

A DECADE OF SPACE PROGRESS

General Electric Missile and Space Division offers a pictorial tribute to the . . .

SATURN HISTORY DOCUMENT
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History of Science & Technology Group

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National Aeronautics and Space Administration

Charged with the mission of exploring space for peaceful purposes, the National Aeronautics and Space Administration was created October 1, 1958. During the past decade of accelerating activity, NASA drew broadly from all fields of science and engineering, amassed a vast reservoir of talented people and technological breakthroughs, and unleashed a flood of new benefits for mankind.

Among the splendid benefits spawned by NASA's hard-driving research and development efforts are the acceleration of national productivity and services, sweeping advances in science and technology, sophisticated managerial techniques, and a host of new materials, products and processes that have already begun to enrich our lives.

In building the basic structure for America's pre-eminence in space, NASA developed a strong industrial base; nurtured great scientific competence in the nation's universities and research laboratories; trained scientists and engineers, astronauts and military personnel for future needs in space; created high-thrust boosters with enormous payload capabilities; refined superior guidance and control systems; perfected space rendezvous and docking techniques and the ability to

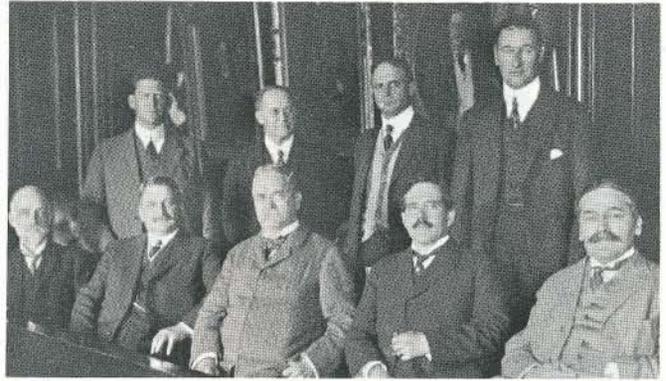
maneuver accurately in the space environment; established a broad structure of massive ground facilities to assemble, test and launch space vehicles to serve the nation's needs for many years to come; and inspired America's youth.

Since its beginnings ten years ago, NASA has launched satellites which have extended global communications channels, improved accuracy of weather forecasting and have shown promise in assisting in air and water navigation around the globe. Scientific spacecraft have probed the space environment, taken pictures of the moon and Mars and measured characteristics of Venus and the sun. Each new development provided a platform for future progress. And General Electric's Missile and Space Division is proud and privileged to have shared in these dramatic attempts at man's mastery of his environment.

Yesterday, NASA's unmanned spacecraft blazed trails to Mars, Venus, the moon. Today, NASA's superbly trained, highly skilled astronauts are poised to follow. Tomorrow, as the National Aeronautics and Space Administration guides this nation through the next years of its peaceful pursuit of pre-eminence in space, mankind's outermost horizons may truly be infinity.

*GE Challenge
Fall (Sept.) 1968*

1 The organizational nucleus of NASA was the National Advisory Committee for Aeronautics, created in March 1915 to "supervise and direct the scientific study of the problems of flight, with a view of their practical solution." Members of NACA, pictured at their first meeting, were representatives of the military and naval air services, the Weather Bureau, the Smithsonian Institution and the scientific community.



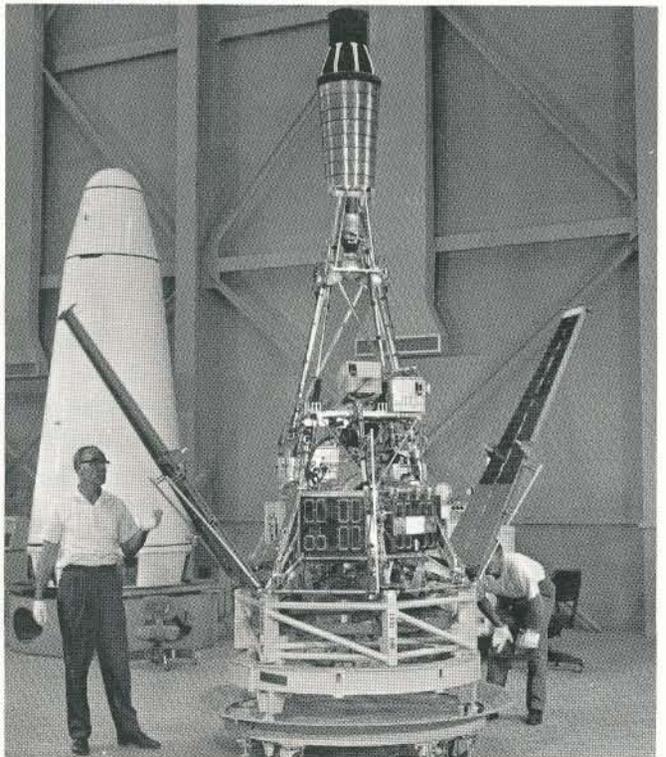
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2 President Dwight Eisenhower hands commissions to heads of new National Aeronautics and Space Administration following swearing-in ceremonies at the White House in 1958. From left, Dr. Hugh Dryden, deputy administrator; the President; Dr. T. Keith Glennan, administrator.



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3 Checkout of Ranger 1, first of a series of spacecraft NASA used to place highly sensitive instruments on the moon.

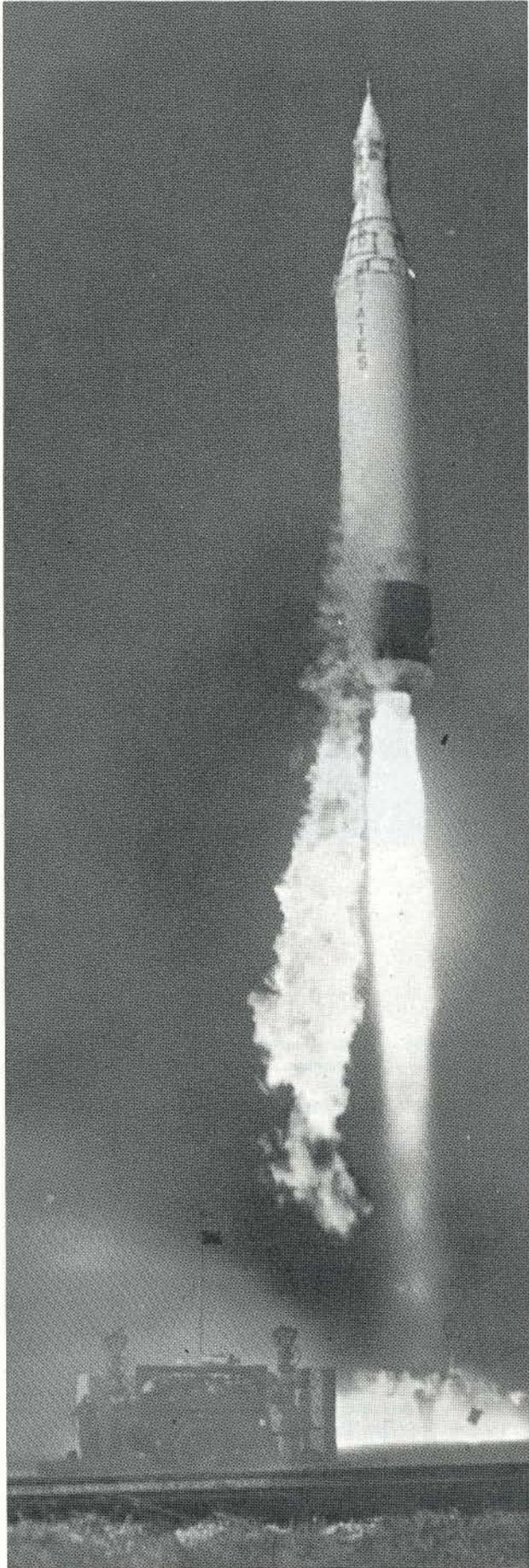


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4 Big Joe-Atlas booster poised for launch.

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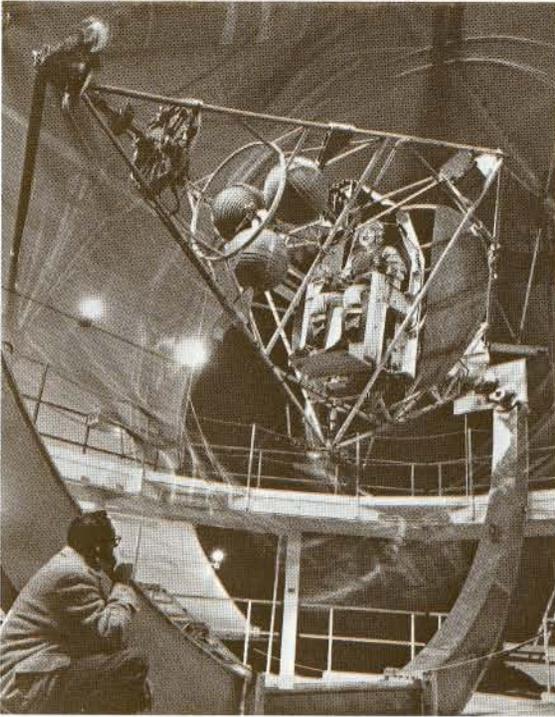
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1 Launching of Juno 2.

2 Thor-Able boosts Explorer 6 satellite on journey to relay scientific data on particles and meteorology. A later Explorer, number 8, confirmed existence of helium layer in upper atmosphere.



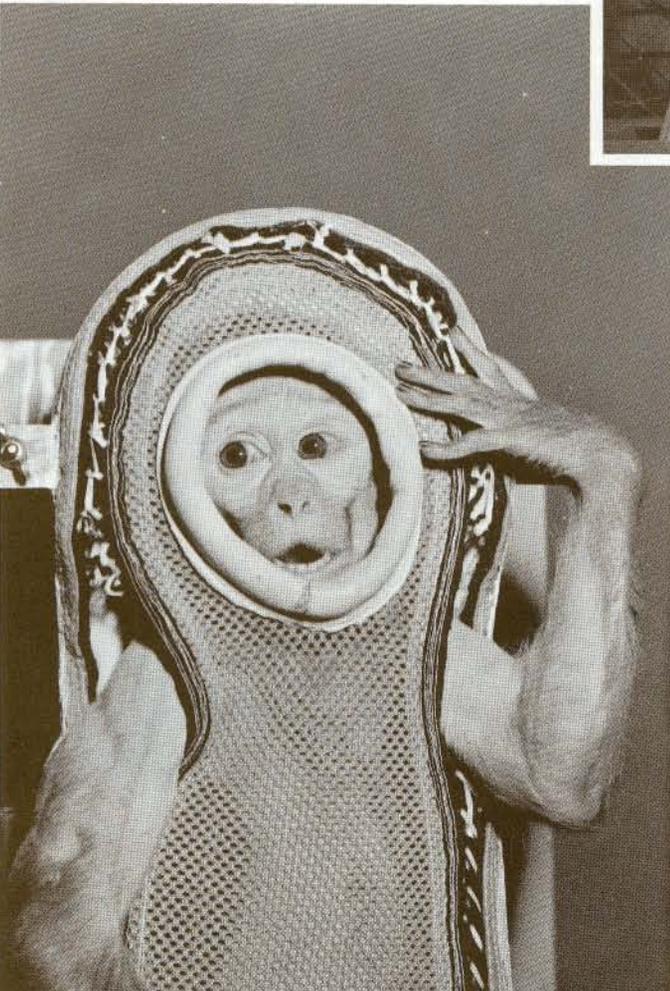
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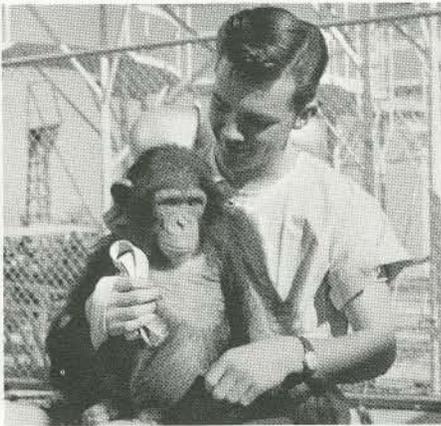


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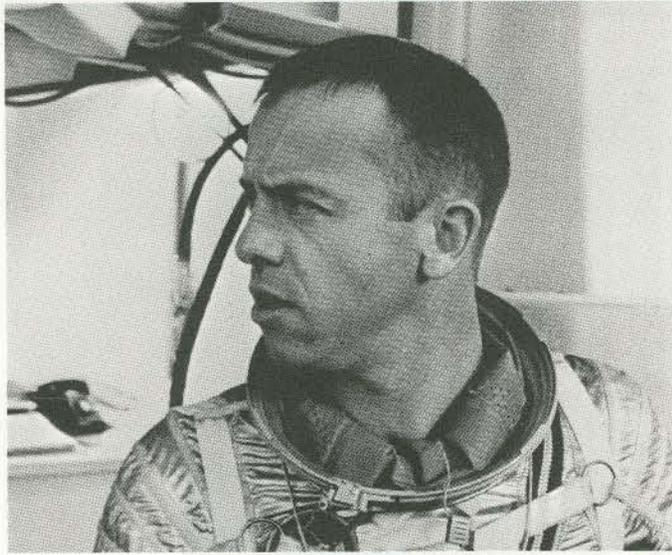
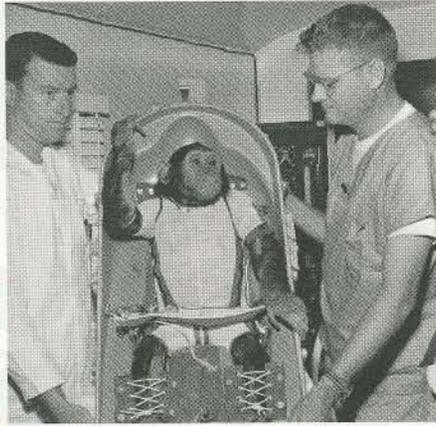


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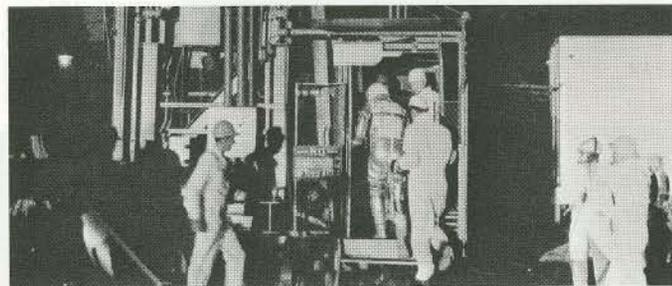
- 1 NASA established a training and simulation program to prepare astronauts for missions which, at that time, were engulfed in unknowns. Crew members were trained to operate the spacecraft in the best possible manner—both under normal conditions and in emergency and contingency situations. Here, Astronaut Gus Grissom achieves stability in a Mastif Trainer.
- 2 President John Kennedy congratulates Astronaut Alan Shepard, first American in space, after his historical ride in Freedom 7, May 5, 1961. Joining in the ceremonies on the White House lawn are six other astronauts, their wives and NASA officials.
- 3 Model of manned satellite capsule is positioned in the Full Scale Tunnel of the Langley Research Center for tests to determine life, drag and stability characteristics. Tests are included in an extensive wind tunnel, laboratory and free-flight testing program designed to result in optimum shape of orbital vehicle.
- 4 Rhesus monkey is fitted in a net-like suit prior to a journey in a Project Mercury Little Joe test capsule. Animal and biological package were flown under sponsorship of USAF School of Aviation Medicine.



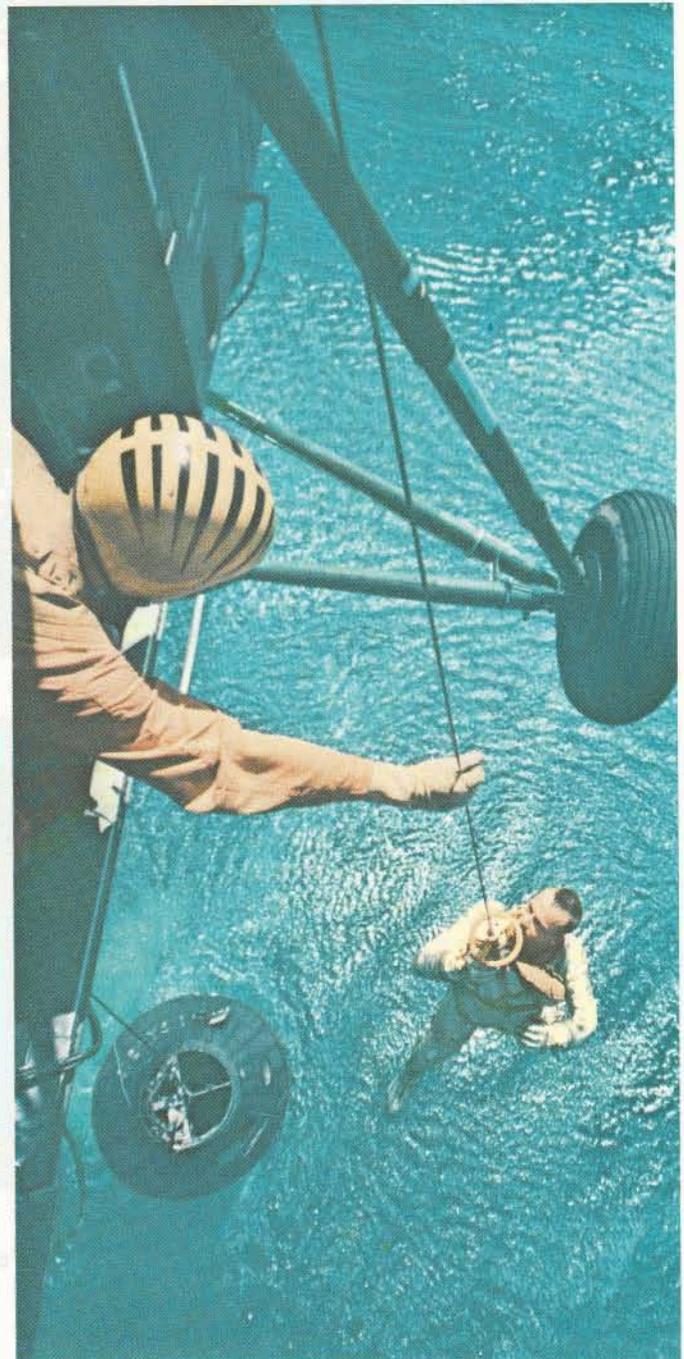
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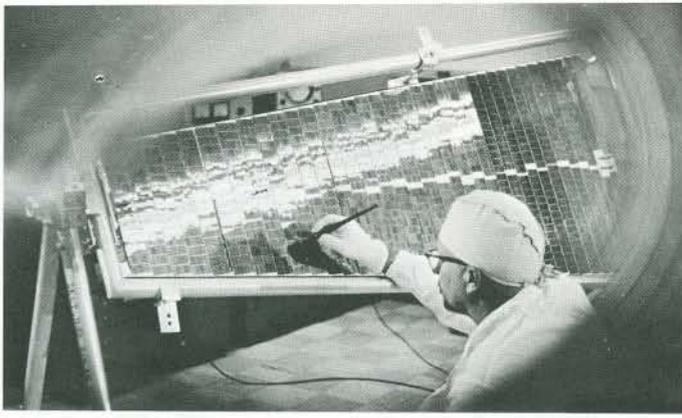
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1 Chimpanzee specially trained for Mercury-Redstone 2 flight relaxes with animal handlers from Aeromedical Field Laboratory, Holloman AFB, New Mexico. Another chimp (center photo) sits in couch in which he rode during 16-mile ballistic flight. In photo at right, animal handlers release chimpanzee from flight couch.

2 Astronaut Alan Shepard is being suited up in his space gear for a test simulation flight.

3 Stepping aboard gantry elevator, Astronaut Shepard prepares to ride up to third level of Redstone gantry where he'll be placed into Mercury Capsule.

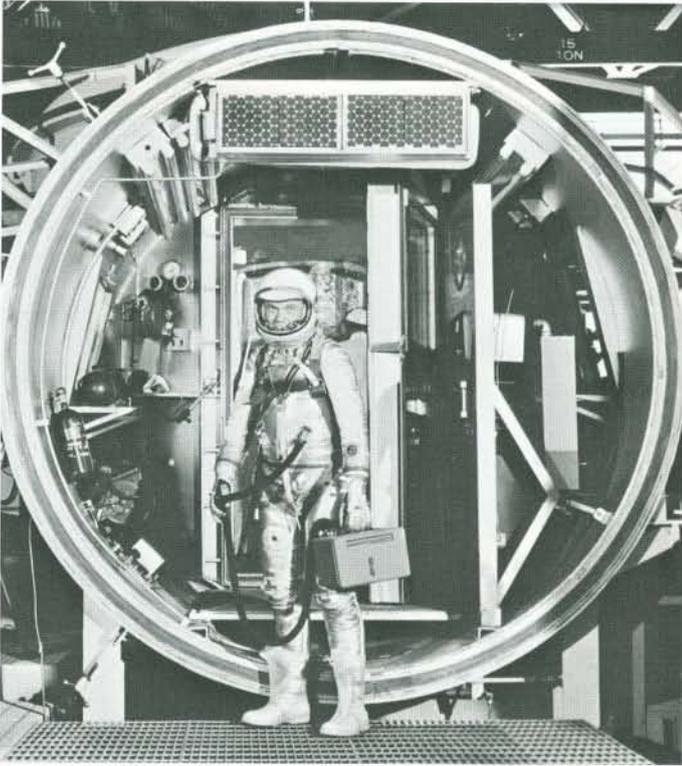
4 Shepard's recovery after flight to an altitude of 115.7 miles and a distance down range of 302 miles which demonstrated integrity of Mercury spacecraft and feasibility of spaceflight by man.



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1 Jet Propulsion Laboratory engineer cleans solar panels on Ranger 5. Lunar exploration spacecraft, launched October 18, 1962, was NASA's third attempt to place instrumented package on lunar surface.

2 Mercury Astronaut John Glenn stands before entrance to Mercury altitude test facility in Hangar S at the Cape. Within chamber, space environment simulators were run with Mercury pilots "flying" their spacecraft to an equivalent of 220,000 feet altitude.

3 James E. Webb, NASA's administrator, was sworn in Tuesday, February 14, 1961 by John Johnson, general counsel. Robert Lacklen, director of personnel, holds the Bible.

4 During pre-launch activities, Astronaut John Glenn enters Friendship 7. After flight Glenn said: "We are just probing the surface of the greatest advancement in man's knowledge of his surroundings . . . there are benefits to science across the board."

5 Ion engine uses the principle of electric propulsion to gain thrust by ionizing cesium atoms and accelerating them out the rear of the engine.



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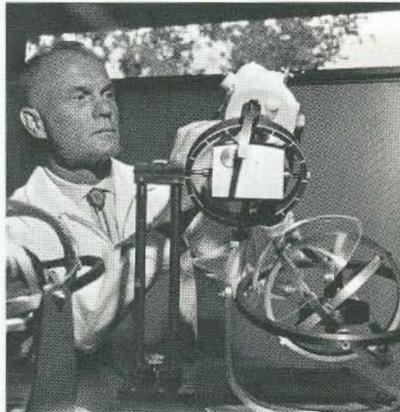


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6 Elements of simulated environmental test program conducted at Marshall Space Flight Center to determine the problems of maintaining a carrier rocket in space. Engineer in pressurized space suit stands on air bearing platform.



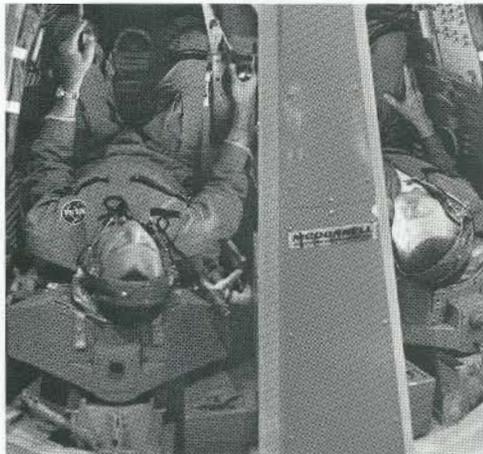
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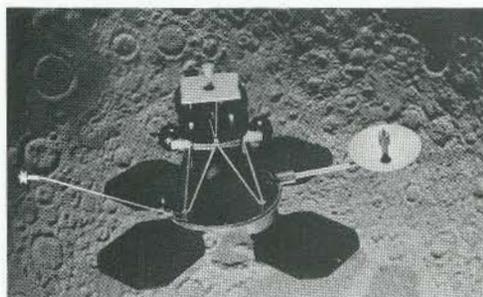
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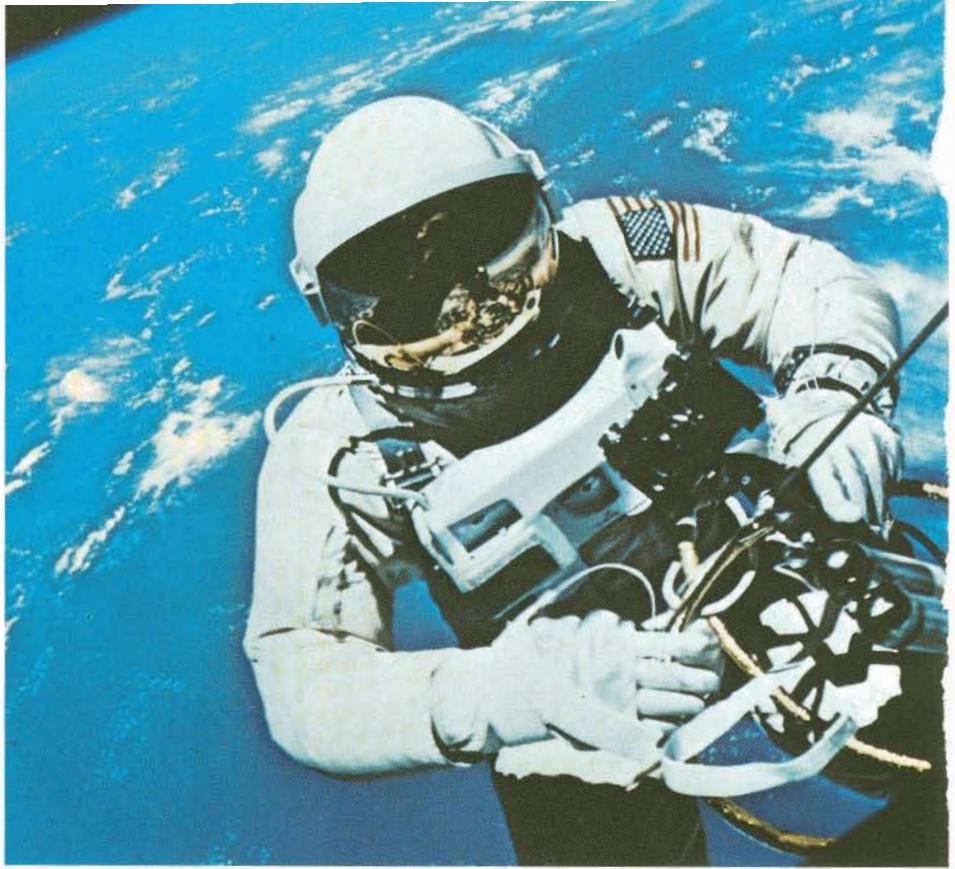


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- 1 One-tenth scale model of Centaur launch vehicle, in Lewis Research Center supersonic wind tunnel, undergoes hydrogen vent studies.
- 2 NASA Astronauts Alan Shepard and Frank Borman in the Gemini mission simulator at Cape Kennedy. Simulator duplicates in exact detail the interior of the two-man Gemini spacecraft.
- 3 Meteorological balloon is manufactured with "warts" to make it more stable in turbulent air streams than smooth spherical balloons. It works on same principle as dimpled golf ball which is less erratic in flight.
- 4 Scale model of the moon and NASA's Lunar Orbiter spacecraft show how unmanned, camera-carrying satellite would approach to within less than 30 miles of the moon to take high resolution pictures of lunar surface.
- 5 During intensive training period, John Glenn studies moments of inertia on a reference model of the lunar module at Manned Spacecraft Center, Houston, Texas.
- 6 Astronaut Frank Borman, with his Parasail canopy inflated, starts off on a run for a towed flight to an altitude of about 400 feet and release. Parachute training program was held at Ellington AFB, Texas.
- 7 This giant air passage in the 16-foot transonic wind tunnel at Langley houses a massive set of stationary guide vanes. Vanes form an ellipse 58 feet high and 82 feet wide. Function of the 81 curved vanes is to force air to make a right-angle turn smoothly.



June 3, 1965, during the third revolution of an extended earth orbital flight, Gemini 4 pilots James McDevitt and Edward White perform the first extravehicular activity in the manned space flight program. Ed White, leaving the Gemini capsule to walk in space, is a human satellite orbiting the earth at an altitude of 120 miles above the Pacific Ocean. Command pilot McDevitt remains at the controls to keep the spacecraft in a stable attitude. Within a few months, NASA astronauts proved ability of two manned spacecraft to rendezvous in orbit.

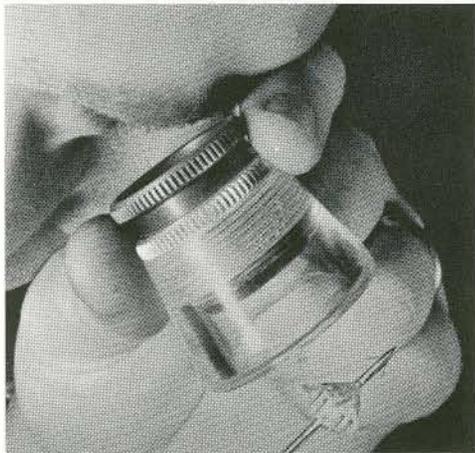




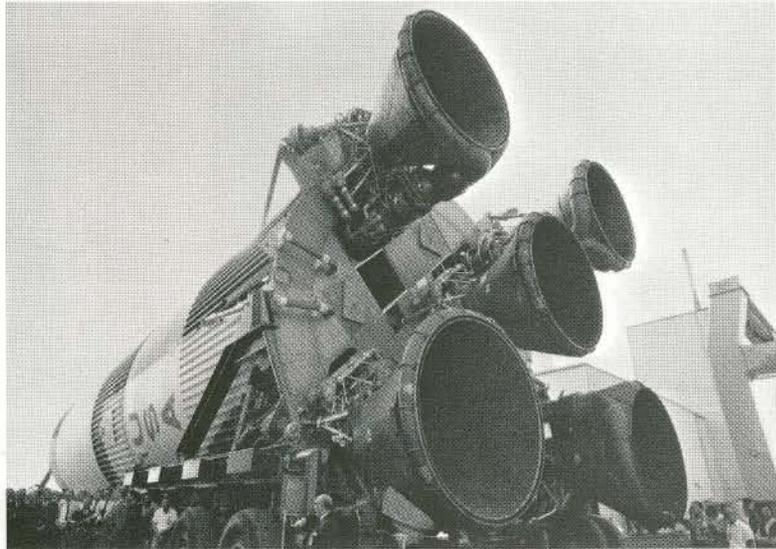
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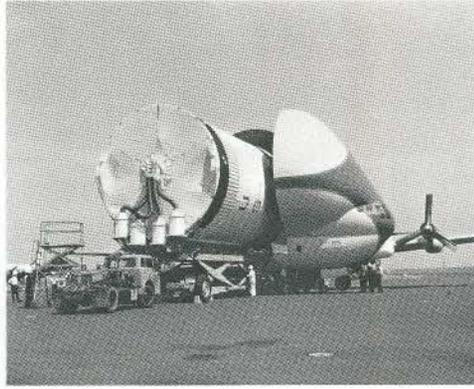


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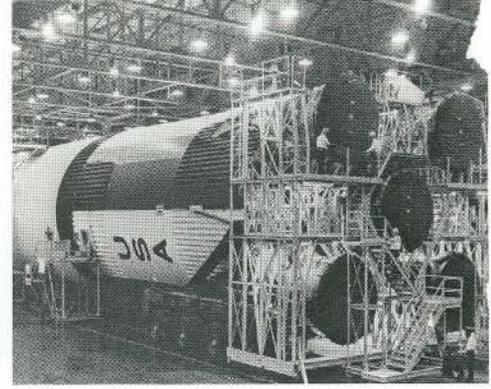
- 1 Jubilant, bewhiskered Astronauts Frank Borman (right) and James Lovell arrive aboard the aircraft carrier U.S.S. Wasp. Pilots of Gemini 7 splashed down December 18, 1965, to conclude a record-breaking two-week mission.
- 2 One-inch scale model of a typical supersonic airplane design is examined before being installed for sonic boom studies in four-foot supersonic tunnel at Langley Research Center. Through such research NASA is providing a better general understanding of the sonic boom problem.
- 3 President Lyndon Johnson presents Distinguished Service Medal to NASA Associate Administrator Dr. Robert Seamans for his part in the overall program for the peaceful exploration of space. Adding his congratulations is NASA chief James Webb.
- 4 Astronaut Thomas Stafford, pilot, in the Gemini 6 spacecraft prior to the closing and securing of the hatches during the pre-launch countdown.
- 5 Wally Schirra, command pilot for the Gemini 6 mission, and Stafford accomplished first space rendezvous on December 15, 1965, coming within six feet of the orbiting Borman-Lovell Gemini 7 craft.
- 6 Astronaut McDevitt leaves Gemini spacecraft with his survival kit during "water egress" training exercises in the Gulf of Mexico.
- 7 NASA Marshall Space Flight Center marks completion of the first Saturn 5 S-1C booster in 1965. This giant stage—138 feet long and 33 feet in diameter—provides lift-off power for three stage Saturn moonrocket.



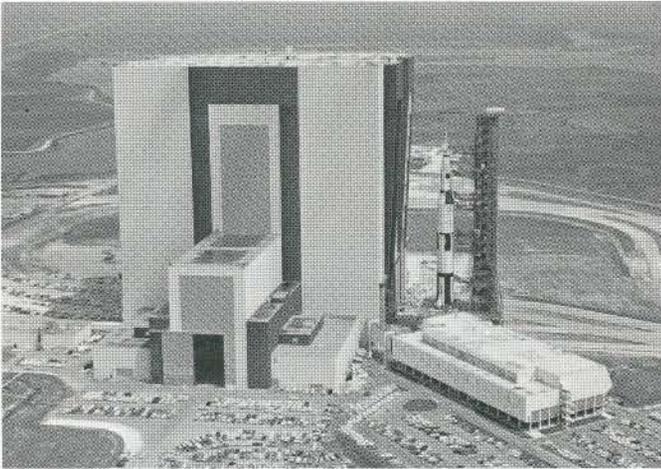
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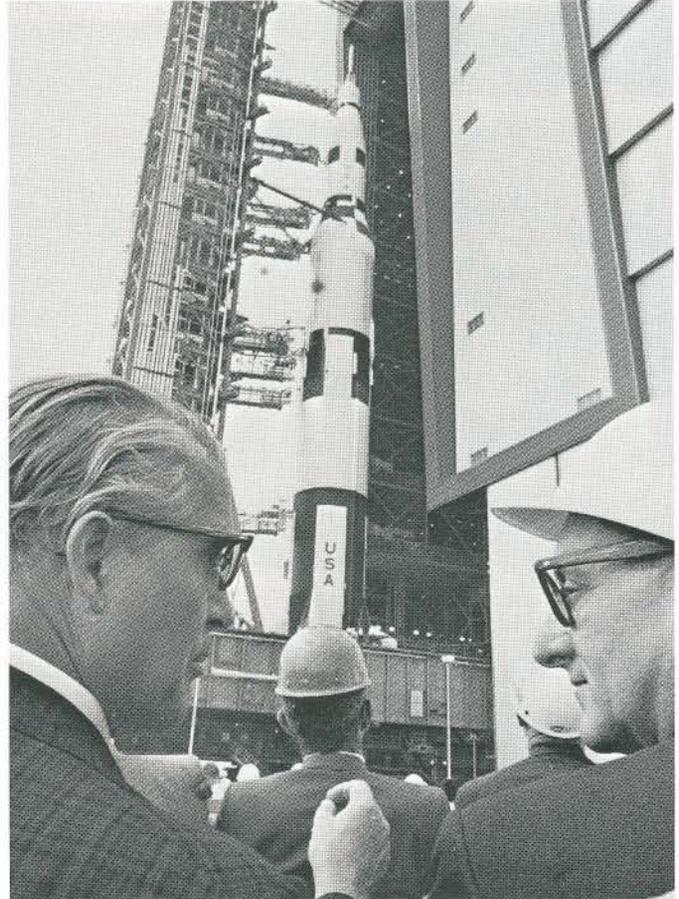
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- 1 First stage of Apollo/Saturn launch vehicle undergoes final checks before leaving Michoud Assembly Facility in New Orleans.
- 2 Second stage is loaded aboard giant Super Guppy aircraft at Mather AFB near Douglas Test Center, Sacramento, Calif.
- 3 Back at Michoud, 80-foot-long Saturn stage undergoes a launch simulation to verify that it can perform its prescribed functions.
- 4 The 365-foot-tall Apollo/Saturn 5 facilities vehicle moves from Vehicle Assembly Building at Kennedy Space Center and will be transported to launch complex. This test vehicle will not make the journey to the moon; it's being used to verify launch facilities, train launch crews and develop test and checkout procedures.
- 5 Rocketeer Dr. Wernher von Braun, director of Marshall Space Flight Center, and Dr. George Mueller, associate administrator for Manned Space Flight, get close-up of the Apollo/Saturn 5 facilities vehicle roll-out.
- 6 A trail-blazing research success, this X-15 rocket-powered aircraft was piloted by John McKay of the joint NASA-Air Force research program. The X-15 holds the world's speed record, greater than 4,000 miles per hour, and the altitude record of 67 miles.

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1 NASA test pilot brings Lunar Landing Research model to a hover over Rogers Dry Lake, Calif. prior to making a descent and landing. Wingless machine simulates problems of landing a manned spacecraft on the moon in low-gravity conditions.

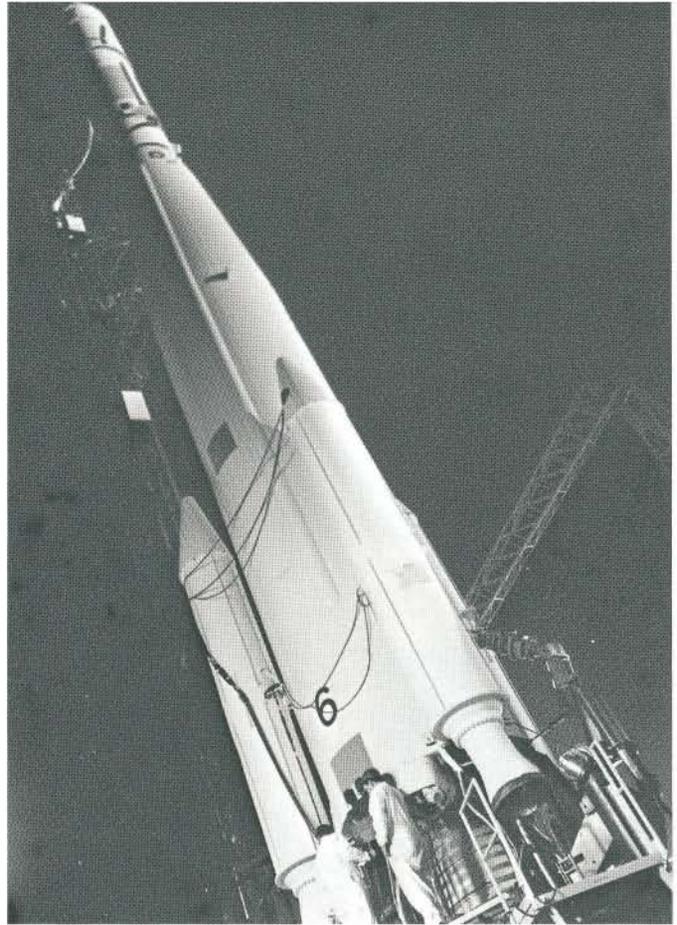
2 "Fish-eye view" of Saturn 1B instrument unit being assembled in a high bay area at IBM's Huntsville Facility. Engineers and technicians install guidance, control and other instrumentation, making up the vehicle's nerve center.

3 Thrust-Augmented Thor-Agena B stands ready on its launch pedestal awaiting the countdown at Western Test Range. With 335,550 pounds of thrust, vehicle boosted Nimbus 2, NASA's weather-watching satellite, developed by GE's Missile and Space Division, into orbit on May 15, 1966.

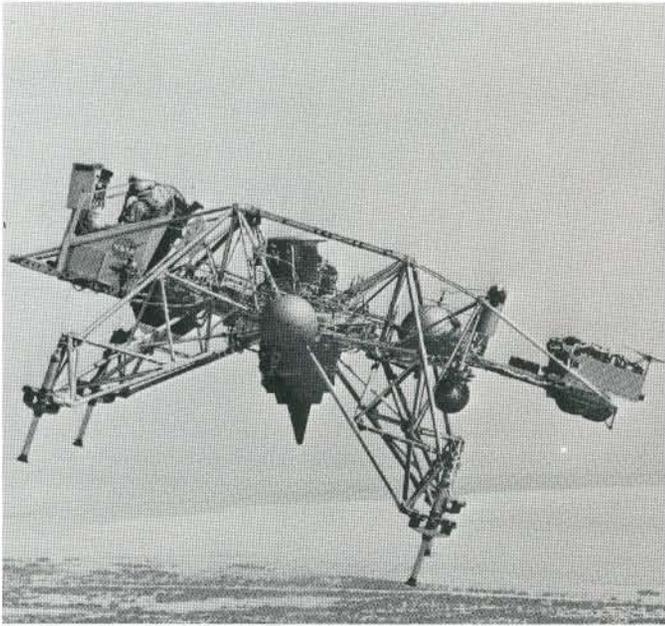
4 Later in the year, as it swung high in its elliptical orbit, Lunar Orbiter 2 turned its wide angle lens on the southern half of the moon's hidden side, producing this photograph.

5 The world's first view of the earth taken by a spacecraft from the vicinity of the moon. Photo transmitted to earth by Lunar Orbiter 1.

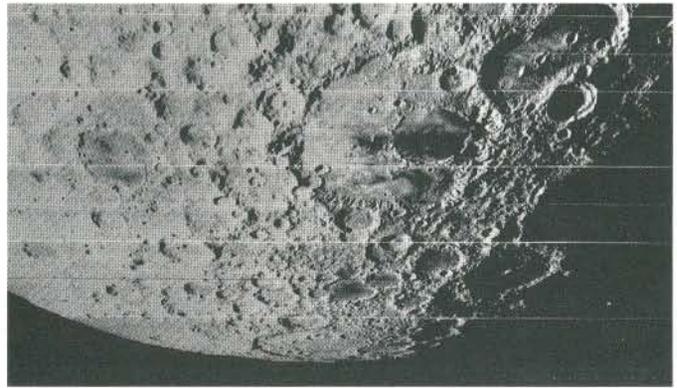
Overleaf: Applications Technology Satellite, in 22,000-mile-high orbit, returned color photo of earth (photo, left). South America is clearly visible in lower center. At right, Apollo/Saturn 5, as tall as a 36-story building, roars away from Cape Kennedy moonport in a billow of fire and smoke.



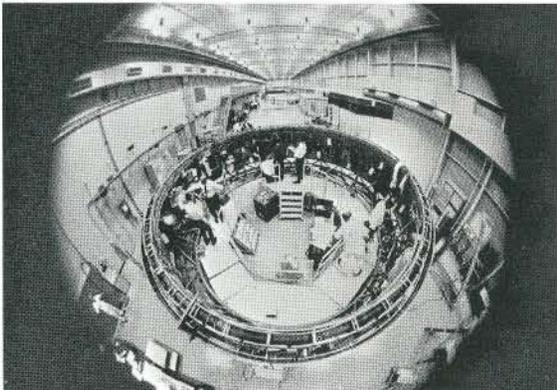
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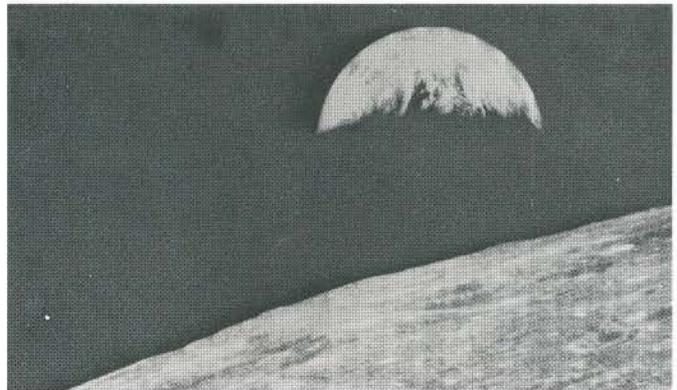
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