SPACE CITY COVER SOCIETY

P. O. BOX 53545 HOUSTON, TEXAS 77052

SCCS

Space Log

Vol 9 No 1 March 1979

SHUTTLE ORBITER COLUMBIA

The Space Shuttle orbiter Columbia arrived at its new home at the Kennedy Space Center Saturday, March 25 after completing its troubled two week cross-country odyssey.

Shackled to the top of a 747 jetliner, the orbiter completed the last leg of its journey from the Dryden Flight Research Center at Edwards, California to Florida under sunny skies. But it had not been that nice of a weather pattern during the trip. And bad weather had been the explanation for much of the delay in getting it to its destination.

Among the 3,000 persons waiting beside the 15,000-foot runway built for this and future landings were astronauts John Young and Robert Crippen, scheduled to ride the shuttle on its maiden flight in November of this year. NASA officials had planned to launch the Columbia on a solo flight November 9, but they now say that, because of a series of minor snafus, the craft's maiden voyage might not come until next year.

Here is the story of pre-flight and flight conditions describing what led up to the delay in departure from Edwards and reasons for additional delay en-route.

On February 23, 1979, there was the completion of the checkout of the Orbiter Columbia preparatory to its being handed over to NASA from the assembly center at Palmdale, California. The Space Systems Group of Rockwell International helped design, develop and build the Columbia Orbiter.

The morning of March 8 saw the "rollout" at Palmdale and the overland trip to Edwards. It arrived at Edwards in the afternoon of the same day. Whereas there was a ceremonial rollout for Orbiter 101 Enterprise, NASA had given a thumbs-down to the request from Rockwell to hold a similar rollout for Columbia.

After its arrival at Edwards the Orbiter 102 was housed in the Mate-Demate Devise (MDD) where it was lofted atop the 747 Carrier Aircraft and bolted to it with the already installed mechanism. Things went well and it appeared that the scheduled test flight early the next morning would take place. But just prior to the test flight on March 9, workers discovered that one of the three triangular struts that bolt Columbia to the 747 was misplaced.

It was then apparent that the cross-country flight from Edwards to the Kennedy Space Center could not take place that day so the mission was aborted. It took six hours of work to fix the problem and that afternoon the test flight finally started.

Pilot Fitz Fulton took off smoothly and eased the piggyback rig 270 mph up to an altitude of 5,000 feet over several desert towns surrounding Edwards. When the mated craft did climb into the desert air, long strips of insulating tape tore loose from the tail and fuselage. The flight lasted only 17 minutes.

The combined Shuttle Orbiter and Carrier Aircraft returned to the NASA Flight Center and made a perfect landing. Then it was discovered that there were gaping holes along the leading edge of Columbia's five-story-tall tail, more gaps below the cockpit, and shreds of insulating tape scattered across the runway. The flailing, flapping tape also damaged some of the heat-resistant silicon tiles that cover the Shuttle. The tape and more than 32,000 tiles are part of a thermal protective system designed to protect the Orbiter's aluminum skin from the intense heat of re-entry from space into the Earth's atmosphere.

More work was necessary and this took until the weekend of March 18 to complete. Then the weather took over...it was a heavy rain in the Edwards vicinity on March 19 and the cross-country flight was delayed until the next day. Then on March 20, a successful test flight was made by the mated pair just before noon. Gusty winds and rain along the planned route put everything into a holding pattern. Then in mid-afternoon, the pair took off from Edwards with a planned landing and overnight stopover at Kelly Air Force Base in San Antonio, Texas.

Again, the weather took command and the Columbia riding piggyback on the 747 landed at Biggs Army Air Field in El Paso, Texas. This had originally been schedule as a fuel-stop but now it became a place to sit out the weather for a couple of days.

On March 22, just after nine in the morning, the mated pair departed El Paso and arrived in San Antonio at Kelly Air Force Base about 1 hour and 40 minutes later. Due to the weather, San Antonio again became a stop over spot to spend the night. Late the next morning it departed from San Antonio and headed for Florida. On its way it winged by Houston, flew over the Johnson Space Center and was applauded by hundreds of JSC workers and visitors as it went over.

It had another re-fueling stop late in the afternoon at Eglin Air Force Base in Florida and finally arrived at the Kennedy Space Center very late that afternoon.

Not since the flight of Apollo 13 has so much gone wrong with a U. S. space schedule but all is well that ends well. Now, Columbia is at KSC and workers are making the many preparations for her first flight. With that flight a new space era will begin.

The Columbia is one of a fleet of Space Shuttles being developed and built for NASA by Rockwell. Like its sister ships to follow, the Columbia will transport to Earth orbit cargo ranging in size from satellites and spacecraft to small, self-contained payloads that can be flown for a relatively low cost. Each orbiter can fly at least 100 missions, carry 65,000 pounds of payload in its huge cargo bay, stay in space up to 30 days, return 32,000 pounds of cargo to Earth, and be readied for another flight within two weeks of landing. No other spacecraft ever built could approach this performance.

It is now the beginning...it is now the era of the Space Shuttle.

VOYAGER 1 ENCOUNTER WITH JUPITER

Voyager 1 made its closest approach to the planet Jupiter on March 5, 1979 and the findings immediately began to startle scientists. And the surprises continue daily. Coming within 172,400 miles of the Jovian clouds, the spacecraft survived intense radiation and began feeding scientists at the Jet Propulsion Laboratory in Pasadena, California startling views of the larger Jovian moons. But the most surprising discovery of all was the revelation of a thin, flat ring around the planet Jupiter.

As the Voyager spacecraft swung around the planet at speeds up to 65,000 miles per hour, unexpected scientific data was given to the scientists. Perhaps Cornell's Carl Sagan said it best with, "This is almost beyond interpretation. There is different chemistry, different physics, different forces at work out there." The encounter with Jupiter by Voyager 1 lasted 39 hours and they were hours that were full and tense. Voyager was sending back enough data to fill miles of magnetic tape. And the information could keep scientists busy for years. New worlds of science had been opened up.

As to the ring around Jupiter, scientists had not expected to find it. And when they did, they were not sure what to make of it. The rings around Saturn have been observed from the Earth by telescopes since Galileo discovered the rings in 1610. Then in 1977 an airborne telescope discovered five rings around Uranus. Some of the objects in the Uranus rings may be at least a mile in diameter. The rings of Saturn are no thicker than 10 miles but they are about 170,000 miles wide. According to the "Roche-limit" these rings are thought to be rocky fragments from a moon that disintegrated.

Jupiter's ring is sparsely populated with dark objects about the size of a large boulder. Dr. Tobias Owen, a member of the team from State University of New York estimates the ring to be less than 18 miles thick but more than 5,000 miles wide. Since Voyager's observation of the ring was from an edge-on perspective, Dr. Owen said there was no way of determining if wide concentric gaps exist in the swarm of debris, similar to those gaps in the Saturn and Uranus rings.

The ring of Jupiter has been invisible from Earth because of its thinness and its transparency when viewed at any angle except straight on, Owen explained. As to the formation of the ring, scientists could only speculate. They suggested that the fragments could be material left over from the time of Jupiter's formation, rocks that somehow failed to coalesce when the largest planet in the solar system was pulling itself together. Or it could be an unlikely satellite or asteroid that was torn apart by Jupiter's tremendous gravity.

Voyager 2, an identical spacecraft will rendezvous with Jupiter on July 9, 1979. It will now be programmed to take a series of photographs as it crosses the region of the ring. Perhaps at that time some answers will be given and possibly more questions to ponder.

One might call Jupiter a mini-solar system and it is now known to be surrounded by 13 moons and possibly a 14th. The four largest are Io, Europa, Ganymede and Callisto. These are called Galilean moons, after their discoverer. They are now known to be large enough to be considered small planets. But viewed from telescopes on Earth they appear to be no more than fuzzy dots. Voyager's cameras have shown scientists that the moons of Jupiter are not only complex but each different from the others. Their surfaces vary greatly in age, composition and appearance.

The surface of Callisto is filled with craters. Scientists speculate that the craters could have been formed by crashing meteorites over the past 4 billion years. Callisto has no mountains but does have a feature never seen before in the solar system. It has a huge, smooth, circular basin rimmed with concentric ridges that look like a frozen tidal wave. And scientists speculate that the ridges were caused when a huge meteorite hit, melted subsurface ice and caused the water to spread out from the point of impact, and then to freeze again.

Ganymede, like Callisto is composed of at least half water and ice. Its surface is less cratered than Callisto's and its age put at 1 billion years. Europa was viewed with only a long distance glimpse by Voyager 1 but Voyager 2 in July will catch it more fully in its cameras.

But Io, the fourth Galilean moon, was as much of a surprise as Jupiter was. It is shown as being scarred with plateaus, dry plains, highlands and fault lines. Its surface is surprisingly smooth, indicating that it is only about 10 million to 100 million years old. It does not show many impact craters. Scientists speculate that some unusual erosional process is at work. Io (pronounced like my-oh) lies inside a doughnut-shaped radiation belt. Voyager measured fields there with 400,000 watts of electricity.

Io and Earth have one thing in common and Professor Bradford A. Smith, a University of Arizona astronomer and leader of the Voyager imaging science team, calls it the most exciting thing to so far come out of the Voyager mission. At least four volcanoes are now erupting on Io and Io and Earth are the only two bodies in the solar system known to be volcanically active.

Most of the volcanic material probably rains back down on the moon. This almost-continuous downpour of matter could explain why Io's surface appears so smooth and free of impact craters. Io's surface is essentially refreshed each day, since its volcanoes, like some restless crew of plasterers, are constantly redoing it with recycled material.

Like other successful space probes, Voyager 1 has raised as many questions as it has answered. It managed to look deep into Jupiter's Great Red Spot but provided no explanation for what causes this huge, hurricane-like storm center. Yet scientists are convince that the $400-million mission will pay off in valuable new insights into the solar system. One scientist said that, "We may learn something about the evolution of the Earth and where it is going."

Voyager is now going to keep a November 1980 date with Saturn. After that, it will head farther out into space. Though its nuclear-powered instruments will be no longer functioning, it bears tidings from Earth. It carries a golden record that will play greetings in 60 lauguages--if any one out there is willing to listen.

FACTS ABOUT JUPITER

Everything about Jupiter is enormous: when the solar system formed, most of the material that did not end up in the Sun went to make Jupiter. It is larger than the rest of the planets combined. It is the fifth planet from the Sun. And it completes one orbit every 11.86 Earth years. A day on Jupiter is complete in 9 hours, 55 minutes and 30 seconds. This extremely rapid rotation causes the planet to be flattened at the poles. And the planet is composed primarily of hydrogen. Indeed it is so massive that very little of its original material could have escaped in the 4.6 billion years or so since it formed.