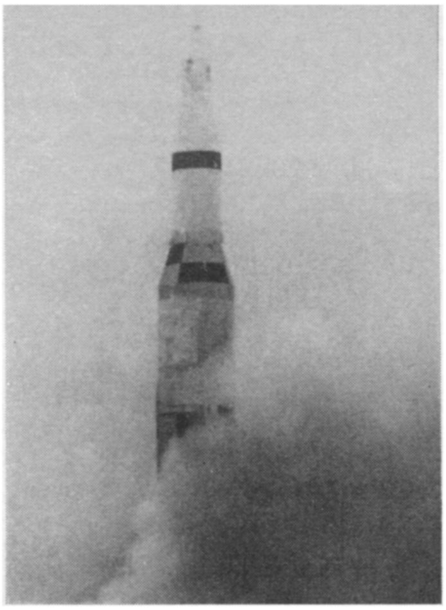
science news
OF THE WEEK



Apollo: healthy in mid-flight

Glitches, viruses and overtraining were conquered before a trouble-free launch and array of firsts

To cost accountants, the three-day delay prior to last week's launch of Apollo 9, first manned flight of the spidery lunar module, was a $500,000 headache. Round-the-clock labor shifts had to be maintained, spacecraft batteries replaced, data recomputed and liquid helium supplies completely replenished.

To chief astronaut physician Dr. Charles A. Berry, however, the hold was "a lot of money in the bank."

For the third time out of three manned Apollo missions, the crew had turned up sick. The Apollo 7 astronauts had been made uncomfortable by colds and sinus trouble; Apollo 8 was the scene of nausea, headache and other symptoms. Fortunately, Apollo 9 Astronauts James McDivitt, David Scott and Russell Schweickart came down with their matched sore throats and colds while still on earth.

The major culprit, Dr. Berry indicated, was the punishing training program followed—or rather endured—by all three men, including exhaustive sessions in the spacecraft simulators and working days sometimes stretching to more than 18 hours. The complexity of the planned Apollo 9 mission, in fact, had resulted in a training program even more demanding than usual. Concern for the health of the crew did cause the extra workload to be lifted 10 days before the scheduled Feb. 28 launch. Although it turned out to be a case of locking the barn after the horse had escaped, the flight plan was also modified to reduce the workload in space, eliminating numerous communications radar and star-sighting experiments.

Officials agreed that Apollo 9 was the most involved, critical mission of all the manned space flights carried out by the U.S. A dozen extra people were added in the mission control center in Houston to handle the extra problems of having a new spacecraft—the lunar module—and a scheduled spacewalk on the same mission.

But despite several minor technical problems (known as "glitches" to flight controllers), the March 3 launch, only 1.7 seconds past the planned 11:00 a.m. (EST), seemed to presage a successful flight.

For the fourth time, the Saturn V booster endeared itself to its designers, this time by placing the spacecraft in an orbit less than one percent out-of-round from the intended 118.5-mile-high circle.

Later, the command and service modules, containing the astronauts and the Service Propulsion System, were separated from the booster, flown 50 feet away, turned around and flown back. There they coupled with the lunar module's docking collar, peering out from the booster's end.

This was the justification for all the Gemini programs' docking practice, with its LM-simulating Agena target vehicles. On the Apollo 11 moon-landing mission in July, the docking will take place twice, once in earth orbit, and once in lunar orbit as the LM rejoins the waiting command module.

Once the modules were coupled, a switch in the command unit triggered four explosive devices to release spring-loaded catches holding the LM to the booster stage. Free of the booster, the CM-SM-LM combination was just as it will be for the flight to the moon. About three hours later, the powerful SPS engine was triggered in the first of eight planned firings, the last of which would start the astronauts home this week.

It was the SPS engine that was the star of the Apollo 8 moon-orbiting engine when it successfully locked the spacecraft into its lunar orbit, then kicked it free again for the trip home.

The star of Apollo 9 was, of course, the lunar module. By midweek, after transferring for the first time in space to the spidery craft, two of the astronauts had successfully fired its descent engine. Flight controllers were looking forward to firing the ascent engine, designed to lift the lander off the moon's surface, on Thursday. They were also anticipating Thursday's scheduled space-clamber by rookie astronaut Schweickart, designed to show that the two LM crewmen could get back to the command module even if the enclosed docking tunnel between the two spacecraft should be blocked.

Scheduled for this week is perhaps the most significant experiment yet in the space agency's drive for an earth-resources satellite. Four identical Hasselblad cameras, coupled together and mounted in the spacecraft hatch window, were to photograph dozens of sites around the earth, through different filters and on different film.

Different features of the earth's surface will show up when photographed at different wavelengths (SN: 6/1, p. 527). For example, for observing lake and coastal water bottoms, a filter-film combination sensitive to light from 480 to 620 millimicrons is used; at that frequency, it is possible to penetrate the waters to show how waste and pollution from rivers are distributed as they flow into the sea.

Another combination, with color infrared film, measures from 510 to 900 millimicrons. That takes advantage of the fact that plants reflect near-infrared light differently from visible light, and could be used to assess the extent of some kinds of crop disease.

As Apollo 9 was to be measuring resources data from space, another NASA study was being carried out from aircraft over the North Atlantic. Radar scatterometers, infrared spectrometers, clusters of cameras and other instruments were being flown over the raging winter sea between Ireland and Iceland, trying out ways to measure wave heights, temperature and humidity. An open question is whether this type of measurement could be made from a satellite. ◇