J. Watson

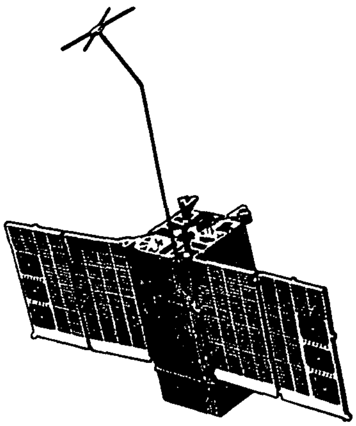
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Washington, D. C. 20546
202-755-8370

FOR RELEASE:
FRIDAY AMs,
March 3, 1972

PRESS KIT

PROJECT: TD-1A



contents

(NASA-News-Release-72-43) TD-1A: PRESS KIT H.G. Allaway, et al (NASA) 3 Mar. 1972 13 p CSCL 22C

N72-18833

Unclas

(CATEGORY) G3/30 17735

- more -

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Washington, D. C. 20546
Phone: (202) 755-8370

FOR RELEASE:
FRIDAY AMs
March 3, 1972

Howard G. Allaway
(Phone: 202/755-3680)

Kenneth Senstad (GSFC)
(Phone: 301/982-5566)

RELEASE NO: 72-43

ESRO SPACECRAFT TO BE LAUNCHED BY NASA

The largest and most advanced scientific spacecraft ever built in Western Europe, the European Space Research Organization's (ESRO) Thor-Delta 1Z (TD-1A), will be launched by the National Aeronautics and Space Administration on board a thrust-augmented, two-stage Delta rocket no earlier than March 8 from the Western Test Range, Lompoc, Calif.

The box-shaped, 472-kilogram (1,038-pound) spacecraft carries seven unique scientific experiments, weighing 145 kilograms (320 pounds). They were provided by six European universities and research organizations to study high energy emissions from stellar and galactic sources and the Sun not visible to Earth-bound observatories.

- more -

February 25, 1972

In the planned circular orbit of 550 kilometers (340 statute miles), the experiment sensors will be able to observe ultraviolet radiation, X-rays, and gamma rays unhindered by the blanketing and absorbing effect of the Earth's atmosphere. Data obtained should provide insights into fundamental problems of cosmology, such as the evolution of the universe and the turbulent environment of interstellar and intergalactic space.

Four of the seven experiments will scan the sky to study emissions from stars and galactic sources with various degrees of spectral and directional precision. Of the remaining three, two are designed to measure regions of the high-energy X-ray spectrum of the Sun, and one will measure composition of primary particles of cosmic and solar origin as well as proton fluxes.

To accomplish these objectives, TD-1A will be placed in a high inclination -- 97 degrees -- sun-synchronous orbit which will allow operation for about 230 days before it enters the Earth's shadow.

ESRO will reimburse NASA for the cost of the Delta vehicle and the launch as well as related pre-launch and support services.

For the first time on a European-built spacecraft, TD-1A will employ a three-axis stabilization system which will permit directional viewing by the scientific experiments. The system will also enable the solar panels to point at the Sun for adequate electrical power to operate the spacecraft.

This will be the sixth scientific spacecraft launched by NASA for ESRO. The latest, HEOS 2, was launched January 31, this year, from the Western Test Range. Other spacecraft in the program were: IRIS, launched May 17, 1968; Aurorae, launched October 3, 1968; HEOS 1, December 5, 1968; HEOS 1, December 5, 1968, and BOREAS, October 1, 1969.

ESRO member nations are Belgium, Denmark, Federal Republic of Germany, France, Italy, The Netherlands, Spain, Sweden, Switzerland, and the United Kingdom.

Once in orbit, TD-1A will be tracked by European Space Tracking (ESTRACK) stations in Belgium, Spitzbergen, Alaska and the Falkland Islands, supported by a Norwegian station located at Tromso.

The mission will be controlled from the European Space Operations Center (ESOC) located at Darmstadt, Federal Republic of Germany.

During launch and early orbit phases of the mission, additional tracking support will be provided by stations of the world-wide NASA Spaceflight Tracking and Data Network (STDN) operated by the Goddard Space Flight Center, Greenbelt, Md.

ESRO project management for the TD-1A spacecraft is charged to the European Space Research and Technology Center (ESTEC), Noordwijk, the Netherlands. Prime contractor for the spacecraft is the French firm Engins Matra, Velizy, France, aided by four European firms.

NASA project management for the mission and the Delta launch rocket is charged to the Goddard Space Flight Center. Overall NASA program management is under the Office of Space Science, NASA Headquarters, Washington, D.C.

(END OF GENERAL RELEASE: BACKGROUND INFORMATION FOLLOWS)

THE TD-1A SPACECRAFT

The 472-kilogram (1,038-pound) TD-1A is the largest and most advanced scientific spacecraft ever built in Western Europe. It is also the first European-built spacecraft with a three-axis stabilization system, permitting directional viewing of the scientific experiments. This system will permit a complete scan of the celestial sphere by the experiments in a six-month period.

The box-like main structure, 980 millimeters (38.6 inches) by 2,158 millimeters (85 inches), resembles a large refrigerator. It is divided into two sections, the smaller bottom section contains all of the spacecraft electronics and other sub-systems, while the top section contains the 145-kilogram (320-pound) experiment complement. Equipment and experiments in both sections are mounted on shelves or the spacecraft walls.

Attached to the sides of the TD-1A are two large solar panels which are deployed when orbit is achieved. Also deployed after orbital injection is a 2.7-meter (106.3-inch) omnidirectional antenna fixed to the bottom of the spacecraft.

The most unique engineering feature of the spacecraft is its attitude control system. It is designed to maintain one axis point at center of the Sun with an accuracy of better than one minute of arc. The system, consisting of Sun and Earth sensors, reaction wheels, gyroscopes, argon gas jets and control electronics, will provide for the spacecraft to be rolled about the sun-point axis once each orbit, thus insuring that experiment sensors except those for solar radiation will always point away from the Earth.

The TD-1A was built by five European firms with French firm Engins Matra, as prime contractor. Other firms involved include Erno Raumfahrttechnik of Germany, Saab-Scania of Sweden, Hawker Siddeley Dynamics of the United Kingdom, and Fiat of Italy.

- more -

TD-1A EXPERIMENTS AND INVESTIGATORS

The seven scientific experiments on board TD-1A are designed to carry out pioneering studies of emissions from stars and galaxies as well as detailed measurements of X-rays, gamma rays, and cosmic rays. The experiments were provided by six European universities and scientific organizations. Scientific results from TD-1A are expected to provide new insights into the evolution of the universe and the little-understood high energy forces controlling it.

Ultraviolet Spectral Telescope. This large, 30-centimeter-diameter (11.7-inch) telescope will study ultraviolet emissions from stars and galaxies in the region of 1,000 to 3,000 Angstroms. The telescope is fixed with respect to the spacecraft, and consists of a spectrometer equipped with photomultipliers. The experiment was provided by the University of Liege, Belgium, and the United Kingdom Science Research Council. Co-investigators are Mr. C. Jamar of the University of Liege and Mr. P. J. Barker of the Science Research Council.

Ultraviolet Stellar Spectrometer. This Cassegrain-type telescope system and spectrophotometer will operate in three ultraviolet wavelengths between 2,000 and 3,000 Angstroms. It has a 26-centimeter-diameter (10.1-inch) mirror gimballed around two perpendicular axes and will lock on stars by means of two internal servo-control loops. The device was developed by the Laboratory for Space Research (Laboratorium voor Ruimteonderzoek), Utrecht, the Netherlands. Mr. T. Kamperman is the principal investigator.

Spectral Study of Cosmic Rays. The instrument consists of four Cerenkov-type detectors to measure the intensity of nuclei of charge between two and 28. It will be able to determine the charge spectrum, energies, and intensities of these extremely high energy sub-atomic particles. The experiment is provided by the Center for Nuclear Studies (Centre d'Etudes Nucleaires), Saclay, France. Mr. M. D. Kierle is the principal investigator.

- more -

Spectral Study of Extraterrestrial X-rays. This device, also provided by the French Center for Nuclear Studies with M. D. Kierle principal investigator, consists of an X-ray collimator and a proportional counter. It will carry out measurements of extraterrestrial X-rays in the energy range of three to 30 KeV. X-ray sources scheduled to be investigated include the center of our galaxy and the Crab Nebula.

Solar Gamma Ray Detector. The experiment sensor consists of an anti-coincidence scintillator, a tungsten converter, and a Cerenkov-type detector and energy analyzer with related electronic equipment. It will measure gamma ray emissions from the Sun in the energy range of from 50 to 500 MeV. The experiment was developed by the University of Milan, Italy, with Dr. O. Citterio as principal investigator.

Spectral Study of Solar X-rays. Consisting of a photomultiplier with a scintillator, this experiment will measure solar X-ray emissions in the energy range of from 20 to 700 KeV. It was provided by the Laboratory for Space Research, Utrecht, with H. Van Beek as principal investigator.

Stellar Gamma Ray Detector. Designed to measure gamma rays from inter-stellar space, the device consists of a spark chamber, a vidicon camera and a set of detectors to record gamma rays of energy in excess of 30 MeV. The experiment was developed jointly by the Max Planck Institute, Munich, Germany, the University of Milan, and the French Center for Nuclear Studies. Principal investigators include Professor K. Pinkau of the Max Planck Institute, Prof. G. Boella of the University of Milan, and M. D. Kierle of the Center for Nuclear Studies.

- more -

DELTA LAUNCH VEHICLE

The ESRO TD-1A spacecraft will be launched by a two-stage, thrust-augmented NASA Delta N rocket. This will be the 88th flight for Delta. Of the previous 87 flights, 80 have successfully placed satellites in orbit.

Delta is managed for the NASA Office of Space Science by the Goddard Space Flight Center, Greenbelt, Md. Launch operations are conducted by the Kennedy Space Center's Unmanned Launch Operations. The McDonnell-Douglas Astronautics Corp., Huntington Beach, Calif., is the Delta prime contractor.

The thrust augmentation for Delta 88 consists of three solid-propellant Castor II booster rockets attached to the Thor first stage. They will ignite simultaneously with ignition of the first stage.

Overall, the Delta N is 32.3 meters long (106 feet), including the spacecraft shroud. Its weight at liftoff is 98,050 kilograms (197,890 pounds) -- just under 100 tons. Its thrust at liftoff, including the three strap on booster rockets, is 1,460,000 Newtons (326,000 pounds).

Engines for the kerosene-liquid oxygen fueled 22.8-meter-long (75-foot) first stage are built by the Rocketdyne Division of North American Rockwell Corp. The three solid fuel booster rockets are produced by the Thiokol Chemical Corp. The propellants of the 3.9-meter-long (12-feet, 10-inch) second stage are Unsymmetrical Dimethyl Hydrazine (UDMH) for fuel, and Inhibited Red Fuming Nitric Acid (IRFNA) for the oxidizer, using motors produced by the Aerojet General Corp.

MAJOR FLIGHT EVENTS

Event	Time: Minutes/Seconds
Liftoff	T - 0:00
Solid Motors Burnout	T - 0:38
Jettison Solid Motor Casings	T - 1:30
Main Engine Cutoff	T - 3:34
Stage 1 Separation	T - 3:39
Stage 2 Ignition	T - 3:39.8
Jettison Fairing	T - 3:56
Stage 2 First Cutoff	T - 9:54.9
Stage 2 Restart	T - 50:28
Stage 2 - Second Cutoff	T - 50:32.4
Spacecraft Separation	T - 52:07

- more -

TD-1A KEY PERSONNEL

European Space Research Organization

Project Manager	Thomas Curl
Project Scientist	Dr. Jos van Boeckel
Launch Operations Manager	Norman Holmes

NASA Headquarters, Office of Space Science

Associate Administrator	Dr. John E. Naugle
Director, Launch Vehicles	Joseph B. Mahon
Manager, Small Launch Vehicles and International Programs	Robert W. Manville
Delta Program Manager	Isaac T. Gillam

Goddard Space Flight Center

Director	Dr. John F. Clark
Delta Project Manager	William R. Schindler
Project Manager	Robert Goss
Mission Operations System Manager and Mission Support Manager	Robert G. Sanford
Network Support Manager	Gerald A. David
Control Center Operations Manager	Richard A. Schumacher
Orbital Computations Engineer	Ellen L. Herring

Kennedy Space Center, Unmanned Launch Operations

Director, Unmanned Launch Operations	John Neilon
Manager, Western Test Range Operations Div.	Henry R. Van Goey
Spacecraft Coordinator	Carl Latham

- more -

TD-1A FACT SHEET

Launch: From Launch Complex SLC-2, Western Test Range, Lompoc, Calif.

Launch Rocket: Two-stage, thrust-augmented Delta N.

Planned Orbit: Circular, 550 kilometers (340 statute miles)
Inclination: 97 degrees
Period: 96 minutes

Operating Lifetime: At least six months.

Spacecraft Weight: 472 kilograms (1,038 pounds), with 145 kilograms (313 pounds) of experiments.

Main Structure: Rectangular, box-like structure, 980 millimeters (38.6 inches) by 2,158 millimeters (85 inches), consisting of two units bolted together, upper unit containing experiments and lower unit housing spacecraft subsystem equipment.

Appendages: Two solar panels attached to sides of spacecraft, folded at launch, 1,515 millimeters (59.6 inches) by 1,780 millimeters (69.9 inches).

Omnidirectional antenna, at bottom of spacecraft, folded during launch, extends to 2.7 meters (106.3 inches) after orbit is achieved.

Power System: 9,360 solar cells to provide regulated and unregulated direct current voltage to spacecraft systems and regulate alternating current to scientific experiments. Total power available 330 watts.

Communications and Data-Handling System:

Telemetry: PCM-PM System capable of transmitting 1,700 bits per second in real time, and 30,600 bits per second in delayed time. Two on-board tape recorders with storage capacity exceeding 20 megabits of data. Transmitting frequencies are 136.050-MHz and 137.74-MHz.

Commands: The telecommand system allows for 280 commands, half of which are used for the experiment payload, operating at 148.250-MHz.

Tracking and Data-Acquisition: European Space Operations Center (ESOC) operated by ESRO at Darmstadt, Germany, will direct tracking by the European Space Tracking Station (ESTRACK) network with stations at Redu, Belgium; Alesund, Spitzbergen; Fairbanks, Alaska, and Port Stanley, Falkland Islands. In addition, the Norwegian Station at Tromso will be used. During launch and early orbit phase, stations of the NASA Space Flight Tracking and Data Network (STDN) will be used.

- end -