A Chance to Be First

I believe this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to earth. No single space project in this period will be more impressive to mankind, or more important for the long-range exploration of space; and none will be so difficult or expensive to accomplish. In a very real sense, it will not be one man going to the moon—it will be an entire nation.

—John F. Kennedy, May 25, 1961

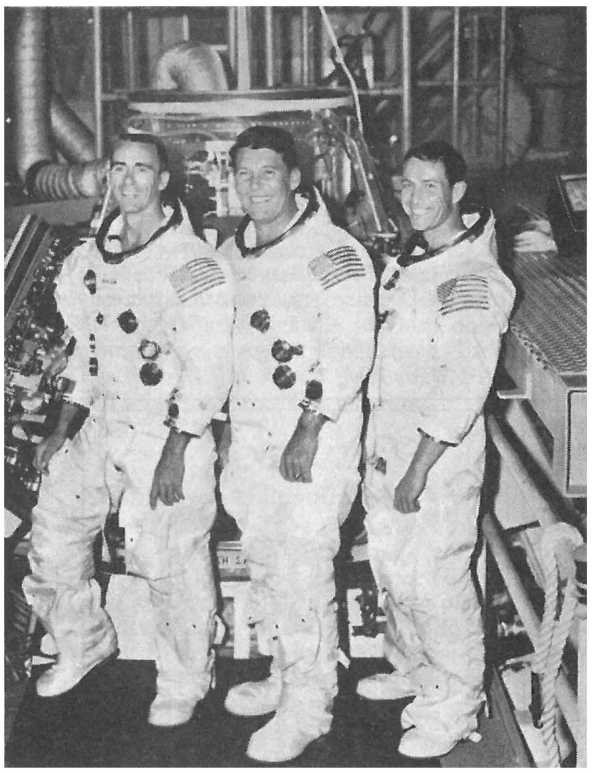
THIS week, still hopeful that they can achieve the goal set by President Kennedy but aware that time is fast running out, U.S. spacemen will begin their final lunar thrust. Barring last-minute delays, Astronauts Walter Schirra, Walter Cunningham and Donn Eisele will be shot into earth orbit aboard Apollo 7 in the first manned flight of the spacecraft that will eventually carry astronauts to the moon. If Apollo lives up to NASA's expectations during its eleven-day mission, it will clear the way for a possible flight around the moon in December and the landing of astronauts on the lunar surface as early as the spring of next year.

There is much to be done in the short time that is left. But an impressive amount has already been accomplished. Before they are ready to test the performance of their complex craft in space, astronauts put in long months of practice in equally complicated machines at the Manned Spacecraft Center near Houston (*see color pages*). There, in computer-operated simulators, replicas of spacecraft interiors, they go through complete missions. The simulators move at a touch of the controls, actually vibrate during launch, and present changing views of the earth, moon and stars during their simulated missions. Before they blast off, Astronauts Schirra, Cunningham and Eisele will have spent an impressive 1,200 hours in preparing for their mission. They have had an unexpectedly long time to practice; this week's flight, scheduled for February 1967, was postponed after Astronauts Virgil Grissom, Edward White and Roger Chaffee died in a spacecraft fire during an Apollo ground test at Cape Kennedy.

10-Sec. Exit. The tragedy jolted NASA out of the complacency that had built up during the highly successful Mercury and Gemini programs, in which a total of 16 manned craft were sent into space, maneuvered and recovered without serious mishap. In a frenzy of self-doubt, NASA virtually tore up the Apollo program, shifted personnel, and clamped down hard on the procedures and workmanship of North American's Space Division, prime contractors for the Apollo spacecraft.

At a cost of $75 million, Apollo itself was redesigned, with thousands of changes in materials, wiring and equipment. In place of the old inward-swinging, three-part hatch that took 90 sec. to open, Apollo 7 has a single outward-swinging hatch that can be opened in 10 sec. To snuff out any fire that might start, there is now an emergency venting system that can reduce cabin pressure in seconds. And while the spacecraft is on the pad, a mixture of 60% oxygen and 40% nitrogen has been substituted for the 100% oxygen of flight, further reducing the danger of fire.

NASA



ASTRONAUTS CUNNINGHAM, SCHIRRA & EISELE
Three to make ready.

Much of the 15 miles of wiring aboard Apollo has also been rerouted to keep it away from high-temperature devices, which might cause it to overheat. Wiring has also been rerouted around areas where it could be worn by rubbing against instruments and other wires or walked on by workers or the astronauts themselves. In addition, the more than 1,000 lbs. of nonmetallic materials aboard Apollo (grease, wire insulation, spacesuits, etc.) have been checked for flammability and replaced if they failed to meet NASA's new fireproofing standards. Flammable plastic-foam pads and nylon in the astronauts' spacesuits and seat belts have been replaced by Fiberglas "Beta cloth," which is heavier and more bulky but also more fire resistant.

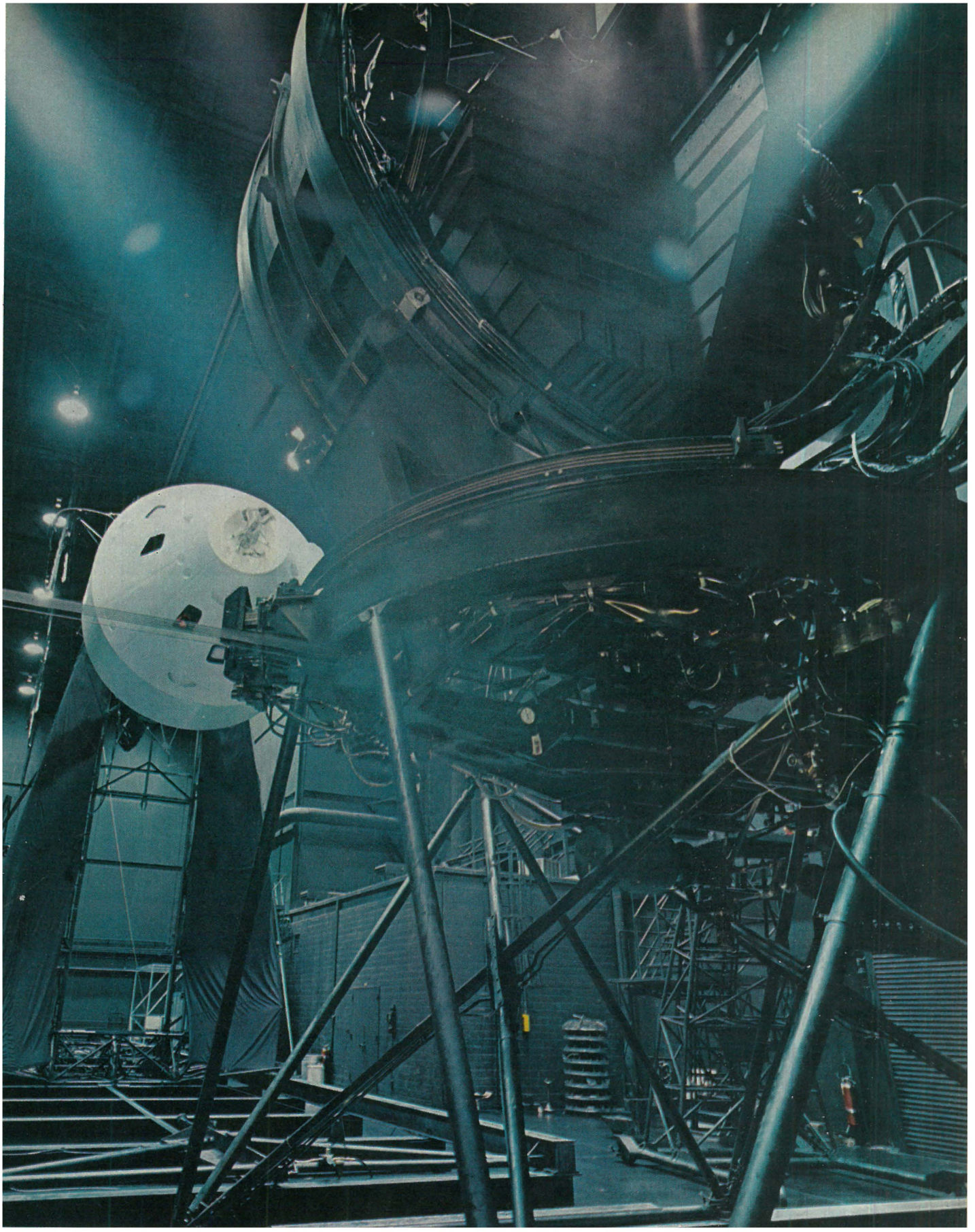
"We're paying a price for safety," says Flight Director Glynn Lunney. "The spacesuits are bulkier, the Fiberglas itches like hell, and the seat belts are difficult to cinch down because they are so stiff. But you are seeing a spacecraft several hundred percent improved." Apollo's new safety devices, and a string of successful shots during the past year, have partially restored NASA's confidence. Four unmanned Apollo spacecraft have now flown without serious mishap, two of them atop the mighty rocket Saturn 5.

Housekeeping Chores. When Apollo 7 takes off this week, the conical command module, carrying the three astronauts, and the attached cylindrical service module, will be launched into orbit by a Saturn 1B rocket, which is not powerful enough for the moon mission. "Simply flying the vehicle will be a major test in itself," says Flight Director Lunney. "The men will do the works—move around and eat, manage the housekeeping chores and keep the cockpit running." In the process they will be fully occupied keeping track of 24 instruments, 566 switches and 40 "on-off" indicators that show which systems are operating.

The astronauts will also attempt to rendezvous with the burnt-out final stage of their launch rocket, using only a sextant and a telescope for direction finding; the Apollo command module is not equipped with rendezvous radar. During their week-and-a-half space journey, they will start Apollo's large, 20,500-lb.-thrust engine eight times to test its reliability. That engine literally means the difference between life and death. On actual moon missions, it will be used to guide an Apollo spacecraft into orbit around the moon, and, later, to fire the craft out of lunar orbit into a trajectory that will return it to earth.

Spectacular Bonus. Apollo 8, which will carry Astronauts Frank Borman, James Lovell and William Anders into orbit late in December, was originally designed to duplicate this week's flight and to recheck any equipment or procedures that go wrong on Apollo 7. Now, spurred by growing concern that the Soviets are planning to upstage the U.S. by sending the first manned craft around the moon, NASA has folded a spectacular bonus into Apollo 8's schedule. If all goes well with Apollo 7, Apollo 8 will be shoved from earth orbit toward the moon by the last stage of its Saturn 5 launch rocket.

Near the moon, the spacecraft will be

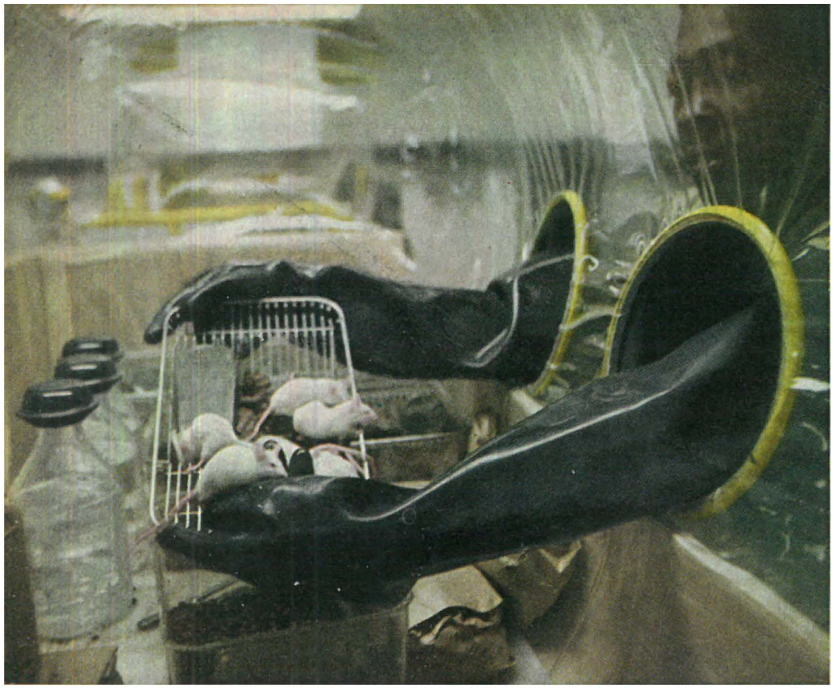


BERT BRANDT

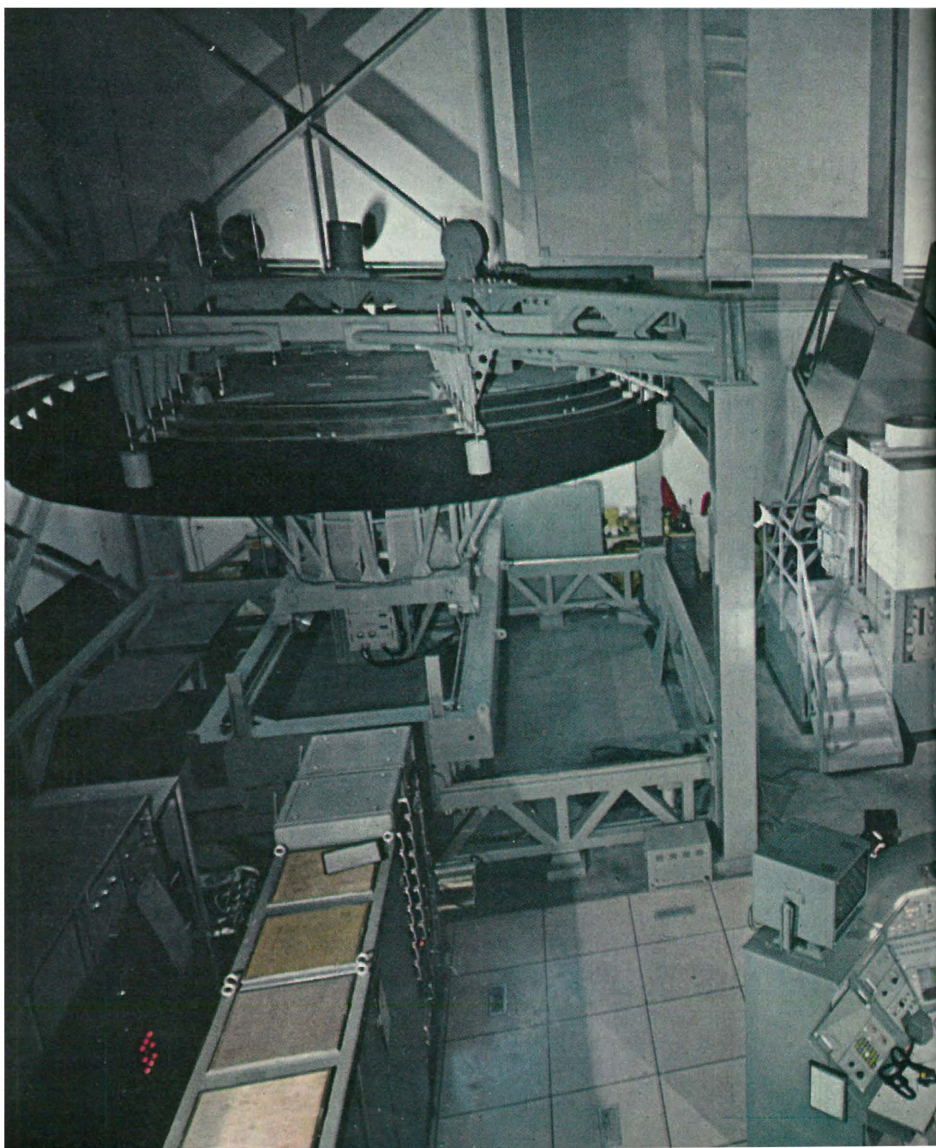
AIMING FOR THE MOON

In a darkened room at NASA's Manned Spacecraft Center in Houston, a huge Lunar Module simulator (foreground), carrying two astronauts, and a white Apollo Command Module maneuver in a rendezvous and docking operation that astronauts must perform precisely if they are to return safely from the moon's surface.

BERT BRANDT



Moon rocks returned to earth will be analyzed in this contamination-proof cabinet. Germfree mice shown here will be exposed to rocks in test for possible harmful lunar organisms.



In the huge housing at right, astronauts are subjected to the final test of their skills—actual landing on the moon. Inside the simulator is buried an instrument-crammed crew compartment. On the circular overhead disk at the left of the picture is a replica of the moon's surface, scanned from below by a movable television camera. The image is transmitted by closed-circuit TV to "windows" in the compartment. As the astronauts move their controls, the TV camera responds to simulate the real Lunar Module's course, here skimming a crater, there avoiding a peak, settling on lunar "seas" or crashing in a crevasse. Controllers at the console monitor the performance, sometimes inject "malfunctions" to test astronauts' reactions.

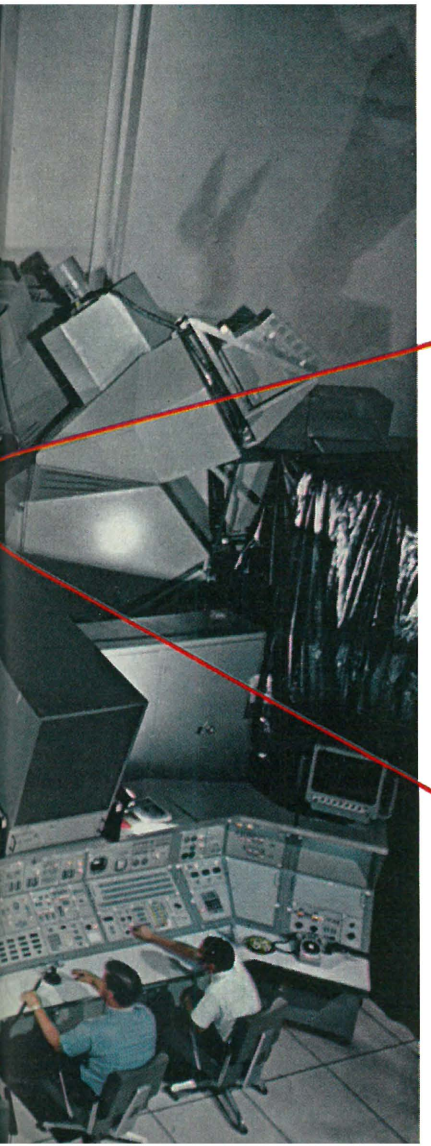
RALPH MORSE

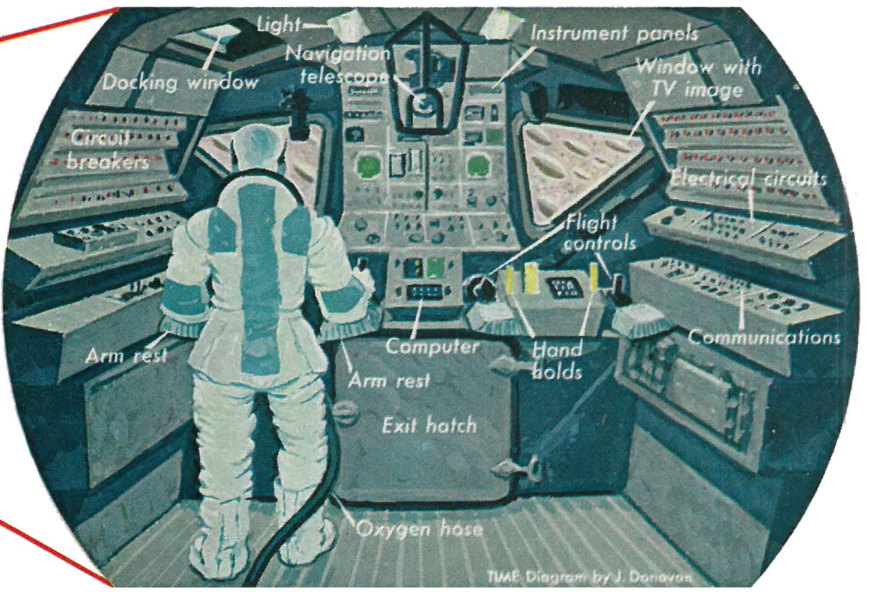
Astronauts emerge from practice session aboard Apollo Command Module encased in giant vacuum chamber where craft is subjected to spacelike environment. Firemen stand ready to deal with any repetition of the blaze that killed three astronauts at Cape Kennedy in 1967.

BERT BRANDT

Practicing the semi-weightlessness of moon walking, Engineer Harold Johnson romps on NASA's "Partial Gravity" simulator, which he helped invent to duplicate the effect of moon's gravity.

BERT BRANDT





Cutaway shows astronaut inside Lunar Module simulator making moon landing.

RALPH MORSE

In eerie light of a lunar sunrise, Astronaut Don Ling works outside a Lunar Module set on a realistic lunar landscape. He is setting up an instrument to measure moonquakes, using a hook-ended rod because of the difficulty of bending and kneeling in spacesuit. Circular sheet, coated with gold, protects instrument from temperature changes. Other devices include a tool carrier (far left), a miniaturized nuclear generator and a pallet containing still-unpacked instruments (right).

braked enough to be pulled into a 60-mile-high lunar orbit. It will make ten 2-hr. circuits while the astronauts shoot movie and still pictures of the lunar surface below. Then Apollo 8 will return to earth, using re-entry techniques tested last April during the unmanned flight of Apollo 6.

Come February, Astronauts James McDivitt, David Scott and Russell Schweickart are scheduled to zoom into earth orbit aboard Apollo 9, the first complete moon package to be shot into space. In addition to the Saturn 5 rocket and the Apollo command and service modules, the package will include the trouble-plagued lunar module (LM) that is destined, eventually, to land on the moon. The mission will include space walks, rendezvous and docking maneuvers, and the first transfer in space of astronauts between Apollo and LM.

Completion of these three missions without any serious problems would seem to violate the laws of probability. Apollo has 2,000,000 functional parts, 587,000 inspection points, and 47 engines (not including the 42 in Saturn 5 and three more in the escape tower that is jettisoned shortly after launch). Any one of those items conceivably could cause trouble. But NASA nonetheless is optimistically planning for success. Says Metallurgist Thomas Paine, who this week replaced retiring NASA Administrator James Webb: "We have put great stress on the ability of the Apollo 9 crew to operate the LM. All subsequent crews will have extensive training in all of the activities required for lunar landing."

Automatic Spacecraft. Although space officials steadfastly deny that the U.S. is racing with the Russians to land the first men on the moon, all of the planning and practicing has been carried out with one eye on the Soviet space effort. NASA officials—as well as the rest of the world—are uncomfortably aware of the huge psychological difference between first and second place in the moon race. U.S. space officials first greeted last month's pioneering flight of Russia's Zond 5 with a mixture of admiration, envy and chagrin, certain that it was a prelude to an imminent manned Russian flight around the moon and, eventually, a manned landing.

Now they are not so sure. Zond, it was revealed, re-entered the atmosphere on a simple ballistic trajectory, steep enough to heat the craft to levels that only instruments, not humans, could safely withstand. An article about Zond published in Russia made no mention of manned flight. It stressed the value of "automatic spacecraft" for lunar and planetary research and the return of "research materials."

Thus, on the eve of the final phase of Apollo's lunar mission, there were increasing hopes that the first men to set foot on the moon, and to look up at a moonlike earth in the sky above them, would, after all, be U.S. astronauts.