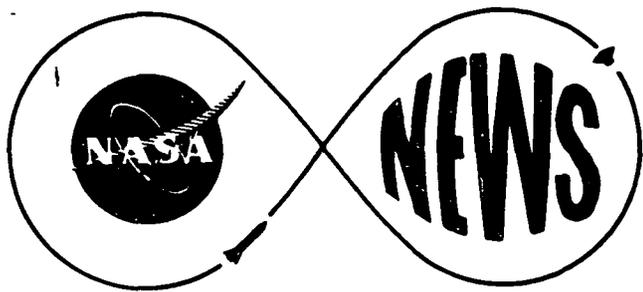


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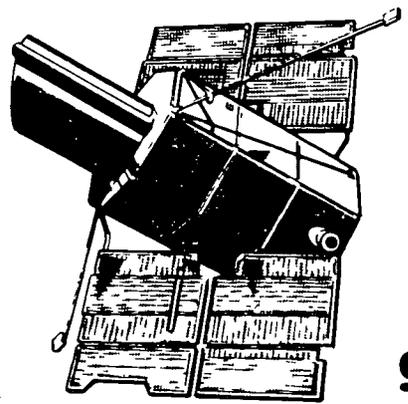
**NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION**
Washington, D. C. 20546
202-755-8370



FOR RELEASE:

AM's Thursday,
August 17, 1972

PROJECT: OAO-C



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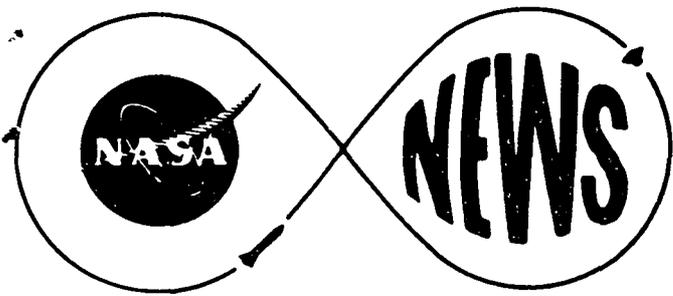
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(NASA-News-Release-72-156/156A) ORBITING
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**NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION**

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FOR RELEASE:

AM's Thursday,
August 17, 1972

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RELEASE NO: 72-156

NASA TO LAUNCH HEAVIEST ASTRONOMICAL OBSERVATORY

The heaviest and most complex U.S. unmanned space observatory, designed to seek answers to some of the fundamental questions concerning stars and interstellar matter, is being readied for launch by NASA from Kennedy Space Center, Fla., aboard an Atlas-Centaur rocket no earlier than August 21.

Called Orbiting Astronomical Observatory-C (OAO-C), the 2,200-kilogram (4,900-pound) automated spacecraft will view the heavens with a precision and clarity never before possible. It will be able to point its sensitive ultraviolet telescope -- the largest ever orbited -- at an object the size of a basketball seen from a distance of 650 kilometers (400 statute miles) for periods up to one hour.

- more -

July 31, 1972

OA0-C, to be launched into a 740-kilometer (460-statute-mile) circular orbit, is the fourth and final spacecraft in the series initiated by NASA in 1959.

After orbit is achieved the observatory will be renamed Copernicus in honor of the Polish astronomer Nicolaus Copernicus (1473-1543), recognized as the father of modern astronomy. (Next year marks the 500th anniversary of his birth.)

The primary astronomical eye of OA0-C is an 82-centimeter (32-inch) diameter reflecting telescope housed in the central tube of the three-meter (10-foot) long cylinder-shaped spacecraft. It will provide, via radio signal, spectral readings in ultraviolet light. This portion of the electromagnetic spectrum is not visible to ground-based observatories because of the obscuring effect of the Earth's atmosphere. The instrument is provided by Princeton University.

Its primary objectives will be (1) to study the interstellar absorption of hydrogen, oxygen, carbon, silicon, and other common elements in the interstellar gas; and (2) to investigate ultraviolet radiation emitted from so-called young hot stars (early-type stars) in wavelength regions between 930 and 3,000 Angstroms.

The second instrument carried by OAO-C was provided by England's University College, London, under the sponsorship of the U. K. Science Research Council. It consists of three small telescopes and a collimated proportional counter, to study X-ray sources in space, at various wavelengths up to 70 Angstroms.

One of the major discoveries of space exploration has been the finding that many objects in the universe emit X-rays. It had long been known that the sun emitted low intensity X-rays, and astronomers assumed that other stars emitted proportional amounts that could not be detected from Earth.

However, sounding rockets and NASA's Uhuru satellite (Explorer 42), launched December 12, 1970, have discovered more than 200 X-rays sources in the universe. These sources give off enormous amounts of energy. They exist in such diverse regions as the Magellanic Clouds, the Crab Nebula, galaxies and even in some areas of the sky where no visible object can be found. The enormous energy they emit suggest energy processes heretofore thought impossible.

The University College, London experiment will seek new X-ray sources, better locate and map sources already known, and help open the door to a better understanding of these celestial phenomena.

The experiment was selected for OAO-C as part of NASA's program of international cooperation in which scientists and agencies of other countries provide experiments selected on the basis of merit in competition with United States proposals. Foreign experiments flown on NASA spacecraft are funded by the country proposing them. The results are shared jointly by the sponsoring agency and NASA and published in scientific journals.

Although OAO-C is physically similar to the three previous observatories in the program, it has undergone a number of technical improvements.

For example, the spacecraft carries a newly developed gyro inertial reference unit as the primary attitude sensor, augmented with four star trackers. Also being flown are a newly developed electrically scanned star tracker and a precision digital solar aspect sensor to help assure precision pointing.

In addition, a new and unique on-board computer, to improve and simplify orbital operations, is being flown as an experiment. Its stored command memory can handle 16,000 18-bit words and store up to 1,024 ground commands. This will allow automatic operation of OAO-C between its daily contacts with the ground station at Rosman, N.C.

The most obvious exterior physical difference between OAO-C and OAO 2 is the inclusion of a more effective tubular sun baffle to allow operation of the Princeton telescope in daylight, additional baffles for the University College, London experiment, and two forward looking star trackers.

The NASA program of Orbiting Astronomical Observatories was initiated in 1959. The first OAO, launched April 8, 1966, failed after only three days in orbit because of a malfunction in its power system and high voltage arcing in the star tracker system. Although it operated only briefly, basic engineering results were obtained that proved the technical feasibility of the OAO concept.

OAO 2, launched December 7, 1968, has operated continuously since then -- far beyond its expected lifetime. It carries ultraviolet viewing instruments provided by the University of Wisconsin and the Smithsonian Institution's Astrophysical Observatory.

Its scientific results have been impressive. It has added a new dimension to astronomy by opening a large portion of the electromagnetic spectrum for astronomical investigations from space. It has made major contributions to man's knowledge of galaxies, stars, the solar system, and Earth's upper atmosphere.

It has also made major observations during its lifetime of comets, a nova, and most recently, in May this year, a supernova. (See section "OAO 2 results," pp.).

The third observatory -- OAO-B -- was launched November 30, 1970. It was designed to conduct astronomical and astrophysical research, by spectrophotometry, of ultraviolet emissions from celestial objects deep in space. However, its 96-centimeter (38-inch) telescope never operated because the Atlas-Centaur shroud failed to deploy and orbit was not achieved.

Overall, the OAO program, as the nation's pioneering space astronomy observatory series, has achieved impressive success. According to OAO Deputy Project Manager and Project Scientist, Dr. James E. Kupperian, Jr., "OAO has opened the door to advanced space astronomy programs of the future by proving that meaningful space astronomy investigations can be conducted from automated unmanned observatories."

"Of particular significance," he says, "is the fact that the space environment does not degrade observing instruments. Earth-bound telescopes are subjected to severe degradation due to environmental pollution and the effects of gravity -- factors not present in space."

In summary, he says, "In terms of scientific achievements it has moved us closer to finding some of the ultimate answers to the basic problems of cosmology."

OA0-C's pointing accuracy -- the most precise ever developed -- approaches the pointing accuracies needed for future large space astronomy programs such as the NASA Large Space Telescope (LST).

Currently, the Marshall Space Flight Center, Huntsville, Ala., is investigating the feasibility of the LST. This observatory will have the capability of viewing to the edge of the of the universe with its proposed three-meter (10-foot) mirror. Present plans tentatively call for launching this enormous viewing instrument, weighing more than 9,000 kilograms (20,000 pounds), from the Space Shuttle in the early 1980s.

The OA0 program is directed by the Office of Space Science, NASA Headquarters. Project Management is charged to the Goddard Space Flight Center, Greenbelt, Md. Goddard is also responsible for spacecraft communications and tracking under direction of the NASA Office of Tracking and Data Acquisition.

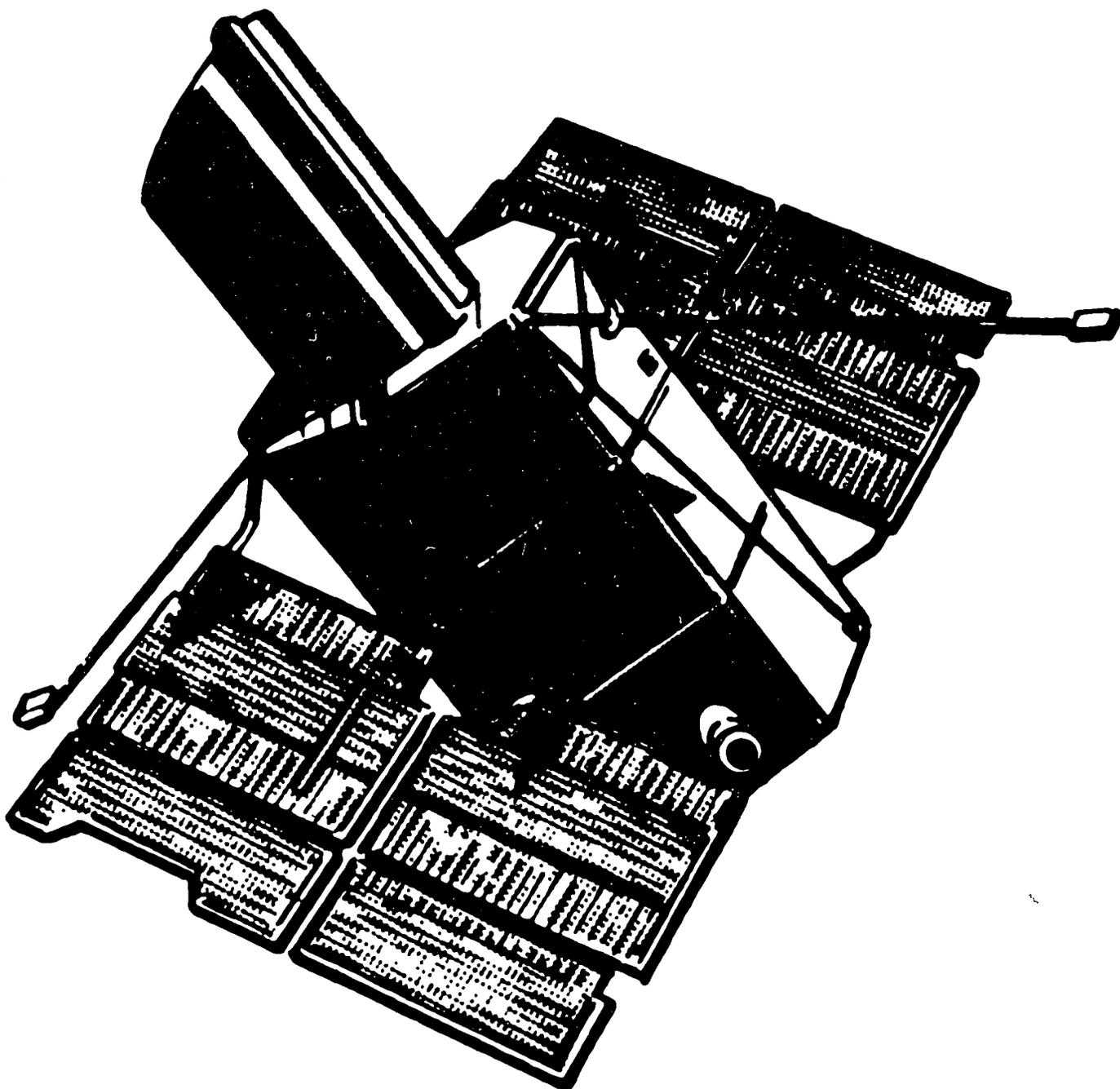
The Grumman Aerospace Corp., Bethpage, N.Y., has been prime contractor for all OAO spacecraft. Prime contractor for the Atlas-Centaur rocket is General Dynamics-Convair, San Diego, Calif.

Management of the Atlas-Centaur launch vehicle is under the Lewis Research Center, Cleveland, Ohio. Launch operations are conducted by the Unmanned Launch Operations Division of the Kennedy Space Center, Fla.

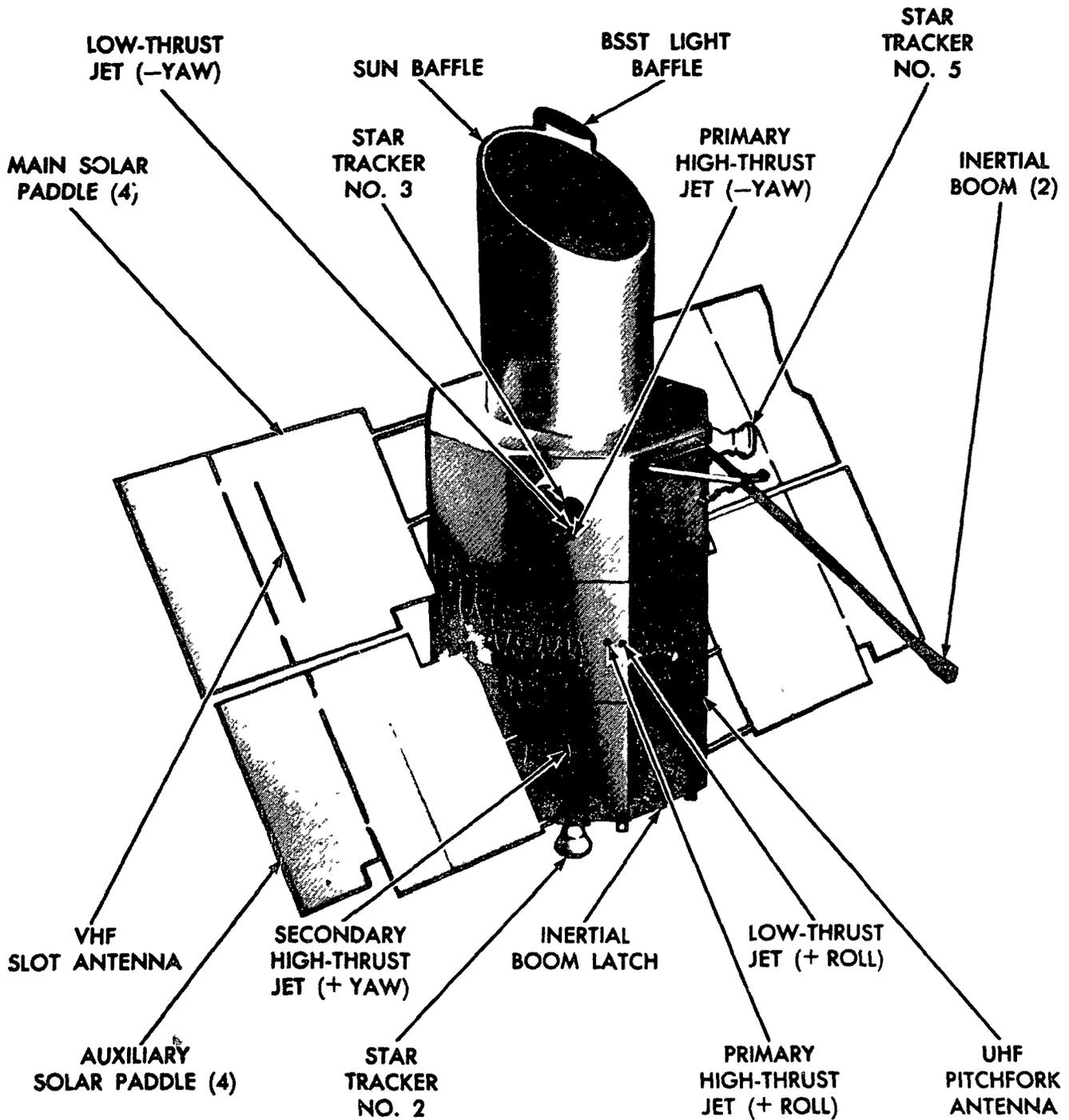
The Princeton Experiment Package was built by Sylvania Electronics Systems, Needham, Mass., and the Perkin-Elmer Corp., Norwalk, Conn. The University College, London X-ray experiment was built by a group of firms in the United Kingdom, including Pye Telecommunications, Cambridge; Elliott Brothers, London, and Rank-Taylor-Hobson, Hertfordshire.

More than 1,000 subcontractors and vendors from throughout the United States have participated in the OAO program.

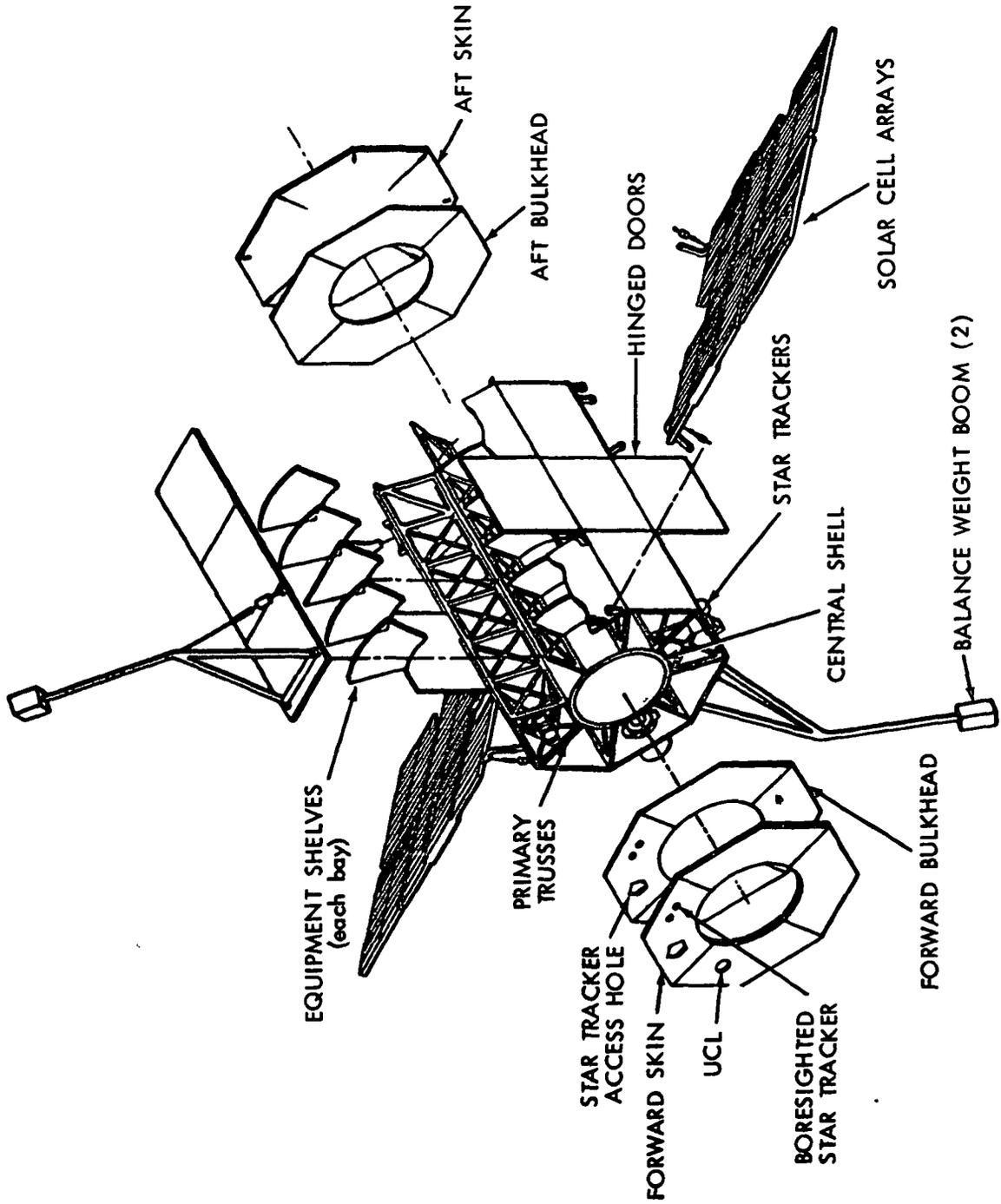
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CAO-C SPACECRAFT



OAO-C SPACECRAFT - EXPLODED VIEW



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THE PRINCETON EXPERIMENT PACKAGE

The basic structure of the Princeton Experiment Package (PEP) is a 100-centimeter (40-inch) diameter cylinder, about three meters (10 feet) long, weighing about 450 kilograms (1,000 pounds). The primary mirror is 82 centimeters (32 inches) in diameter. The experiment also includes guidance optics and detectors to generate precise signals needed to point the spacecraft.

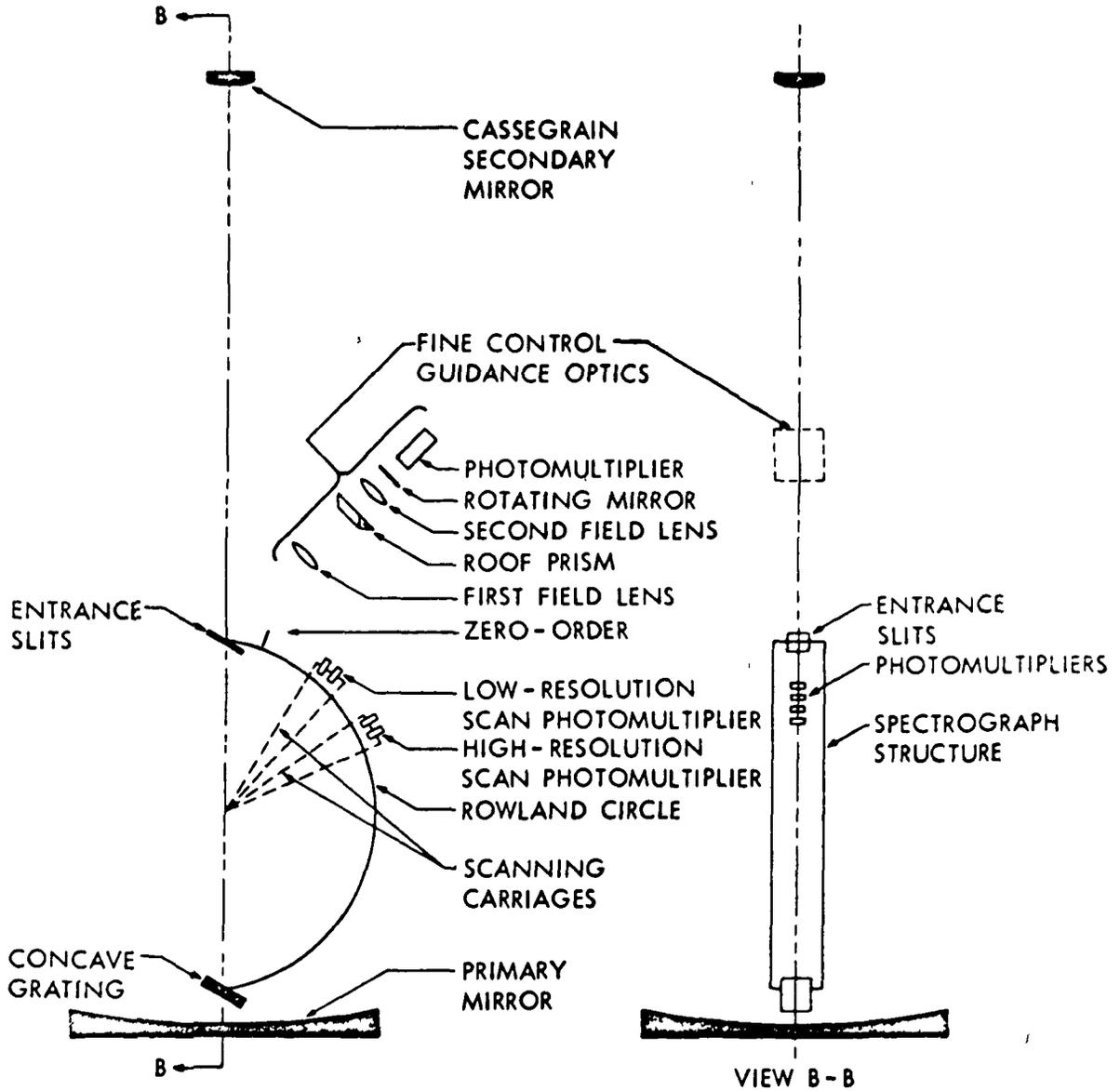
To reduce weight, the primary mirror was made from thin, fused, silica ribs assembled in a pattern much like an egg crate. This reduced mirror weight to 47 kilograms (105 pounds). According to project officials, a similar solid glass mirror would weigh about 160 kilograms (360 pounds).

The mirror is held in position during launch by a specially designed vibration isolation system to separate it from three quartz rods which will keep mirror temperatures uniform. After orbit is attained, and just before the experiment is activated, the mirror will be released automatically and moved against the quartz rods.

The PEP spectrometer is isolated from the telescope structure by a suspension system using a combination of viscous and spring dampers. This protects the sensitive device from launch shock and vibration and keeps it thermally isolated from the telescope.

PEP will be able to view stars down to the sixth magnitude in ultraviolet light. Initially, PEP will look at 47 young hot stars in our galaxy. PEP will use about 90% of the OAO-C viewing time, normally 27 days a month.

In operation, ultraviolet energy from a star being studied will be collected by the primary mirror and reflected to a 10-centimeter (3.9-inch) secondary mirror at the far end of the telescope cylinder. The light energy is then directed into the spectrometer, where a complex optical and electronic analysis occurs.



Princeton Experiment Optical Layout

The end product is a series of photon counts that are proportional to the intensity of light of specific wavelengths. These data are then telemetered to ground stations and recorded for later analysis.

- more -

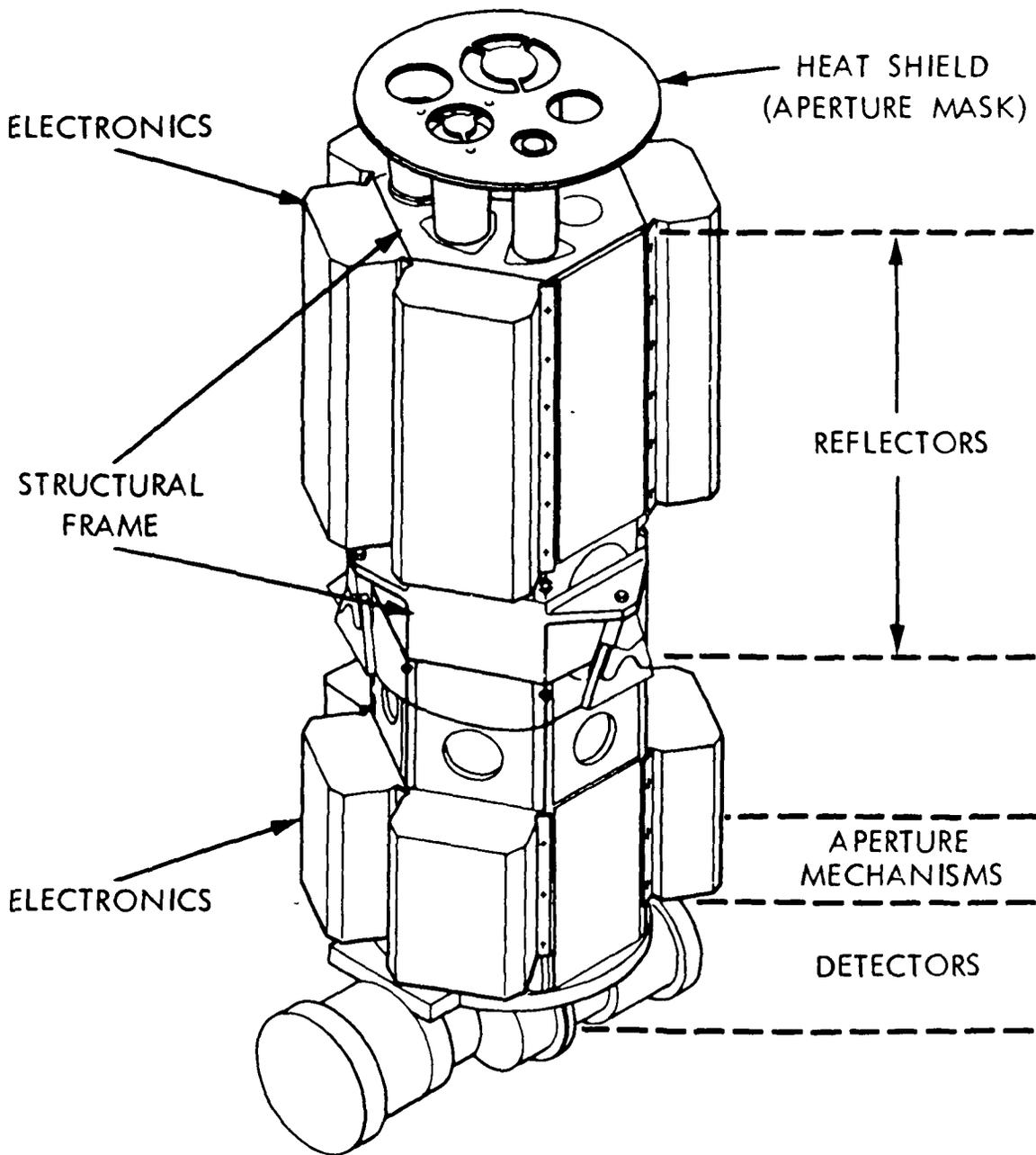
THE X-RAY EXPERIMENT

The University College London X-ray experiment is the first non-U.S. experiment carried by an OAO. Its purpose is to study stellar X-ray sources and X-ray absorption in interstellar space.

The experiment package, mounted in an upper bay of the main body of the observatory, consists of three small telescopes to study X-rays at wavelengths up to 70 Angstroms. The telescopes are supplemented by a collimated proportional counter covering the range of one to three Angstroms. This device views a larger portion of the sky background.

Detection and analysis of X-ray data involves gas proportional counters and an open tube channel multiplier.

Data obtained will be relayed to ground stations, where it will be recorded and sent to the University College of London. The experiment will use about 10 per cent of the observatory viewing time.



University College London Experiment
Stellar X-Ray Telescope

GUEST INVESTIGATOR PROGRAM

To broaden participation of the scientific community in the OAO program, a guest investigator program was established with the OAO 2. Initially 14 proposals were selected by NASA and a list of 107 objects approved. During its first three years of operation the program has provided almost 500 observations. In addition to formal OAO guest investigators, a large number of scientists participated in the program on an informal basis. This program has been highly successful.

When data from OAO-C become available, guest investigators will be appointed by NASA on the basis of joint proposals submitted with the principal investigator. Guest investigators will then work directly with principal investigators to obtain the data they need. The program is open to both U.S. and foreign astronomers.

OAO 2 SCIENTIFIC RESULTS

OAO 2 has operated successfully for more than three and one-half years. In doing so it has far exceeded its engineering and scientific objectives. Its design life-time of one year has been exceeded because of outstanding efforts by engineers and technicians at the OAO Operations Control Center, Goddard Space Flight Center, and at the five tracking stations collecting its scientific data.

To date, OAO 2 has obtained data on more than 3,000 star fields containing more than 25,000 stars. It has made over 10,000 individual observations of about 1,500 celestial objects.

The first major scientific results from OAO 2 were reported in 41 papers at a special meeting of the American Astronomical Society at Amherst, Mass., last year. The papers summarized the work of 45 investigators who represented 21 different institutions. A comprehensive article, "Orbiting Astronomical Observatory: Review of Scientific Results," appears in the July 21, 1972, issue of Science journal.

OAO 2 has discovered that the intensity of radiation in extragalactic nebula (outside of our own galaxy) increases in the far ultraviolet. The excess energy is probably due to the light from the hottest young stars, but the rise of intensity in the ultraviolet is too steep to be attributed to the stars alone. A likely theory is that dust within the galaxy reshapes this energy curve. If this interpretation is right, it may also explain the strong infrared radiation recently observed from galaxies. The ultraviolet excess is of importance for several aspects of extragalactic research:

- * for determining the dust content of galaxies;
- * for determining the stellar content and stellar evolution processes in galaxies;
- * for correcting ground-based observations for the effect of the red shift; and
- * for comparing cosmological theories with observations.

OAO 2 also discovered magnesium emission in the spectra of cool giant and supergiant stars. Magnesium emission is an indicator of activity in the chromospheres (outer atmospheres) of the sun and stars. Detailed spectral observations of stellar magnesium gives valuable data on the existence and nature of stellar chromospheres under a wide range of temperatures and gravity. Not only do such observations provide greater insight into the nature of stellar chromospheres, but they also test theories of the solar chromosphere in ways not now possible.

Other OAO 2 findings include:

- * Study of the absorption and scattering of starlight in the upper atmosphere of Earth that has provided additional information on the structure and composition of the upper atmosphere.
- * Discovery of a huge hydrogen cloud a million miles in diameter around comet Tago-Sato-Kosaka.
- * Observations that may settle a long standing enigma concerning a group of stars notable for apparently anomalous elemental abundances and for their enormous magnetic fields, more than 10,000 times stronger than our sun's.

Discovery that hottest stars are even hotter than suspected, are aging about twice as fast as suspected, and are burning hydrogen at a very rapid rate.

- * Observations in May this year of a supernova -- the first to be viewed by satellite -- in the small galaxy NGC 5253. This is the brightest supernova in the past 35 years; for a short time its ultra-violet intensity out shone the entire galaxy to which it belongs.

ATLAS-CENTAUR LAUNCH VEHICLE

OA0-C is the 21st operational launch for the Atlas-Centaur. So far during 1972 it has successfully launched two Intelsat IV commercial communications satellites into Earth orbit and a Pioneer spacecraft to fly-by Jupiter and eventually out of the solar system.

The Atlas booster develops 1,793,350 newtons (403,000 pounds) of thrust at liftoff using two 760,950-newton (171,000-pound) thrust booster engines and one 267,000-newton (60,000-pound) thrust sustainer engine. Its propellants are RP-1 (a kerosene type fuel) and liquid oxygen (LOX).

The Centaur second stage, which was developed and is flown under the direction of NASA, Lewis Research Center, Cleveland, Ohio, was the first U.S. rocket to use the high energy liquid hydrogen, liquid oxygen combination. Its two RL-10 engines develop 66,750 newtons (15,000 pounds) thrust each. Flown in combination with the Atlas booster up to the present time, Centaur is in the process of being integrated with the Titan III booster to launch Viking spacecraft to Mars in 1975 and other large payloads.

Centaur carries insulation panels and a nose fairing which are jettisoned after the vehicle leaves the Earth's atmosphere. The insulation panels, weighing about 522 kg. (1,150 lbs.), surround the second stage propellant tanks to prevent the heat of air friction from causing excessive boil-off of liquid hydrogen during flight through the atmosphere. The nose fairing protects the payload from the same heat environment.

The only changes in launch vehicle hardware compared with the last OA0 launched by Atlas-Centaur is the installation of an auxiliary spring system on the nose fairing. The OA0-B mission which was launched on an Atlas-Centaur in the fall of 1970 failed when the shroud did not completely separate. On subsequent flights of Centaur a new type of explosive bolt was used and no further failures have occurred. Now qualification tests have been completed on a new auxiliary spring system to give added insurance that the two halves of the nose fairing will completely separate from each other during flight.

Launch Vehicle Characteristics

Liftoff weight including spacecraft: 149,012 kg
(328,510 lbs.)

Liftoff height: 41.2 meters
(135 feet 4 inches)

Launch Complex: 36 B

Launch Azimuth: 60 degrees

	<u>Atlas Booster</u>	<u>Centaur Stage</u>
Weight:	128,547 kg (283,393 lbs.)	18,247 kg (40,227 lbs.)
Height:	21.3 meters (70 feet)	19.9 meters (65 feet, 4 inches) (with payload fairing)
Thrust:	1,793,350 Newtons (403,000 lbs.) (sea level)	133,500 Newtons (30,000 lbs.) (vacuum)
Propellants:	Liquid Oxygen & RP-1	Liquid hydrogen & liquid oxygen
Propulsion:	MA-5 system (2- 760,950-Newton 171,000 lb.) thrust engines, 1-267,000 N (60,000 lb.) sustainer engine and 2-2,982-N (670-lb.) thrust vernier engines.)	Two 67,000-N (15,000-lb.) thrust RL-10 engines. 14 small hydrogen peroxide thrusters
Velocity:	8,709 meters per hour (5,443 mph) at BECO; 10,634 meters per hour (6,646 mph) at SECO.	25,259 meters per hour (15,787 mph) at spacecraft separation
Guidance:	Pre-programmed auto- pilot through BECO. Switch to Centaur inertial guidance for sustainer phase.	Inertial guidance.

<u>Flight Events</u>	<u>Program Time</u> Seconds	<u>Speed Inertial</u>		<u>Range</u>		<u>Altitude</u>	
		KM/HR	MPH	Kilometers	Statute Miles	Kilometers	Statute Miles
Liftoff							
Booster Engine Cutoff	151.3	8,758.6	5443.5	63.5	39.5	79.5	49.4
Booster Jettison	154.4	8,831.0	5488.5	68.8	42.8	84.8	52.7
Jettison Insulation Panels	196.3	9,699.8	6028.5	152.4	94.7	163.6	101.7
Sustainer Engine Cutoff	233.1	10,693.7	6646.2	221.8	137.9	224.7	139.7
Atlas Separation	235.4	10,656.4	6623.0	226.0	140.5	228.5	142.0
Centaur Engine Start	244.9	10,404.1	6466.2	246.9	153.5	245.8	152.8
Jettison Nose Farring	256.9	10,434.8	6485.3	280.1	174.1	272.4	169.3
Centaur Engine Cutoff	694.8	25,391.5	15,781	1,885.1	1,171.6	747.2	464.4
Spacecraft Deploy Solar Panels	704.8	25,400.0	15,786	1,948.0	1,210.7	747.2	464.4
Extend Spacecraft Balance Booms	719.8	25,400.0	15,786	2,042.5	1,269.4	747.2	464.4
Spacecraft Separation	744.8	25,401.0	15,787	2,199.8	1,367.2	747.3	464.5
Start Centaur Reorientation	1050.8	25,395.9	15,784	4,127.4	2,565.2	747.7	464.1
Start Centaur Retrothrust	1544.8	25,421.2	15,799	7,240.2	4,499.8	741.9	461.1
End Retrothrust	3394.8	25,593.4	15,906	18,884.8	11,737.0	697.9	433.8

FLIGHT SEQUENCE

Atlas Phase

After liftoff, AC-22 will rise vertically for about 15 seconds before beginning its pitch program. Beginning at two seconds after liftoff and continuing until T plus 20 seconds, the vehicle will roll to the desired flight azimuth of 60 degrees.

After 151 seconds of flight, the booster engines are shut down (BECO) and jettisoned three seconds later. The Centaur guidance system then takes over flight control. The Atlas sustainer engine continues to propel the vehicle to an altitude of 221 kilometers (138 statute miles). Prior to sustainer engine shutdown, the second stage insulation panels are jettisoned.

The Atlas and Centaur stages are then separated by an explosive shaped charge that slices through the interstage adapter. Retro-rockets mounted on the Atlas slow the spent Atlas stage.

Centaur Phase

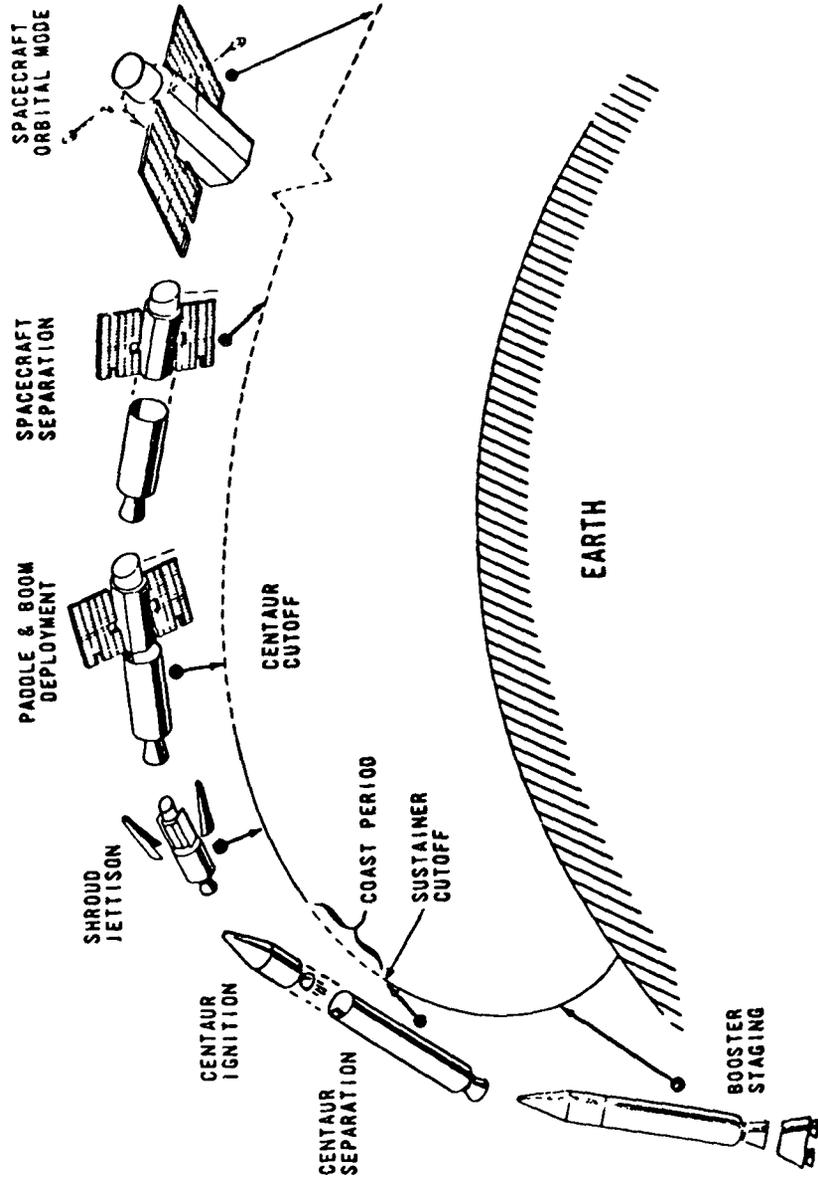
At approximately four minutes four seconds into the flight, the Centaur's two RL-10 engines are ignited for about seven and one-half minutes. This will place the Centaur and OAO spacecraft in a near circular orbit at an altitude of 740 kilometers (460 statute miles).

Twelve seconds after main engine start, the nose fairing around the spacecraft is separated. Twenty five seconds after main engine start, Centaur initiates a right yaw maneuver to attain the final orbital inclination of 35 degrees. The original launch azimuth of 60 degrees was designed to avoid the Bermuda area during re-entry of the Atlas booster and nose fairing.

Separation

Separation of the OAO spacecraft takes place by firing explosive bolts on a V-shaped metal band holding the spacecraft to the adapter. Compressed springs then push the spacecraft away from the launch vehicle at a rate of about one meter (3.2 feet) per second.

OAO-C LAUNCH SEQUENCE



Retro Maneuver

Five minutes after spacecraft separation, the Centaur stage attitude control thrusters are used to reorient the vehicle. The 223-newton (50-pound) thrust vernier engines are then fired to settle the propellants. The remaining liquid hydrogen and liquid oxygen are vented overboard to provide enough thrust to place the Centaur stage in a slightly different orbit from the spacecraft.

The final Centaur orbit will have an apogee of approximately 783 kilometers (487 statute miles) and a perigee of 693 kilometers (431 statute miles).

Launch Window

The OAO-C launch window opens at approximately 6:28 EDT on August 21 and closes two hours later. In case of delay, the window opens four minutes later every day for the next four days. The opening of the launch window is based on the requirement that the new spacecraft be in sunlight when it separates from the launch vehicle and approximately 180 degrees away from the OAO-2 so that there will be no conflict in the use of tracking or telemetry facilities during passes of each spacecraft.

OA0-C ORBITAL OPERATIONS

Once in orbit the observatory will undergo an extensive check out from the ground to assure that all systems are operating as planned.

The first 12 hours in the life of the newly designated Copernicus spacecraft--is called the survival phase. During this critical time a minimum expenditure of control gas will occur. Efforts will be made to confirm that the observatory is stabilized and that basic systems are in proper order.

With orbit 16, the stabilization systems checks will begin. On orbit 20 the spacecraft will be reoriented and, beginning with orbit 26, star tracker high voltage systems will be turned on and checked. If the trackers are ready, star search will begin during orbit 28.

By day four, during orbit 56, plans call for checkout of the University College, London X-ray experiment. Then, on orbit 57, the Princeton Experiment Package low voltage turn-on is scheduled, with high-voltage turn-on during orbit 59.

Experiment checkouts will continue until orbit 98. Then a series of spacecraft checks will be undertaken until orbit 115, at which time formal experimentation begins.

The entire checkout--one of the most thorough ever undertaken with an unmanned spacecraft--will be completed about 12 days after orbit is achieved. Copernicus will then be operational.

-more-



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John J. Neilon	Director, Unmanned Launch Operations
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Lewis Research Center

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Edmund R. Jonash	Director, Launch Vehicles
W. R. Dunbar	Deputy Director, Launch Vehicles
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Lawrence J. Ross	Project Engineer

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Professor John E. Rogerson, Jr.	Executive Director, OAO Program

University College of London

Professor R. L. F. Boyd

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Grumman Aerospace Corporation

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General Dynamics - Convair

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Launch Vehicle Program

B. R. Foushee

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Optics and Mechanical Systems

University College, London
X-Ray Experiment

Pye Telecommunications
Cambridge, England

Electronics, heaters and
harness

Elliot Brothers
London, England

Structural frame, aperture
mechanisms, baffle tubes and
discs

Rank-Taylor-Hobson
Hertfordshire, England

Reflector mandrels

Major Spacecraft Subcontractors

<u>Company</u>	<u>Responsibility</u>
Adcole Corp. Waltham, Mass.	Solar aspect sensors
Arco Great Neck, New York	Electrical components
AVCO Corp. Electronics Division Cincinnati, Ohio	OAO command receiver
Bendix Corporation Electric Power Division Eatontown, N.J.	OAO power control unit, power regulator unit, and diode box
Bendix Corporation Clips-Pioneer Division Teterboro, N.J.	Fixed head tracker
Dalmo Victor Co. Belmont, Calif	Magnetic unloading system
Granger Associates Bohemia, N.Y.	Diplexer and hybrid junction
Fairchild Industries Space and Electronic Systems Division Germantown, Md.	Thermal control louvers
General Electric Co. Spacecraft Department Valley Forge, Pa.	Stabilization and Control System
Gulton Industries Alkaline Battery Division Metuchen, N. J.	Storage battery
Hughes Aircraft Co. Culver City, Calif.	Solid state transmitters
IBM Federal Systems Division Owego, N. Y.	Primary processor and data storage programmer and star tracker sequence controller and spacecraft system controller unit equipment

ITT Federal Laboratories
San Fernando, Calif.

Boresight star tracker

Kollsman Instrument Corp.
Syosset, N. Y.

Gimbal star trackers

Magnetic Control Company
ADC-Product Divison
Minneapolis

Current sensors (OAO)

Radiation Corp.
Melbourne, Fla.

Spacecraft data handling
equipment/Experimenters
data handling equipment.

Spectro-Lab
Sylmar, Calif.

Solar arrays

0AO-C FACT SHEET

Spacecraft

Weight: 2,200 kilograms (4,900 pounds), including 450 kilograms (1,000 pounds) of scientific experiments.

Structure: Eight-sided cylinder, 2.1 meters (seven feet) wide; 3.0 meters long (10 feet). Overall width is 6.3 meters (21 feet) with solar panels extended.

Stabilization and Control: Three-axis stabilized, with pointing accuracy of .1 arc second--most precise ever achieved by a spacecraft. System uses four gimballed star trackers, an inertial reference unit (IRU) to facilitate slew maneuvers and maintain pointing accuracy, and a system of stabilizing gyros.

Experiments:

Princeton Experiment Package (PEP): Located in central experiment tube of spacecraft. PEP is a 3-meter (10 feet) long ultraviolet telescope, an 82-centimeter (32-inch) mirror, an ultraviolet spectrometer and sensors for the telescope guidance system, able to view stars as faint as the seventh magnitude.

Scientific objectives include study of the abundance and temperature distribution of the interstellar gas from which stars form; study the structure of stellar atmospheres of young, hot stars. Data received in digital form.

University College of
London X-Ray Package:

Mounted in an upper bay of the main body of the spacecraft, experiment consists of three small telescopes and a collimated proportional counter. This X-ray experiment will permit pinpointing many of the recently-discovered X-ray sources more precisely. Data received in digital form.

Launch:

On board a two-stage Atlas-Centaur rocket from Launch Complex 36, Kennedy Space Center, Fla.

Planned Orbit:

Circular, 740 kilometers (460 statute miles), inclined 35 degrees. Orbital period is 100 minutes.

Operating Lifetime:

One Year.

Tracking and Data
Acquisition:

Space Tracking Data Network (STDN) stations at Rosman, N.C.; Quito, Ecuador; Santiago, Chile, operated by the Goddard Space Flight Center.

OAO Project Management:

Goddard Space Flight Center, Greenbelt, Md.

Atlas-Centaur Management:

Lewis Research Center, Cleveland, Ohio

Launch Operations:

Unmanned Launch Operations, Kennedy Space Center, Fla.

OAO Prime Contractor:

Grumman Aerospace Corp. Bethpage, N.Y.

Atlas-Centaur Prime
Contractor:

General Dynamics-Convair San Diego, Calif.