PRESS KIT

NASA

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

TELS. WO [illegible]
WO [illegible]

FOR RELEASE: WEDNESDAY AM'S
January 19, 1965

RELEASE NO: 65-14

PROJECT: OSO-B2

N65 15040
(ACCESSION NUMBER)
35
(PAGES)
(NASA CR OR TMX OR AD NUMBER)
(THRU)
1
(CODE)
31
(CATEG)
FACILITY FORM 602

CONTENTS

GENERAL RELEASE.................................. 1-4

EXPERIMENTS...................................... 4-5

BACKGROUND INFORMATION........................... 6-22

- OSO-B2 Satellite............................ 6-10
- Scientific Objectives....................... 10-11
- Experiments................................. 11-12
- Pointed Experiments......................... 12-15
- Wheel Experiments........................... 15-20
- Delta Launch Vehicle........................ 20-22

OSO-B2 PARTICIPANTS.............................. 22-23

FACT SHEET....................................... 24-27

- Satellite................................... 24
- Launch Phase................................ 24
- Power Subsystem............................. 25
- Tracking, Telemetry and Command Stations..... 25
- OSO I Achievements.......................... 25-27

SUN FACT SHEET AND GLOSSARY...................... 27-29

To be launched no earlier than February 2, 1965

NEWS NASA

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

TELS. WO 2-4155
WO 3-6925

FOR RELEASE: WEDNESDAY AM'S
January 20, 1965

RELEASE NO: 65-14

NASA TO LAUNCH SOLAR OBSERVATORY FROM CAPE KENNEDY

The National Aeronautics and Space Administration will launch a 545-pound Orbiting Solar Observatory from Cape Kennedy, Fla., no earlier than Feb. 2, 1965.

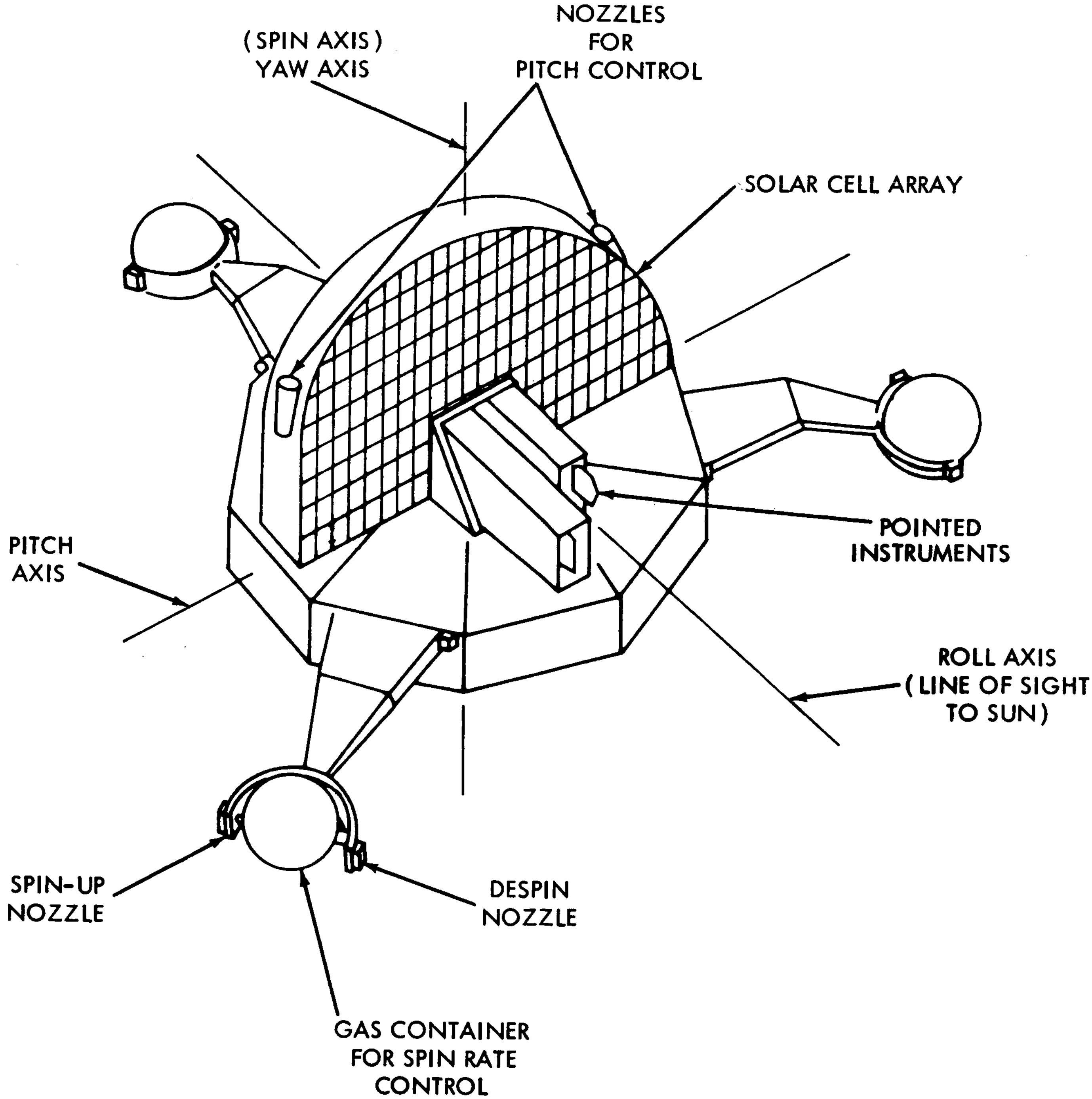
The launch will climax a nine-month effort to ready the OSO for flight. The spacecraft is made up mainly of parts salvaged from the OSO-B damaged last April in a pre-launch mishap and from components of a spacecraft built for prototype testing.

Because this spacecraft will carry the same scientific payload as the OSO-B, it is designated OSO-B2. If it achieves orbit it will be called OSO II.

OSO I, the first satellite devoted exclusively to the study of the Sun, was launched March 7, 1962. OSO-B2, although physically similar to OSO I, carries experiments capable of conducting more extensive scientific investigations.

-more-

1/13/65



SPACECRAFT CONFIGURATION

NASA

OSO-B was to have been launched in April 1964. However, on April 14, during pre-launch checkout at the Spin Test Facility at Cape Kennedy, the satellite was seriously damaged when the X-248 third stage rocket to which it was mated inadvertently ignited. Three technicians were burned fatally and nine others were hospitalized in the accident. An investigating board determined that the rocket was ignited by static electricity.

Many components and six of the eight experiments on the spacecraft were salvaged and along with parts of the OSO prototype, backup parts of the OSO-B and some newly-built parts were assembled into a new spacecraft.

Ball Brothers Research Corp., Boulder, Colo., is prime contractor to NASA's Goddard Space Flight Center, Greenbelt, Md., project manager of the OSO project.

OSO-B2 will be launched by a three-stage Delta rocket into a circular orbit at 350 miles altitude and inclined 33 degrees to the equator. It will take about 95 minutes to complete an orbit. Operational lifetime is expected to be about six months.

The spacecraft's eight experiments will account for 215 pounds of the 545-pound total. This continues the precedent of high ratio of experiment weight to total spacecraft weight set by OSO I.

The satellite has two main sections. The spinning base portion, called the wheel, provides gyroscopic stability and houses the telemetry, command, batteries, control electronics and gas spin-control arms and five experiment packages. The top section called the sail, is fan-shaped and will point toward the Sun when visible. The sail contains the two primary solar pointing experiment packages (containing three experiments) and solar cells to convert solar energy into electrical power.

For the first time, the instruments, controlled by ground command, will scan the entire solar surface, requiring four minutes to complete each scan. This technique is known as the raster scan mode of operation.

In addition to the scanning capability, OSO-B2 will carry a new digital telemetry system to increase data capacity and resolution; a new command system capable of receiving 70 commands as opposed to eight for OSO I; and, finally, a redesigned and improved tape recorder.

The eight advanced experiments carried by OSO-B2 are designed to further the work of OSO I; study X-rays, gamma rays and ultraviolet radiation. They represent a joint government-university-industry effort.

EXPERIMENTS

The two experiment packages carried in the sail section which will scan the Sun include:

(1) Ultraviolet spectrometer - Spectroheliograph (Harvard University).

(2) Solar X-ray and ultraviolet imaging experiment (Naval Research Laboratory).

(3) White light coronagraph (Naval Research Laboratory).

The latter two experiments are in a single package.

The five wheel-mounted experiments are:

(1) Zodiacal light device to monitor polarized light in interplanetary space (University of Minnesota).

(2) High energy gamma ray measuring device for measurement of primary cosmic gamma rays (University of New Mexico).

(3) Low energy gamma ray measuring device for detection and analysis of the energy spectrum of gamma rays (Goddard Space Flight Center).

(4) Astronomical ultraviolet spectrophotometer (Goddard Space Flight Center)

(5) Emmissivity stability measurements of thermal-radiation characteristics of the satellite's surface to determine stability of satellite temperature-control coatings (Ames Research Center).

The OSO program is directed by the Physics and Astronomy Programs Division of the Office of Space Science & Applications at NASA Headquarters. Project management is under the Goddard Space Flight Center, Greenbelt, Md., which is also responsible for tracking and data acquisition and the Delta launch vehicle.

OSO satellites are built under Goddard contract by Ball Brothers Research Corp., Boulder, Colo. The three-stage Delta rocket used to launch OSO is produced by Douglas Aircraft Co., Santa Monica, Calif.

Eight OSO satellites have been planned. The first of these, OSO-I, was launched in March 1962. It provided data on more than 75 solar flares and monitored the Sun's ultraviolet brightness and X-ray emissions for many months.

(Background Information Follows)

OSO-B2 SATELLITE

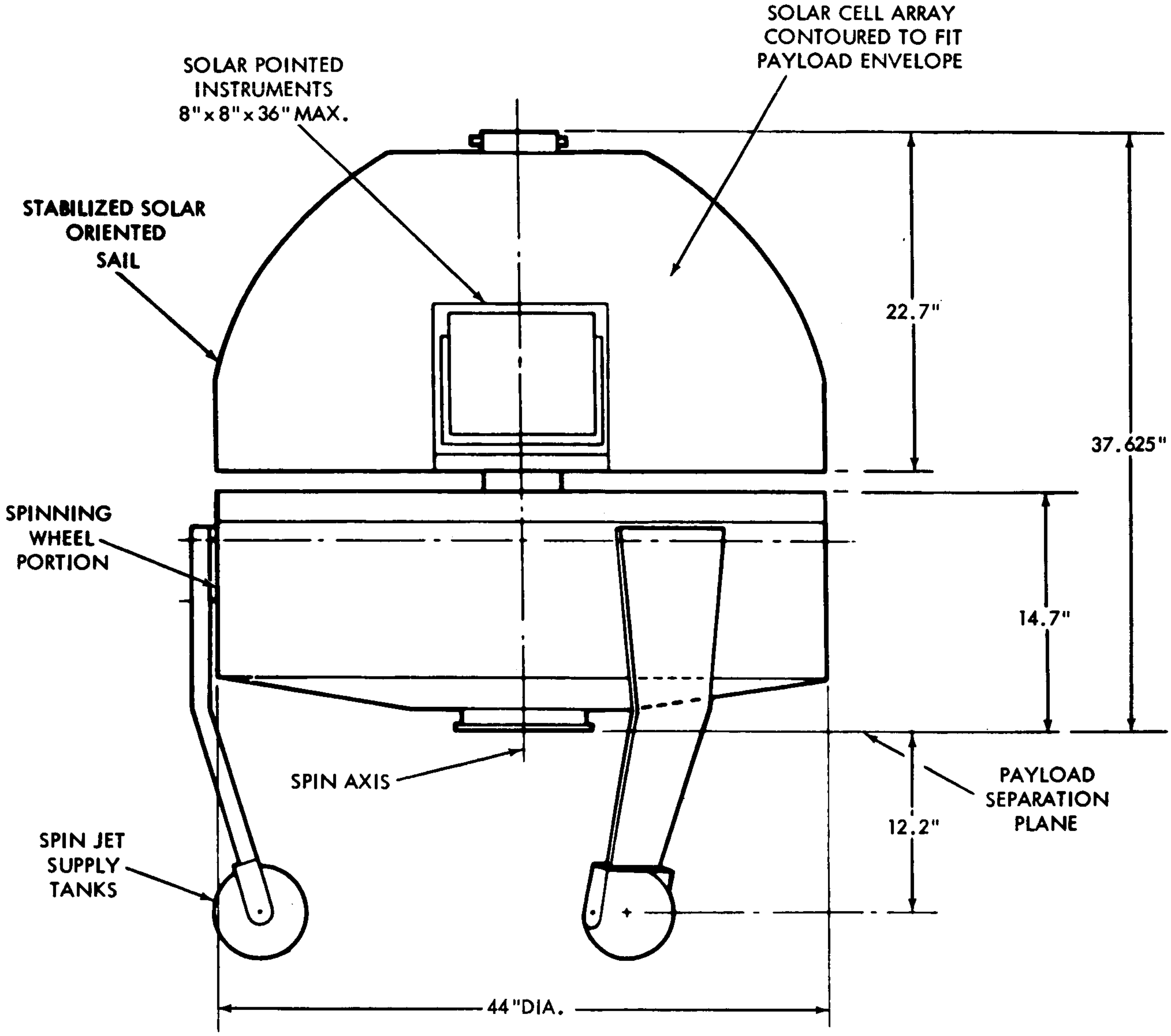
OSO is one of the NASA series of large observatory-class satellites being developed by the Goddard Space Flight Center. In addition to OSO, these are the Orbiting Geophysical Observatory (OGO) and the Orbiting Astronomical Observatory (OAO). The first OGO was launched Sept. 4, 1964. The first OAO is scheduled to be launched later this year.

The OSO spacecraft is a space platform for direct observation of the Sun. The sail (upper) section is oriented toward the Sun and contains solar cells and the experiments which point toward the Sun.

The wheel (lower) section provides stability for the spacecraft by gyroscopic spinning. The sail and wheel sections are joined by an aluminum shaft with a hub containing bearings which support the sail section. Within the hub is a motor which drives the sail structure to maintain Sun orientation. A slip ring assembly within the hub provides power and signal connections between the sail and wheel sections.

Wheel and Sail Structure

The 44-inch diameter, nine-inch high wheel structure is made of aluminum alloy and consists of nine pie-shaped compartments



ORIENTED AND SPINNING WHEEL PORTION OF SPACECRAFT

each with 1,000 cubic inches of space. Five compartments contain experiments and four house the electronic controls, batteries, telemetry and radio-command equipment.

Three 30-inch long arms extend at 120-degree intervals when orbit is achieved. Each arm has a six-inch diameter sphere mounted at the end containing nitrogen gas under a pressure of 3,000 pounds per square inch. These automatically control the wheel spin rate (30 revolutions per minute) by release of the gas through tiny jets.

The sail structure is nearly semicircular with a radius of 22 inches. It is covered with 1,860 solar cells, except for the portion occupied by the pointing and scanning experiments. Behind the solar cell panel are electronic and mechanical components to operate the sail.

When the satellite is injected into orbit, it will be spinning at about 120 revolutions per minute. Before it separates from the Delta third stage (which also goes into orbit), the three arms containing the gas vessels are extended. This action reduces the wheel spin rate to about 90 rpm. The gas jets are used to further decrease the spin rate to 30 rpm.

-more-

Meanwhile, the sail section, controlled by an electrical servo-mechanism, spins in the opposite direction to the wheel. A complex system of pointing control devices insures that the sail points toward the Sun when the OSO is in daylight.

Photodetectors seek the Sun. Four coarse detectors, each with a 90-degree field of view, provide signals which despin the upper section until the detectors point the sail to within two or three degrees of the Sun. Two fine detectors make more precise adjustments in azimuth and give signals for changes in elevation.

The pointing accuracy of the sail (one minute of arc) is comparable to sighting an object 18 inches in diameter from a distance of a mile.

Fine elevation pointing of the sail experiments is attained by a servo-control contained in the casing that supports experiments. Azimuth control of the sail is accomplished with another servo. The asimuth and elevation servos direct the sail to face the Sun continually.

Data Handling System

The improved data-handling capability of OSO-B2 is made possible by a new pulse code modulated (PCM) digital telemetry system and a new recorder system. Data obtained from each experiment is translated into a series of eight-digit "words" and stored on the tape recorder which operates continually during each orbit. The tape is read out at high speed by ground station command. Readout time takes five and one-half minutes after which the recorder automatically resumes its data recording assignment.

The times and sequences needed to store information from each experiment on the tape recorder is determined electronically. Each experiment contains the electronics needed for its readout and for delivering the data to the tape recorder.

The telemetry system also includes electronics equipment to monitor such housekeeping functions as voltages, temperatures and raster scan position. It also reports on the proper operation of the experiments.

All communications with the satellite are performed by the Goddard-operated Space Tracking and Data Acquisition Network (STADAN). In addition to the primary experiment data obtained via the tape recorder, a ground command capability can be used for real-time readout over STADAN stations.

SCIENTIFIC OBJECTIVES

The objectives of the Orbiting Solar Observatory program are to advance our understanding of the Sun's structure and behavior and to determine the physical processes by which the Sun influences the Earth.

The Sun is the nearest star to Earth and offers opportunities to acquire new knowledge of astrophysical phenomena and to test theories. It is the only star in which man can directly observe structural features such as sunspots or prominences and the only one near enough to permit detailed study of its X-rays, gamma rays and radio emissions.

The Sun emits electromagnetic radiations of all wavelengths and energetic particles. This radiated energy striking the Earth produces circulation in both the upper and lower atmospheres. In the lower atmosphere, this circulation produces long-range climatic effects which result in the day-by-day movement of weather systems.

Part of the solar radiation and particle emission, however, is absorbed or reflected by the upper atmosphere, and this radiation -- X-ray and ultraviolet -- produces the region of great electron concentration called the ionosphere. Rapid changes in the intensity of solar radiation in these wavelenghts have been noted by OSO I. These changes always follow a period of activity on the Sun's surface. Solar-particle emission also undergoes large variations following solar flares.

Thus, a study of solar activity and its effect on Earth, aside from basic scientific interest, is necessary for a fuller understanding of the space environment prior to manned flights to the Moon and beyond.

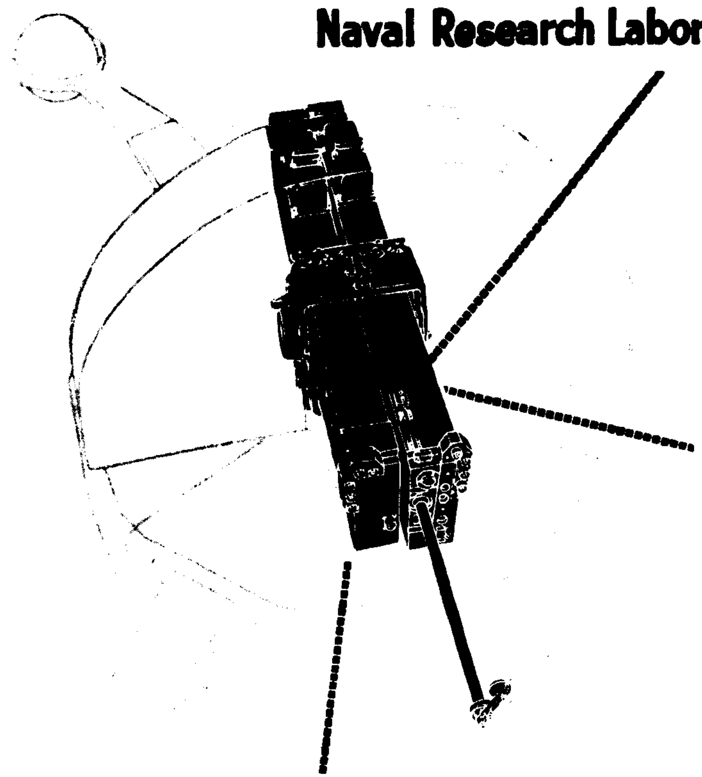
Of the total radiation spectrum emitted by the Sun, the Earth's atmosphere absorbs most of the ultraviolet and X-rays below the level of 3,000 Angstroms. The OSO satellite operating above the atmosphere is an ideal research tool for solar investigation.

EXPERIMENTS

The experiments selected for the OSO-B2 were chosen for their potential to provide answers to some of the more pressing questions on the nature of solar emissions. In basic terms, these experiments are intended to map the frequency and energy of solar emissions.

Specific OSO-B2 objectives are:

-more-



Naval Research Laboratories-Ultraviolet Telescopes & Coronagraph
Cognizant Scientist: Dr. R. Tousey
Pointed Mode: *(1) White Light Coronagraph (Two Orthogonal Polarizations)*
Raster Mode: *(1) 304 Å Spectroheliograph*
(2) 584 Å Spectroheliograph
(3) 1216 Å Spectroheliograph

Naval Research Laboratories-X-Ray Telescopes
Cognizant Scientist: Dr. T.A. Chubb
Pointed Mode: *(1) 2-8 Å Burst Monitor*
(2) 8-20 Å Burst Monitor
(3) 44-60 Å Burst Monitor
(4) Prominence Detector
(5) Background Detector
Raster Mode: *(1) 8-20 Å Spectroheliograph*
(2) 44-60 Å Spectroheliograph

Harvard College Observatory-Ultraviolet Spectrometer
Cognizant Scientist: Dr. L. Goldberg
Pointed Mode: *(1) Monochromatic Selection*
(2) Slow Spectral Scan (300-1400Å)
(3) Fast Spectral Scan (300-1400Å)
Raster Mode: *(1) Monochromatic Selection (2500 Wavelength Settings)*

ORIENTED EXPERIMENTS

- To construct a detailed plot of the Sun's ultraviolet light over the spectrum from 300 to 1400 Angstroms.

- To monitor bursts of solar X-ray emission in the ranges of from 2 to 60 Angstroms.

- To map repetitively the X-ray sources on the Sun in several wavelength bands by scanning the Sun.

- To map by scanning, ultraviolet source regions on the Sun in several monochromatic bands.

- To scan the solar corona in white light.

- To monitor the direction and intensity of polarized and unpolarized zodiacal light in red and blue light.

- To measure the direction and arrival of cosmic gamma ray radiation in the high energy range of 50 million electron volts to 1 billion electron volts.

- To measure cosmic gamma ray radiation in the low-energy range of 0.1 to 3.0 million electron volts.

- To perform an all-sky spectroscopic survey of ultraviolet light sources in the range of 1,300 to 2,600 Angstroms.

POINTED EXPERIMENTS

Ultraviolet Spectrometer-Spectroheliograph Experiment

The ultraviolet experiment developed by Harvard University uses a spectrometer to scan a wavelength region of the ultraviolet spectrum between 300 and 1,400 Angstroms. A photomultiplier tube (a radiation sensitive device that uses a screen covered with various types of phosphorescent materials so that it sees only radiation of certain wavelengths) screens out wavelengths beyond 1,400 A and has only a weak response to wavelengths below 300 A.

The device will scan the spectrum at two rates of speed which can be controlled by ground-station commands. The entrance slit of the spectrometer is connected to the scan drive. In addition to scanning the solar ultraviolet spectrum, it also will be able to move to any desired wavelength and a raster-type back and forth motion of the entire sail section will automatically cause an image of the Sun to the constructed at any desired wavelength.

Solar X-ray and Ultraviolet Imaging Experiment

The solar X-ray monitor experiment was designed by the U.S. Naval Research Laboratory. It consists of seven Geiger counters set up to measure X-ray emissions from the Sun. Five of the counters will be used during the pointed portion of satellite operation. Two will be used during the raster scan process.

Working at various ranges of the spectrum, the counters will be pointed directly at the Sun and record solar X-rays continuously, except during the telemetry readout periods. A background device, looking in a direction away from the Sun provides the basis for correcting the data by taking into account interference from Van Allen or other radiation in the vicinity of the OSO-B2 orbit.

One of the counters is designed to look at the region around the Sun for prominence events. During this process the Sun is artificially eclipsed by a blocking disk two feet from the counter.

The two Geiger counters used for scan phase are intended to provide a coarse X-ray mapping of the solar disk. This will be accomplished by recording the responses of an X-ray detector as it scans across the Sun. A pulse generated in each of the Geiger counters will be separately transmitted to the data-storage system during each scan, thus permitting recording of patterns at two different wavelengths.

All the Geiger counters are connected by a common counter gas supply. Of the seven Geiger counters in the experiment, one will be excited by an internal radioactive source used to control the high-voltage power supply. The other detectors are then operated from this common power supply. The experiment is designed to operate only when the satellite is in direct sunlight.

White Light Coronograph Experiment

There are two phases to this experiment also provided by the U.S. Naval Research Laboratory. Its purpose, first, is to map the intensity of the white light corona of the Sun which has been artificially eclipsed during the pointing mode of satellite operation. Second, the Sun will be mapped in three types of ultraviolet light.

The principle of the first part of the experiment is to use a disk to eclipse the Sun and a mechanical scanner to then scan the solar corona. Coronal light will be detected on a photomultiplier. Its output will be amplified, converted into a digital number, stored, and fed to the tape recorder.

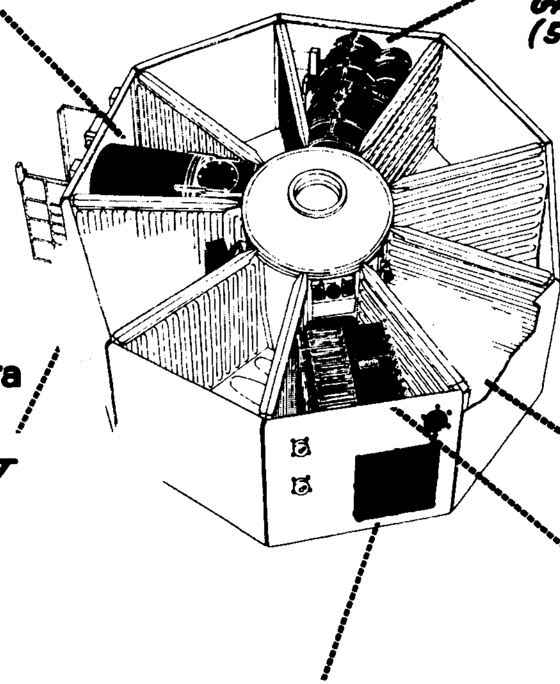
The ultraviolet scan phase of the experiment consists of a dispersion grating followed by a set of three ultraviolet photomultipliers preset to focus on an important solar ultraviolet line. The outputs of the photomultipliers are tied together and fed to the tape recorder in digital form.

WHEEL EXPERIMENTS

Zodiacal Light Experiment

This experiment, provided by the University of Minnesota, is designed to determine the origin of the polarization of zodiacal light, a nebulous light seen in the west after twilight and in the east before dawn.

Extensive studies of zodiacal light have shown that the unpolarized zodiacal light is confined to directions close to the ecliptic plane or the principal plane of the solar system planets.



WHEEL EXPERIMENTS

At angles from above or below the ecliptic plane, however, the zodiacal light becomes polarized; at an angle of approximately 50 degrees, polarization reaches as high as 20 per cent.

Experiment apparatus will measure the intensity of polarized zodiacal light at angles 90 degrees to the Sun. To do this, photomultipliers covered by polaroid sheets are placed on the top and bottom of the rotating wheel to look in both directions along the spacecraft's spin axis. Two pairs of photomultipliers, mounted approximately 90 degrees apart around the wheel will look in opposite directions. Each set will consist of one visible and one infrared photomultiplier. Because orientation of the sail toward the Sun requires control of the spacecraft only in pitch and yaw, the spacecraft will slowly roll so that the wheel and photomultipliers will vary from looking into the plane of the ecliptic to looking at right angles to it. Thus, the experiment will monitor the intensity and direction of polarized light outside the Earth's atmosphere.

High Energy Gamma Ray Experiment

This experiment, provided by the University of New Mexico, is designed to measure primary cosmic gamma ray radiation in the energy range of about 50 million electron volts (MEV) to one billion electron volts (BEV).

Regions suspected of producing high-energy radiation include the Crab Nebula and a jet of gas in galaxy M87. Direct observational location of such sources by determining the direction of arrival of primary charged particles is not possible over most of the energy range because interstellar magnetic fields scramble the directions before the particles reach the Earth.

Matter in the vicinity of any such sources will be strongly irradiated producing pi mesons as well as other secondary charged particles.

The gamma rays produced by the decay of neutral mesons will travel through space without deflection, however, and may allow the source to be localized. The majority of these gamma rays should have energies from 50 MEV to one BEV. Since large numbers of gamma rays are produced in the atmosphere by secondary emission, measurement can be conducted only above the atmosphere.

The system of counters used for this measurement convert gamma rays of the energy desired in a lead converter to electrical pulses, while other gamma rays are absorbed by the lead.

Measurement of the strength of these pulses provides an indication of the strength of the gamma rays.

Low Energy Gamma Ray Experiment

This Goddard Space Flight Center experiment is designed to detect lower energy gamma rays coming from the Sun or other sources and to analyze their energy in the spectrum range from .1 to 3.0 MEV.

The principle of the experiment is similar to that of the low energy gamma ray experiment carried on board OSO I, although the instruments involved have been redesigned and improved.

This device uses a spectrometer behind a plastic phospher shield which screens out charged particles. The spectrometer has a crystal detector sensitive only to gamma rays of the desired energy range and is viewed by a photomultiplier tube which converts them to electrical impulses which are a measure of the energy of the rays.

Astronomical Ultraviolet Spectrophotometry Experiment

The purpose of this Goddard Space Flight Center experiment is to increase our knowledge of stellar atmospheres, interstellar gas and dust. The data obtained will be used to help in the Orbiting Astronomical Observatory satellite program by providing preliminary, detailed information on the brighter sources of ultraviolet in the universe.

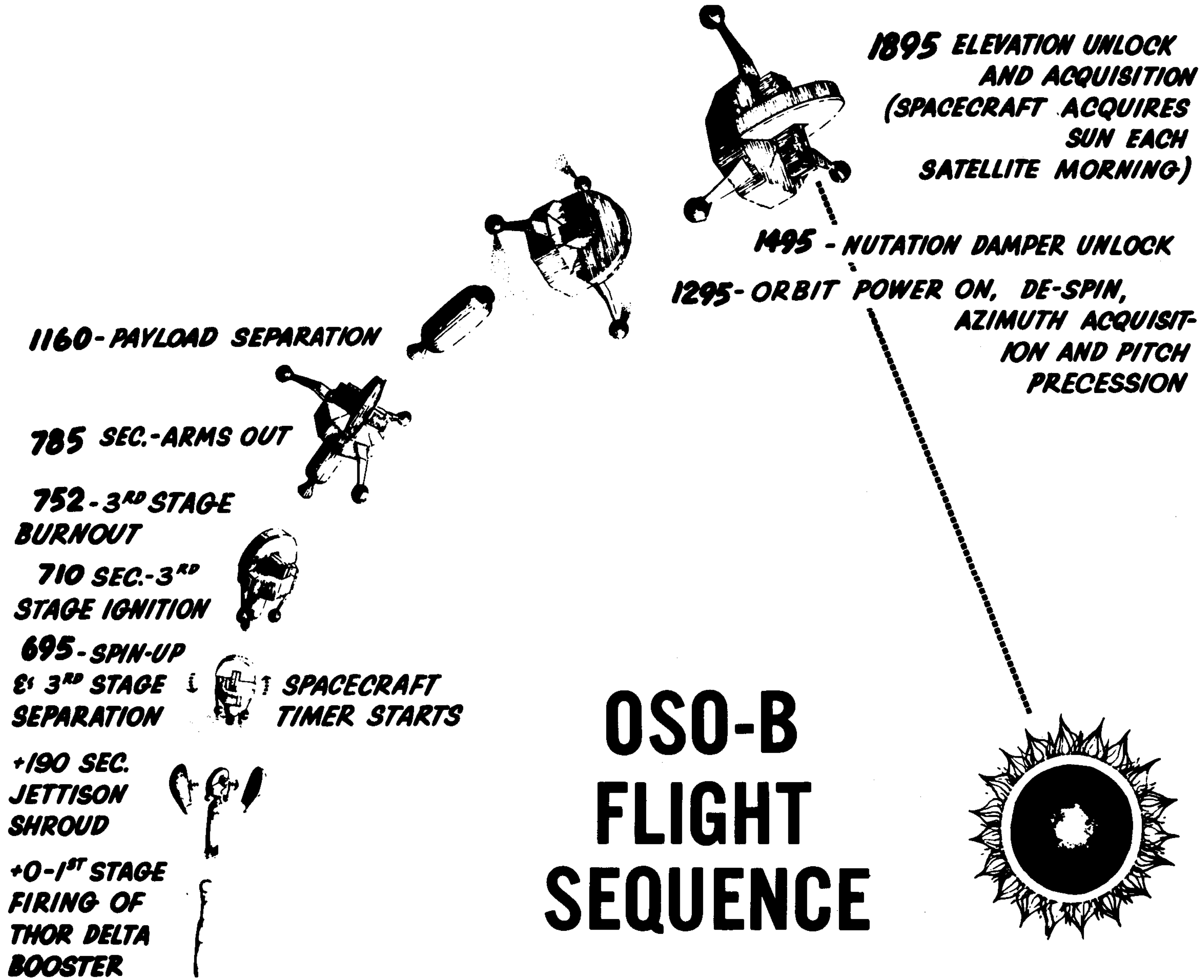
This experiment consists of two slit-type grating spectrophotometers with two telescopes. One will be calibrated to look in the 900 to 2,000 A region and the other from 1,800 to 3,800 A. The overlap is intended to reduce the ambiguities which may be caused by the higher orders of ultraviolet radiation.

An area of the sky about one-half by one degree will be imaged on the entrance slit. Light passing through the slit will be reduced into a two-inch-square picture and reflected by the grating to a camera mirror two inches square. This forms an image of the first slit on an exit slit in front of a photomultiplier which converts the ultraviolet energy into voltages.

Emissivity Stability Experiment

This experiment from the NASA Ames Research Center is designed to support NASA's Apollo manned lunar landing program. It is a relatively simple experiment involving special coatings which will be tested for emissivity stability; that is, their ability to retain their characteristic thermal and reflective

OSO-B FLIGHT SEQUENCE



properties when exposed to the Sun and space. They will be applied to a disk on the wheel which is exposed to solar energy during orbit.

Measurements of performance degradation with time will be telemetered to ground stations. These data will be valuable in selecting proper protective coatings to be used on the Apollo capsule.

DELTA LAUNCH VEHICLE

The three-stage Delta vehicle, built by the Douglas Aircraft Co., will be used to launch the OSO-B2 satellite. Delta's record to date includes 25 satellites launched into orbit and two launches in which orbit was not achieved. The Delta project is managed by the Goddard Space Flight Center.

The Delta rocket has the following characteristics:

Height:	90 feet
Maximum diameter:	8 feet
Lift-off weight:	About 57 tons

First stage: Modified Thor, produced by Douglas Aircraft Co.

Fuel:	Liquid (Kerosene/liquid oxygen)
Thrust:	170,000 pounds

Burning time:	About two minutes and 26 seconds
Thor weight:	Over 50 tons

Second stage: Aerojet General Corp., JA 10-118 propulsion system.

Fuel:	Liquid (UDMH/IRFNA)
Thrust:	About 7,500 pounds
Burning time:	About two minutes and 30 seconds
Weight:	Two and one half tons

Third stage: Allegany Ballistics Laboratory X-258 motor

Fuel:	Solid
Thrust:	About 5,700 pounds
Burning time:	23 seconds
Weight:	About 573 pounds
Length:	61.27 inches
Diameter:	18 inches

During first and second stage powered flight, the Bell Telephone Laboratory radio-guidance system is used for inflight trajectory corrections. It also commands second-stage cutoff when the desired position and velocity have been achieved.

Following second stage cutoff, a coast period of approximately 7 minutes occurs. Near the end of this period, small rockets mounted on a table between the second and third stage ignite and spin up to 120 revolutions per minute. The second stage then separates and third stage ignition occurs, giving OSO-B2 its final boost into orbit.

OSO-B2 PARTICIPANTS

NASA HEADQUARTERS

Dr. Homer E. Newell	Associate Administrator for Space Science and Applications
Dr. John E. Naugle	Director, Physics and Astronomy Programs Division, OSSA
Richard E. Halpern	OSO Program Manager
Dr. Henry J. Smith	OSO Program Scientist
T. B. Norris	Delta Program Manager

GODDARD SPACE FLIGHT CENTER

Dr. Harry J. Goett	Director
Dr. John W. Townsend, Jr.	Associate Director, Office of Space Science and Satellite Applications
L. T. Hogarth	OSO Project Manager
Dr. John C. Lindsay	OSO Project Scientist
T. E. Ryan	Tracking and Data Systems Manager
William R. Schindler	Delta Project Manager
Robert H. Gray	Manager, Goddard Launch Operations

BALL BROTHERS RESEARCH CORP.

R. H. Gablehouse	OSO Project Manager
L. T. Ostwald	OSO-B Project Engineer

-more-

DOUGLAS AIRCRAFT CO.

G. R. Hanson	Chief, Douglas Field Office, Cape Kennedy
J. Kline	Delta System Engineer

EXPERIMENTERS

Harvard University	Ultraviolet Spectrometer Dr. Leo Goldberg Dr. Edward M. Reeves Dr. William H. Parkinson Dr. William Liller
Naval Research Laboratory	Solar X-ray Burst Monitor Dr. T. A. Chubb Dr. R. W. Kreplin
Naval Research Laboratory	White Light Coronograph Dr. Richard Tousey J. D. Purcell
University of Minnesota	Zodiacal Light Monitor Dr. Edward P. Ney Dr. W. F. Huch Dr. R. W. Maas
University of New Mexico	High-Energy Gamma Ray Dr. Christopher P. Leavitt
Ames Research Center	Emissivity Stability Dr. Carr B. Neel Dr. G. G. Robinson
Goddard Space Flight Center	Low Energy Gamma Ray Kenneth J. Frost
Goddard Space Flight Center	Ultraviolet Spectrophotometry Dr. Kenneth L. Hallam William A. White

-more-

FACT SHEET

ORBITING SOLAR OBSERVATORY B-2

SATELLITE

Weight:	About 545 pounds (215 pounds of scientific experiments and associated instruments including 131 pounds in wheel section and 84 pounds in sail section).
Shape:	Base section: nine-sided wheel with three arms carrying the spin control gas supply; top section: fan-shaped with pointing and scanning instrumentation.
Size:	Wheel diameter: 44 inches, increased to 92 inches with three arms extended. Overall height: 37 inches.
Lifetime:	Designed for six months lifetime.

LAUNCH PHASE

Launch site:	Complex 17, Cape Kennedy, Eastern Test Range.
Launch vehicle:	Three-stage Delta rocket
Launch azimuth:	108-degrees.
Orbit:	Circular, 350 miles.
Orbital period:	95 minutes.
Angle of inclination:	33 degrees (roughly between 35° N and 35° S of the equator).

-more-

POWER SUBSYSTEM

Solar power supply:	33 watts maximum using 3.8 square feet of N/P solar cells arranged in 36 parallel strings of 52 cells each on the Sun-facing side of the sail section.
Typical maximum load:	26 watts including 15 watts for satellite systems and 11 watts for experiments.

TRACKING, TELEMETRY AND COMMAND STATIONS

All tracking and telemetry stations are part of the Goddard Space Flight Center's Space Tracking and Data-Acquisition Network (STADAN). Secondary stations will be used for acquisition and command only during the early orbit phase of the launch or when no primary station is available to command and record data.

Primary stations:	Fort Myers, Fla.; Quito, Ecuador; Lima, Peru; Santiago, Chile; Blossom Point, Md.
Secondary stations:	Mojave, Calif.; Woomera, Australia; Johannesburg, Republic of South Africa.

OSO I ACHIEVEMENTS

OSO I, the first of the NASA observatory class satellites, was launched March 7, 1962. It is still transmitting some data, although it no longer is capable of pointing at the Sun and its tape recorder has ceased to operate.

It is generally acknowledged that the OSO I satellite has proved to be one of the most successful U.S. scientific satellites, both from an engineering and scientific standpoint. All of the data from its 13 experiments have not yet been fully analyzed, and the initial results are still considered to be preliminary. However, Dr. Homer E. Newell, Associate Administrator for Space Science and Applications has cited eight of the most noteworthy achievements of the satellite to date. They are:

- Solar ultraviolet and X-rays observed for more than a year beginning in Spring 1962.
- Far ultraviolet analyzed in detail and continuously.
- Activity centers observed directly in radiations which govern Earth's atmosphere.
- Comparative measurements of X-ray brightness of the quiet Sun, sunspot groups, and solar flares.
- Time and brightness sequences shown to exist in series of small X-ray flares.
- Solar X-ray output showed marked increases in fractions of a second.
- Lyman-alpha hydrogen ultraviolet line brightening first seen from flares.
- Quiet Sun fluxes of low energy neutrons and Bremsstrahlung X-rays shown to be vanishingly small.

In addition to its scientific achievements, OSO I, as has been mentioned, also marked a significant step forward in satellite engineering techniques. Most significant of these were:

- The first of the "observatory" satellites, with demonstrated solar pointing more accurate than any other satellite or rocket system.

- First long-time operation of direct current torque motors, bearings, slip rings and other moving parts in the environment of space for an extended period.

- A "first" of its kind damper to minimize satellite wobble.

- First scientific satellite to use a tape recorder to obtain complete orbital data coverage.

SUN FACT SHEET AND GLOSSARY

Age: Estimated 10 billion years.

Diameter: About 864,000 miles (109 times that of Earth).

Volume: 1,300,000 times that of Earth.

Density: 0.26

Mass: 333,000 x Earth

Surface Temperature: 10,300°F (Earth, average of 32°F).

Interior Temperature: 35 to 50 million degrees F. (Earth, 5000°F)

Rotation: Varies, more rapid near the equator where average is 24.65 days.

Distance from Earth: 93 million miles or 1 astronomical unit.

Specific Gravity: 1.41 (Earth, 5.52).

Surface Gravity: 28g (Earth 1g).

Corona: The Sun's outermost layer visible only through a coronograph or during total solar eclipse when it appears as a varying white halo against the dark silhouette of the Moon. When there are relatively few sunspots, the corona has an almost smooth outline. During disturbances, however, its streamers can extend outward for millions of miles.

Cosmic Ray Particles: Mostly protons with energies ranging from less than 10 MEV (million electron volts) to 50 BEV (billion electron volts).

Photosphere: The visible disk of the Sun; diameter 1/2 degree.

Chromosphere: The transition region between the corona and photosphere.

Gamma Ray: A quantum of electromagnetic radiation emitted by an atomic nucleus as a result of a quantum transition between two energy levels of the nucleus. Energies range from 100,000 to 1 million electron volts.

Granulation: The structure -- like rice grain -- of the photosphere. These grains are constantly in motion, and have a turbulent life of only a few minutes.

Limb: The edge of the Sun's disk.

Penumbra: The grayish-filament-like structures surrounding the umbra of a sunspot.

Plages: The bright or dark calcium clouds that are found near sunspots. Sometimes called flocculi. The general form for any chromospheric activity center.

Prominences: Clouds of bright hydrogen that lie on the Sun's surface, or photosphere. Flame-like in appearance they sometimes shoot outward a million miles. The more spectacular seem to be associated with sunspots.

Proton-Proton Cycle: The process of creating stellar energy at a lower temperature than that required for the carbon cycle. Probably the most important energy source in the Sun.

Solar Constant: A figure which represents the rate of energy received from the Sun. Figured as the amount of energy received on the surface of a hypothetical sphere outside the Earth's atmosphere. Solar constant is 1.94 calories per square centimeter.

Spectrometer: An instrument which measures intensity in various wave lengths. A dispersing element, such as a diffraction-grating is employed to give the various wave lengths.

-more-

Spicules: The fine structure in the corona seen at the poles. Has life-time measured in seconds.

Sunspots: The dark areas in the photosphere having extremely strong magnetic fields. Apparently they are the venting valve for the tremendous forces at work below the photosphere. Some of the larger ones have a total area of several million miles. Temperature within a sunspot is believed to be several thousand degrees less than that at the surface. The number of sunspots varies over a solar cycle of 11.3 years between maximum and minimum sunspot activity.

Umbra: The dark central portion of a sunspot.

-END-