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JOURNEY TO VENUS

As many as 10 unmanned spacecraft from the United States and the Soviet Union will visit the planet Venus late this year, according to plans by officials of the National Aeronautics and Space Administration. Six of the visiting spacecraft will be American sent to the mysterious and cloud-covered planet by a pair of Pioneer-Venus spacecraft.. The first was launched May 20, 1978 and the second will be launched in August. Venus 1, launched from Cape Canaveral, Fla., will orbit Venus December 4, and the second (Venus 2) will arrive around December 9. Pioneer Venus 2 will split into five independent space vehicles, which will penetrate the hazy, yellow clouds surrounding Venus.

PIONEER VENUS 1....Blast-off was flawless from Cape Canaveral at 9:13 a.m. EST. The 131-foot tall and 10-foot wide orbiter was on its way to the 400-million mile journey. As Dr. George Page, director of expendable vehicles said, "I don't remember a launch with fewer problems".

THE VENUS PROGRAM....The $250 million Pioneer Venus project is aimed at providing atmospheric information unavailable from telescopes and three previous U. S. explorations. Never before has a spacecraft circled a planet solely to gather atmospheric data. Venus resembles Earth in size, density and distance from the sun, but its lack of water puzzles scientists. "Why is a planet that might be our twin so hostile to life?"asked Dr. Thomas Donohue, in charge of science steering for the project. NASA officials speculate that the earth may also become dry and devoid of life because our own atmosphere is slowly thickening with carbon dioxide from burning of fossil fuels.

Because the 900-degree temperature on Venus remains the same all day every day, it is an ideal weather laboratory. Many of the 30 experiments on board the spacecrafts will test those atmospheric conditions. NASA officials believe radar mapping will confirm that the planet's surface resembles a rocky desert. Radar astrononers have discovered enormous volcanoes and a canyon stretching 870 miles long and 95 miles wide.

PIONEER VENUS 2....The second Pioneer launch is set for August 7, and will carry to Venus a drum-shaped spacecraft "bus" that will piggy-back four probes to Venus. Three probes are small, weighing 200 pounds apiece. The fourth probe is more than four times that size. The largest probe will be dropped by parachute along the equator of Venus on its day side. The probe's parachute will drop off about 30 miles above the surface allowing the bullet-shaped spacecraft to float down and take measurements of the planet's thick atmosphere.

Two of the small probes will be aimed at the night side of the planet, near the north and south poles. The third small probe will be directed to the day side, even closer to the south pole than the other small probe. All three of the small probes will measure temperature and pressure of the atmosphere in different regions of Venus.

THE SOVIET VENUS PROJECT....Soviet plans for Venus are still a little vague to U. S. planners but NASA planetary programs director A. Thomas Young said that he understands that the Soviets in August will launch two spacecraft that will separate into four spacecraft when they arrive at Venus late this year. "We think that two of their spacecraft will fly by the planet and the other two will attempt to land on Venus," Young said. "We don't know yet when the Soviets will get to Venus but we think it will be a little later than our own arrival."

THE PLANET VENUS....Venus is the planet most similar to Earth in size, mass and distance from the Sun. But its surface is much hotter, its atmosphere much denser, and its rotation much slower than that of Earth. Because Venus is closer to the Sun, it receives about twice as much energy as Earth. However, it is more reflective than Earth because of its cloudy atmosphere. One of the most puzzling aspects of Venus is its lack of water. If Venus is as dry as it seems, where did the oceans of Venus go, if any ever existed. One speculation is that the water rose into the upper atmosphere and was dissociated by solar ultraviolet radiation into hydrogen and oxygen.

The rotation of Venus is very slow and in a retrograde direction, that is, opposite to the direction of the planet's revolution about the Sun and to the rotation of most other planets. Some scientists believe that Venus' period of rotation is tied to the revolution of the Earth and Venus around the Sun. Venus presents the same hemisphere toward Earth at each closest approach; that is, each time the planet passes between Sun and Earth. If the rotation of Venus is locked to the close approaches of Earth and Venus, then the internal distribution of mass within Venus should be slightly asymmetric.

Why does Venus rotate so slowly when most other planets rotate in periods of hours rather than months? One speculation is that a large body hit Venus and stopped its rotation. This large body might have been captured as a satellite into a retrograde orbit and later impacted with Venus to stop its normal rotation and rotate it slowly in an opposite direction. It could be that Venus was formed from large fragments, and as a result of the combined impacts of these fragments never had much rotation. According to another suggestion, solar tidal effects in Venus' dense atmosphere may have slowed rotation and then "turned the planet over", accounting for its backward rotation.

WHAT ANSWERS WILL BE FOUND?....Nobody knows for sure but is is going to be another exciting year in space exploration. But one thing is always sure. As soon as one question is answered, the answer leads to another and sometimes more complicated question.

NASA NAMES ASTRONAUT CREWS FOR EARLY SHUTTLE FLIGHTS

Four two-man crews were selected by NASA on March 16, 1978 to begin training for early orbital flights of the Space Shuttle. They are:

John W. Young, 47, commander; Robert L. Crippen, 40, pilot
Joe H. Engle, 45, commander; Richard H. Truly, 40, pilot
Fred W. Haise, 45, commander; Jack R. Lousma, 42, pilot
Vance D. Brand, 46, commander; Charles G. Fullerton, 41, pilot

John W. Young, who has flown four space flights, will be the commander of the first orbital test flight of the space shuttle, and Cmdr. Robert L. Crippen, who will be making his first space flight, will be the pilot during the first orbital test of the reusable spacecraft. Their backup crew will also be two pilots who await their first space mission, Col. Joe H. Engle, commander, and Cmdr. Richard H. Truly, pilot. The Young-Crippen launch is now scheduled for March 1979. The mission probably will be no longer than 54 hours, and will be launched from Cape Canaveral and land at the Edwards Air Force Base in California.

The next three orbital tests flights will also end at Edwards, but the following two and most other shuttle operational flights will end at the cape. Flight assignments for the others named will be made at a later date. Each flight will be of increasing complexity, to check out the nation's first reusable spacecraft.

Young, 47, is chief of the astronaut office at the Johnson Space Center. He was pilot of the first manned Gemini flight, commander of Gemini 10, and command module pilot during the Apollo 10 mission. Young was also commander of the Apollo 16 mission. During that mission be became one of the 12 men who have explored the moon. He is a retired Navy captain.

Crippen, 40, was transferred to JSC from the canceled Manned Orbiting Laboratory program. Engle, 45, had astronaut wings he earned as an X-15 pilot when he came to JSC. He was one of the pilots who flew approach and landing tests on the space shuttle orbiter.

Haise, 45, was the first commander of a shuttle approach and landing test. He was the lunar module pilot for the abortive Apollo 13 mission. En route to the moon, an explosion blew a hole in the rear of the spacecraft, which caused a lunar landing to be canceled and resulted in some long days and nights as the crew and ground controllers worked to bring the spacecraft home safely.

Lousma, 42, is a Marine. He was the pilot for the Skylab 3 mission in 1973. Brand, 46, was the command module pilot for the Apollo-Soyuz Test Project, the first manned international space mission. Fullerton flew shuttle approach and landing tests with Haise. An Air Force lieutenant colonel, he was assigned to the Manned Orbiting Laboratory before becoming a NASA astronaut in 1969. Fullerton served on astronaut support crews for the Apollo 14 and 17 missions.

Truly flew with Engle on the shuttle approach and landing tests. He is a Navy commander and was a Manned Orbiting Laboratory astronaut prior to transferring to NASA in 1969. Truly was on astronaut support crews for Skylab and Apollo-Soyuz missions.

RETURN TO SKYLAB

The Haise-Lousma mission is scheduled for October 1979. It will be a five-day mission, one day of which will be spent in the vicinity of Skylab. Skylab served as home and workshop for three groups of three astronauts. It was abandoned in 1974. They will fly to within about 1,000 yards of the space station. Then, working by remote control from the shuttle, they will attach a small device to Skylab. When it is fired, the device will, if all goes according to plan, increase Skylab's altitude about 70 miles. This will increase the orbital lifetime of the space station by about two years, it is estimated. Studies are being conducted of possible future use of Skylab.

PRE-LAUNCH SCHEDULE

Young said shuttle crews will go from JSC to the cape only a day before they are scheduled to be launched, a departure from the days of Apollo when crews were at the cape much earlier. He explained that there are no flight simulators at the cape and that the crews will be using those at JSC to maintain their proficiency. Before launch time, the shuttle crews will study shuttle systems, hardware and software in classroom sessions. They will also visit companies making flight hardware, to take part in tests. In addition, they will visit the plant where the shuttle is put together and the cape for countdown tests.

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UPDATE ON PIONEER 11 AND VOYAGER

NASA has rejected the recommendations of its own scientists and decided to fly the Pioneer 11 spacecraft outside of the rings of Saturn instead of between the two large rings circling the planet. What the decision means is that Pioneer 11 will pass Saturn in 1979 at a distance of about 18,000 miles from the edge of its outermost ring, then swing in under the rings to a distance of 15,000 miles from the planet Saturn. Pioneer scientists had recommended that Pioneer 11 be targeted to a gap about 6,000 miles wide between the outer and inner rings. Dr. Noel W. Hinners, NASA's associate administrator for space science, and A. Thomas Young, director of planetory programs, put it this way: The decision to fly away from the rings is based on a desire to use Pioneer as a "pathfinder" for the two Voyager spacecraft headed for encounters with Saturn in 1980 and 1981. They want to find out if Pioneer can safely navigate past the planet so the space agency can target Voyager 2 to the planet Uranus after it flies by Saturn in 1981. "A successful Pioneer will greatly increase our willingness to commit Voyager 2 to Uranus", Young said. "The survival or non-survival of Pioneer on the outside trajectory can have an important influence on achieving the maximum science return from all three spacecraft."

The target zone for Pioneer 11 outside the rings is identical to the flight path that will be taken by Voyager 2 when it flies by Saturn in 1981. Voyager 2 will then go on to the planet Uranus which will not be visited in the forseeable future by any other spacecraft but Voyager 2.

SHUTTLE ORBITER FERRY FLIGHT FROM EDWARDS TO HOUSTON TO HUNTSVILLE

Space Shuttle Orbiter 101, the Enterprise, made its journey from the test flight center at Edwards Calif., to Huntsville, Ala, covering 1,790 miles. Riding atop the same 747 aircraft that carried it aloft for the recent test flights, the pair left Edwards in the early morning of March 10, 1978. It arrived in Houston at the Ellington Air Force Base, near the Johnson Space Center, and remained there from the afternoon of March 10 until early a.m. March 13. It then departed for the Marshall Space Flight Center, in Huntsville, Ala. While it Houston, it was open to visitors and was viewed by more than 230,000 people during its stay there.

At the Marshall Center, the orbiter, about the size of a DC-9 aircraft, will be joined to other elements of the Space Shuttle -- the external fuel tank and the solid rocket boosters -- for numerous vibration tests in a 400-foot-tall dynamic test stand. The external tank and solid boosters will be brought to the center by water and rail. The vibration tests are scheduled to be concluded in November 1978 and the Enterprise will return to the Rockwell International facility in Palmdale, Calif., in December.

VIBRATION TESTS AT THE MARSHALL CENTER

In a huge facility originally constructed for testing the Saturn V Moon rocket, engineers will evaluate structural dynamics and their effect on the control system of the Shuttle. These tests are called MVGVT, an acronym which stands for Mated Vertical Ground Vibration Tests. The term vibration may be misleading. This is not a shaking test to learn how strong the vehicle is. Engineers at the Marshall Center will "float" the Shuttle in the center's tall test tower and apply vibrations to its exterior with exciters powered by amplifiers similar to those found on home stereo sets. Sensors placed along the skin at other locations record the characteristics of the vibrations as they pass from one area to another.

Information from these tests will allow the center to verify the system design and mathematical models that predict how the Shuttle's control system will react to the much more severe vibrations expected during launch and flight into orbit. The ground vibration tests will continue through most of the year with pauses only to change the test configuration of the Space Shuttle vehicle.

The first test article configuration will include the orbiter and external tank to simulate the high altitude portion of a Shuttle mission after the solid rocket boosters have separated. The liquid oxygen tank of the external tank will be filled with smaller and smaller quantities of deionized water to simulate use of propellant by the main engines. The liquid hydrogen tank will be pressurized but empty.

For the second test configuation, solid rocket boosters filled with inert propellants will be stacked in the stand along with the orbiter and tank. This configuration simulates liftoff conditions. This will be the first stacking of all Space Shuttle components as they will appear for launch. Following this test series, all components will again be removed from the stand.

The third test configuration will be the same as the second except that the solid rocket boosters will be empty, simulating the portion of a Shuttle mission just prior to booster separation. Following this final test series, Shuttle components will be removed from the stand and prepared for return to points of origin.

In actual flight, the boosters, external tank and orbiter will be joined to form one unit. The boosters are attached to the sides of the tank and the orbiter is fastened on top of the tank between the boosters. The boosters provide thrusting power during the first two minutes of flight. The main engines, pulling propellants from the external tank, burn for about the first eight minutes of flight.

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SOVIETS PULL SPECTACULARS IN SPACE

The previous space endurance record for the Soviets was 61 days and for the U. S. it was an incredible 84 days. Many expected the record to stand for some time. But with recent Soviet space flights, they have not only set a new record, with more to come, but many have compared that and other feats performed by them as "important as the U. S. Moon landing."

They recently set a space endurance record of 96 days and James E. Oberg, a scientist at JSC predicts that before the end of the year, Russian crews will have set records in Salyut 6 of 120 days to 180 days! According to Oberg, the Russians are now using recycled water aboard Salyut and within two years he says that they will be using recycled air and growing food in space. He says that Salyut has shown great maturity over the earlier Salyuts and that the Russians are now using a new spacesuit that is adjustable, one size for all and can be gotten into in five minutes. Further predictions by Oberg are that the Russians will send into space a multi-modular space station and that from there they can begin taking steps toward manned flights to the planets.

HISTORIC LINK-UP....On January 11, 1978, there was an historic link-up in space. Three Soviet spacecraft linked-up and indications were that they could stay that way indefinitely. Two Russian spacecraft had been connected for a month at the time and the third linkedup on January 11. Soyuz 26 cosmonauts Lt. Col. Yuri Romanenko and Georgy Grenhko were launched into space December 10, 1977 and Soyuz 27, carrying Lt. Col. Vladimir Janibekov and Oleg Makarov, was launched January 10. Then on January 22, 1978, a pilotless space capsule docked with the manned orbiting space laboratory and delivered supplies and fuel to the two Soyuz 26 cosmonauts. The official Tass news agency said it was the first time a robot spacecraft had carried out an automatic docking to deliver supplies to a manned station in orbit. Salyut 6, launched in August 1977, has about a year more left of orbital life. Western scientists said that the Soviets probably will keep it manned almost continually. They may not be far from wrong because Soyuz 28 docked with Salyut 6 for about a week and then landed March 10. The two cosmonauts aboard Soyuz 28 were Valdimir Remek, a Czechoslovakian, and his Soviet colleague was Alexei Gubarev.

SKYLAB ACTIVATION

In February 1978, data on the orbit of the Skylab Workshop indicated that it will have descended to 150 nautical miles altitude and could begin reentry into the Earth's atmosphere as early as late summer of 1979 and as late as the second quarter of 1980. NASA based the prediction on data provided by the North American Air Defense Command's satellite tracking organization. With that in mind, NASA worked on plans to alter such a situation and the best one being reactivation. By reactivation of the Skylab's thruster attitude control system, it would cause it to go into a very slow tumble which would decrease the atmospheric drag and perhaps add several months to the orbital lifetime. This attempt was conducted by NASA engineers and flight controllers from the Marshall Space Flight Center, Huntsville, Ala., and the Johnson Space Center in Houston, in addition to the NASA/Goddard Space Flight Center tracking crews. Contact with Skylab was made from a ground station in Bermuda with initial contact being made on March 6. A triple charge to the on-board batteries was made on March 7, a full charge of batteries made on March 8 and turn on of Skylab command and telementry systems made on March 10. Then on March 13, a final pass of Skylab was made and the contact closed down.

Scientists at the Johnson Space Center will then attempt in June to change the position of Skylab to minimize the craft's drag as it passes through the fringes of the Earth's atmosphere. The objective is to extend the life thus giving astronauts aboard the space shuttle time to reach it with a small booster rocket and push it safely farther into space or into a controlled descent into an ocean.

Skylab was launched May 14, 1973, and abandoned in February 1974 after three successful manned missions, the last extending for 84 days. Although it was designed to remain in orbit through 1985 increasing radiation from the sun has affected both the craft and the Earth's upper atmosphere, increasing the amount of drag and threatening to pull the Skylab back to Earth as early as the fall of 1979.

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NINTH ANNUAL LUNAR CONFERENCE

The Moon and other worlds were the focus of the ninth annual Lunar and Planetary Science Conference, a weeklong meeting held at NASA's Johnson Space Center. It began Monday March 13. The conference attracted more than 500 scientists from the U. S. and abroad, and was hosted jointly by JSC and the Lunar and Planetary Institute of Houston. The conference included 471 papers on such varied subjects as the formation of the solar system, new discoveries in moon rocks, the histories of planets, meteorites that contain material from ancient stars, and comparative studies of Mars, Venus, and the Earth. A summary session was presented Friday morning and described the major new discoveries in these and other areas of research. For the third consecutive year, the Soviet Union sent a delegation of space scientists to the conference to present results from their own lunar missions, their Venus planetary probes and some recent meteorite crater examination.

The conferences, begun in 1970, were originally used to share the knowledge gained from the recently obtained lunar samples. The first six Lunar Science Conferences were almost entirely involved with lunar studies. More recently, lunar research has become increasingly important for helping to understand the other planets of the solar system, and the last two conferences, in 1976 and 1977, included much more information about comparative studies of such other worlds as Venus, Mercury, Mars, and the asteroids. The name of this year's conference has been changed to "Lunar and Planetary" to reflect the continuing trend for combined studies in planetary exploration.

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FIRST SPACELAB SCIENCE CREW SELECTED

Two Americans were named May 30, 1978 by NASA as part of an international group of five scientists who will serve as payload specialists during the first Spacelab mission scheduled for the latter part of 1980. One American and one European eventually will be selected to fly aboard the Earth-orbiting space laboratory and operate the science instruments. The American payload specialists were nominated and selected by the Investigators Working Group (IWG), which is composed of scientists representing all investigators. The two U. S. scientists selected were:

Dr. Michael L. Lampton, 37, of Berkeley, Calif., a space physicist at the University of California, Berkeley.

Byron K. Lichtenberg, 30, of Natick, Mass., a vestibular researcher at the Massachusetts Institute of Technology, Cambridge, Mass.

Payload specialists are new to the space program. Their responsibilities will be to perform experiments in space aboard NASA's Space Shuttle, which will carry Spacelab into Earth orbit. Payload specialists are not pilots.

The three payload specialists who are not chosen to fly in space will act as backup specialists, participating in ground-based mission activities at NASA's Johnson Space Center, Houston, during the flight. This choice will be made some months before the flight. The American payload specialists named this week were selected from a list of six finalists, identified late last year after screening programs were conducted. The European scientists, announced earlier in May in Europe were selected by the European Space Agency (ESA) from among thousands of applicants in its member states after parallel screening programs were conducted in Europe.

The first Spacelab will be launched aboard the Shuttle from NASA's Kennedy Space Center in Florida. It will orbit the Earth at an altitude of 155 miles. At the end of the seven-day mission, the Shuttle will return for a runway-type landing at the Kennedy Center, be serviced and readied for other missions. On the Spacelab 1 mission, investigations will be conducted in stratospheric and upper atmospheric physics, materials processing, space plasma physics, life sciences, astronomy, solar physics, Earth observations and space technology.

NASA's Marshall Space Flight Center, Huntsville, Ala., is responsible for the payload specialists' training activities as part of its overall management responsibility for the Spacelab mission. ESA's Spacelab Payload and Coordination in Europe (SPICE) organization will manage training activities in Europe.