Space Log

SPACE CITY COVER SOCIETY
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VOYAGER 1 AND 2 MISSIONS

VOYAGER 1

Voyager 1 plunged downward toward the outer edge of Saturn's rings, stirring up bits of cosmic debris. Reaching a peak velocity of 56,600 miles per hour, it came within 77,200 miles of the planet's banded cloud tops for its nearest approach to Saturn. The historic date was November 12, 1980; the time was 3:46 p.m. PST.

Voyager 1 had been launched on September 5, 1977 and now that it was encountering Saturn, it was sending pictures across nearly a billion miles of space to a tracking station in Spain. There, the impulses were relayed around the globe by satellite, and the image appeared on a TV monitor at the Jet Propulsion Lab in Pasadena, California. JPL is mission control for the Voyager 1 and 2 missions.

As the spacecraft executed its maneuvers, it had made the three-year trip with astonishing precision; near the climax of its journey, it was off by only 12 miles!

The encounter ended December 15, 1980 and during that time, Voyager 1 took more than 17,500 photographs. And then it headed out of the solar system with its scan-platform instruments being turned off December 19, 1980. Although the exact location of the heliopause (the outer edge of the solar wind) is unknown, it is possible Voyager 1 will reach it sometime before 1990.

VOYAGER 1 SATURN SCIENCE SUMMARY

SATURN.....From the spacecraft, as from Earth, Saturn's atmosphere appears grossly similar to Jupiter's, with alternating dark belts and light zones, circulating storm regions and other discrete dark and light cloud markings. Unlike Jupiter, however, Saturn's markings are strongly muted by a thick haze layer above the visible cloud tops. (Jupiter has a similar haze layer, but it is not as optically thick as Saturn's.) Because Saturn is colder, the cloud layers are deeper in the atmosphere than at Jupiter and appear blander.

The bulk of Saturn's atmosphere is composed of hydrogen. Helium accounts for only about 11 percent of the mass of the atmosphere above the clouds, compared to an abundance of about 19 percent at Jupiter. The difference is consistent with gravitational separation of helium and hydrogen in Saturn's interior and could generate the excess energy radiated by Saturn over that received from the Sun.

SATURN'S RINGS.....Voyager 1 found that the classically observed A, B, and C rings consist of hundreds of small ringlets, two of which are elliptical in shape. Even the classical gaps were seen to contain ringlets; the Cassini Division appears to contain at least five, each of which shows finer detail. The F ring, discovered by Pioneer 11 in 1979, is composed of three separate ringlets that appear to be intertwined. The inner and outer limits of the F ring are controlled by two shephere satellites, 1980S26 on the outside and 1980S27 on the inside.

Voyager 1 also photographed the D and E rings, during passage through Saturn's shadow, and confirmed a new ring near 2.8 Saturn radii from the center of the planet. It was designated G ring. The existence of a satellite or a ring at the radius had been postulated on the basis of Pioneer 11 fields and particles data.

SATURN SATELLITES.....Voyager 1 observed all Saturn's known satellites except Phoebe. Mimas, Enceladus, Tethys, Dione and Rhea are approximately spherical in shape and appear to be composed mostly of water ice. Tethys in particular seems to be largely ice, while Dione has a density that indicated it is 40 percent rock. Mimas, Tethys, Dione and Rhea are all cratered; Enceladus appears smooth.

TITAN.....Because of its unique atmosphere, Titan may turn out to be the most important and interesting body, from a terrestrial perspective, in the solar system. For almost two decades, space scientists have searched for clues to the primeval Earth. At Titan, they found an atmosphere whose chemistry may be related to that of the early Earth.

Titan appeared from Earth-based and Pioneer 11 observations to be the largest satellite in the solar system. Voyager's close approach and diametric occultation show it to have a diameter of 3,194 miles, slightly smaller than Ganymede, Jupiter's largest satellite. Both are larger than the planet Mercury. Titan's density thus appears to be about twice that of water ice, requiring Titan to be composed of nearly equal amounts of rock and ice, as is Ganymede.

Titan's surface cannot be seen in photos from Voyager 1; it is hidden by a dense, optically thick haze. Several distinct, detached haze layers can be seen above the visibly opaque haze layer. The layers merge into a darkened hood over the north pole of Titan. Also, Titan has no measurable intrinsic magnetic field; it therefore has no electrically conducting convective liquid core. Its interaction with Saturn's magnestosphere distorts the planet's field in Titan's wake. The big satellite also serves as a source for neutral and electrically charged particles in Saturn's magnetosphere.

VOYAGER 2 SATURN ENCOUNTER

Voyager 2 soared past the ringed-planet Saturn at a speed of 54,000 miles per hour and only 63,000 miles above Saturn's cloud tops. The time was 8:24 p.m. PDT; the date was August 25, 1981. It had journeyed nearly a billion miles of space and its four-year travel had put it exactly 2.7 seconds early!

Scientists at the Jet Propulsion Laboratory in Pasadena, California (mission control for the Voyager Project) said the pictures coming in from the cameras of Voyager 2 were "spectacular... they exceed our fondest dreams."

As it has been since Galileo first gazed at Saturn 371 years ago, it was the rings that stole the show. Dr. Bradford Smith, head of the project's imaging team said, "We are seeing the rings at a higher and higher resolution; it looks as though we have underestimated again."

Until recently, scientists had assumed that Saturn had only half a dozen rings. Pictures taken by Voyager 1 and now those taken by Voyager 2 showed that the count was first raised to a hundred; now the number of rings could be as many as one thousand.

Dr. Edward Stone, chief sceintist for the Voyager Project said, "Everything we are seeing is new. We are looking at the system in which we live. It is our solar system and every time we look at it, we are learning new facts about it."

Voyager 2 was only slightly closer to Saturn than was Voyager 1 in November 1980, but it did come much closer to five of Saturn's moons on its whirlwind tour of the Saturnian system. These five were: Enceladus, Tethys, Hyperion, Iapetus, and Phoebe.

Among the photographic treasures sent back by Voyager 2 was the discovery of a massive 300-milewide crater on Tethys, the icy moon that circles Saturn at a distance of 183,000 miles. The crater, nearly one-third the size of Tethys itself, bore graphic testimony to the moon's collision with a massive object in the early days of the solar system, more than 4 billion years ago.

Hyperion, another moon, seems to have been shattered by a similar cataclysm. New pictures sent back revealed that Hyperion's surface is scarred by craters, visible reminders of collisions that took place as the solar system formed out of a swirling cloud of gases. They were even some surprises about Titan, Saturn's largest moon, which had been assigned a low priority on the Voyager 2 mission because it had been scrutinized so closely during Voyager 1. Voyager 1 showed only one prominent feature visible in the slightly orange, haze-shrouded moon; a dark cap of clouds hanging over its north pole. Voyager 2's pictures revealed that the cap had turned into a band of clouds that appear to circle, but no longer cover the polar region. "A change has definitely taken place," Smith said. "But Titan is still a rather uninspiring orange ball."

Enceladus, one of Saturn's collection of at least 17 moons, was a special target of Voyager. Thought to be almost barren of the impact of craters, some scientists had suspected some sort of activity was constantly renewing its shiny, icy surface. But Voyager 2's pictures showed vast fields of craters, though the scars of previous impacts were less sharp than those on other moons. Cracks in valleys spread over the face, which also showed areas of smooth plains. David Morrison, a member of Voyager's imaging team, said, "The pictures suggest an ice object that may even be liquid water inside right up to the edge of a hard frozen crust." Gary Hunt, another member of the team, said, "All sorts of scientific theories are falling by the board, buried beneath the new flood of information sent back by the spaceship."

Voyager 2, launched August 20, 1977 from Cape Canaveral, Florida, still has a journey to make. It will travel another 1.76 billion miles to a Uranus encounter in January 1986, then to a rendezvous with Neptune in August 1989.

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VOYAGER 1 AND 2 JUPITER ENCOUNTER

Before reaching Saturn, both Voyager 1 and 2 made encounters with Jupiter, and opened up a whole new world for space scientists. Voyager 1 made its closest encounter with Jupiter on March 5, 1979, after an 18-month journey. It flew to within 172,500 miles of the colorful, cloudy surface and then began its 20-month cruise to Saturn.

Voyager 2 made its closest encounter with Jupiter on July 9, 1979, with an approach at about 404,000 miles from the planet's visible cloud tops. Then, it headed for its encounter with the planet Saturn.

EVENT COVERS

The Space City Cover Society serviced covers for the launch of Voyager 1 and 2 (Voyager 2 was launched first as it took a different space-route) and the encounter with Jupiter. All of those covers have been offered by us previously but due to so many new collectors joining us since then, we have been requested to bring the list up to date. We will include all of these in our "Planetary Covers" section and at higher prices since our small supply will be gone before too long. If you wish to see which covers you might be missing, we are listing them on the back side of this page. There is a separate order blank enclosed for ordering them.

SCCS COVERS FOR VOYAGER 1 AND 2 MISSIONS

VOYAGER 1

Roll Out Voyager 1 spacecraft moved to Complex 41 Launch Pad on August 31, 1977. There, the the vehicle mating and final preparations were made prior to launch aboard a Titan Centaur (TC-6) rocket. (Cape Canaveral cancel) Catalog price SOLD OUT

Launch Voyager 1 launched from Cape Canaveral on September 5, 1977. (Cape Canaveral cancel) Catalog price $3.50

Launch Voyager 1 launched. September 5, 1977 cancel from Pasadena, California, home of the Jet Propulsion Laboratory, mission control for Voyager Project. Catalog price SOLD OUT

Jupiter Encounter Voyager 1 made its closest encounter with Jupiter after 18 months in space on March 5, 1979. It came within 172,400 miles of the planet's cloud tops and then began its 20-month journey to Saturn. (Pasadena cancel). Catalog price $4.00

VOYAGER 2

Roll Out Voyager 2 moved to Complex 41 Launch Pad on August 13, 1977. There, vehicle mating and final preparations were made prior to launch aboard a Titan Centaur (TC-7) rocket. (Cape Canaveral cancel). Catalog price SOLD OUT

Launch Voyager 2 launched on August 20, 1977, from Cape Canaveral (Cape Canaveral cancel). Catalog price $3.50

Launch Voyager 2 launched. August 20, 1977 cancel from Pasadena, California, home of the Jet Propulsion Laboratory, mission control for Voyager Project Catalog price SOLD OUT

Jupiter Encounter Voyager 2 made its closest encounter with Jupiter on July 9, 1979. The closest approach was at about 404,000 miles from Jupiter's visible cloud tops and then it headed for the planet Saturn. (Pasadena cancel). Catalog price $4.00

DOUBLE CANCELLED COVERS

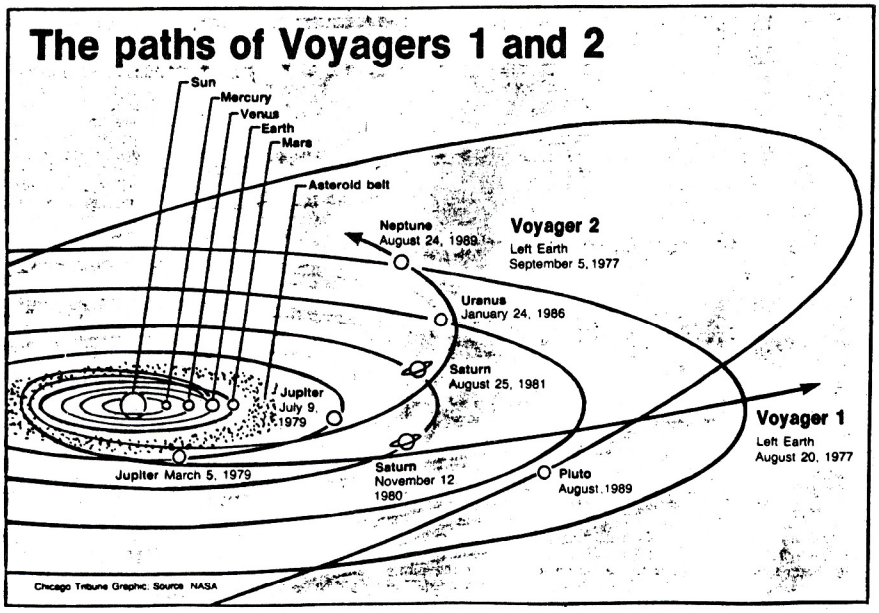
All of these were sold out on our first offering right after the events and attest to the ever-growing popularity of the field of double cancels. We list them for reference only.

(a) Launch (Sep 5, 1977) (Cape Canaveral) and Jupiter Encounter (Mar 5, 1979) (Pasadena).

(b) Launch (Aug 20, 1977) of Voyager 1 and Launch (Sep 5, 1977) of Voyager 2. Both cancels are Cape Canaveral.

(c) Launch Voyager 1 (Aug 20, 1977) and Launch Voyager 2 (Sep 5, 1977). Both cancels are of Pasadena, California.

(d) Jupiter Encounter Voyager 1 (Mar 5, 1979) and Jupiter Encounter Voyager 2 (Jul 9, 1979). Both cancels are Pasadena, California.



UNMANNED SATELLITES

For those of you that have been collecting Space City Cover Society covers over the years, you are aware that we also service covers for all of the major unmanned satellite launches from the Cape Canaveral area. With so much hectic activity over the last few years, we have not had a chance to offer these unmanned satellite launch covers but will do so over the next few months. We will do these by subject matter and this will enable the newer collector to collect these with more ease of knowing what the launches are for.

By offering these SCCS covers in this manner, we will also enable the collector to secure these at really bargain prices. Most of these are no longer available from dealers and when you are able to locate the needed covers, the price is usually two to three dollars, according to the event.

We will start with the "FLTSATCOM" covers and the set of five will be included on the special enclosed order blank. For those of you that have previous SCCS satellite launch covers, this is the time to continue. For those of you that are newer to the SCCS covers, this will be the ideal time to start. Except for the planetary launches (such as Voyager, Pioneer, Viking, etc) these satellite launch covers from Cape Canaveral are done by us in quantities of only 300. Due to the smaller quantities, this is an added attraction to making sure your SCCS covers stay in the category of "desirable".

FLTSATCOM

The FLTSATCOM satellites are the spaceborne portion of a worldwide Navy , Air Force and Department of Defense system to enable communications between naval aircraft, ships, submarines, ground stations, Strategic Air Command elements and presidential command networks. The satellite system provides 23 ultra high frequency communication channels and one super high frequency channel. NASA is reimbursed for all additive costs of the Atlas Centaur rocket and launch services by the Department of Defense under provisions of a launch services agreement.

The FLTSATCOM spacecraft have a design life of five years and are placed in geostationary orbits at different locations above the equator. There, each provides two-way communications between any two points on Earth visible from its orbital location. The FLTSATCOM program is managed by the Naval Electronic Systems Command. The Air Force Space Division, Los Angeles, is responsible for production, launch vehicle/spacecraft integration and tracking and data acquisition.

As the satellites are placed into highly elliptical orbits, a solid propellant rocket motor aboard the spacecraft is used for firing and that circularizes the orbit at a syschronous altitude of 22,237 miles above the Earth. At that altitude, because the speed of the spacecraft in orbit matches the rotational speed of the Earth, the satellite remains in position over one spot on the equator.

ATLAS CENTAUR LAUNCH VEHICLE

FLTSATCOM satellites are launched by the Atlas Centaur launch vehicle. This vehicle is NASA's standard launch vehicle for intermediate weight payloads. It is used for the launch of Earth orbital, Earth synchronous and interplanetary missions. Centaur was the nation's first high energy, liquid hydrogen/liquid oxygen propelled rocket. Developed and launched under the direction of NASA's Lewis Research Center, it became operational in 1966 with the launch of Surveyor 1, the first U. S. spacecraft to soft-land on the Moon's surface.

Since that time, both the Atlas booster and Centaur second stage have undergone many improvements. At present, the vehicle combination can place 10,000 pounds in low Earth orbit, 4,150 pounds in a synchronous transfer orbit and 2,000 pounds on an interplanetary trajectory. The Atlas and the Centaur vehicles have been updated over the years. Thrust of the Atlas engines has been increased about 50,000 pounds since their first use in the space program in the early 1960's.

The Centuar D-1AR has an integrated electronic system that performs a major role in checking itself and other vehicle systems before launch and also maintains control of major events after liftoff. The new Centaur system handles navigation and guidance tasks, controls pressurization and venting, propellant management, telemetry formats and transmission, and initiates vehicle events. Most operation needs can be met by changing the computer software.

THE FLTSATCOM FIVE LAUNCHES

We had the first cover in the series cancelled at the Kennedy Space Center and the other four cancelled at the Cape Canaveral post office. All are correctly cancelled on the dates of the launches. We offer these as a set of five as follows:

Feb 9, 1978	First Launch
Jan 30, 1979	Second Launch
Jan 17, 1980	Third Launch
Oct 30, 1980	Fourth Launch
Aug 6, 1981	Fifth Launch

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