Robert Farquhar (above) has received the American Institute for Aeronautics and Astronautics (AIAA) 1981 Mechanics and Control of Flight Award for his "unique and sustained contributions to the technology of the control and application of libration-point satellites resulting in the successful flight of the world's first libration point mission." The award, presented at the AIAA's Atmospheric Flight Mechanics Conference at Albuquerque August 20, took note of Dr. Farquhar's advocation of a libration "halo" orbit for ISEE-3 satellite to study the solar wind unobstructed by the influences of the Earth's magnetic field. At the libration point, the satellite remains continually suspended in space between the Earth and the Sun and describes a halo, or oval path, about the direct-line of radio interference from the Sun, thus transmitting "in-situ" measures of the solar wind back to Earth.

Kenneth Frost (left) and Peter Burr (right), Project Scientist and Project Manager respectively of the Solar Maximum Mission, shared receipt of the American Institute of Aeronautics and Astronautic's (AIAA) Goddard Astronautics Award at the AIAA 50th Anniversary Honors Night Banquet in Long Beach, California, May 14. The award, one of the AIAA's two most prestigious awards, noted their "significant contributions to the successful development and operation of NASA's SMM and for the scientific achievement made possible through the most comprehensive studies of solar flares ever conducted." Presenting the award is AIAA President Arthur Mager of the Aerospace Corp.

The American Institute for Aeronautics and Astronautics has elected Goddard Director A. Thomas Young one of 50 new Fellows of the Institute for 1981. The new Fellows (in part pictured above) were recognized at the 50th Anniversary Honors Night Banquet in Long Beach, California, May 14.

Voyager Project Team receives awards

NASA presented medals and awards to members of the Voyager project team at the Jet Propulsion Laboratory, Pasadena, Calif., June 2.

The awards recognize nearly 10 years of effort, including early project planning, mission and spacecraft design and development, launch, early flight operations and the highly successful encounters with Jupiter in 1979 and the Voyager 1 Saturn encounter in 1980.

The Voyager project, managed for NASA by the Jet Propulsion Laboratory, launched two spacecraft to Jupiter and Saturn in 1977. Voyager 1 encountered Jupiter March 5, 1979. Voyager 2 encountered Jupiter July 9, 1979. Voyager 1 flew past Saturn Nov. 12, 1980. Voyager 2 will make its closest approach to Saturn Aug. 25, 1981, and then will head for Uranus and possibly Neptune.

The awards were presented to members of JPL and California Institute of Technology, as well as to individuals from other universities, private industry and other NASA centers. Among the awards presented to local individuals were four Distinguished Service Medals, 16 Outstanding Leadership Medals, seven Exceptional Scientific Achievement Medals, 65 Exceptional Service Medals and other awards representing exceptional group and individual achievement.

Receiving Distinguished Service Medals were: Dr. Bruce C. Murray, JPL director; Raymond L. Heacock, former project manager; Harris M. Schurmeier, former project manager; and Dr. Edward C. Stone, project scientist.

Those who received Outstanding Leadership Medals were: John R. Casani, former project manager; Glenn E. Cunningham, former spacecraft team chief; Esker K. Davis, project manager; Michael W. Devirian, former space flight operations director; Ronald F. Draper, spacecraft systems engineer; William G. Fawcett, science instruments manager; Charles E. Kohlhase, mission planning office manager; Richard P. Laeser, mission director/deputy project manager; James E. Long, science manager; Dr. Peter T. Lyman, former deputy project manager; Richard P. Mathison, telecommunications science and engineering division manager; Edward L. McKinley, flight engineering office manager; William S. Shipley, spacecraft development manager; Dr. Charles H. Stembridge, flight science office manager; Francis M. Sturms, former sequence design and integration manager; and George P. Textor, deputy mission director.

Exceptional Scientific Achievement Medals were awarded to: Dr. Andrew P. Ingersoll, imaging science team; Dr. Torrence V. Johnson, imaging science team; Dr. Arthur L. Lane, assistant project scientist, Jupiter; Dr. Gunnar F. Lindal, radio science team; Dr. Ellis D. Miner, assistant project scientist, Saturn; Dr. Frederick L. Scarf, principal investigator, plasma wave experiment, TRW; and Dr. Rochus E. Vogt, principal investigator, cosmic ray experiment.

In addition, 14 Group Awards and 185 Certificates of Appreciation were presented. The following received awards:

Group Achievement Awards

NASA HEADQUARTERS VOYAGER MANAGEMENT TEAM, including:
A. Thomas Young
Robert S. Kraemer

MISSION DESIGN
Mission Planning
Navigation System Design
Ephemeris Development

SPACECRAFT SYSTEM DESIGN AND DEVELOPMENT
Spacecraft Design Team

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Voyager awards

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Attitude and Articulation Control Subsystem
Computer Command Subsystem
Data Storage Subsystem
Electronic Packaging
Environmental Requirements
Environmental Testing
Flight Data Subsystem
Mechanical Systems
Parts Acquisition
Power Subsystem
Propulsion Subsystem
Pyrotechnics Subsystem
Quality Assurance and Reliability
Radiation Protection
Structures, Materials, and Temperature Control
Thruster Valve Assembly Heater Tiger Team
Traveling Wave Tube Amplifier
Telecommunications System
Radioiosotope Thermoelectric Generators
Mechanical and Electronic Fabrication
S- and X-Band Antenna Subsystem
Modulation/Demodulation Subsystem
Radio Frequency Subsystem

SCIENCE INSTRUMENT DEVELOPMENT
Imaging Instrument
Cosmic Ray Instrument
Infrared Interferometer Spectrometer Instrument
Low-Energy Charged Particles Instrument
Magnetometer Instrument
Ultraviolet Spectrometer Instrument
Plasma Science Instrument
Planetary Radio Astonomy Instrument
Plasma Wave Instrument
Radio Science Experiment Development

MISSION OPERATIONS SYSTEM DESIGN AND DEVELOPMENT
Data Records
Deep Space Network Engineering
System Engineering
Ground Data System Development
Wideband Communications

SPACECRAFT SYSTEM TEST AND LAUNCH SUPPORT
Test and Operations Team
Near-Earth Tracking and Data System

LAUNCH VEHICLE DEVELOPMENT AND OPERATIONS
(Lewis Research Center)
Launch Vehicles
Reliability and Quality Assurance
Acquisition

LAUNCH OPERATIONS AND SUPPORT
(Kennedy Space Center)
Launch Operations Team
Launch Support Team

FLIGHT OPERATIONS
Spacecraft Team
Sequence Team
Navigation Team
Science Investigation Support Team
Science Integration Team
Radio Science Support Team
General Science Data Team
Data Library
Operations Coordination Team
Mission Control Team
Control Center Operations and Data Management
Image and Photo Processing
Deep Space Network
Goldstone Deep Space Communications Complex
Australia Deep Space Communications Complex
Spain Deep Space Communications Complex
Deep Space Network Coverage Conflict Resolution
Spacecraft Anomaly Investigations

SCIENCE INVESTIGATIONS
Prelaunch Science Support
Ultraviolet Spectrometer Investigation
Infrared Interferometer Investigation
Cosmic Ray Investigation
Magnetometer Investigation
Plasma Science Investigation
Plasma Wave Investigation
Planetary Radio Astronomy Investigation
Low-Energy Charged Particles Investigation
Radio Science Investigation
Imaging Science Investigation

PROJECT MANAGEMENT, ADMINISTRATION, AND TECHNICAL SUPPORT
Project Management
Project Representatives
Technical Staff
Administrative Support
Secretarial Support
Procurement and Contracts
Printing Services
Documentation
Duplicating Services
Public Affairs
Space Flight Operations Facility Plant

Public Service Group Achievement Award

SPACECRAFT SUBSYSTEM DEVELOPMENT

GROUND DATA SYSTEMS DEVELOPMENT AND OPERATIONS

LAUNCH VEHICLE DESIGN, DEVELOPMENT, AND LAUNCH

Certificate of Appreciation - given to the following Goddard people:
Leonard F. Burlaga
Michael D. Desch
Michael F. Flasar
John E. Green
Michael L. Kaiser
Virgil Kunde
Ronald Lepping
Robert E. Samuelson
Alois W. Schardt
Jack D. Scudder
Donald Stilwell
James H. Trainor

Distinguished Public Service Medal
Carl Sagan (Cornell)

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GODDARD NEWS

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