

TRAVELS NOW AND THEN

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HUNTSVILLE 1971

JETPLEX—This is more than just an airport; it is a unique combination of air, land, rail and river services linking travelers, supplies, producers and consumers all over America in a multi-modal transportation network to support tomorrow's industrial, commercial and business activities today. Over 8,000 acres—1,100 on the airport—can be served by this multi-modal transportation network.

JETPLEX is the rail service provided by Southern Railway that industry needs to supply its production and distribution requirements. Spur tracks can be extended to serve the entire area, including sites on the airport.

JETPLEX is the land transportation service that is available from the fifteen common carriers in the region. With I-65 only six miles west and I-565 approved for connecting I-65 with the airport and the downtown business district of Huntsville, any industrial or business site on or surrounding the airport has immediate access to the Interstate and highway system.

JETPLEX is river transportation from the Tennessee River, with its nine foot clear channel that connects **JETPLEX** property with the inland water system from the Great Lakes to the Gulf of Mexico.

JETPLEX is air transportation from a Regional Airport. Scheduled carrier service by Eastern, Southern and United provides nonstop or single plane service to the major cities of the nation. Two transcontinental routes intersect here and afford direct air service to the West Coast, Eastern Seaboard and Florida. General and executive aviation are serviced by Huntsville Aviation's modern fixed base operation.

JETPLEX is the 1,100 acres of industrial and commercial property on the airport that directly fronts the runways, an existing road system and rail service, river transportation just 3½ miles to the South.

JETPLEX is the airport terminal, appropriately named Skycenter, where under one roof are airline customer services, a 152 room hotel, restaurants, gourmet dining, concessions, car rentals, conference and banquet rooms, a bank and post office. Three hundred feet away are a cabana/pool and an 18 hole golf course.

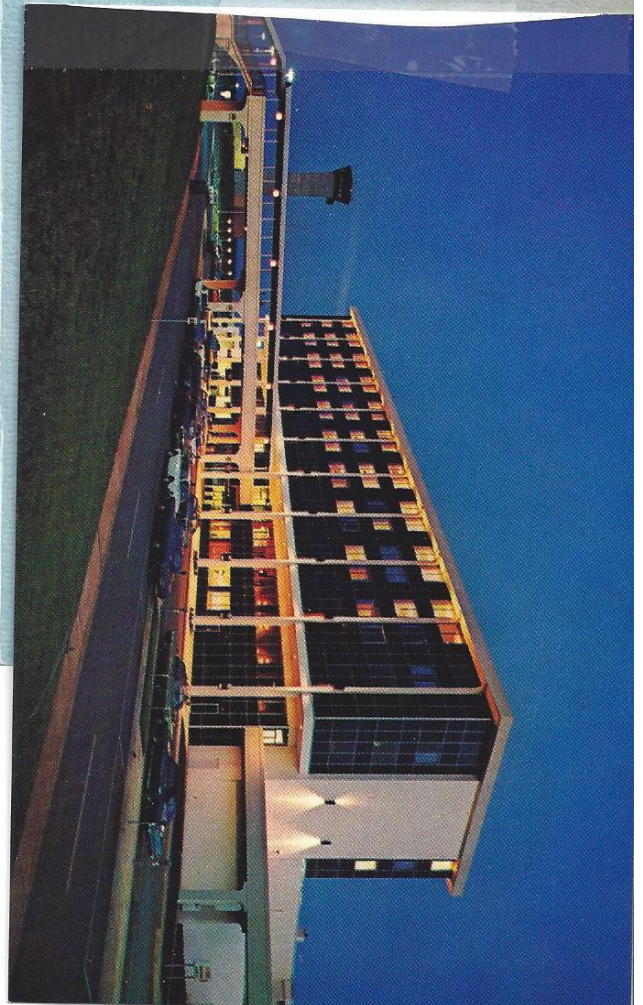
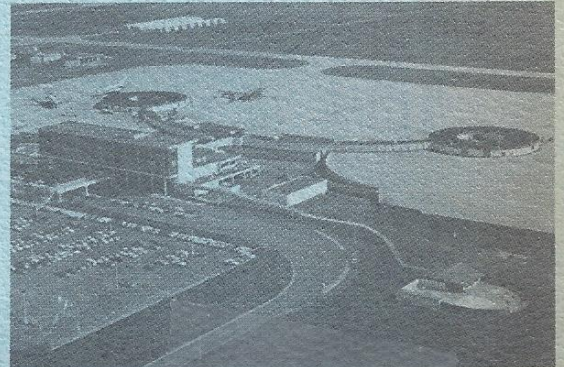
JETPLEX means labor availability—within twenty-five miles are nearly 400,000 people. With the region's educational institutions—universities, junior colleges, vocational and grade schools—the skills of any trade or profession can be provided or enhanced.

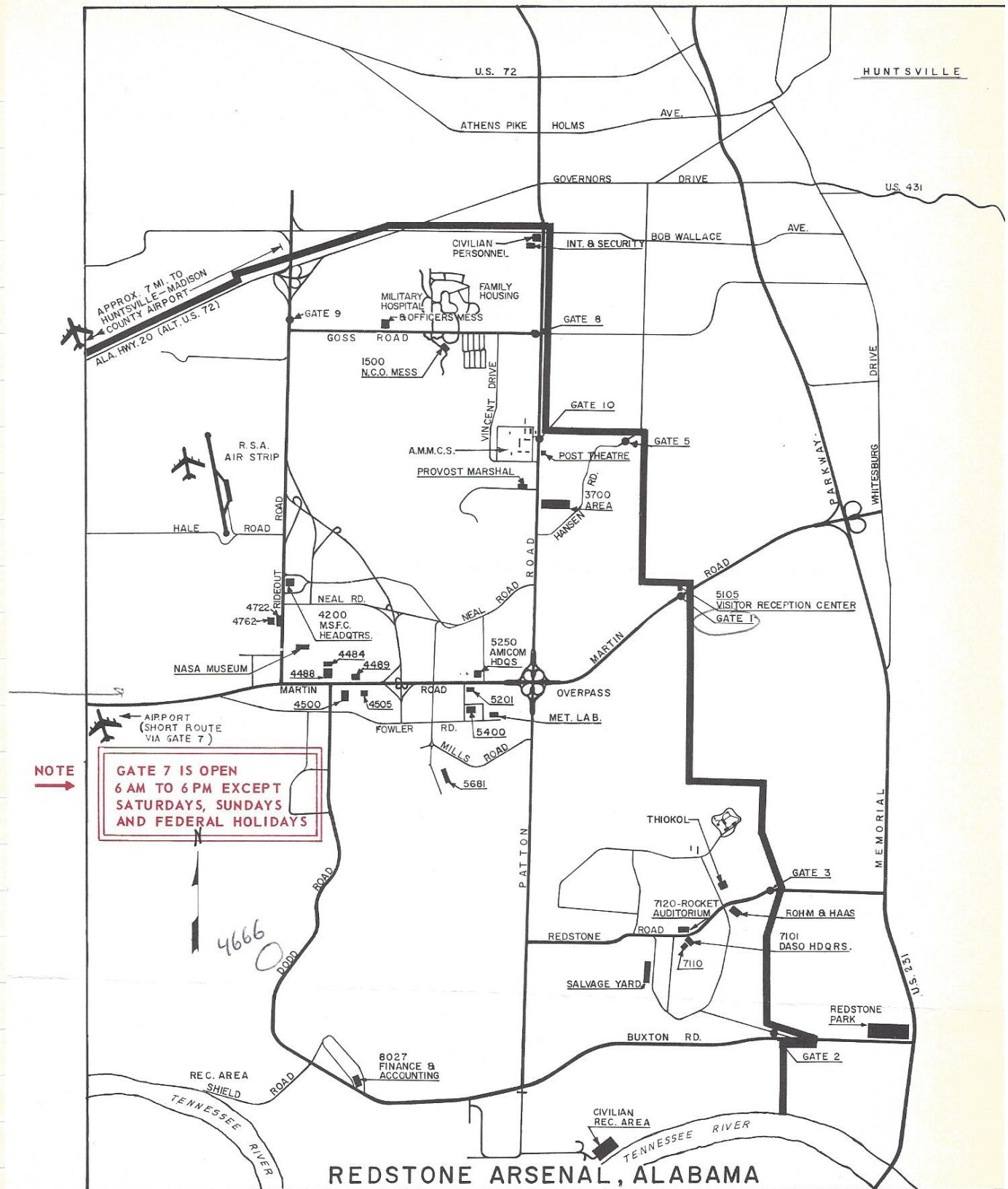
JETPLEX is centrally located to the Southeast and the forty million people that live south of the Potomac and Ohio Rivers and east of the Mississippi. Why don't you locate your facility in **JETPLEX** Country? Contact:

J. E. MITCHELL JR. EXECUTIVE DIRECTOR
Huntsville-Madison County Airport Authority
Huntsville, Ala. (205) 772-9395

JETPLEX

HUNTSVILLE, ALABAMA







FROM SATURNS TO SCIENCE -- THE CHANGING SCENE AT MSFC

This folder gives you a thumbnail sketch of the Marshall Space Flight Center, NASA's largest research, development, and management organization.

At Marshall you will find huge test stands of steel and concrete where the giant Saturn's first stages were static fired;

Lightning-like computers for plotting trajectories, problem solving, and handling millions of bits of data from space;

Laboratories filled with specialized testing equipment;

Lunar Roving Vehicles for riding on the moon;

A huge tank filled with water where astronauts in pressurized space suits can simulate the zero gravity of space;

Work on Skylab, the Space Shuttle, and other programs of the future for exploring space and adapting space technology to Earthly uses;

Studies of large space telescopes which may be able to see the furthestmost expanses of the universe.

The Marshall Center is in transition, completing the Saturn Program and engaging in a wide variety of exciting space science and applications projects.

The concrete and steel structures, the swift computers, and the laboratories with sensitive equipment here are valued at 400 million dollars. Far more valuable, however, are the people -- the scientists, engineers, technicians, and managers with space-related skills and experience -- who are devoting their talents toward reaching the nation's goals in space.

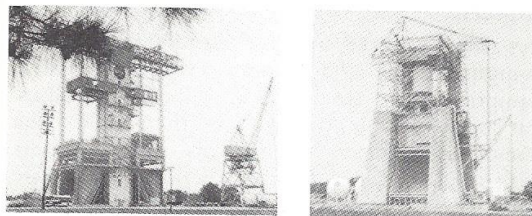
You must go within the laboratories at the Marshall Center to get a close-up look at its real nature. Tirelessly repeated tests, complicated experiments, and drawing board designs seldom make today's headlines, but they help shape the space activities of tomorrow.

Here men and women are busily at work on research, advanced concepts, and long-range studies for space systems which are years ahead of today's hardware.



Practically all of the scientific disciplines are represented at the Marshall Center: mathematicians, physicists, chemists, biologists, and dozens of different types of engineers. All are making a common assault on the problems of space travel. And they are working on the frontiers of knowledge in their chosen professions.

The story of the Marshall Center is not told in terms of steel, stone, or statistics — but in the efforts of its people. Their knowledge, skills, experience, and teamwork are a vital asset in the nation's space program.



HERITAGE AND HISTORY

The Marshall Center is located on 1800 acres in the midst of the U.S. Army's Redstone Arsenal at Huntsville, sprawled among the lush green vegetation and rich red clay of the Tennessee Valley, with low Appalachian foothills on the horizon. The meandering Tennessee River, which forms the southern border of the Arsenal, permitted barge transportation of Saturn stages fabricated and tested here, which were too large for conventional highway, rail, or air movement.

The Center was formed on July 1, 1960, by the transfer of buildings and personnel comprising part of the Army Ballistic Missile Agency from the U.S. Army to the National Aeronautics and Space Administration. It was named for the famous soldier and statesman, General of the Army George C. Marshall, and was officially dedicated by President Dwight D. Eisenhower on September 8, 1960, with Mrs. Marshall attending the ceremony.

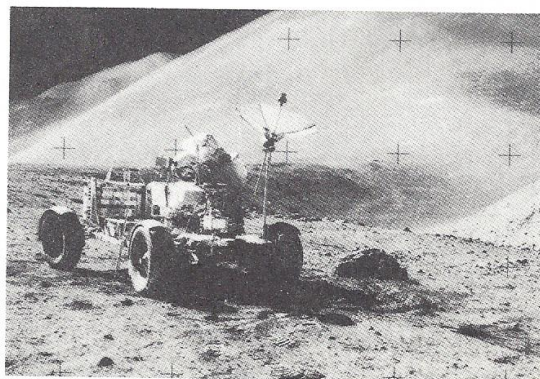
Marshall now has about 5,500 civil service employees and several hundred contractor employees in support roles at its Huntsville location. Other Center employees are located at contractor plants across the nation and at two government-owned, contractor-operated sites obtained to help carry out the goal called for on May 25, 1961, by President John F. Kennedy, for sending men to the moon before the end of the decade of Sixties.

The Michoud Assembly Facility, a 900-acre complex located in New Orleans, was obtained for the manufacture of Saturn stages. The Mississippi Test Facility, located 40 miles away mainly in Hancock County, Mississippi, provided rocket-testing stands and other test and support facilities for acceptance testing of rocket stages and engines.

The people who make the Marshall Center hum can carry a space project forward from the time that it is a faint gleam in someone's eye until it is a bright twinkle in the heavens, transmitting to earth valuable data on its observations.

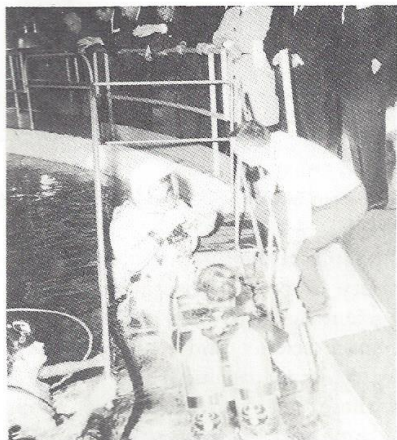
Many of these men and women were early pioneers in rocketry and space. They had a part in many historic firsts for the United States while working at Huntsville, first for the U.S. Army, coming to Redstone Arsenal in 1950, and since 1960 employed by NASA at the same location.

These firsts included the first man-made object recovered intact after a flight through space, the nose cone of a ballistic missile; the first primates, Monkeys Able and Baker, recovered from the Atlantic after a journey into space in the nose cone of a Jupiter missile; the first U.S. satellite, Explorer I, launched January 31, 1958, by a Jupiter C missile developed here; the first American astronaut in space, Alan Shepard, who rode a Mercury spacecraft on a sub-orbital flight over the Atlantic Ocean after being launched May 5, 1961, by a modified Redstone missile, developed here; and the Saturn V launch vehicle, provided by the Marshall Center, made possible the first landing of men on the moon in Project Apollo on July 20, 1969, and later permitted scientific exploration of the moon by astronauts using a Lunar Roving Vehicle.



CHARACTER AND FUTURE

The Marshall Center is one of NASA's nine principal field installations. Each NASA Center has a character or personality of its own. Each one has a unique set of skills and talents, which are used to perform various missions assigned by NASA Headquarters to reach the broad national goals in space.



Neutral Buoyancy Tank

In the past, the Marshall Center has been identified most often as NASA's launch vehicle development center. While this label accurately described part of the Center's activities, it never did tell the whole story. It is true that the Redstone, Jupiter, and Saturn rockets were spawned here. But the Marshall Center, like the moon on which much public attention has been focused in recent years, has always had another side, which is just now coming into view. As Project Apollo draws to a close with the December 6 launch of Apollo 17, these other projects which have been in incubation are coming into view.

No longer described by a single predominant launch vehicle project, the Marshall Center has become a multi-project management and engineering establishment, with a great deal more emphasis on scientific activity. This is the Marshall Center's new image.

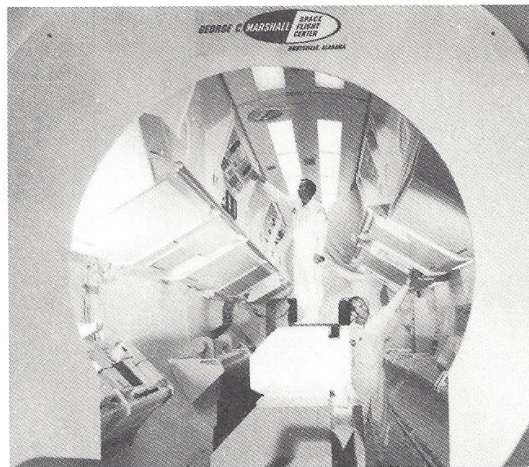
Now, what are some of the programs reflecting the new face of Marshall?

After Apollo will come Skylab, this nation's first manned laboratory in space, which will be launched in the spring of 1973.

In Skylab three different crews of three astronauts each will spend up to 56 days in earth orbit, performing some 60 experiments in the areas of biomedical research, solar astronomy, and observation of the earth's natural resources. The Marshall Center will furnish four Saturn launch vehicles for Skylab, most of the other hardware, and some of the experiments. Many of Skylab's 60 experiments are designed to apply space knowledge more directly to public needs.

Another project, emphasizing science, is the High Energy Astronomy Observatory. HEAO will be the world's largest astronomical observatory to be launched and operated in space. It will study the high energy X-rays, gamma rays, and cosmic rays from galactic and extra-galactic sources. These are the most energetic forms of energy known to man.

Still another scientific project is the Large Space Telescope. More than 40 feet in length and weighing more than 10 tons, this telescope will be able to see galaxies 100 times fainter than those seen by the most powerful ground-based optical telescope. Peering 12 billion light years into the cosmos, this telescope will take us right to the edge of the accessible universe.



The Manned Spacecraft Center at Houston is the lead NASA center in development of the space shuttle, but the Marshall Center has a significant role in the program. Relying on our experience in launch vehicle development, we will provide the engines, external drop tank, solid rocket motors, and some of the payloads for the shuttle. The shuttle, designed to take both men and payloads into earth orbit, will replace virtually the entire stable of NASA launch vehicles.

USING SPACE TECHNOLOGY TO ENRICH LIFE ON EARTH

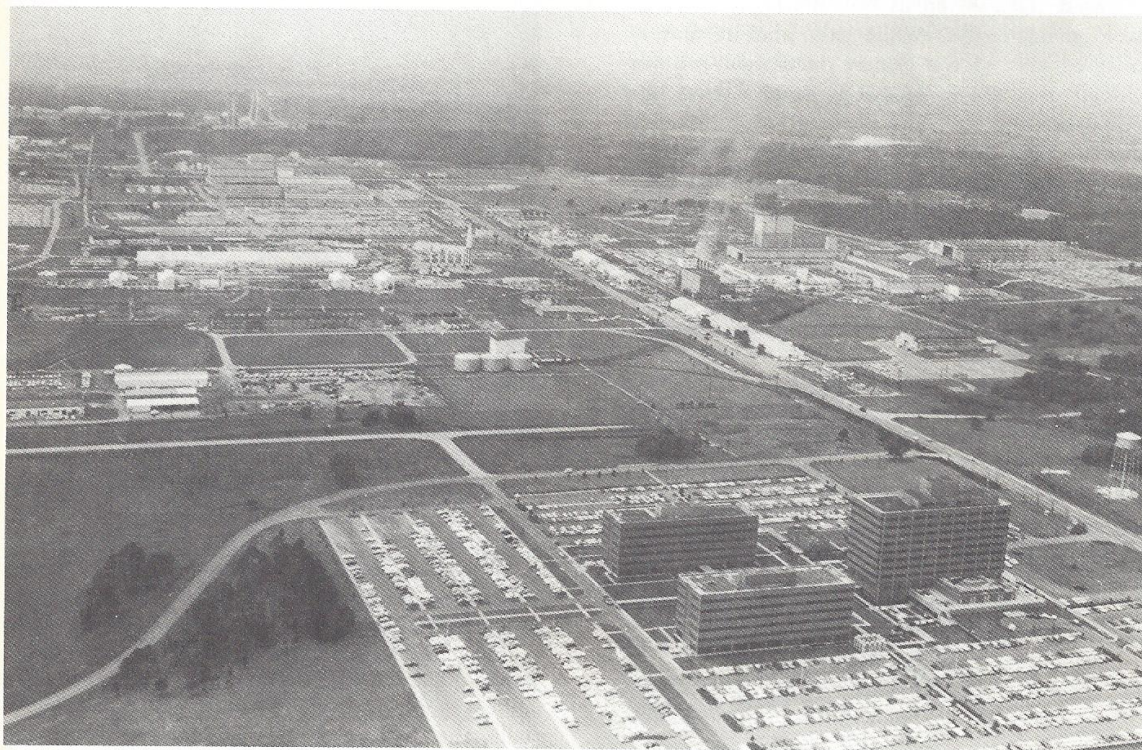
The space program benefits mankind in many ways: new scientific knowledge; advanced technology, including new products, improved manufacturing processes and techniques which mean better value for the consumer; improved weather forecasting and better global communications through satellites; advances in medicine; challenges to education, and others. Moreover, it has demonstrated improved management systems which can be applied to mobilize vast resources of people and materials in other new programs of government or industry.

The application of space science and technology to improve life on earth is coming strongly to the forefront, following the initial phase of exploration and discovery in space. To hasten these applications, NASA Headquarters is designating lead centers in such areas as earth observations, communications, environmental sciences, and meteorology. The Marshall Center may be given the lead center role in the area of communications for managing the NASA-wide effort in communications systems using satellites.



Knowledge from Skylab will be applied directly to public needs.

In summary, the Marshall Center today has a wide variety of projects, both for the continuation of scientific discovery, and for the application of space science and technology for useful purposes. As its management and technical direction of these science-oriented and applications projects come to the forefront, the new image of the Marshall Center will become even more distinctive.



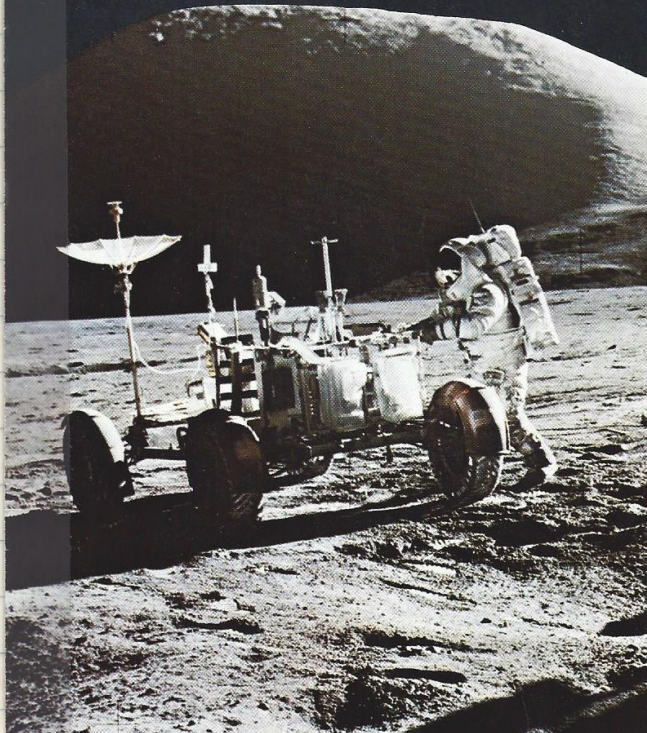
SPACE & ROCKET CENTER FEATURES

NASA TOURS



SEE THE
**MARSHALL
SPACE FLIGHT
CENTER**
HUNTSVILLE, ALA.

TOURS DEPART FROM
VISITOR INFORMATION CENTER



FANTASTIC...



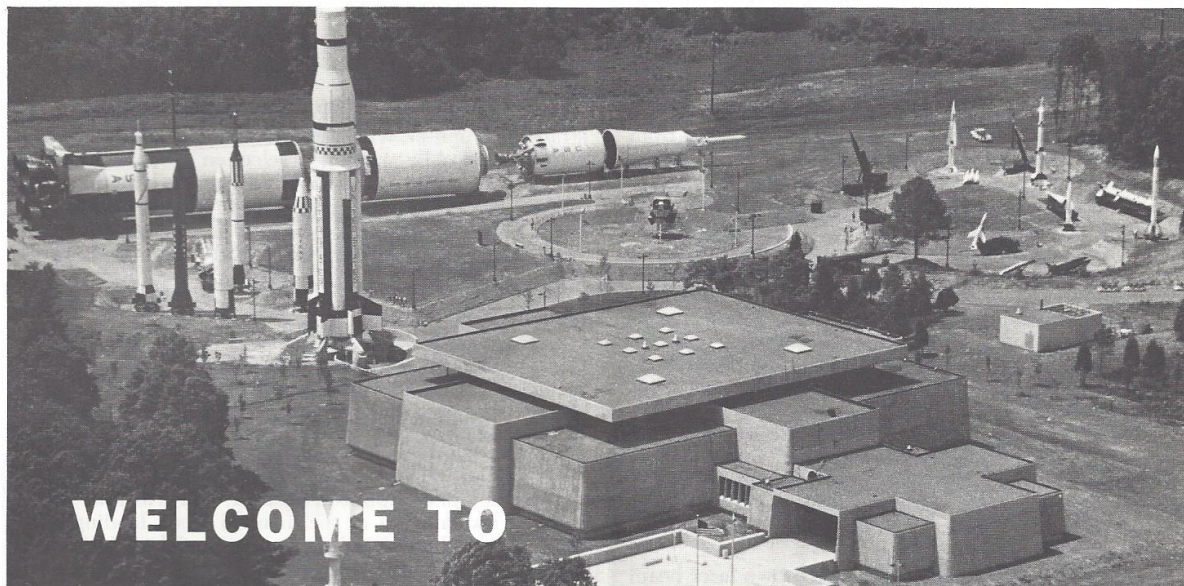
Bring Your Camera!



SPECTACULAR...



ALABAMA SPACE & ROCKET CENTER



EARTH'S LARGEST SPACE EXHIBIT

The Alabama Space and Rocket Center, Earth's largest space exhibit, is "dedicated by the citizens of Alabama to those Americans who have made it possible for man to walk on the moon and to explore the universe; and to the youth of America who will use the technology of space for the benefit of mankind."

Far more than a museum, the Alabama Space and Rocket Center was developed to involve the people of America in the exciting technological revolution of our age. A non-profit educational organization, the Center is dedicated to the advancement and understanding of space exploration, discovery, and rocket development. NASA's Marshall Space Flight Center and the U.S. Army Missile Command are represented jointly with the aerospace and missile industry at this unique space age exhibit. The Center is a self-sustaining facility owned and operated by the State of Alabama. It was officially dedicated on March 17, 1970, and since that time has attracted thousands of visitors from throughout the world.

The architecture of the building sets the mood for your visit to the Center. Designed to resemble a rocket blockhouse, the massive all-concrete building contains 7,000 square yards of concrete. Wall sections of the building have been sculptured, chipped and sandblasted to provide the concrete structure with different textural appearances.

The architecture sets the mood, but it is the content of the Center that is unique, one-of-a-kind and the "finest exhibit of its kind in the world" as proclaimed by space expert Wernher von Braun.

The Space and Rocket Center is as far removed from the "don't touch" style museum of tradition as its centerpiece, the massive Apollo Saturn V moon rocket

(all 363 feet of it), is from the Wrights' first airplane. The Center's emphasis is on experience and participation. You can see, handle, and operate—and learn by doing—much of what the Center seeks to tell. The Center LETS YOU BE THE ASTRONAUT as you experience the sights, sounds and sensations of space travel.

This handout is your suggested tour guide. It contains a brief description of the exhibits with Areas 1-13 indicated and a suggested route to follow. It is suggested that you follow the numbers as you tour the interior and exterior exhibit areas. If you have questions about the exhibits, please direct them to the uniformed personnel on duty throughout the Center. They are available to assist you in operating the exhibits and to answer any of your questions pertaining to the exhibits or visitor services.

AREA 1

In the lobby, you will see the Today In Space exhibit containing the Spacecraft Tracking Station which displays live transmissions from weather satellites. Astronaut training and other manned space flight activities are transmitted from NASA Centers to the Space and Rocket Center. The Wernher von Braun Recognition Room is also located in the lobby. The room contains some of the awards, honorary degrees and other honors bestowed on the world's renown rocket expert.

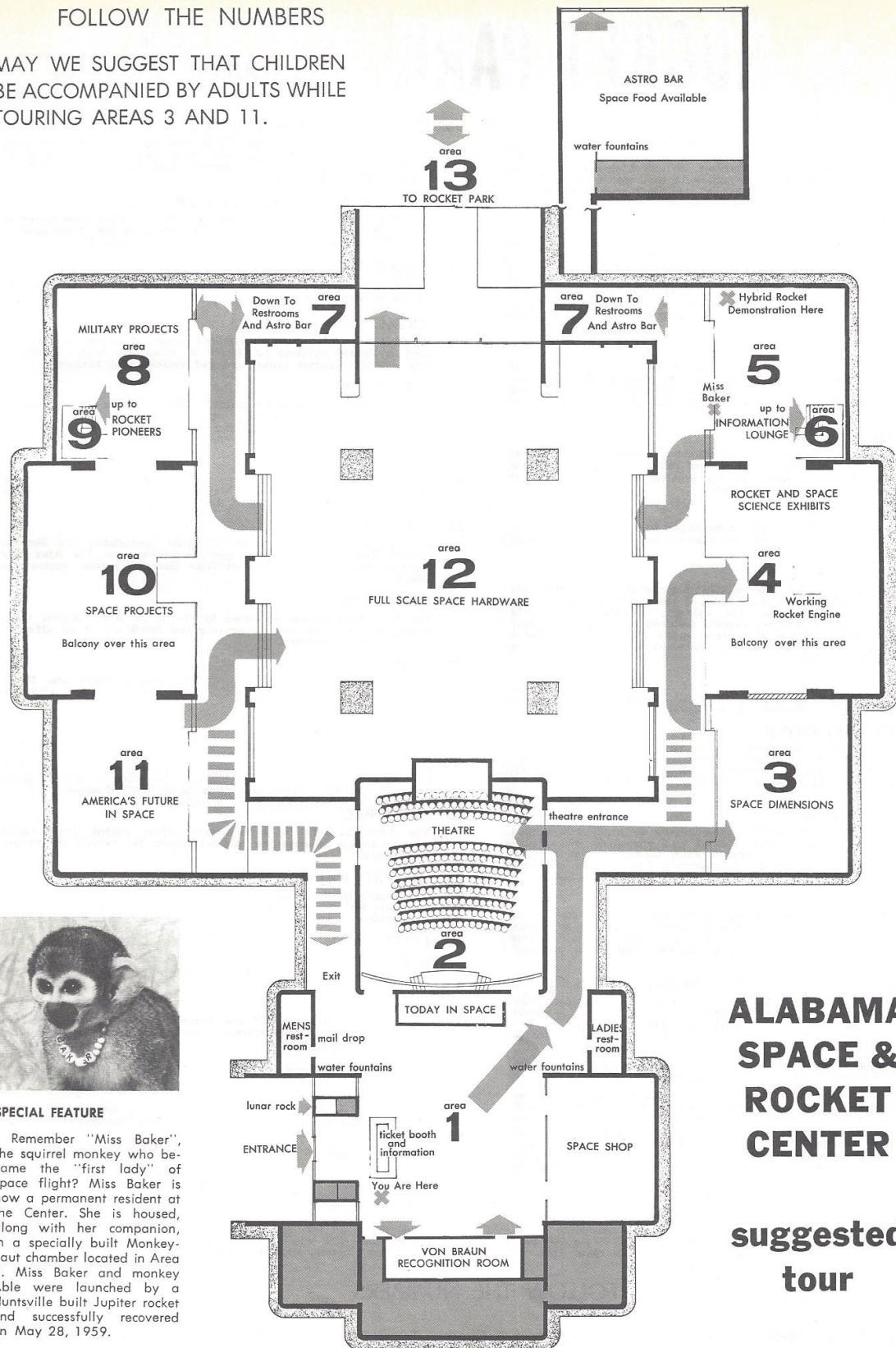
AREA 2

The theater is the next stop where you will see the Center's feature film "Freedom To Explore." Using stereo sound, multi-image projection techniques and spectacular wide screen display, the 11-minute film traces man's development from the stone age to the space

PLAN AT LEAST TWO HOURS TO TOUR—CAMERAS WELCOME

FOLLOW THE NUMBERS

MAY WE SUGGEST THAT CHILDREN
BE ACCOMPANIED BY ADULTS WHILE
TOURING AREAS 3 AND 11.



ALABAMA SPACE & ROCKET CENTER

suggested tour



SPECIAL FEATURE

Remember "Miss Baker", the squirrel monkey who became the "first lady" of space flight? Miss Baker is now a permanent resident at the Center. She is housed, along with her companion, in a specially built Monkey-naut chamber located in Area 5. Miss Baker and monkey Able were launched by a Huntsville built Jupiter rocket and successfully recovered on May 28, 1959.

area 13 ROCKET PARK

USE THIS AS YOUR GUIDE
WHILE TOURING THE PARK

1. **SATURN I**
Saturn I was the first large space vehicle developed solely for space exploration. It was designed and developed at the Marshall Space Flight Center in Huntsville, Alabama. Saturn I operates at a top speed of 17,000 m.p.h. and can launch 11 tons into orbit. Saturn I launched the first unmanned Apollo spacecraft and three Pegasus satellites for meteoroid detection in space.
2. **V-I BUZZ BOMB**
This is the German cruise-type missile called the "Buzz Bomb" because of the unusual sound made by its engine. It is powered by a aero-pulse engine which burns any gasoline-type fuel and produces 900 pounds of thrust. Approximately 20,000 V-I's were launched against England and Belgium during 1944-1945. Over 1200 U. S. built copies, called the JB-2, were tested by the Army and Navy. This missile is exhibited through the courtesy of the Air Force Museum, Dayton, Ohio.
3. **V-2**
The V-2 proved that the basic theories of rocketry were correct. It was first launched on October 3, 1942, at Peenemunde, Germany, and broke all records for height, weight, speed and range. The V-2 was brought to the United States in 1945 and inaugurated the United States missile program.
4. **JUPITER**
In 1959, the Jupiter launched two primates named Able and Baker into space. This experiment proved that living creatures could pass through lift-off and re-entry and return safely to earth. The Jupiter generates 150,000 pounds of thrust.
5. **JUNO II**
Juno II was a modified Jupiter with upper stage added for launching space probes. The pioneer and explorer satellites were launched by Juno II.
6. **REDSTONE**
This rocket is known as "old reliable" because of the many diverse missions it fulfilled in the early days of the space age. There were three versions of Redstone. The military, satellite and manned versions. This is the military version designed to transport nuclear or conventional warheads at ranges up to 200 miles. Its power plant burns liquid oxygen and an alcohol-water mixture producing 75,000 pounds of thrust.
7. **JUPITER C**
The U. S. Army's version of Redstone, Jupiter C, launched the first U. S. satellite—Explorer I on January 31, 1958.
8. **MERCURY-REDSTONE**
The third version of Redstone was the first of a series of rockets used in the U. S. manned space flights. In May, 1961, a Mercury/Redstone rocket launched Astronaut Alan B. Shepard on a sub-orbital flight aboard Freedom 7, the first U. S. astronaut to ride a rocket.
9. **MERCURY ATLAS**
The Atlas space launch vehicle was originally designed as a weapon and later modified to launch manned and unmanned space hardware in 1962. The Atlas launched John Glenn into earth orbit aboard the Mercury Friendship 7 spacecraft. The Ranger, Surveyor, Lunar Orbiter and Mariner spacecrafts were launched by Atlas.
10. **TITAN**
The U. S. Air Force Titan rocket family was developed as part of this nation's defense system. Titan II however was used by NASA to launch the two-man Gemini spacecraft on long duration flights (14 days), rendezvous and docking missions and "walk-in-space" experiments.
11. **APOLLO SATURN V MOON ROCKET**
First Stage—The Apollo Saturn V was designed to transport man to other planets and lift tons of cargo into space. It was the launch vehicle for the moon landing. This first stage is powered by five liquid fuel engines that consume 5,000 gallons of fuel per second producing 160 million horsepower.
Second Stage—The second stage powers the spacecraft to an altitude of 117 miles above the earth at a speed of 15,300 m.p.h.
Third Stage—The third stage increases the spacecraft orbital speed to 17,500 m.p.h. After one orbit it re-ignites to push the spacecraft away from earth at a speed of 25,000 m.p.h. on a path to the moon.
Instrument Unit—The instrument unit serves as the central brain of the total vehicle. This unit is packed with computers and electronic controls designed to maintain a path of flight that will place the astronauts at the required point in space (not shown here—on exhibit in building).
Apollo Spacecraft—The 95,000 lb. Apollo consists of the Lunar Module, Service Module, Command Module and Launch Escape System. The Lunar Module is stored, with its legs folded, inside a protective covering during the powered flight. The astronauts are in the Command Module for most of the flight, and this is the only part of the Apollo/Saturn vehicle that makes a complete round trip.
12. **SIMULATED MOON SURFACE**
"Here men from the planet Earth first set foot upon the moon July 20, 1969, A.D." This simulated moon crater features the Apollo Lunar Module and other equipment used by the astronauts to explore the moon's surface.
13. **X-24 ROCKET PLANE MOCK-UP**
The X-24 is one of the latest rocket planes to have been tested by the U. S. Air Force and NASA. The plane is the forerunner of Space Shuttle and has contributed to its development.
14. **LANCE**
Lance is a surface to surface ballistic missile which is being designed to provide greater fire support to Army divisions.
15. **ENTAC**
ENTAC is a surface-to-surface guided missile of French manufacture used in limited numbers by the U. S. Army. No longer in use, it was effective against tanks, armored vehicles and bunkers.
16. **SERGEANT**
Sergeant is a Field Artillery Ballistic Missile System that is reliable, rugged, accurate and mobile. It utilizes an inertial guidance system and solid propellant motor, giving it immunity to known electronic countermeasures.
17. **HERCULES**
The Nike Hercules is the United States' primary high altitude air defense weapon in operational status. The weapon has successfully killed every winged target ever flown against it.
18. **NIKE AJAX**
The Nike Ajax was this country's first operational Air Defense Guided Missile System. No longer in service use, the Ajax was replaced by the more advanced Nike Hercules system during the 1960's.
19. **NIKE ZEUS**
The Nike Zeus missile, developed by the U. S. Army Missile Command, played a key role in proving the feasibility of an effective ballistic missile defense.
20. **HAWK**
Hawk can search out and destroy attacking aircraft. The Hawk Air Defense System is transportable and capable of maintaining a high rate of fire.
21. **HERMES**
Hermes began in 1945 as an Army project covering a general program of research and development into the various phases of all guided missile technology leading to long range surface to surface and high altitude air defense missiles. The Hermes was designed to carry a heavy warhead to a range of 90 nautical miles.
22. **CORPORAL**
The Army Corporal is a surface-to-surface guided liquid fueled missile capable of engaging tactical targets far beyond the ranges of artillery.
23. **HONEST JOHN**
The Army's Honest John is a simple, free-flight rocket. It is a highly mobile self-propelled launcher and retains the accuracy of standard artillery weapons.
24. **LITTLEJOHN**
Littlejohn is one of the Army's most advanced free-flight rocket systems. It is highly mobile and packs the explosive power of heavy artillery.
25. **LACROSSE**
Lacrosse represents one of the Army's first attempts to obtain extreme accuracy with a surface-to-surface guided missile. Launched on a ballistic trajectory from a rear area, it could be picked up in flight by a forward observer and then steered directly to its target with radioed control commands.
26. **PERSHING**
Pershing is a two-stage, solid propellant ballistic missile with selective range capability. It carries a nuclear warhead to a range of 400 miles.
27. **HOUND DOG**
The U. S. Air Force Hound Dog is a supersonic, jet-propelled, air-surface standoff strategic missile. It is carried in pairs under the wings of B-52 bombers and has a range of 500 miles. The missile carries its own unjammable guidance system effective at high or low altitudes. A B-52 pilot can use the Hound Dog's engines for added power on take off, or in the air, and refuel them later for target runs. The missile is exhibited through the courtesy of the Air Force Museum, Dayton, Ohio.

FOLLOW THE NUMBERS

For Information Write To Alabama Space and Rocket Center, Tranquility Base, Huntsville, Alabama 35807



SATURN V

NASA's largest launch vehicle is used for sending American astronauts to the Moon in Project Apollo and for placing the Skylab into Earth orbit.

The Marshall Space Flight Center and its contractors are providing a total of 15 launch vehicles in the Saturn V program. A review of the program as it draws to a close reflects several historic achievements.

The first Saturn V was launched in an unmanned Earth orbital flight on November 9, 1967, with all three stages performing perfectly. Only one more research and development flight test was made.

Then on its third launch the huge Saturn V was manned. It sent astronauts Frank Borman, James A. Lovell, Jr., and William A. Anders on a voyage highlighted by mankind's first orbits of the Moon, on Christmas Eve, 1968.

The sixth Saturn V, launched on July 16, 1969, resulted in the first manned lunar landing. Astronauts Neil A. Armstrong and Edwin E. Aldrin, Jr., made mankind's first footprints on the Moon on July 20, 1969.

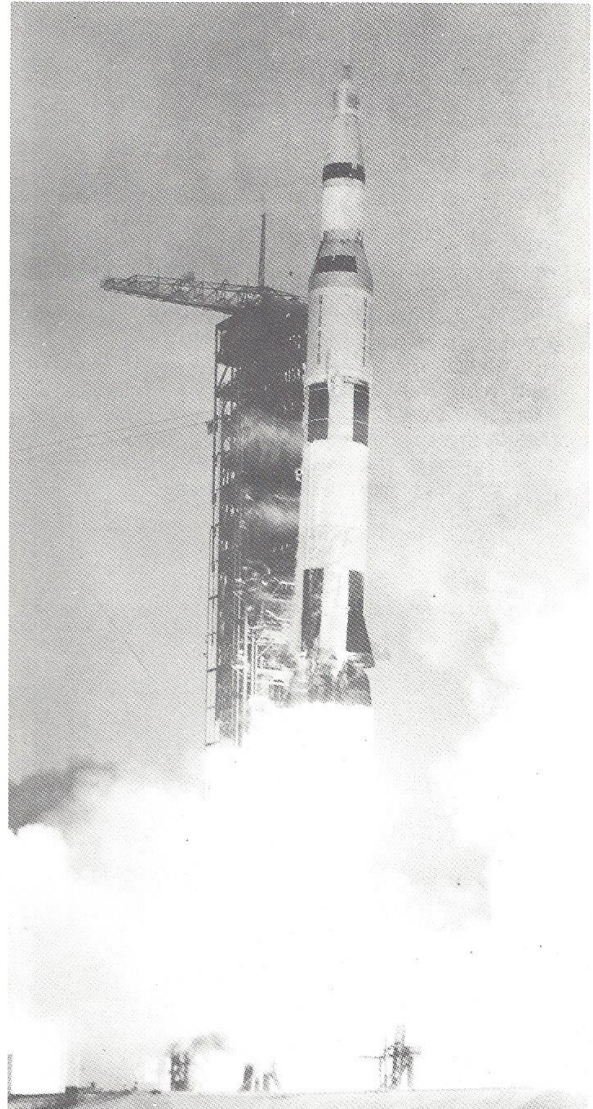
Other flights to the Moon have followed, with the last manned lunar mission in Project Apollo scheduled to begin with the night launch of Apollo 17 on December 6, 1972.

The next job for the Saturn V will be to place the Skylab workshop into Earth orbit in 1973. The workshop is made from a third stage of the Saturn V, and only the first two stages will be used in the launch.

The Saturn V was developed as a new general purpose launch vehicle in the middle range of several configurations under consideration in 1962. It can perform earth orbital missions through the use of the first two stages, while all three stages are used for lunar and planetary expeditions. The first stage is powered by five F-1 engines, which burn kerosene and liquid oxygen to produce more than 7.5 million pounds of thrust. The upper stage engines burn liquid hydrogen and liquid oxygen.

A large network of production, assembly, testing, and launch facilities was prepared for production of the Saturn V. The stages are assembled and checked out in a huge Vehicle Assembly Building, then transported in an upright position to the launch site, more than three miles away.

The Saturn V, including the Apollo spacecraft, is 363 feet tall. Fully loaded, the vehicle weighs some 6.4 million pounds.



Saturn V Flight Record

Apollo 4 mission -- Nov. 9, 1967. First Saturn V flight. Unmanned, Earth orbital. The spacecraft's command module reentry tested.

Apollo 6 -- Apr. 4, 1968. Second unmanned Earth orbital flight. Despite propulsion difficulties in the second and third stages, Apollo spacecraft tested satisfactorily.

Apollo 8 -- Dec. 21, 1968. First manned test of Saturn V. Frank Borman, James A. Lovell, Jr., and William A. Anders made mankind's first orbits of the Moon.

Apollo 9 -- March 3, 1969. James A. McDivitt, David R. Scott, and Russell L. Schweickart tested the Apollo spacecraft during 151 orbits of Earth. First flight of lunar module.

Apollo 10 -- May 18, 1969. Second manned circumlunar flight, by Thomas P. Stafford, John W. Young, and Eugene A. Cernan. Lunar module piloted within 9.26 miles of surface.

Apollo 11 -- July 16, 1969. First manned lunar landing made on July 20. Neil A. Armstrong and Edwin E. Aldrin, Jr. spent 2.8 hours outside lunar module in Sea of Tranquility. Michael Collins orbited overhead.

Apollo 12 -- Nov. 14, 1969. Second landing, made in Ocean of Storms. Charles Conrad, Jr., Richard F. Gordon, and Alan L. Bean. Two EVA's, much science equipment set up.

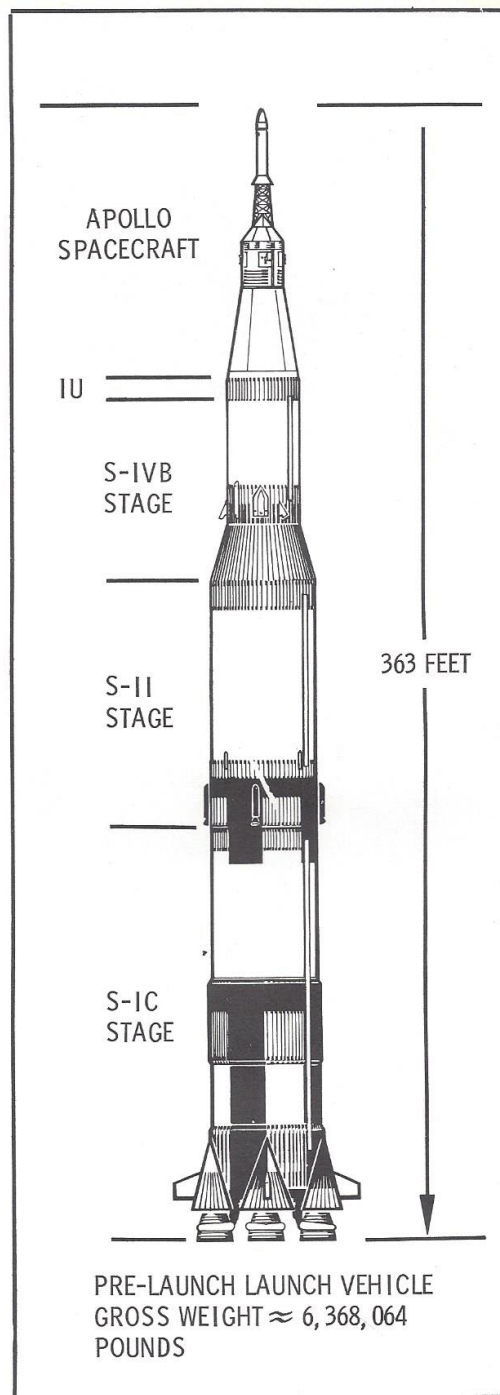
Apollo 13 -- Apr. 11, 1970. James A. Lovell, Jr., Fred W. Haise, Jr., and John L. Swigert circled the Moon, without landing, and returned to Earth after trouble with the service module of the Apollo spacecraft.

Apollo 14 -- Jan. 31, 1971. Alan B. Shepard, Jr., Stuart A. Roosa, Edgar D. Mitchell. First exploration of lunar highlands, made in Fra Mauro area. Pull-cart used to transport scientific equipment and tools.

Apollo 15 -- July 26, 1971. David R. Scott, Alfred M. Worden, and James B. Irwin. First use of Lunar Roving Vehicle. Stay time on surface doubled, reaching 66 hours, 56 mins.

Apollo 16 -- Apr. 16, 1972. John W. Young, Thomas K. Mattingly II, and Charles M. Duke, Jr. LRV used to explore Descartes area.

Apollo 17 -- Dec. 6, 1972. Eugene A. Cernan, Ronald E. Evans, and Harrison H. Schmitt. Last lunar mission in Project Apollo.



learning how to maneuver and work inside a space station.

Unlike previous manned space flight programs, Skylab provides a means for astronaut rescue, should trouble occur. A Command/Service Module (CSM) similar to the one in which astronauts will commute to and from Skylab can be modified into a rescue vehicle accommodating five rather than three crewmen. Two astronauts can pilot the modified CSM to Skylab and bring back Skylab's three crewmen.

Skylab will operate in space for about eight months during which time there will be three manned missions separated by two periods of unmanned operation. The first mission will begin in the spring of 1973 with two launches from Kennedy Space Center, Florida.

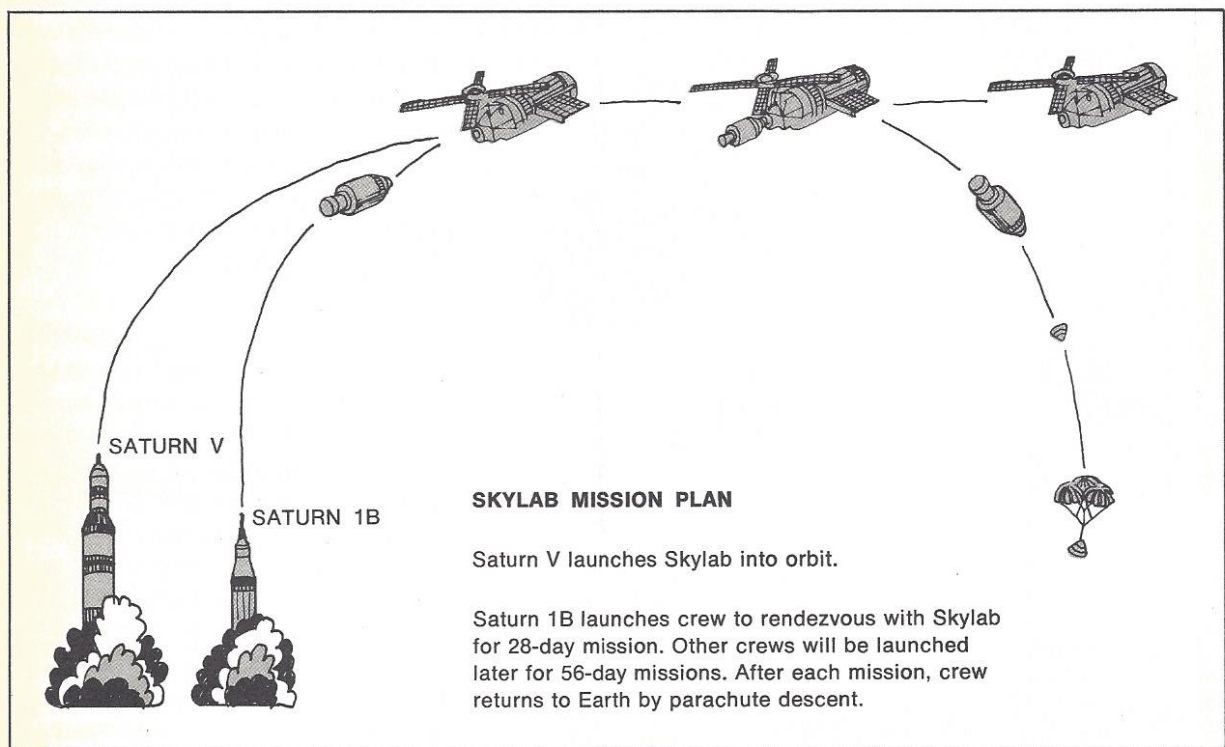
The first launch will be unmanned. The first two stages of a Saturn V launch

vehicle will place the Skylab into Earth orbit.

The next day a manned modified Command/Service Module (CSM), much like the one used in the Apollo lunar exploration program, will be sent into Earth orbit by the smaller Saturn 1B launch vehicle. On board the CSM will be Skylab's first three-man crew. The crew will dock the CSM with the Skylab. The crew will then activate Skylab.

In Skylab, the crew will be able to work and relax unencumbered by space suits. Its facilities will enable the astronauts to eat, sleep, wash, exercise, and work for periods of up to 56 days in space. Skylab's living space is about that of a small two-bedroom house.

After four weeks in space, the crew will return to their CSM, pull away from the rest of Skylab, and go through the



Sun. Mar.23

Fly to ???

06/16/73 SA 243 ATL HSV

06/19/73 SA 242 HSV ATL

06/16/73 DE 145 DET ATL

06/22/73 DE 1479 ATL LAX

11/28/77 DE 1918 LAX ATL

??/??/77 DE ATL LAX

07/25/76 LAX HSV
plus ret. HSV LAX
08/18/76 LAX TYS
plus ret. TYS LAX



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