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Lørdag 1. mars 1986 Nr. 51 – 112. årg. Løssalg kr. 4,50

Olof Palme skutt ned og drept i natt

Sverige er i sjokktilstand etter at statsminister Olof Palme ble myrdet på åpen gate i Stockholm i natt. Fra hele verden kommer reaksjoner på det som er skjedd, med kondolanser til familien og hele Sverige.

På stedet hvor pilen viser stod Olof Palme da han ble skutt i ryggen i natt. Den mørke flekken viser blod etter ham. Palme var på vei hjem fra kino da han ble stoppet av en ukjent mann i natt.

Den svenske statsministeren Olof Palme ble skutt ned og drept på åpen gate i Stockholm i natt. Han ble truffet av ett skudd i ryggen. Hans kone ble også truffet av skudd, men ble ikke alvorlig skadd.

Sverige er i sjokk etter det som er skjedd. Utenriksminister Ingvar Carlsson overtar inntil videre som statsminister.

En mann ble i 6-tiden i morges arrestert for mordet på Olof Palme. Foreløpig vet ingen hva som er motivet bak ugjerningen. Det kan være en sinnssyk person som har vært på ferde, men politiet ser ikke bort fra at udåden er utført av en eller annen sinnssyk gruppe.

Se første side del 2

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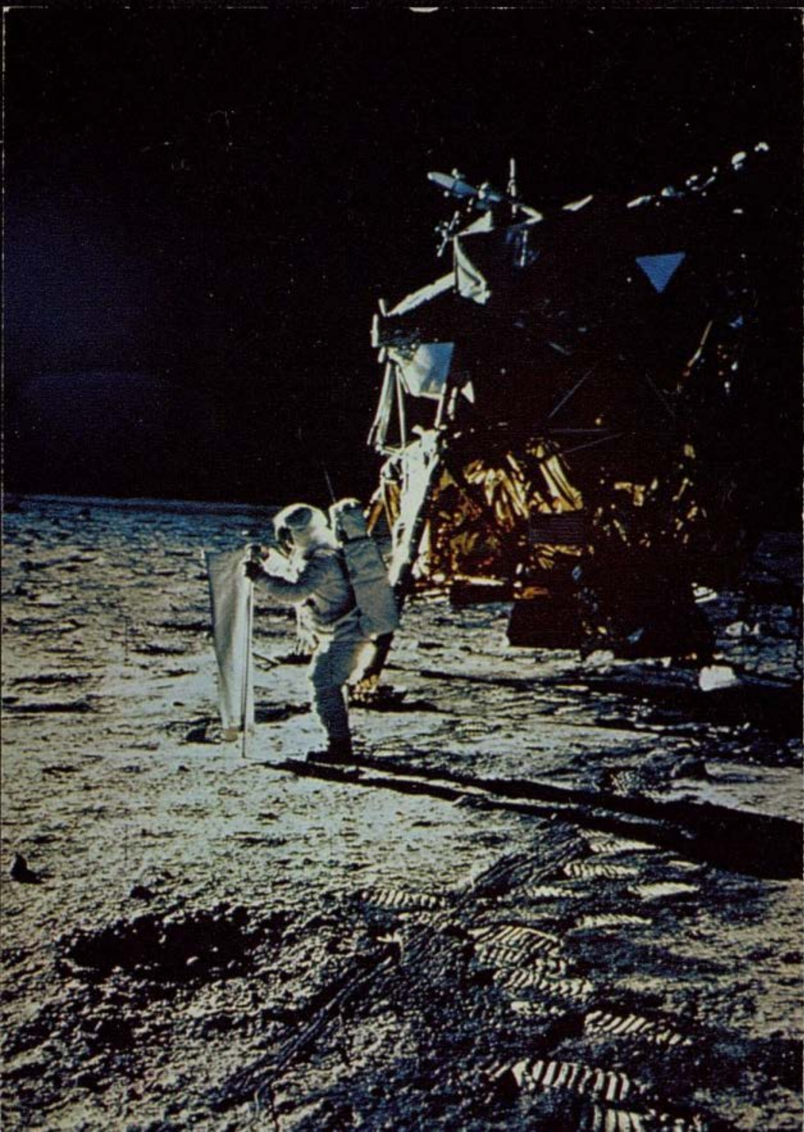

LA CONQUÊTE DE LA LUNE
par APOLLO XI
du 16 Juillet au 24 Juillet 1969
Le LEM sur la Base de la Tranquillité
et Aldrin
déroulant une feuille d'aluminium
pour capter les particules solaires
(Photo communiquée par la NASA)

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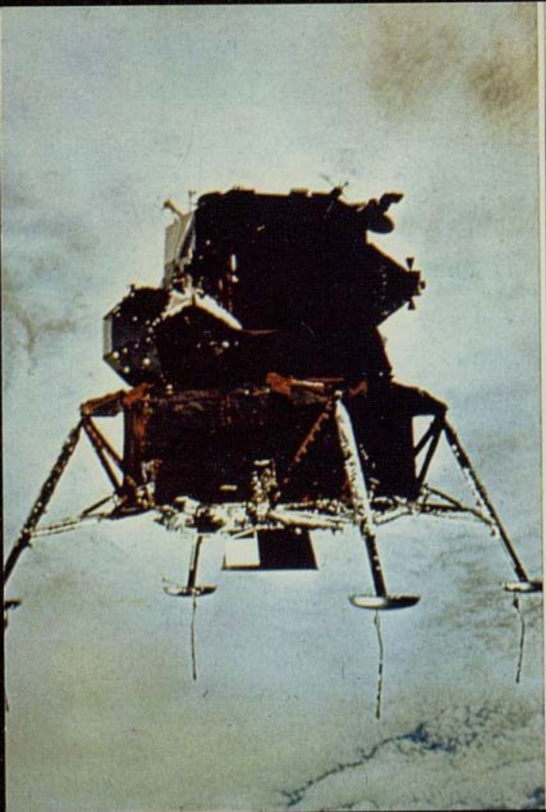


LA CONQUÊTE DE LA LUNE
par APOLLO XI
du 16 Juillet au 24 Juillet 1969
Le LEM dans sa descente
vers la Lune
et Armstrong à l'intérieur du LEM
(Photos communiquées par la NASA)

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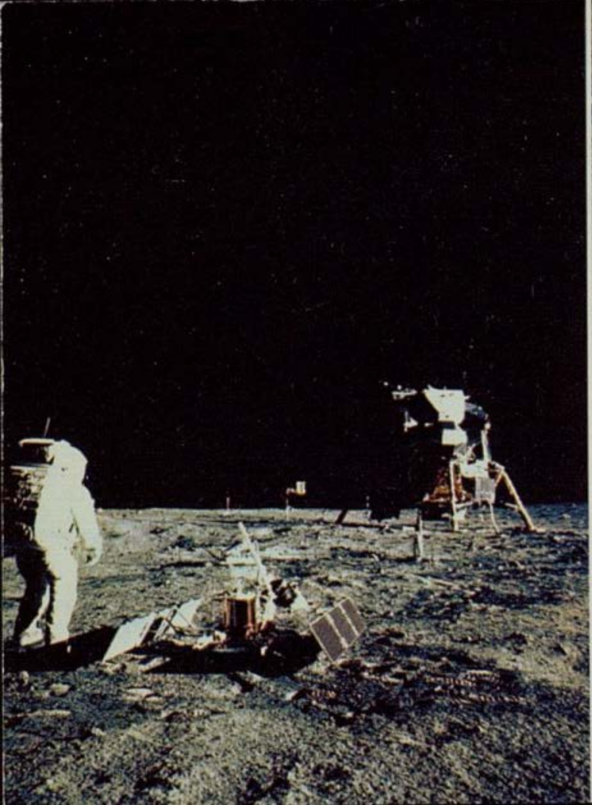

LA CONQUÊTE DE LA LUNE
par APOLLO XI
du 16 Juillet au 24 Juillet 1969
La Base de la Tranquillité
et les premiers pas humains
sur le sol lunaire
(Photos communiquées par la NASA)
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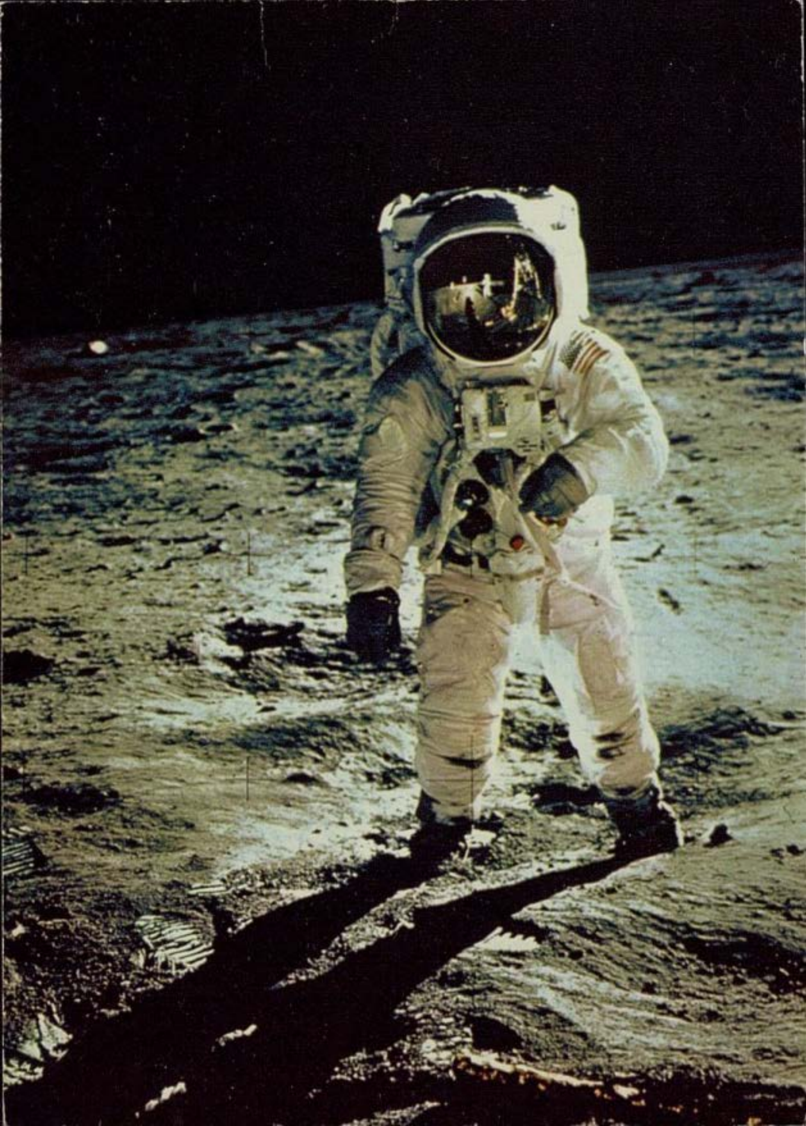

LA CONQUÊTE DE LA LUNE
par APOLLO XI
du 16 Juillet au 24 Juillet 1969
Aldrin sur la Lune
photographié par Armstrong
(Photo communiquée par la NASA)
N° 4

Éditions d'art Yvon PARIS
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Aerial view of Cape Canaveral, Florida, showing service towers of the Air Force Missile Test Center's launching site, Cape Canaveral, Florida.

Patrick Air Force Base, Florida

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America Takes Time to the Moon. *Original collage by Michael Langenstein.*

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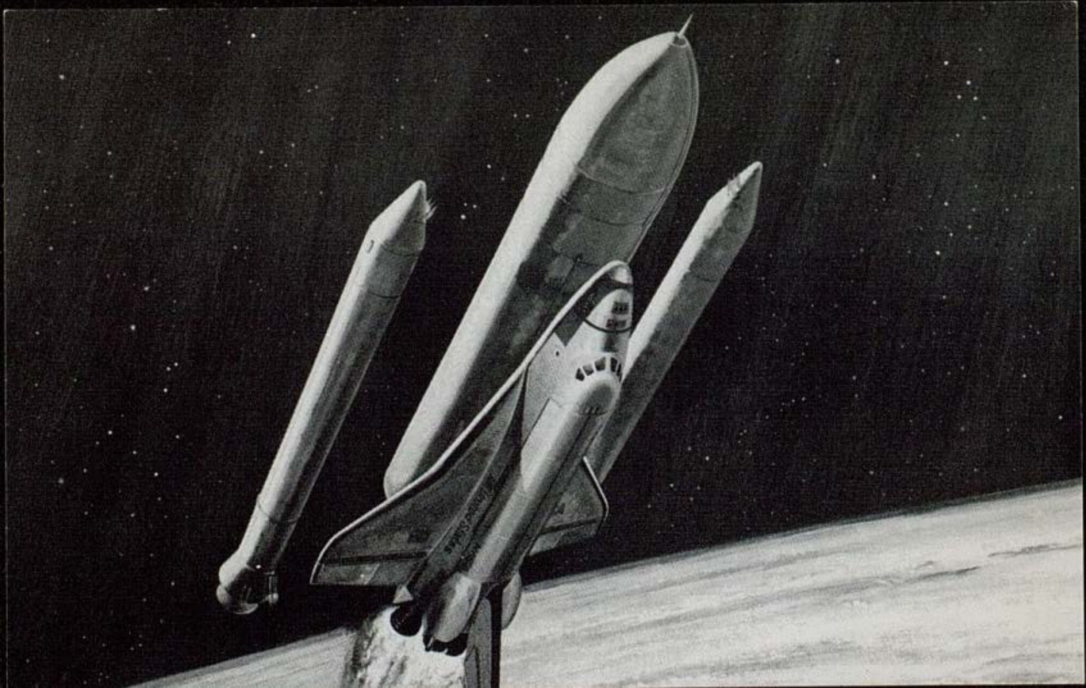
NASA—WHITE/SPACEWALK

Astronaut Edward H. White II walking in space during the third orbit of the Gemini IV flight, June 3–7, 1965. (NASA)



SPACE SHUTTLE boosters jettisoned. The solid rockets are recovered for reuse. NASA photo.

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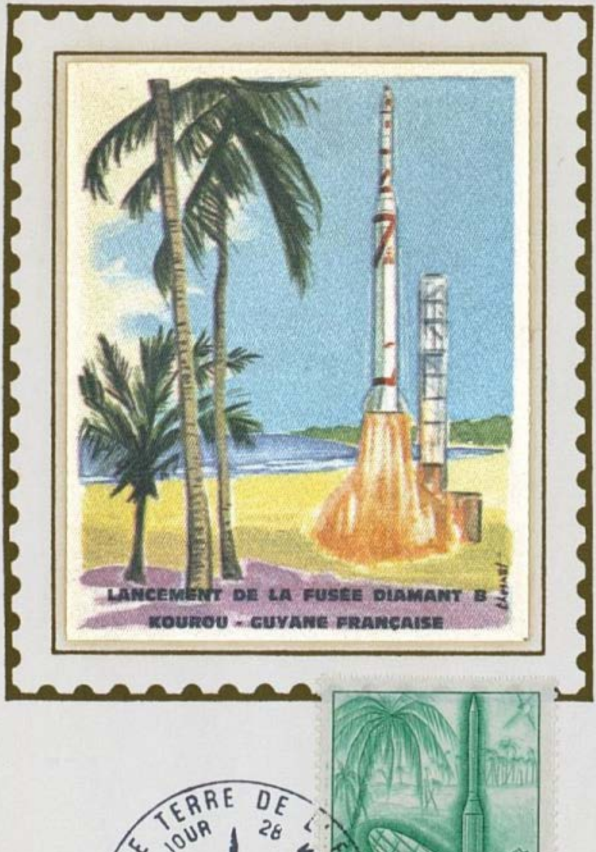
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The prime crew for the National Aeronautics and Space Administration's Apollo 8 Moon Orbital Flight posed by the Apollo mission simulator are astronauts (L to R) James A. Lovell, Jr., Command Module (CM) Pilot, William A. Anders, Lunar Module (LM) Pilot, and Frank Borman, Commander.

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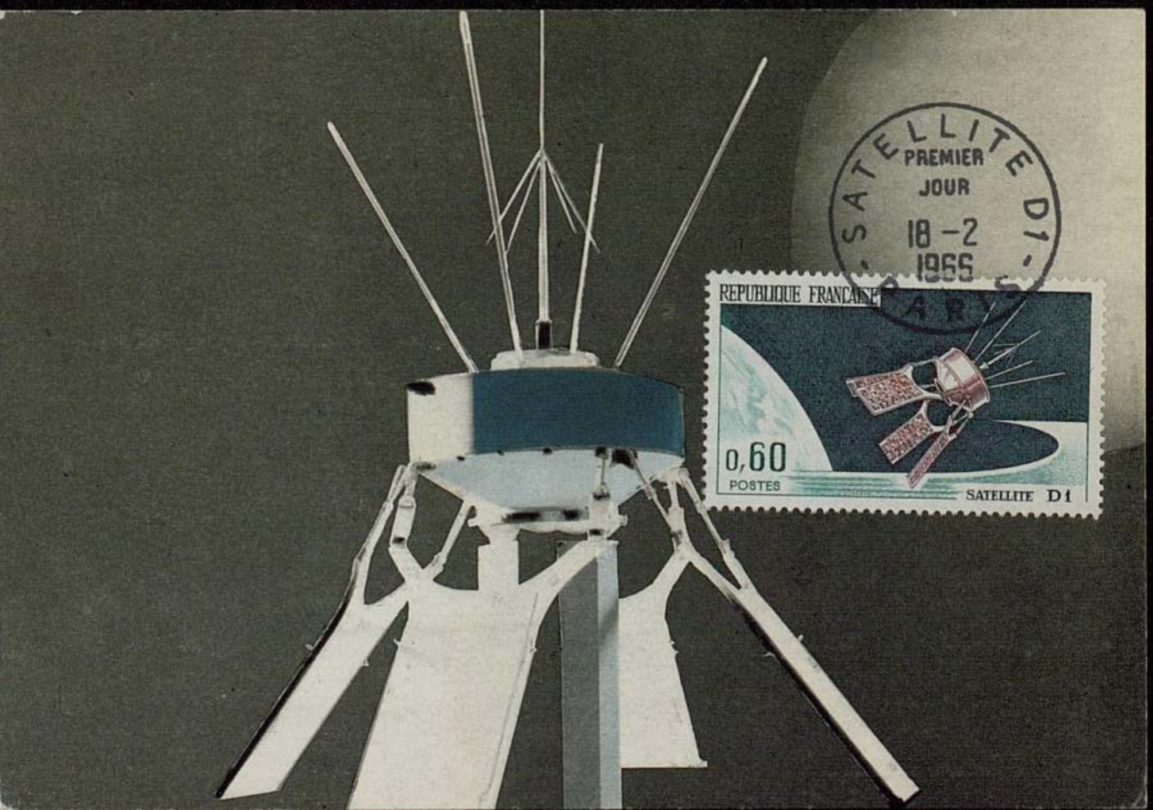
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"SATELLITE EXPERIMENTAL D-1"


United States

Kennedy Space Center, Fl.

The sixth mission of the Space Shuttle, which is the first flight of the Orbiter Challenger, lifts off from Complex 39A into a cloudless sky. Launch date April 4, 1983.

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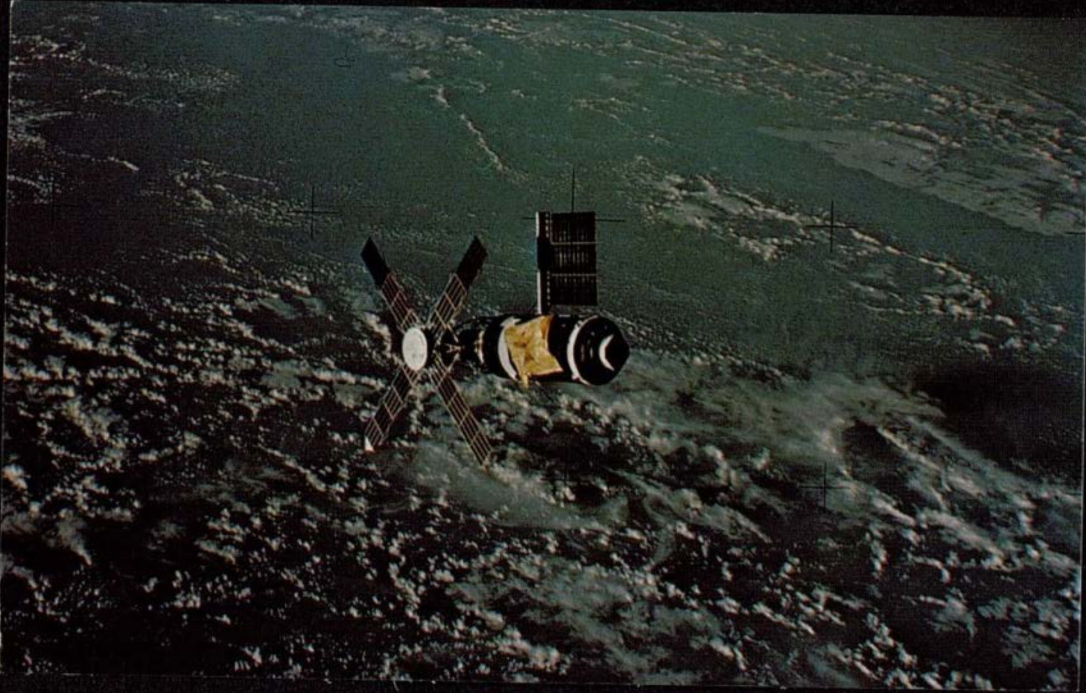

The Skylab space station cluster in Earth orbit taken from Skylab 2 Command/Service Module. One solar array system wing was fully deployed, the other was lost on launch day, May 14. 1973.

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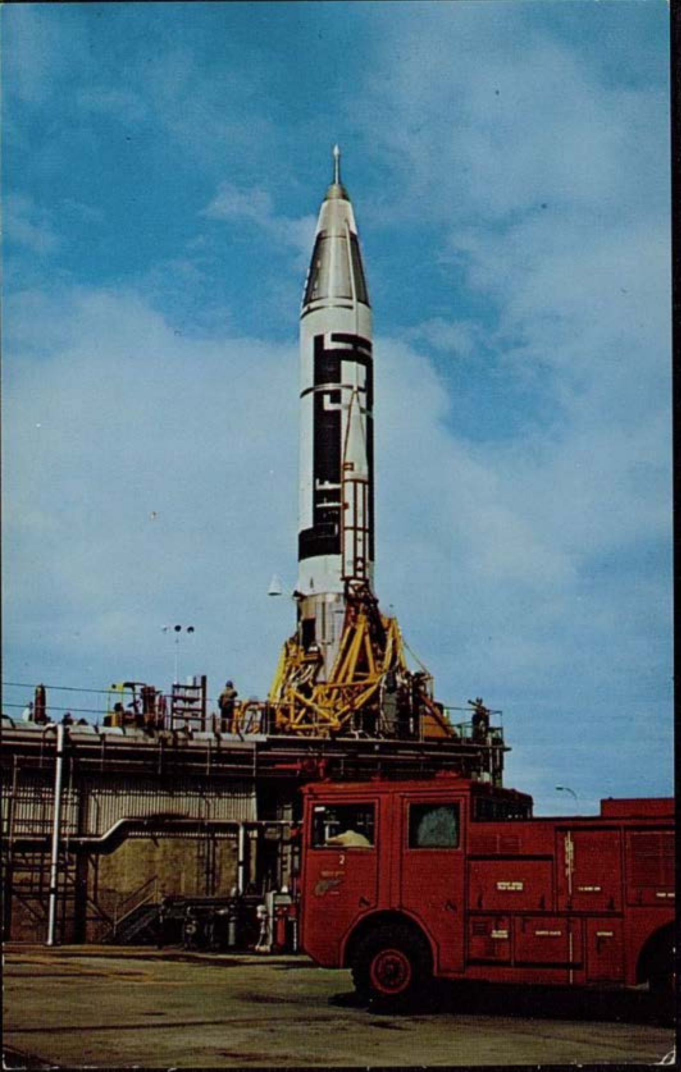
2

The mighty Air Force ATLAS ICBM stands poised on its launch pad at Cape Canaveral in readiness for its test flight.

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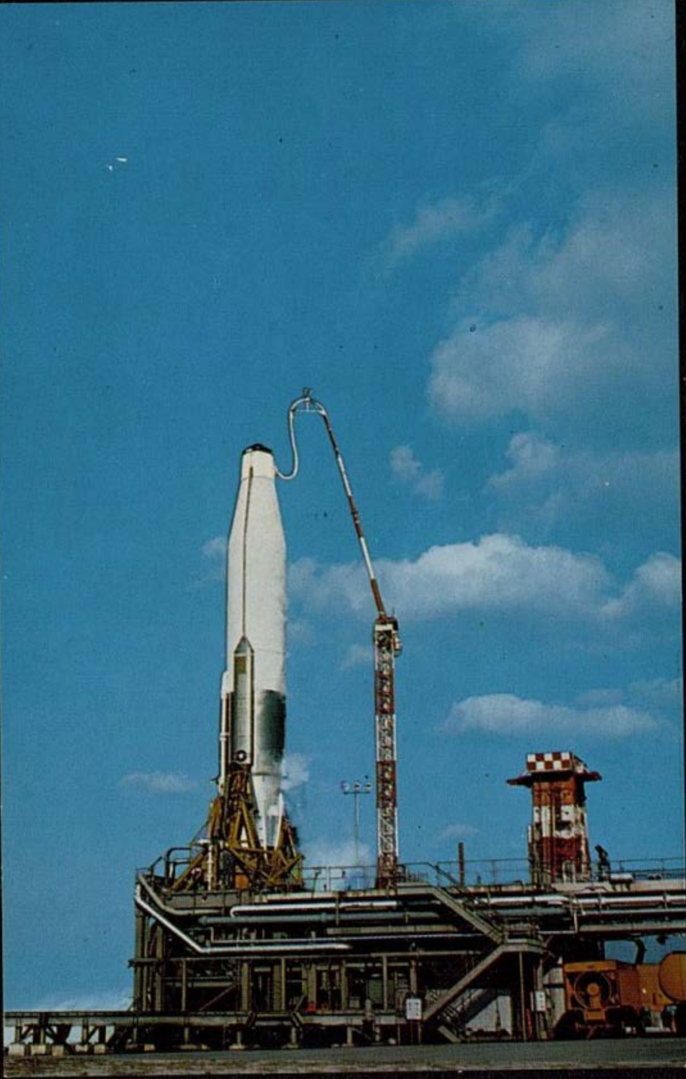

U.S. Air Force **ATLAS ICBM** (SM-65) Fueled and waiting for the launching signal, the 97-Ton ATLAS ICBM is ready for a 5,000 mile flight at the Atlantic Missile Range.

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Greetings from

OUTER SPACE — HUNTSVILLE, ALA.

JUPITER-C

Left: U.S. Army JUPITER-C Missile

This rocket, developed at the Army Ballistic Missile Agency, Huntsville, Ala., was used to launch the free world's first scientific earth satellite, the EXPLORER.

Right: U.S. Army JUPITER Missile

The JUPITER Intermediate Range Ballistic Missile is being developed at the Army Ballistic Missile Agency, Huntsville, Ala. It is capable of carrying a nuclear warhead to a distance of 1500 nautical miles.

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TIROS, the world's first meteorological satellite system was designed and built by RCA for NASA. Eight TIROS have been orbited, successfully fulfilling their missions. Over 325,000 TV photographs televised to earth by TIROS.

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U.S. AIR
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TWO deadly long-range **BOMARC** interceptor missiles prepare to blast from Cape Canaveral on a test mission conducted by the Air Force Missile Test Center.

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Apollo 8
Lunar Vehicle

KENNEDY SPACE CENTER, FLORIDA
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Launch of Apollo 8 Astronauts, Frank Borman, James Lovell and William Anders, in a successful orbit of the Moon.

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Lox Trucks in the foreground pump liquid oxygen into a U.S. Air Force Thor intermediate-range ballistic missile as it stands poised for a 1,500 mile flight from the Cape Canaveral missile test site of the Air Force Missile Test Center.

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BRAVO

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NASA's Gemini 4 spacecraft undergoes technical observation on the deck of the carrier "Wasp" after recovery.

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21. Juli 1969
Das Ereignis des 20. Jahrhunderts:
Menschen auf dem Mond

US-Astronaut Neil Armstrong machte diese Farbaufnahme als Astronaut Edwin Aldrin am 21. 7. 1969 um 4.12 Uhr MEZ den Mond betrat.

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THE SHUTTLE IN SPACE (4)

Not an alien – but Dr Norman Thagard conducting a medical experiment aboard the shuttle in June 1983. At right, fellow crew member Dr Sally Ride – the first American woman to fly in space – talks with ground controllers. (STS–7 Mission)

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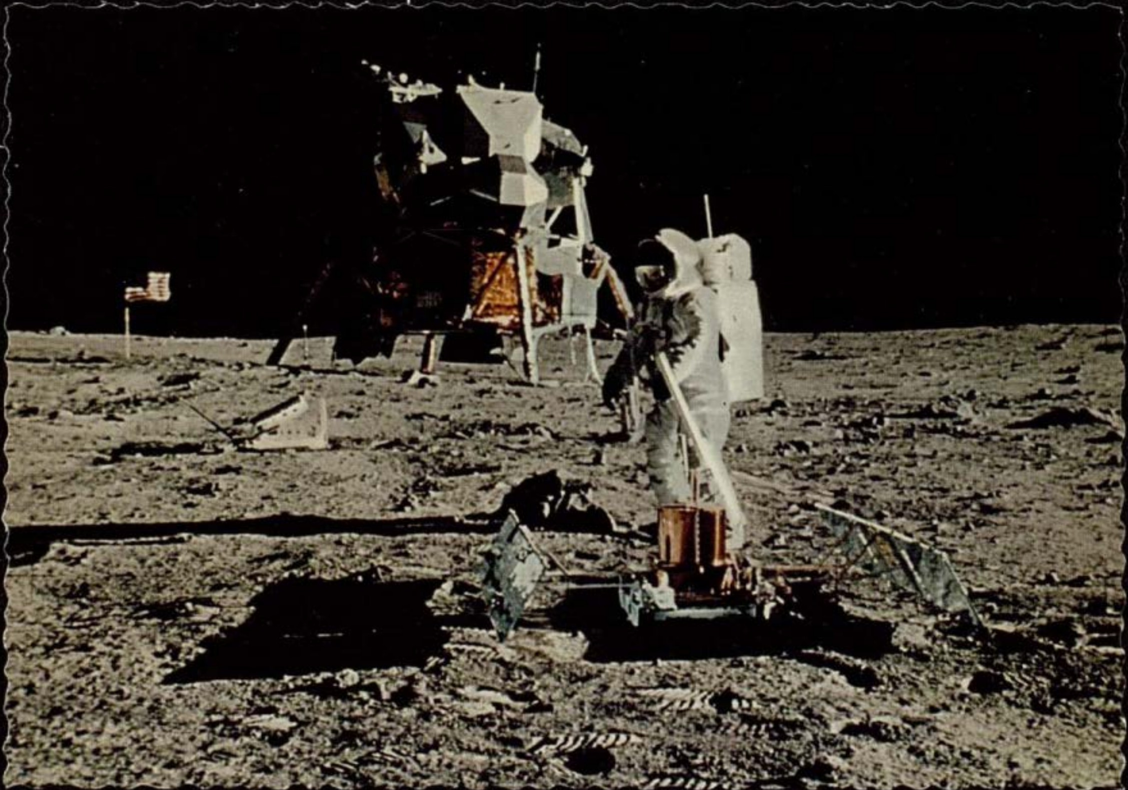

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21. Juli 1969
Das Ereignis des 20. Jahrhunderts:
Menschen auf dem Mond

Vor der Landefähre und dem Sternenbanner errichtet US-Astronaut Edwin Aldrin einen Laser-Reflektor auf dem Mond, der zentimetergenau die Entfernung Erde - Mond mißt.

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THE SHUTTLE IN SPACE (3)

On June 22 1983 Challenger is photographed in orbit from the German built SPAS satellite which it had launched and was to bring back to Earth. (Mission STS–7)

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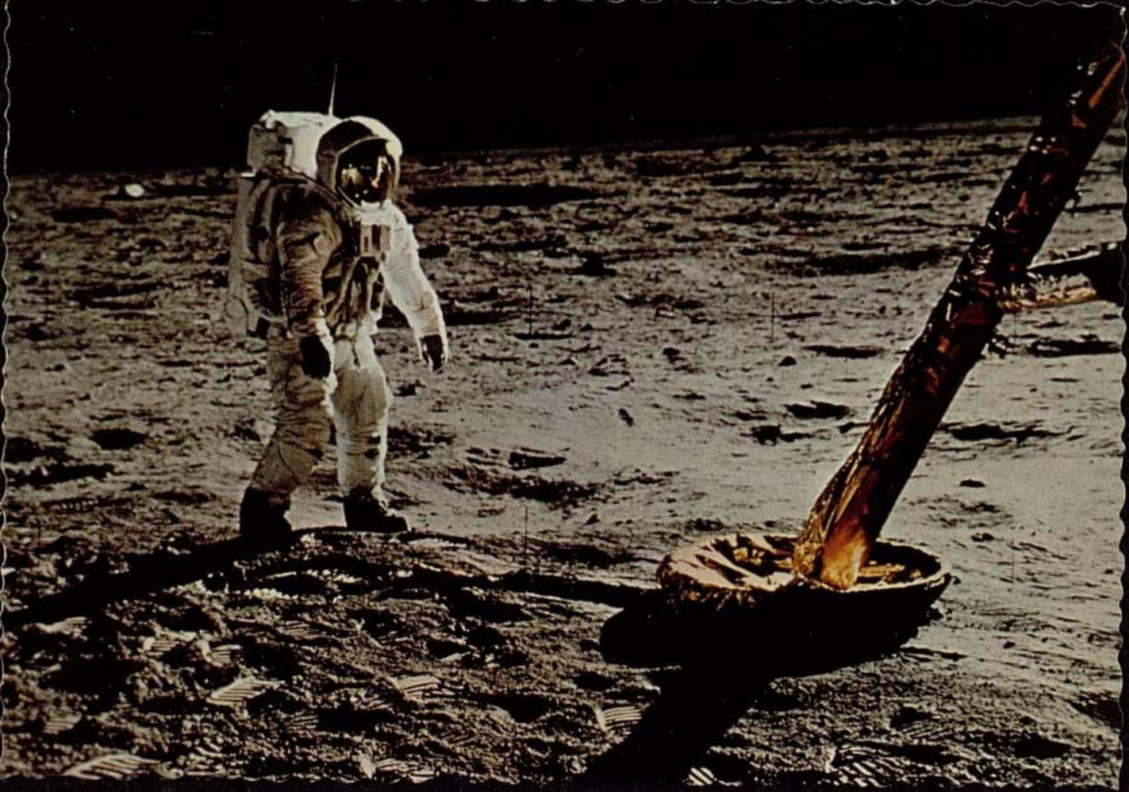

21. Juli 1969
Das Ereignis des 20. Jahrhunderts:
Menschen auf dem Mond

Astronaut Edwin Aldrin macht neben dem Fuß der Landefähre „Eagle" erste Gehversuche auf dem Mond.

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THE SHUTTLE IN SPACE (5)

Challenger, with its first five member crew aboard, lands at the Edwards Air Force Base, California on June 24 1983. (STS–7 Mission)

21. Juli 1969
Das Ereignis des 20. Jahrhunderts:
Menschen auf dem Mond

Als erste Menschen auf dem Mond hißten Neil Armstrong und Edwin Aldrin (Foto) das Sternenbanner auf dem Erdtrabanten.

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THE SHUTTLE IN SPACE (6)

Bruce McCandless uses the Manned Manoeuvring Unit (MMU) on February 7 1984 and makes history with the first untethered space walk. (Tenth Mission)

The NAVAHO points its nose skyward at the Air Force Missile Test Center's launching site, Cape Canaveral, Florida. Manufactured by the North American Aviation Corporation, the NAVAHO has been used by the Air Force to gather data in its RISE (research in supersonic environment) program. Valuable data will be utilized in research and development of the B-70 intercontinental manned bomber.

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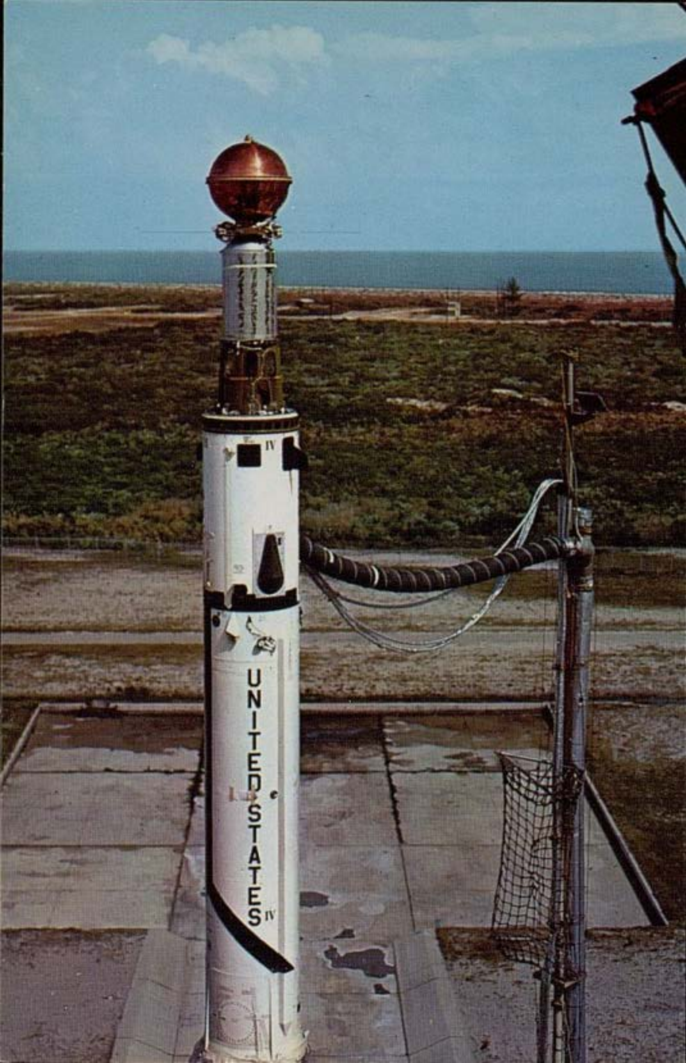
UNITED STATES

P47174

The NASA Echo satellite — which unfolded from its canister into a 100-foot aluminized balloon to reflect radio signals — mated to the final stage of a Thor-Delta rocket at Cape Canaveral, launch site of the Air Force Missile Test Center (U. S. Air Force Photo).

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The Air Force's intermediate range ballistic missile, THOR, sits on its operational launching pad at the Air Force Missile Test Center's launching site, Cape Canaveral, Florida. Manufactured by the Douglas Aircraft Corporation, the THOR will soon be in operation with the Strategic Air Command.

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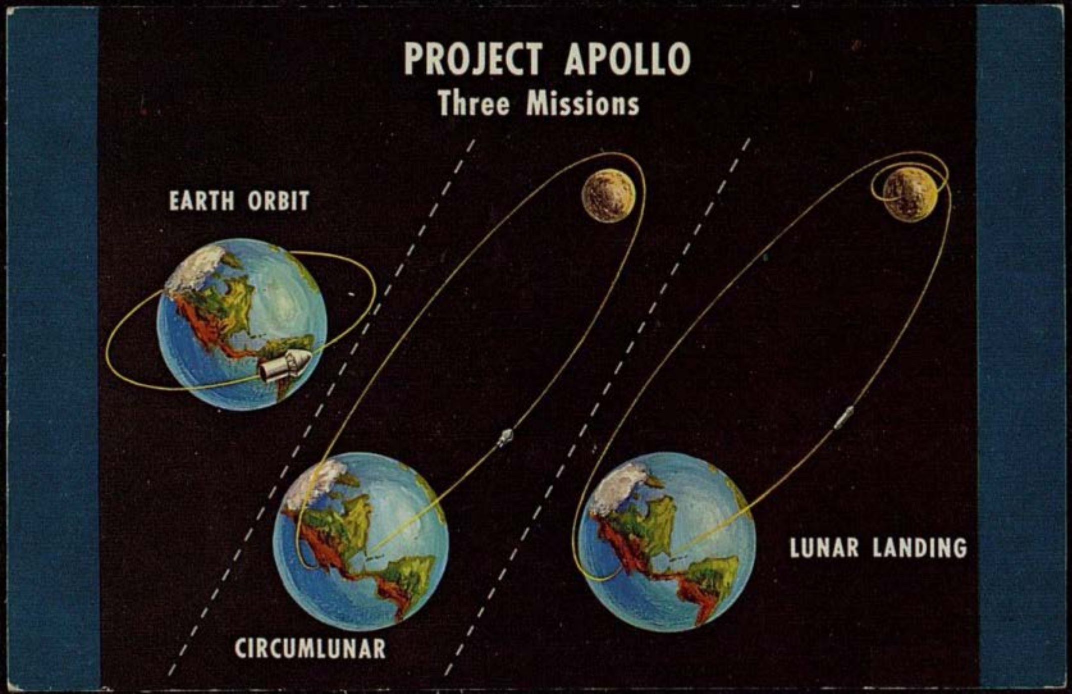
PROJECT APOLLO
Three Missions
EARTH ORBIT
CIRCUMLUNAR
LUNAR LANDING

PROJECT APOLLO

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Mock-up of VANGUARD satellite scientific experiment sitting on top of third stage of the launching vehicle. A six inch satellite was put into ORBIT on March 17, 1958 (still in orbit).

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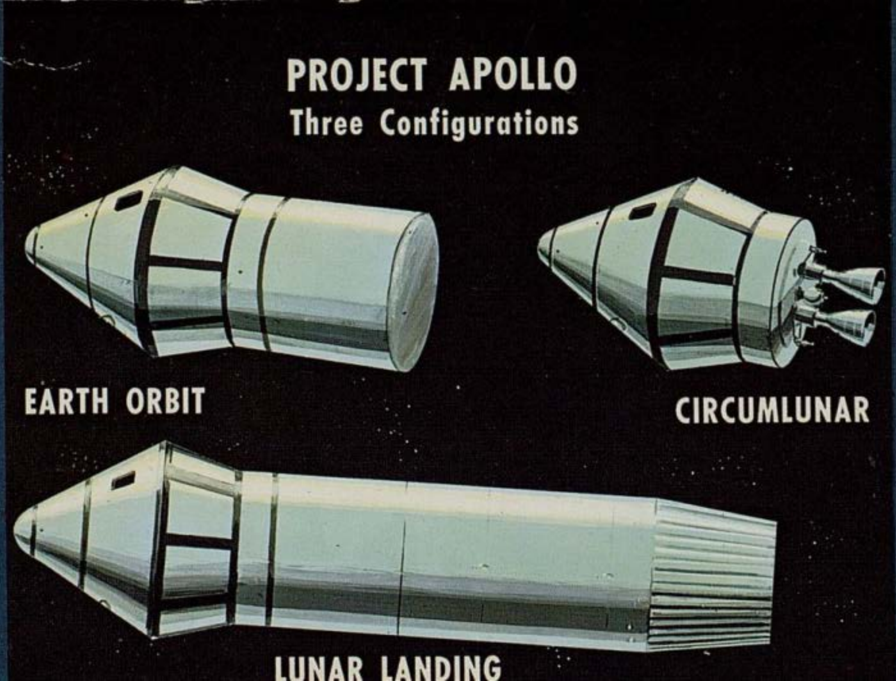
PROJECT APOLLO
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CIRCUMLUNAR
LUNAR LANDING

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PROJECT APOLLO

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The National Aeronautics and Space Administration's VANGUARD is readied for launch at Cape Canaveral, Florida, launching site of the Air Force Missile Test Center.

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Launch of the **Mercury Atlas** vehicle carrying spacecraft **Friendship 7** with Marine Lieutenant Colonel John Glenn aboard. Colonel Glenn on this historic day, February 20, 1962 was the first U. S. Astronaut to orbit the earth.

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LUNAR LANDING

PROJECT APOLLO

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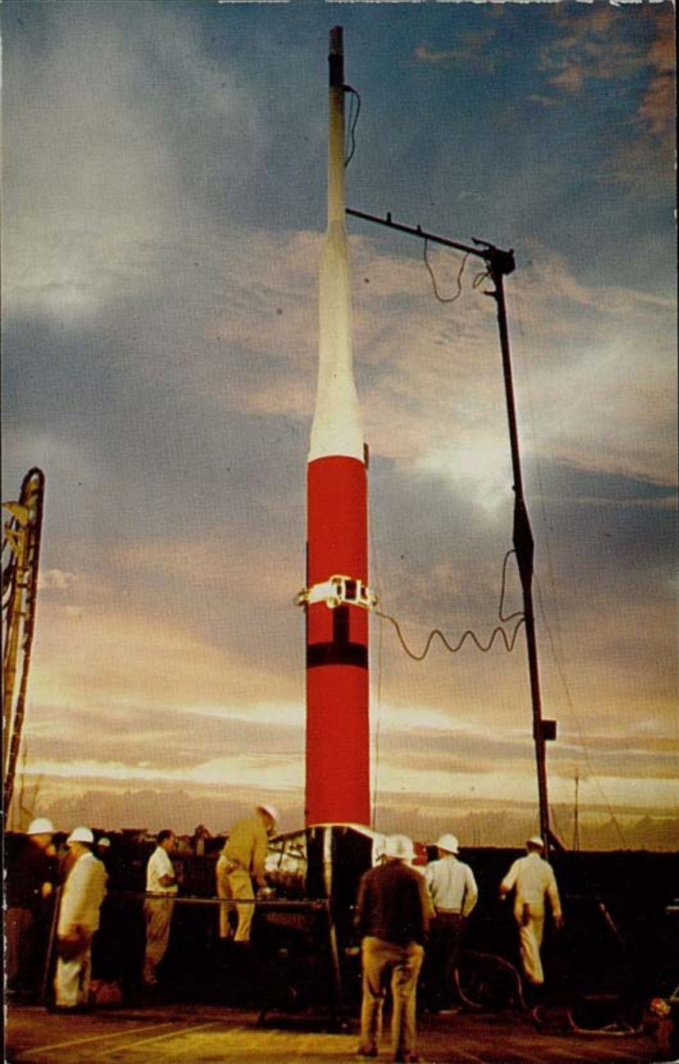

The Navy's POLARIS Flight Test Vehicle is made ready for launch at the Air Force Missile Test Center's launching site, Cape Canaveral, Florida.

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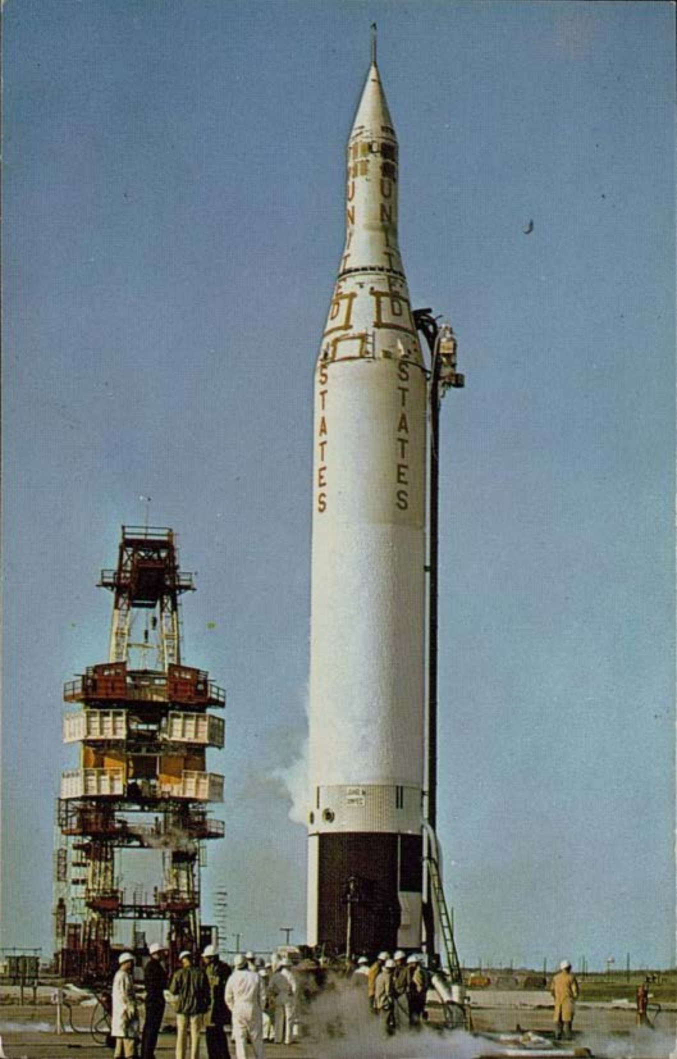
UNITED
STATES

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Juno II Missile being readied for launch. This vehicle put the satellite **Explorer XI** into orbit April 27, 1961. Its primary function is as a space or lunar probe vehicle. **Juno II** uses as its main stage the **Jupiter IRBM**.

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The U. S. Navy's VANGUARD stands poised on its launching stand at the Air Force Missile Test Center's launching site, Cape Canaveral, Florida. The VANGUARD placed the United States second satellite into orbit sending valuable scientific information to International Geophysical Year scientists.

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AERIAL VIEW OF CAPE CANAVERAL, FLORIDA P26220

The service tower of the ATLAS intercontinental ballistic missile gleams in the bright sunshine at the Air Force Missile Test Center's launching site, Cape Canaveral, Florida.

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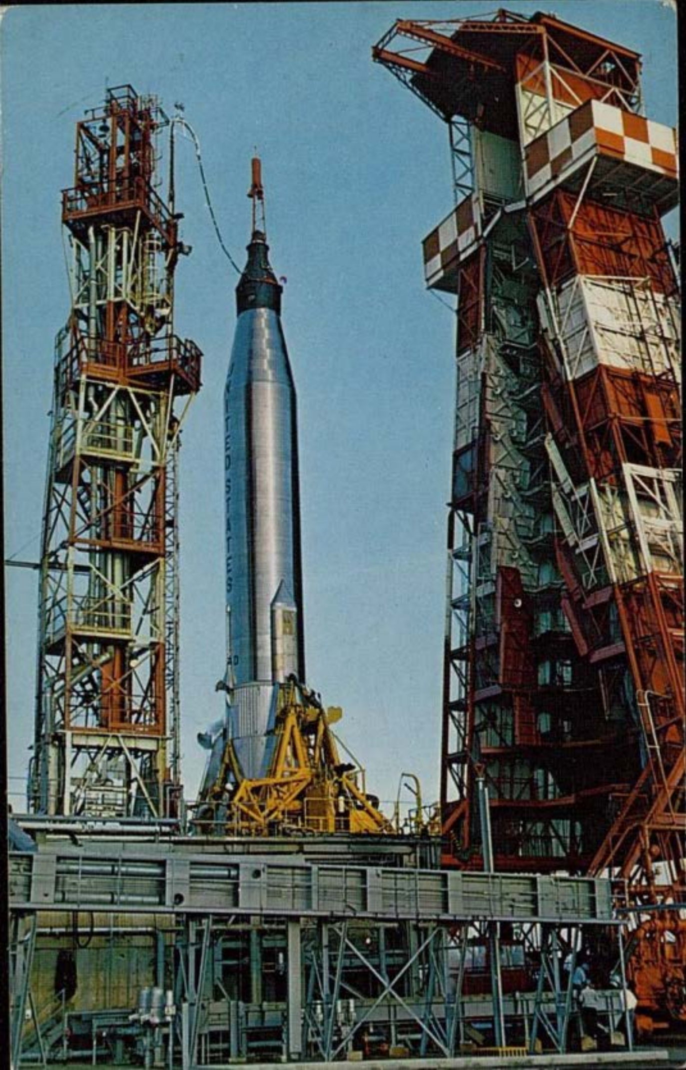
STATES

Mercury Atlas Vehicle MA-7 being readied for launch. Aboard the spacecraft **Aurora 7** is Navy Lieutenant Commander M. Scott Carpenter who orbited the earth 3 times shortly after the taking of this picture on May 24, 1962.

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THOR INTERMEDIATE RANGE BALLISTIC MISSILE

A THOR intermediate range ballistic missile stands in its service tower at the Air Force Missile Test Center's launching site, Cape Canaveral, Florida. The THOR is an Air Force missile manufactured by the Douglas Aircraft Corporation.

P26219

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SERVICE TOWER AND ATLAS ICBM P26221

The service tower for the ATLAS intercontinental ballistic missile is slowly drawn away from the missile on its gigantic "railroad" tracks prior to final preparations for the launching at the Air Force Missile Test Center's launching site, Cape Canaveral, Florida.

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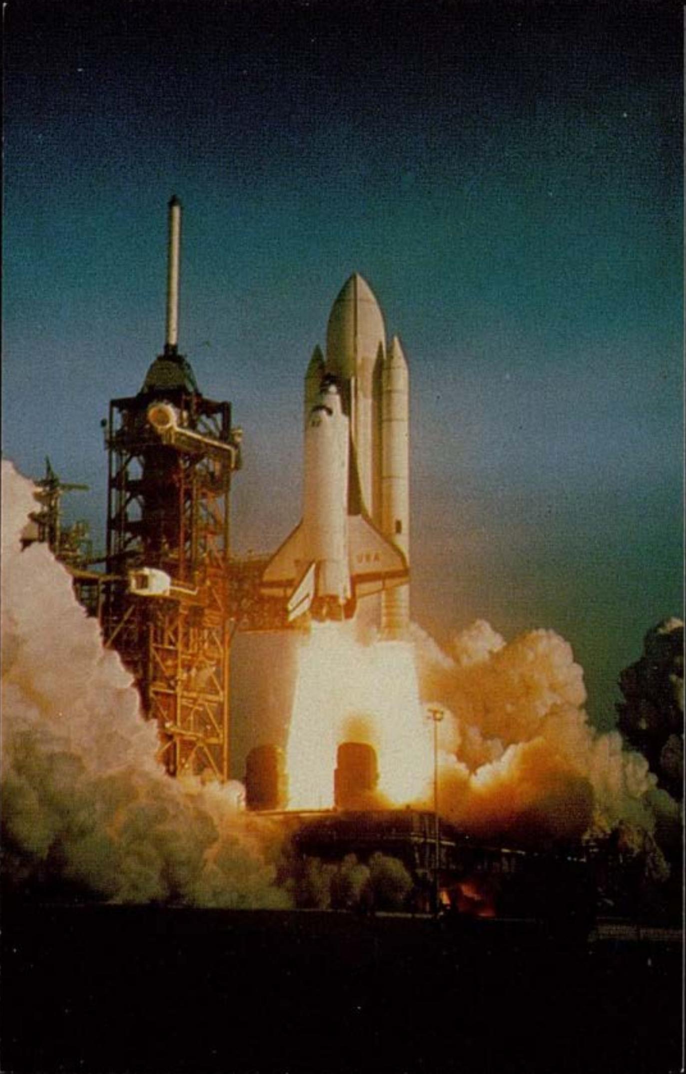

Columbia Flies. Seconds past scheduled launch time of 7 a.m. on April 12, 1981, America's Space Transportation System becomes a fact, with the liftoff of the first Space Shuttle from Launch Pad 39A. K.S.C.

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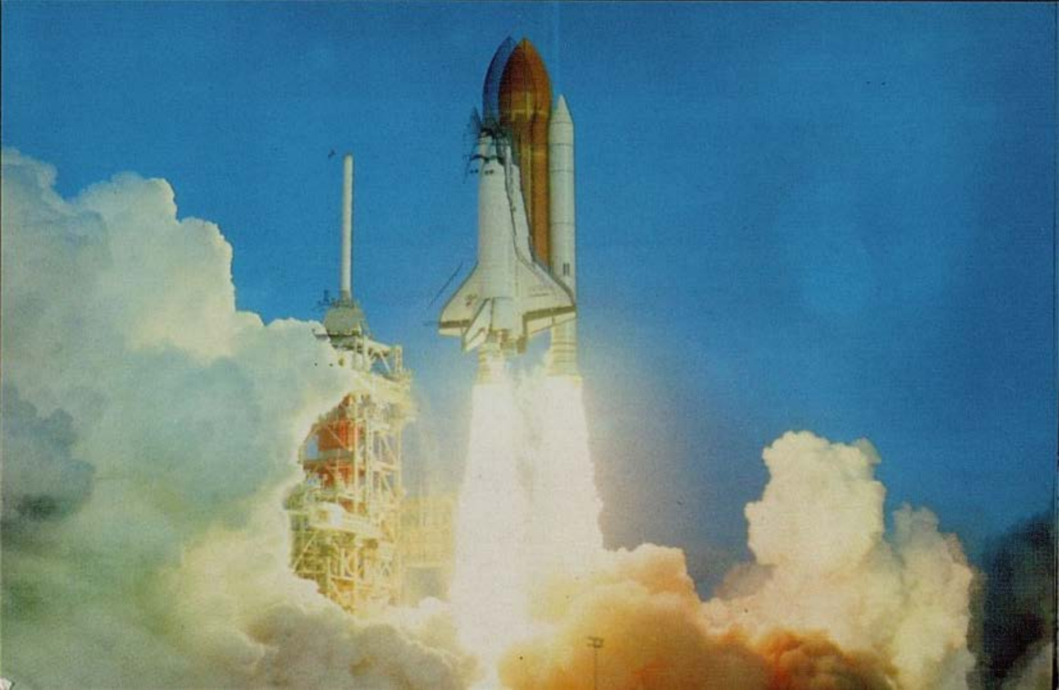

Kennedy Space Center, Fla. Liftoff of Challenger into its 41-B mission. This mission saw Bruce McCandless and Robert Stewart perform the first untethered space walks in history. The mission ended with a touchdown at KSC's Shuttle Landing Facility.

Color Photo by NASA

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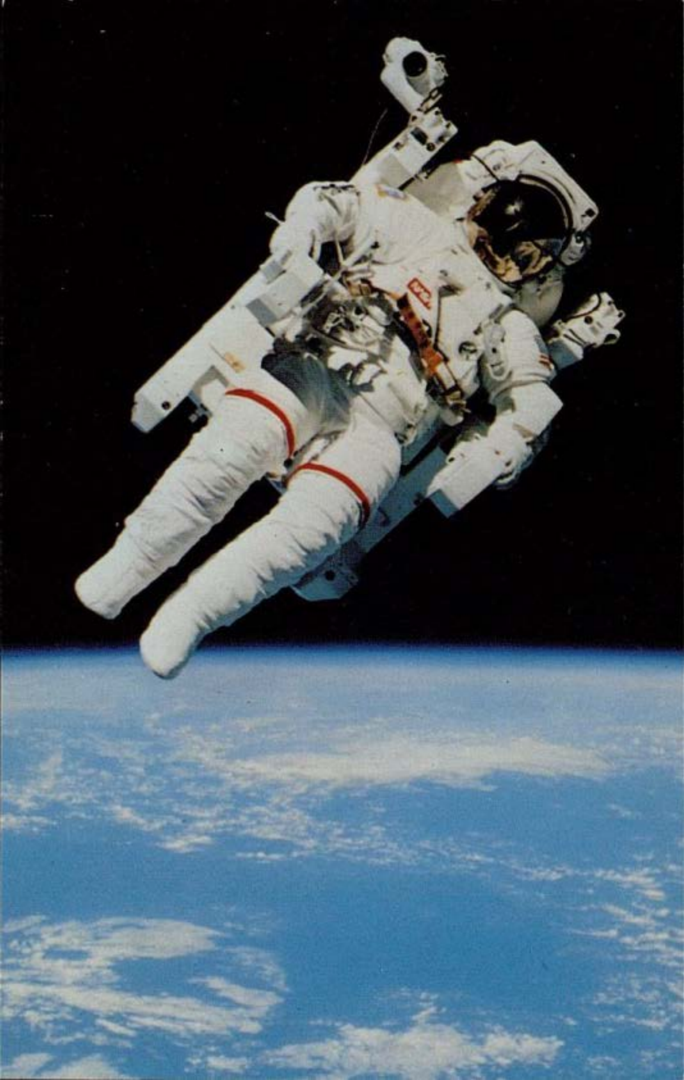

Kennedy Space Center, Fl., Mission specialist Bruce McCandless zips through space with his jet-powered backpack in this picture taken from the shuttle Challenger.

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Kennedy Space Center, Fla. The Shuttle Orbiter Columbia is towed back to the Orbiter Processing Facility following its demating from the STS 9 shuttle stack.

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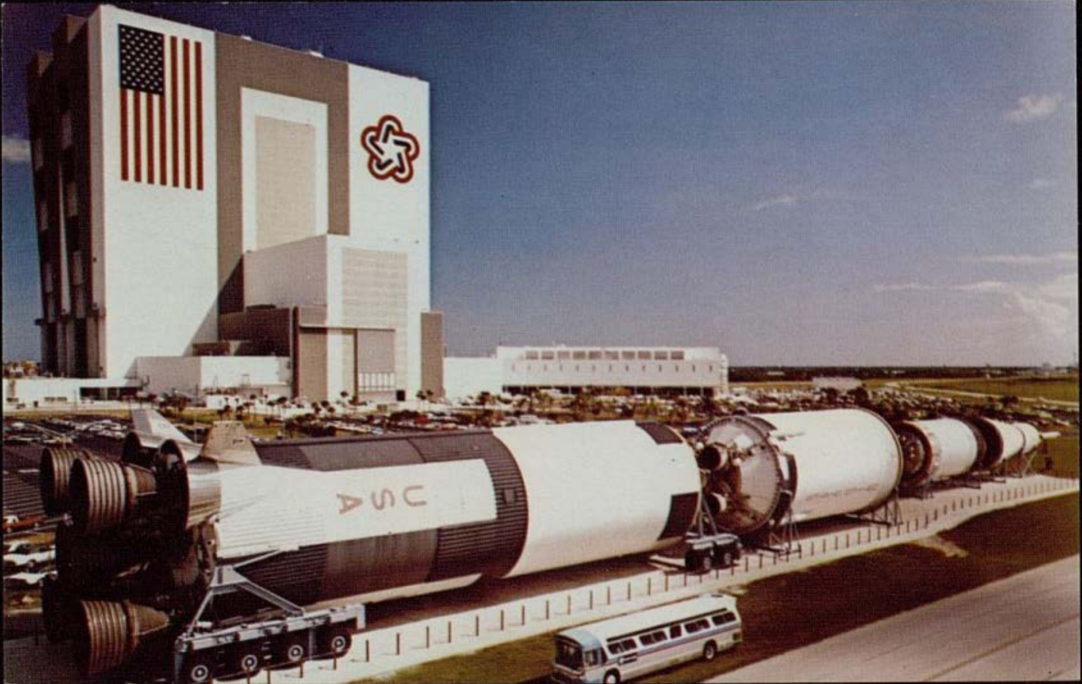
USA

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The Saturn V rocket on display near Vehicle Assembly Building at the Kennedy Space Center, Florida.

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STS-3 thunders aloft on March 22, 1982 at 11:00 AM. Columbia's third flight was manned by Commander Jack Lousma and Pilot Gordon Fullerton.

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Space Shuttle configuration on the launch pad showing service tower to the left and the sound suppressant 290 ft. (or 88.9 meters) water tower on the right.

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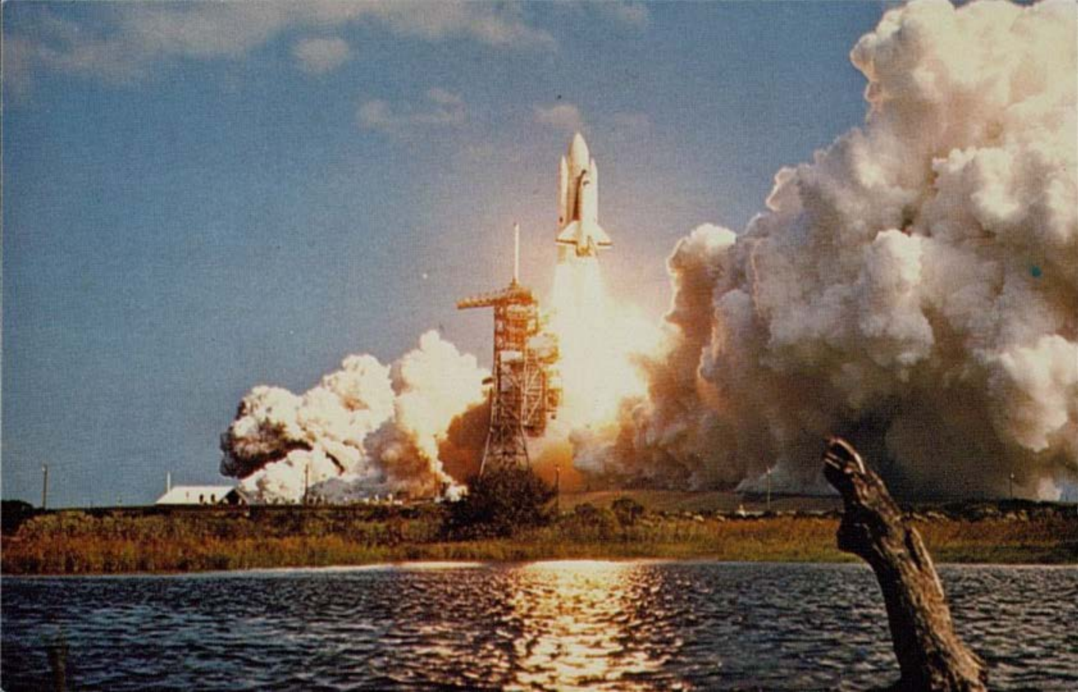

STS-2 flies Nov. 12, 1981. On board, Astronauts Joe Engle and Richard Truly.

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Commander Joe Engle and Pilot Richard Truly on board STS-2, launched Nov. 12, 1981 from Kennedy Space Center.

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STS-4 Launch. Waterbirds disturbed by the activity at Launch Pad 39A. Lift-off June 27, 1982 with Astronauts Thomas K. Mattingly II and Henry W. Hartsfield, Jr. aboard for NASA's final orbital flight test before launching into a new era.

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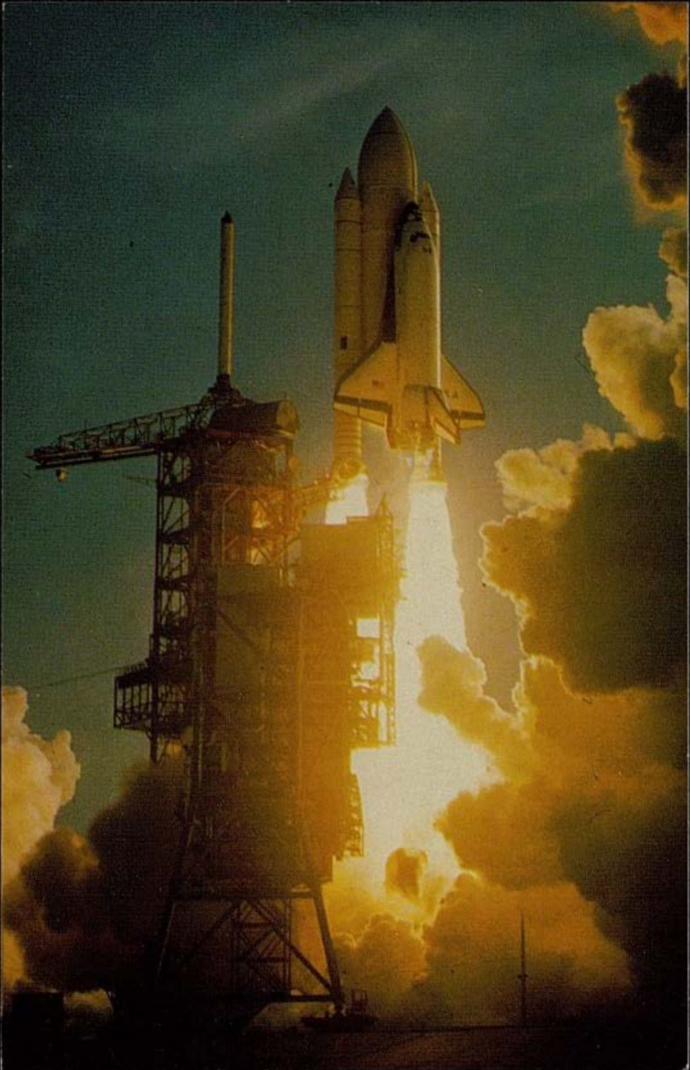

The dawn of a new age in spaceflight. On board Columbia, Astronauts John Young and Bob Crippen ride toward orbit following a successful liftoff of the first Space Shuttle mission. Date April 12, 1981.

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Kennedy Space Center, Fl. Commander Vance Brand and Pilot Robert Gibson guide Challenger to the first-ever landing of a returning spaceship at Kennedy Space Center.

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Space Shuttle Enterprise on the way to "check-out" launch facilities at KSC. Kennedy Space Center, Florida.

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Skylab 2 rollout from V.A.B. to Complex 39B.

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The Saturn V rocket on display near Vehicle Assembly Building at the Kennedy Space Center, Florida.

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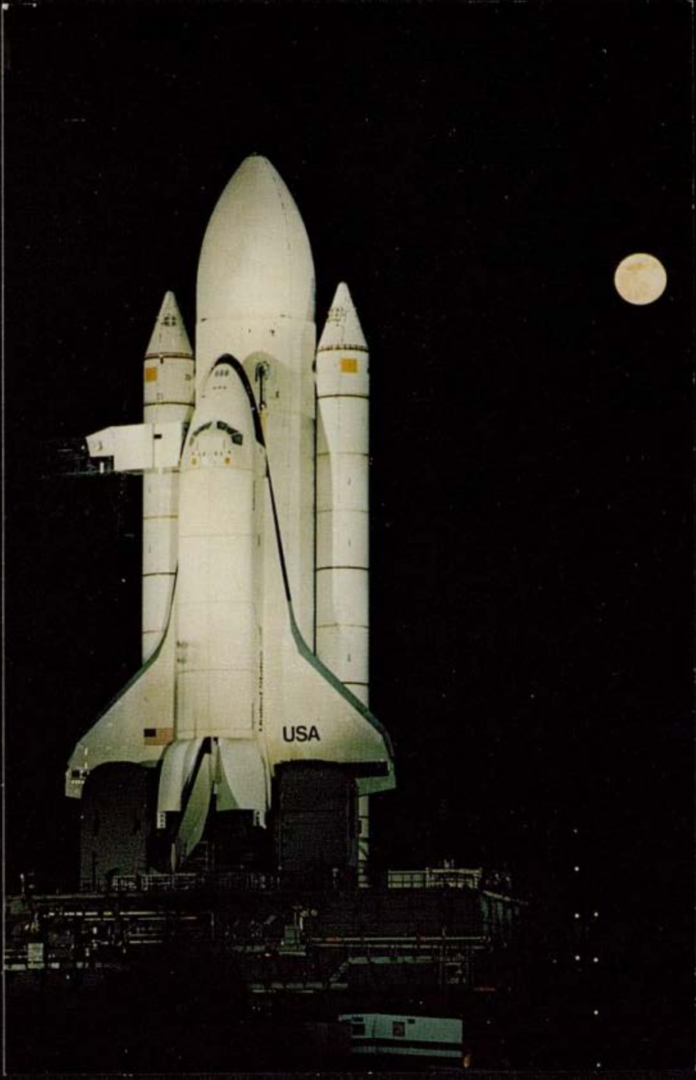
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The Space Shuttle "Enterprise" stands against the darkened Florida sky during testing of the high-intensity lighting systems.

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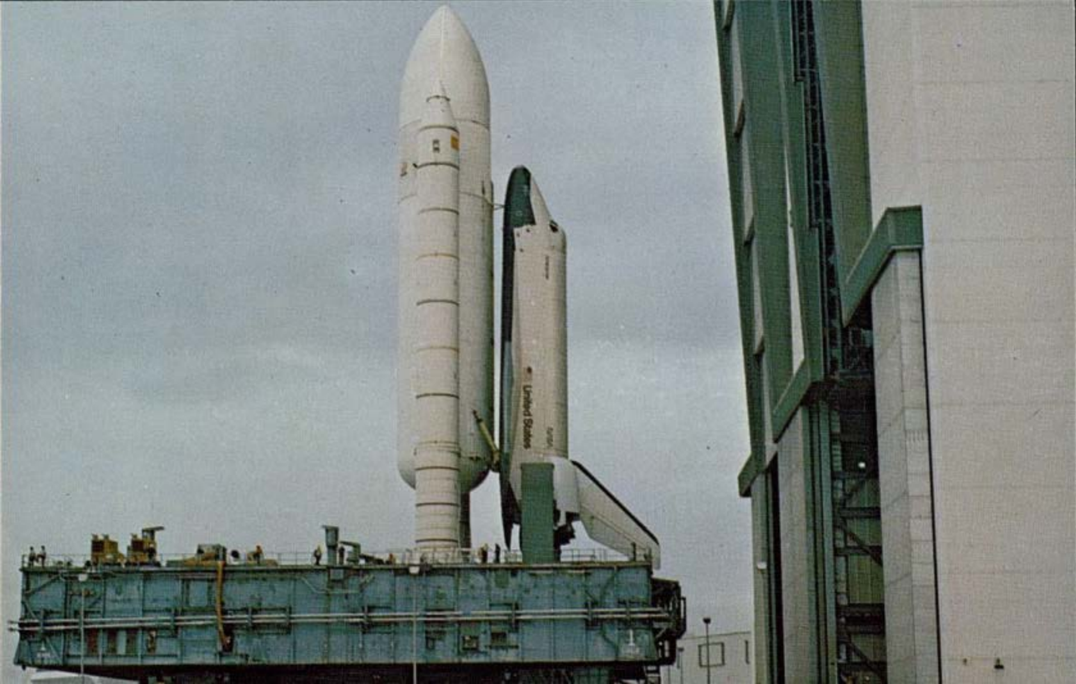
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"Space Shuttle Enterprise rolls out of V.A.B. on first journey to Launch Complex 39A."
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The Apollo 17 space vehicle lifted off from Launch Complex 39 A, at 12:33 EST Dec. 7th 1972.

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"Columbia and N.A.S.A. 747 touchdown on K.S.C. Shuttle Landing Facility."
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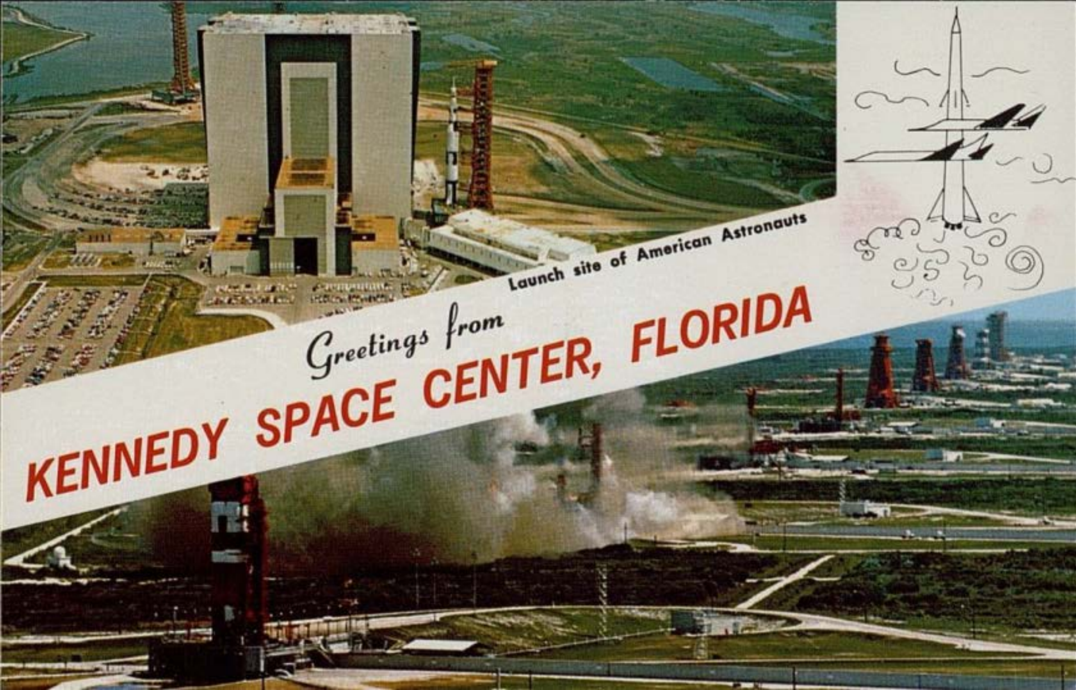
Launch site of American Astronauts
Greetings from
KENNEDY SPACE CENTER, FLORIDA

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The Apollo/Saturn V facilities vehicle moves out of the Vehicle Assembly Building at the Kennedy Space center, on its way to launch complex 39, Pad-A.

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Artist Concept of NASA's John F. Kennedy
Space Center, Cape Kennedy and
neighboring cities.

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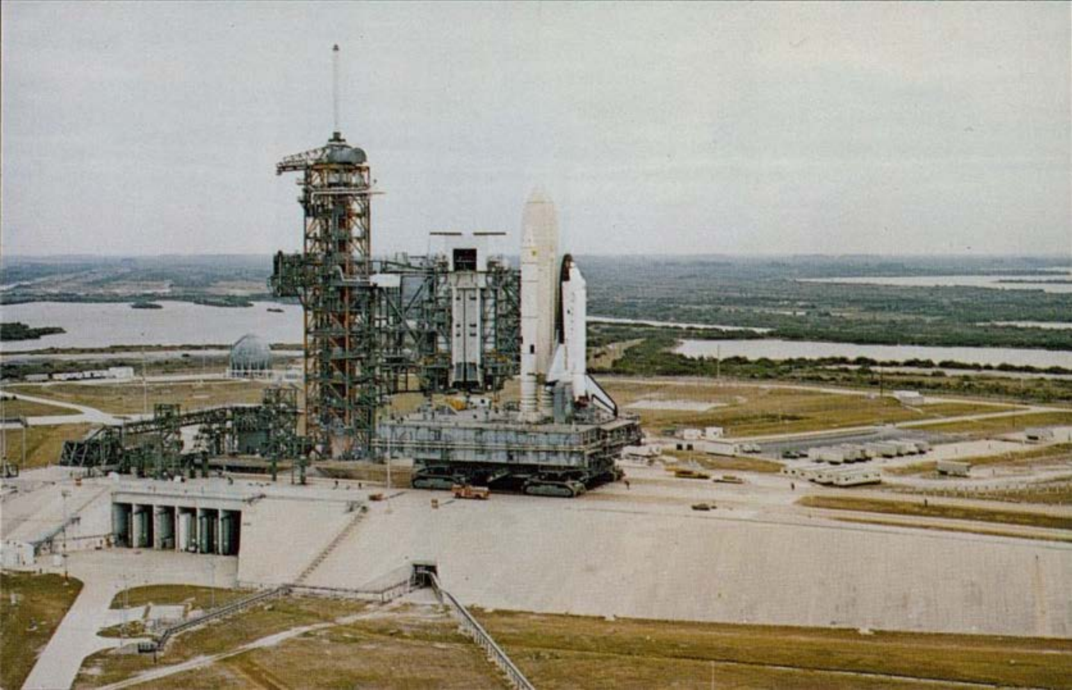

The first Space Shuttle vehicle on its launch site Pad A at Complex 39.

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NASA's Gemini-Titan 4 that launched McDivitt and White from Cape Kennedy, Florida.

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The first Space Shuttle vehicle destined to fly in space slowly inches out of the VAB on its way to Pad A at Launch Complex 39 from where it will be launched in 1981.

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GEMINI IX
APOLLO / SATURN V SPACE VEHICLE

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Scale model of Apollo/Saturn 5 rocket at Visitors Information Center, Kennedy Space Center, Florida. Shows construction of all three stages and location of Spacecraft. Other exhibits show spacecraft and rockets used in Space Program.

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NASA Apollo Saturn V, 500 F facility vehicle enroute from NASA'S vehicle assembly building to launch complex 39 A.

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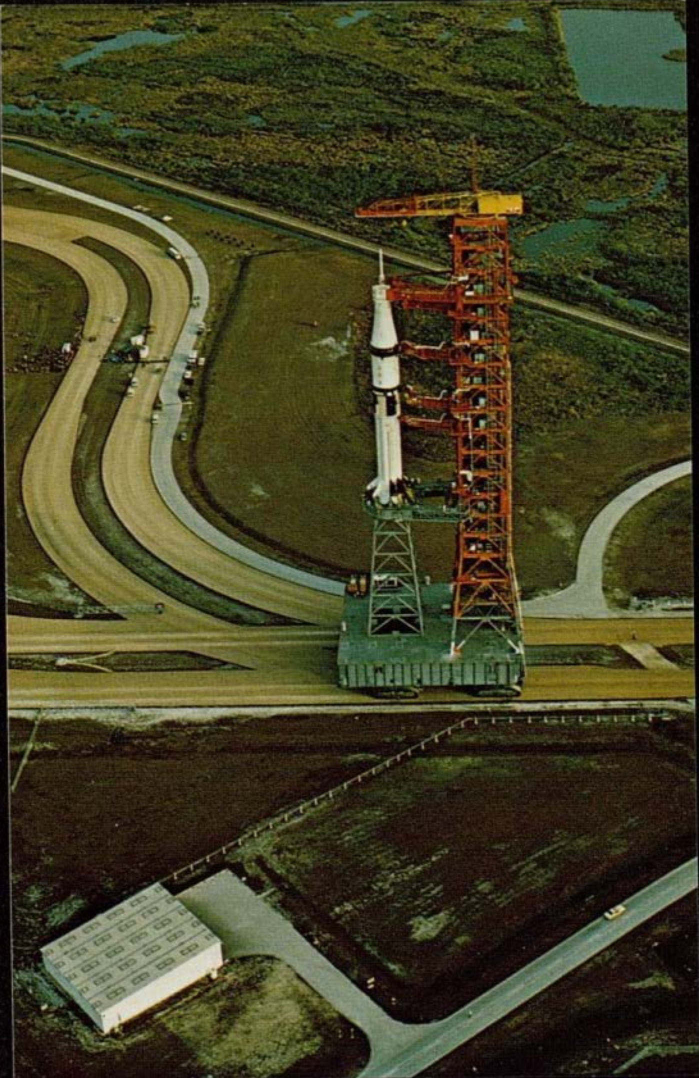

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Skylab 2, rollout to Complex 39B.

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SHUTTLE LAUNCH AT NIGHT
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The Saturn V rocket on display near Vehicle Assembly Building at the Kennedy Space Center, Florida.

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SALLY
CHALLENGER
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FABIAN HAUCK RIDE THAGARD

Space (5) 50p

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June 18, 1983 is inscribed in the record books as a famous first — the first American woman in space, and more popularly known as "Sally's Ride." Sally Kristen Ride, 32, tennis star, Ph.D. in physics, attractive, witty, and cool, performed her mission without a flaw, as the 100-ton craft carried her with four men for a week of blinking dials and video displays in a small, camper-size cabin. "No big deal," said Sally, even though, the landing planned for Florida's Kennedy Space Center had to be switched to Edward's AFB on the Western California desert. Sally's flightmates, Commander Robert L. Crippen, Pilot Frederick H. Hauck, and Mission Specialists John M. Fabian and Norman E. Thagard had nothing but praise for her performance and personality.

Published by Coral-Lee
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Captain Gus Grissom, USAF, shown in his space-suit prior to being the second U. S. Astronaut launched into space.

P49575

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VISITORS VIEW RECREATION OF
APOLLO XI LAUNCH FROM FIRING ROOM 3.
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Astronaut F. Story Musgrave moves along the hand rail system on the Challenger's starboard side during the successful extravehicular activity of April 7, 1983. Photo was made from inside cabin by another crew member. Part of the right wing and orbital maneuvering system pod are visible.

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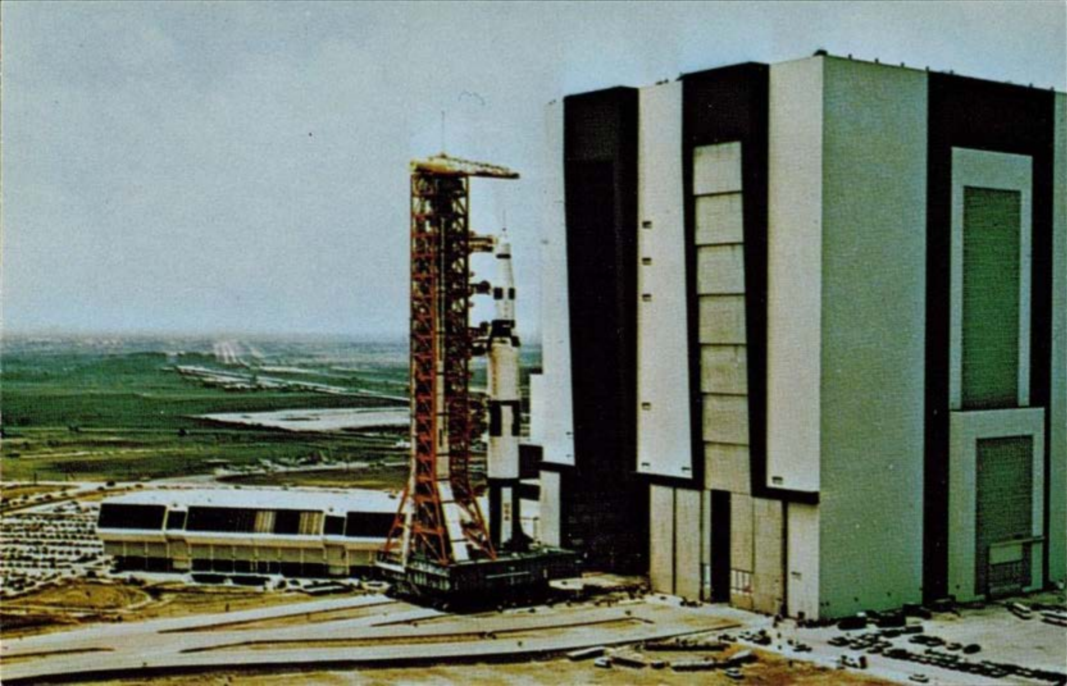

NASA Apollo Saturn V, 500 F facility vehicle enroute from NASA's vehicle assembly building to launch complex 39 A.

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New logo for the Visitor Center of the Kennedy Space Center, Fla., operated by TW Services, Inc.

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At the moment of ignition, swing arms release and prepare to move away, clearing a path for the Apollo 11 space vehicle to lift off launch pad 39A.

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Erected in honor of the Seven Original Astronauts. It consists of the Symbol for the Planet Mercury. The number seven is mounted on the cross of valor. A time capsule to be opened in 2464, with information about the Mercury Flights, was buried beneath the monument in November 1964.

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The prime crew for Apollo 11, astronauts, Neil A. Armstrong, Michael Collins and Edwin E. Aldrin, watch as the space vehicle scheduled to carry them to the moon was positioned on the launch pad.

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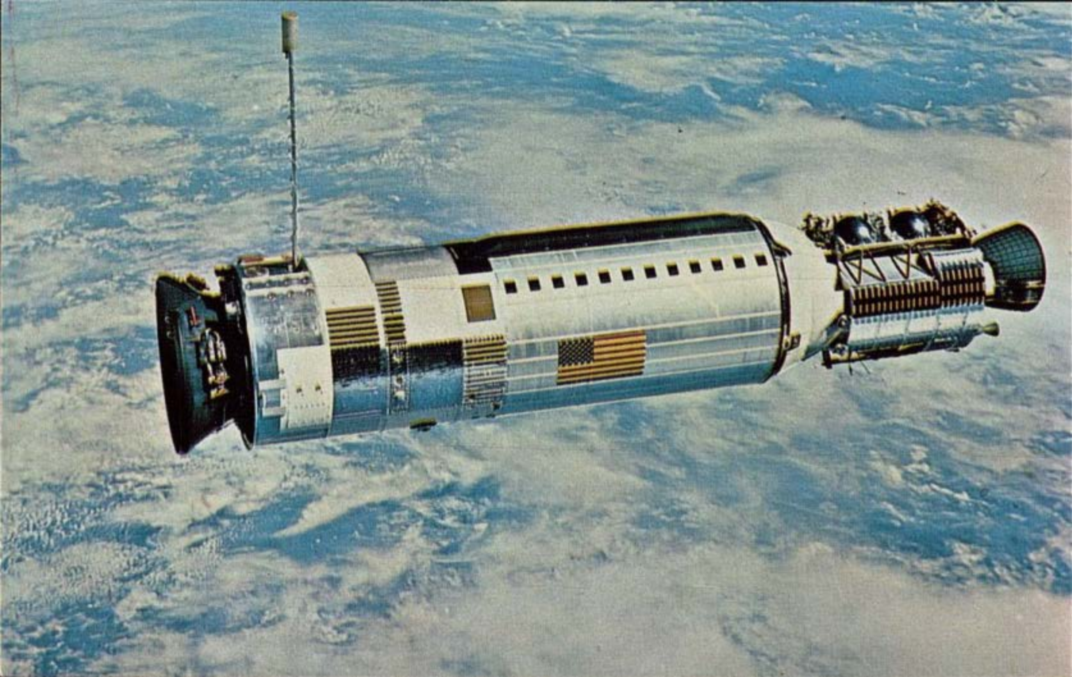

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Gemini 12 spacecraft piloted by Astronauts Lovell and Aldrin, rendezvous with the Agena Target Vehicle.

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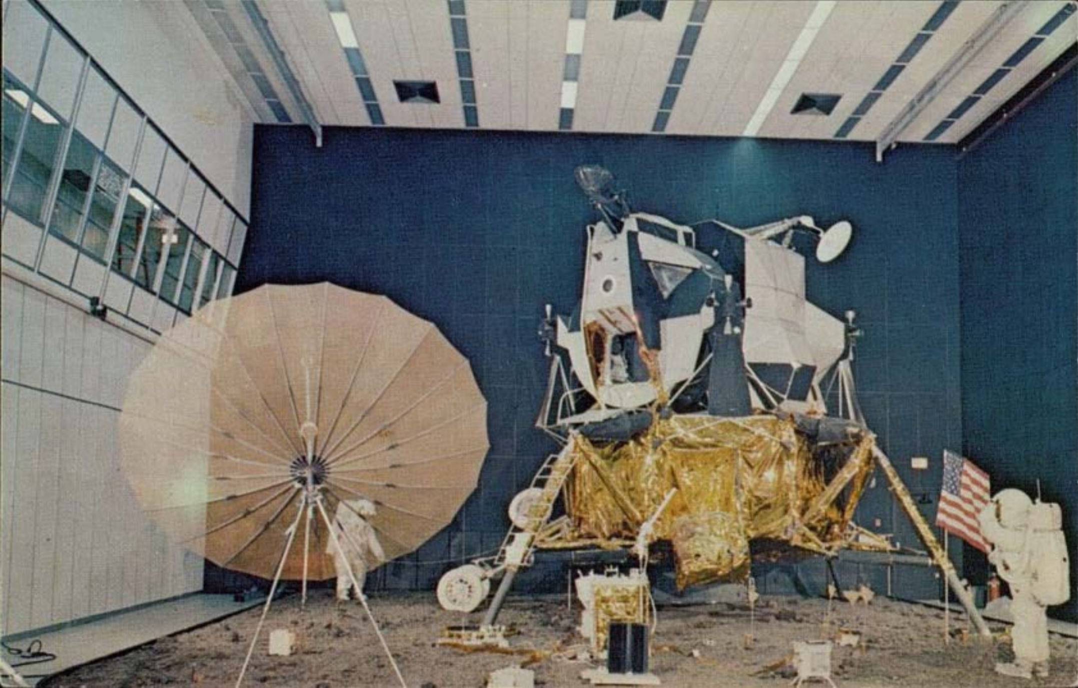

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Lunar Surface Diorama as seen on bus tour of Kennedy Space Center in Florida.

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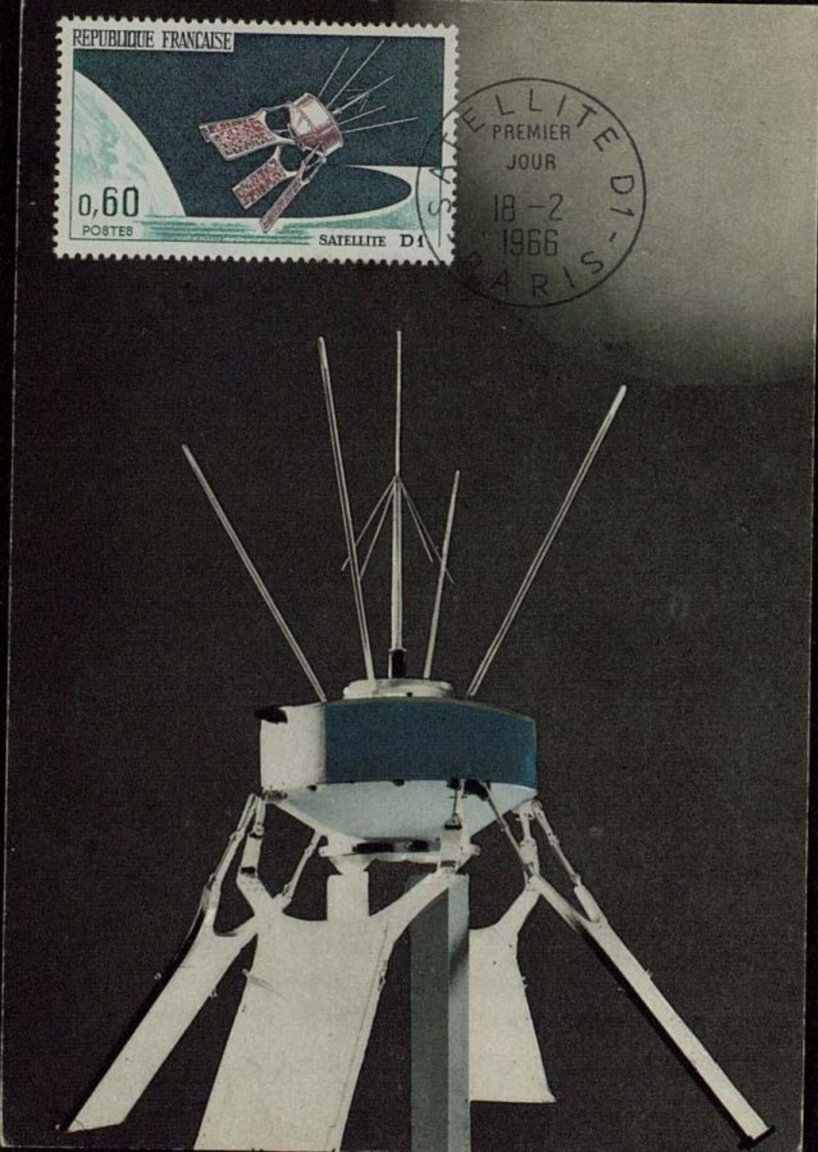
THE SHUTTLE IN SPACE (4)

Not an alien – but Dr Norman Thagard conducting a medical experiment aboard the shuttle in June 1983. At right, fellow crew member Dr Sally Ride – the first American woman to fly in space – talks with ground controllers. (STS–7 Mission)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This is the Earth as it appeared to Apollo 8 crew members Frank Borman, James Lovell and William Anders as they orbited the moon on Christmas Eve, 1968.

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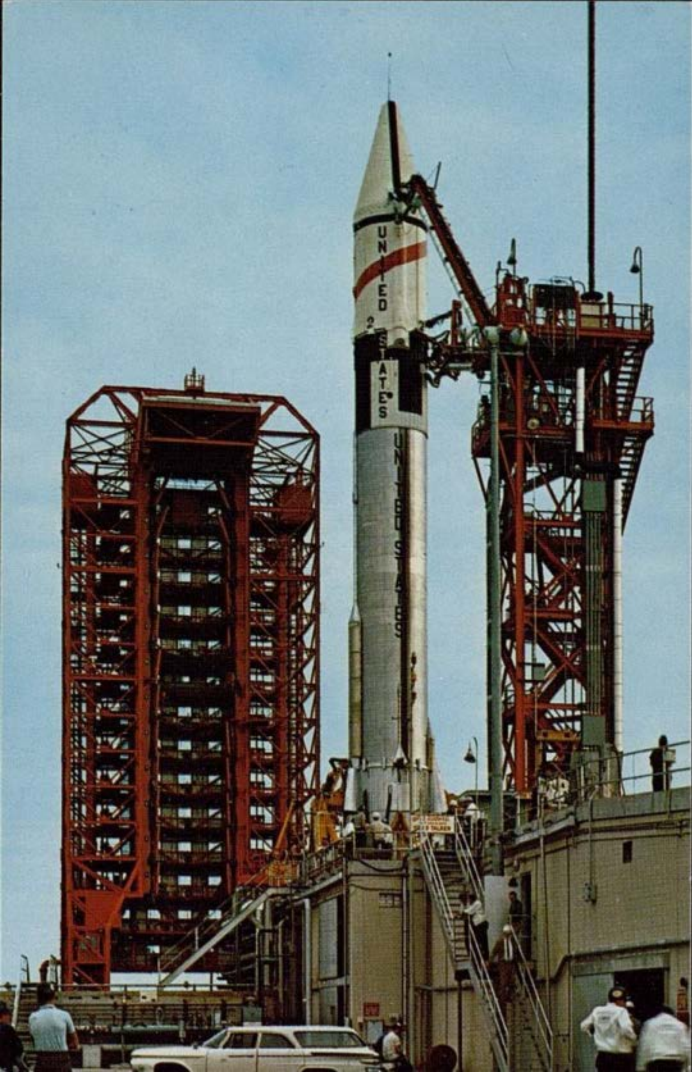

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Pre-launch preparations on the Atlas Centaur hours before lift-off from launch Complex 36 at Cape Kennedy. The Centaur launch vehicle will be used to place a soft-landing payload on the moon.

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Aerial view of Visitor's Information Center with the huge Vehicle Assembly Building at Launch Complex 39 in the background at Kennedy Space Center, Florida.

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Apollo 16 on its Mobile Launcher, moves along crawler-way to Pad A, complex 39. Apollo 16 will land a Lunar Module on the lunar surface in the Descartes area.

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Artist concept of Space Shuttle Orbiter making landing approach to runway at Kennedy Space Center, Florida.

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The Apollo 17 crew pose on the Lunar Roving Vehicle. Apollo 17 Commander Eugene A. Cernan sits at the controls, Dr. Harrison "Jack" Schmitt left, and Command Module Pilot Donald A. Evans.

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Symbols of Supremacy. The magnificent American Bald Eagle shares residence at the Kennedy Space Center with mammoth Launch facilities at Complex 39.

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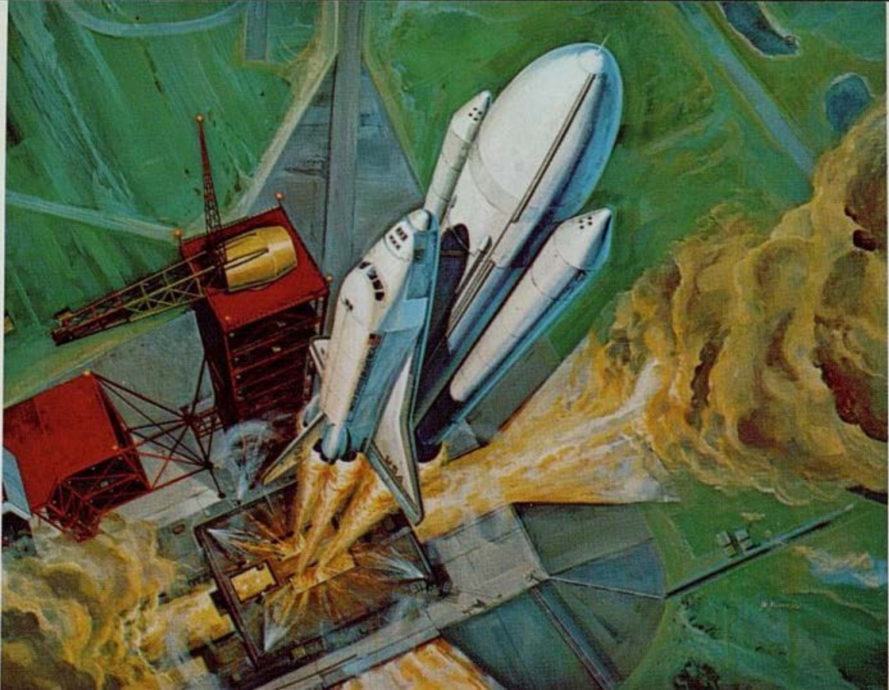

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Artist concept of Space Shuttle lift off at Kennedy Space Center, Florida.

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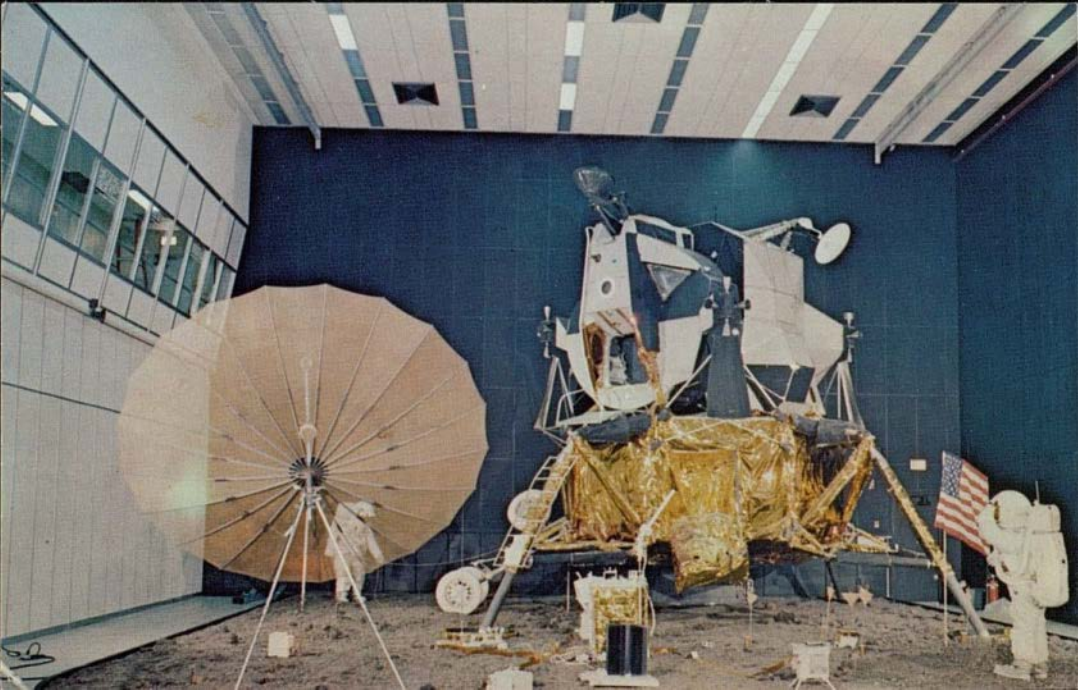

Lunar Surface Diorama as seen on bus tour of Kennedy Space Center in Florida.

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The official emblem of the joint U.S./USSR space mission. The Apollo-Soyuz Test Project will be carried out by a Soviet Soyuz spacecraft and a U.S. Apollo spacecraft, which will rendezvous and dock in orbit.

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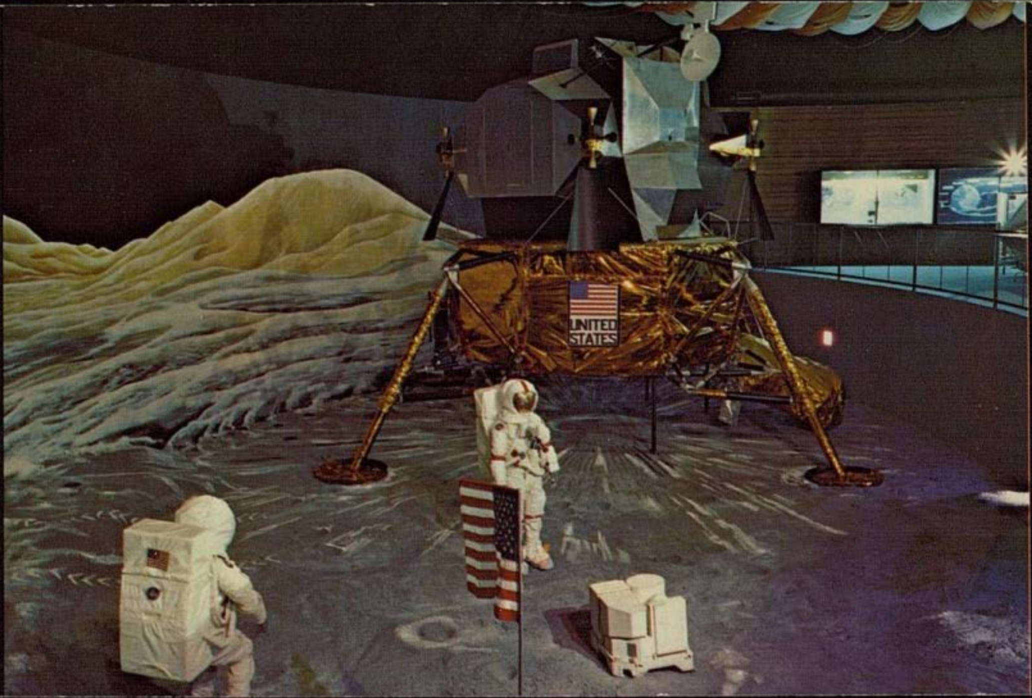
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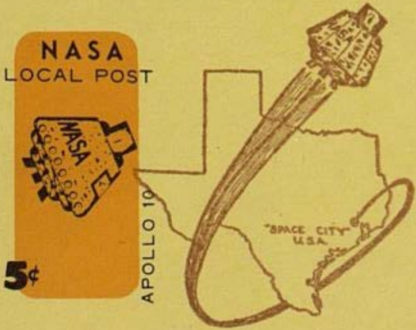

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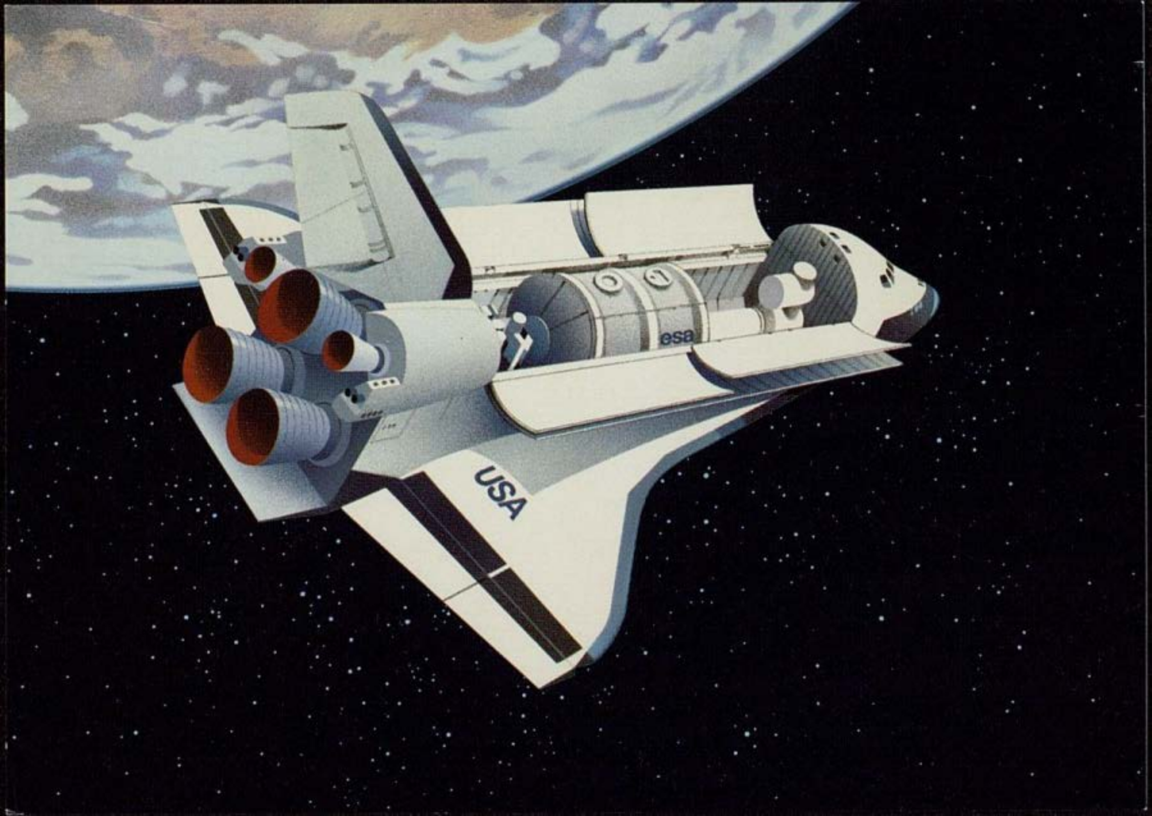
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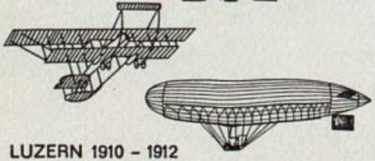

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Earth from Lunar Module

As Apollo 11 speeds towards the moon, the Lunar Module and the Saturn 4B Rocket become detached from the Command Service Module, and the CSM makes a "U-Turn" and re-attaches itself. Soon after this operation, which is performed about 3 hours after blast-off, the protective panels around the Lunar Module are jettisoned to be followed by the Saturn 4B Rocket and this goes into earth orbit. The Lunar and CSM Modules then continue their way to the moon, and in this picture the receding Earth is seen

L6/8605/T


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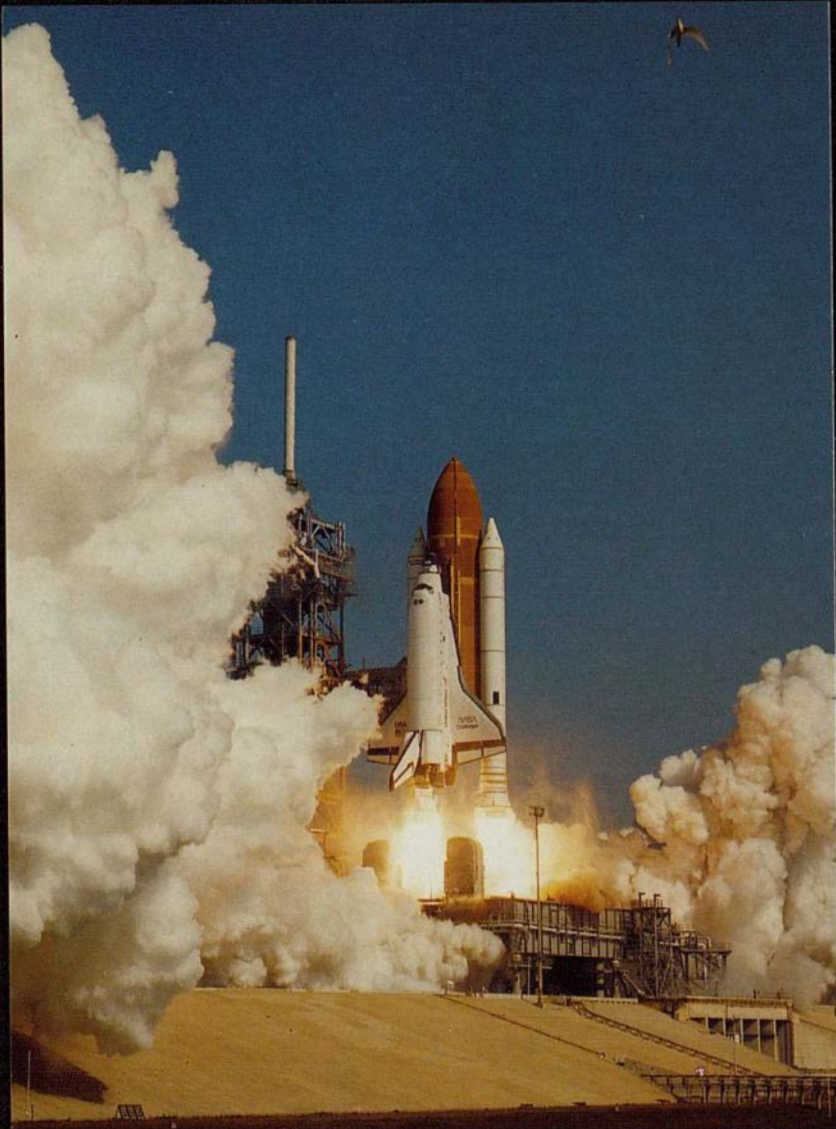

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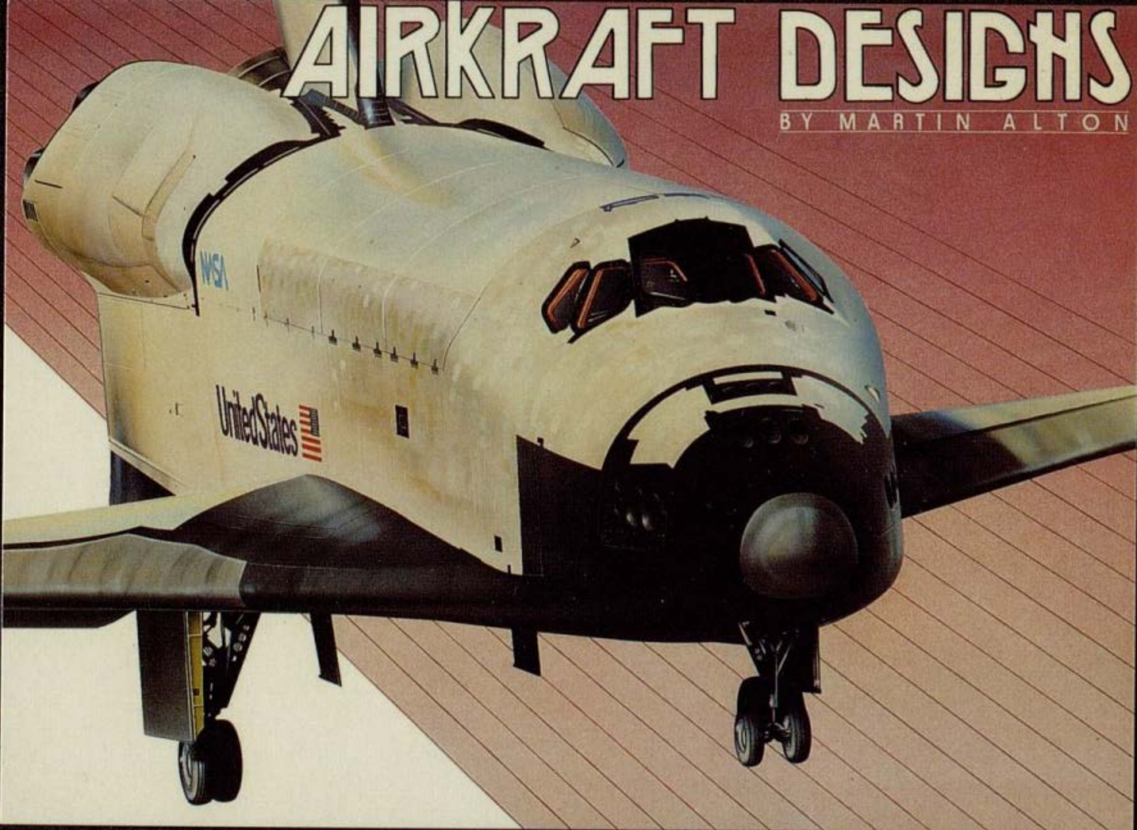

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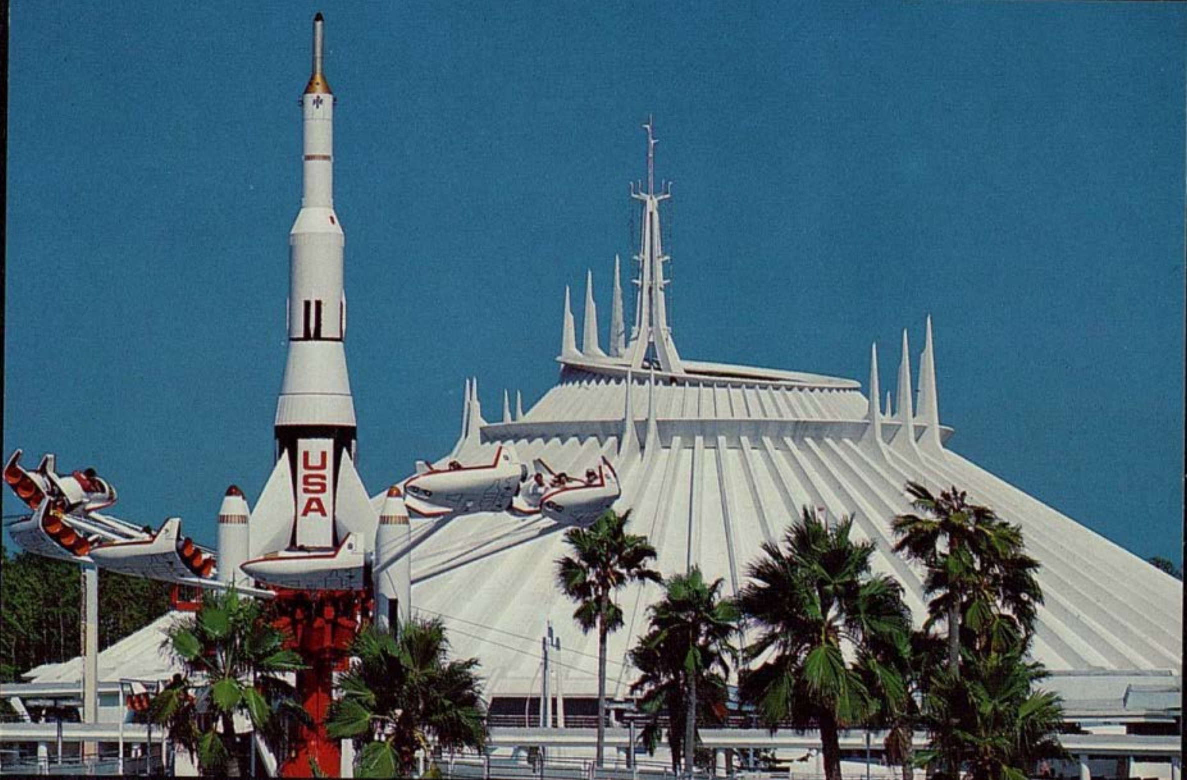
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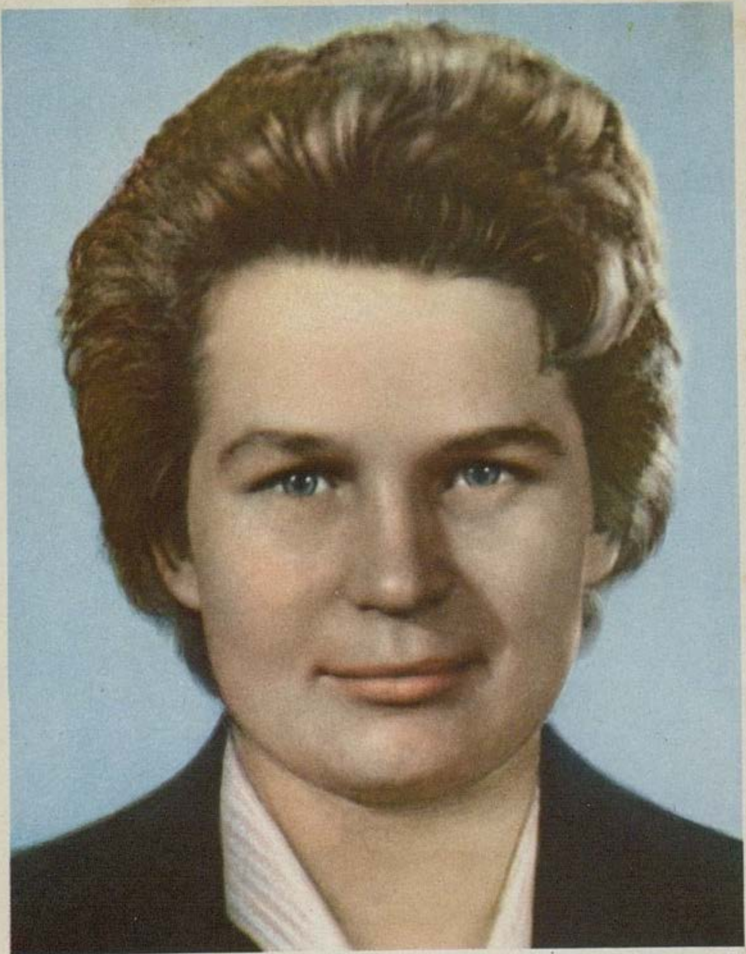

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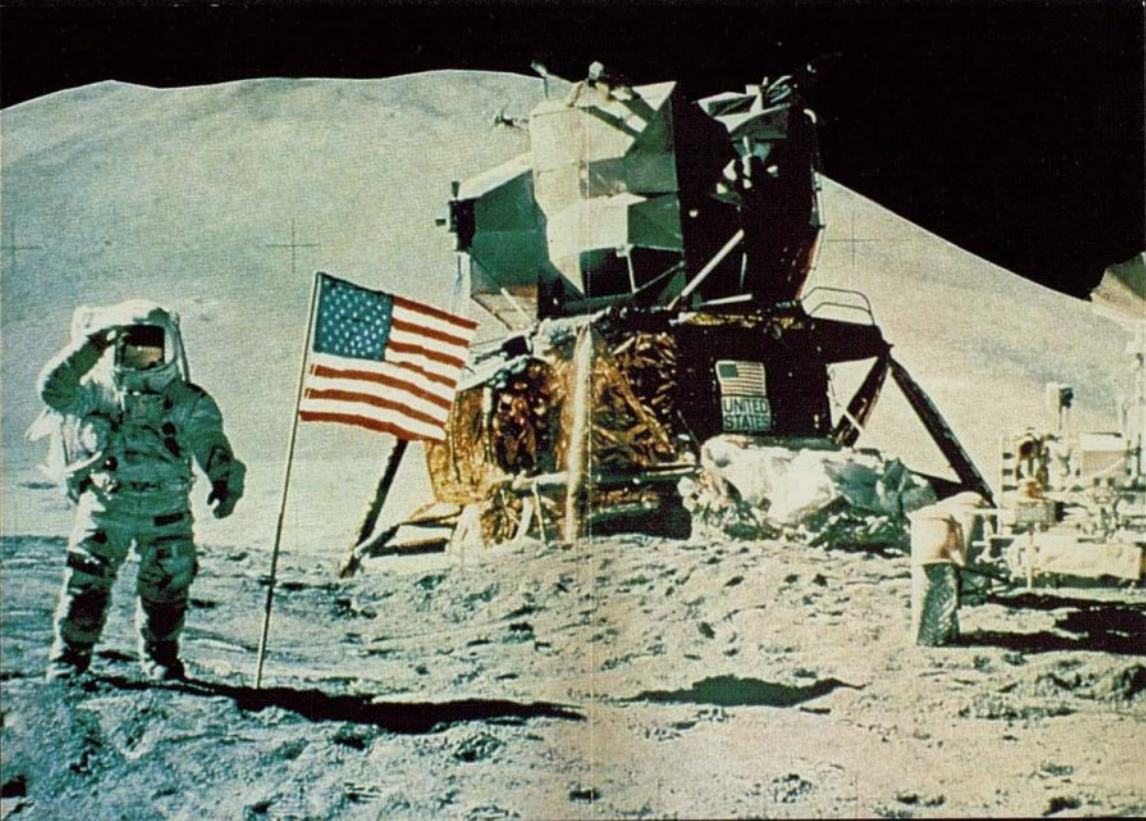
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Colonel James B. Irwin
Apollo-15-Astronaut

Apollo 15 – Start 26.7.71
David Scott – James Irwin – Alfred Worden
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LA CONQUÊTE DE LA LUNE
par APOLLO XI
du 16 Juillet au 24 Juillet 1969

L'amérissage de la Capsule
dans le Pacifique
à 390 km au large de l'Ile Johnston
et à 7 km du Porte-Avions " Hornet ",
et les trois cosmonautes américains :
ALDRIN, COLLINS, ARMSTRONG
(Photos communiquées par la NASA)

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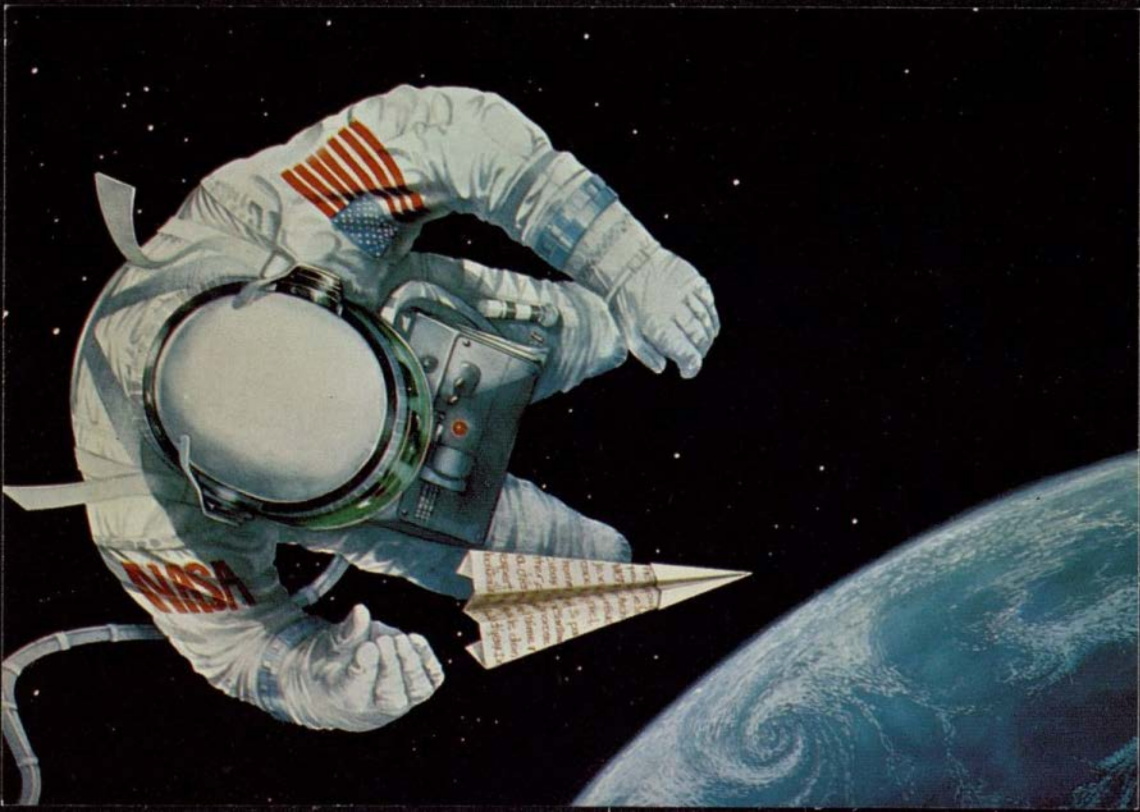
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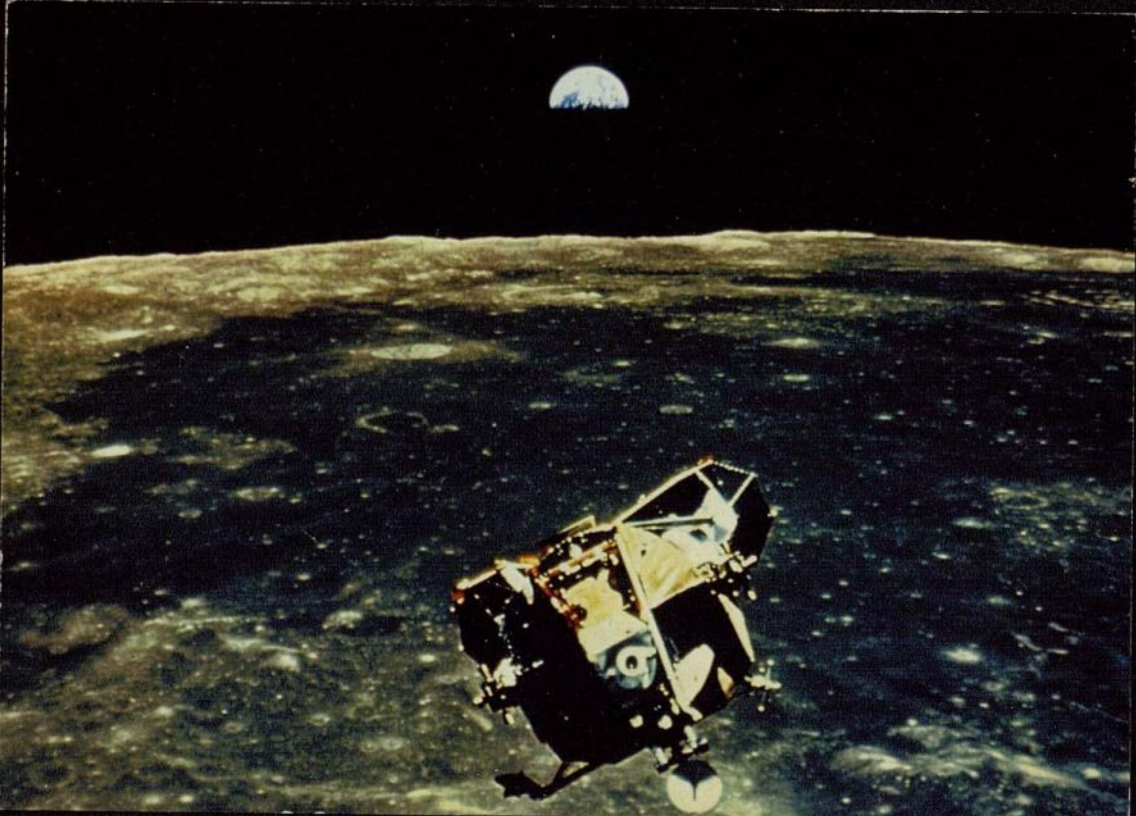

LA CONQUÊTE DE LA LUNE
par APOLLO XI
du 16 Juillet au 24 Juillet 1969
Le LEM vient de quitter la Lune
et au fond la Terre se lève
(Photo communiquée par la NASA)

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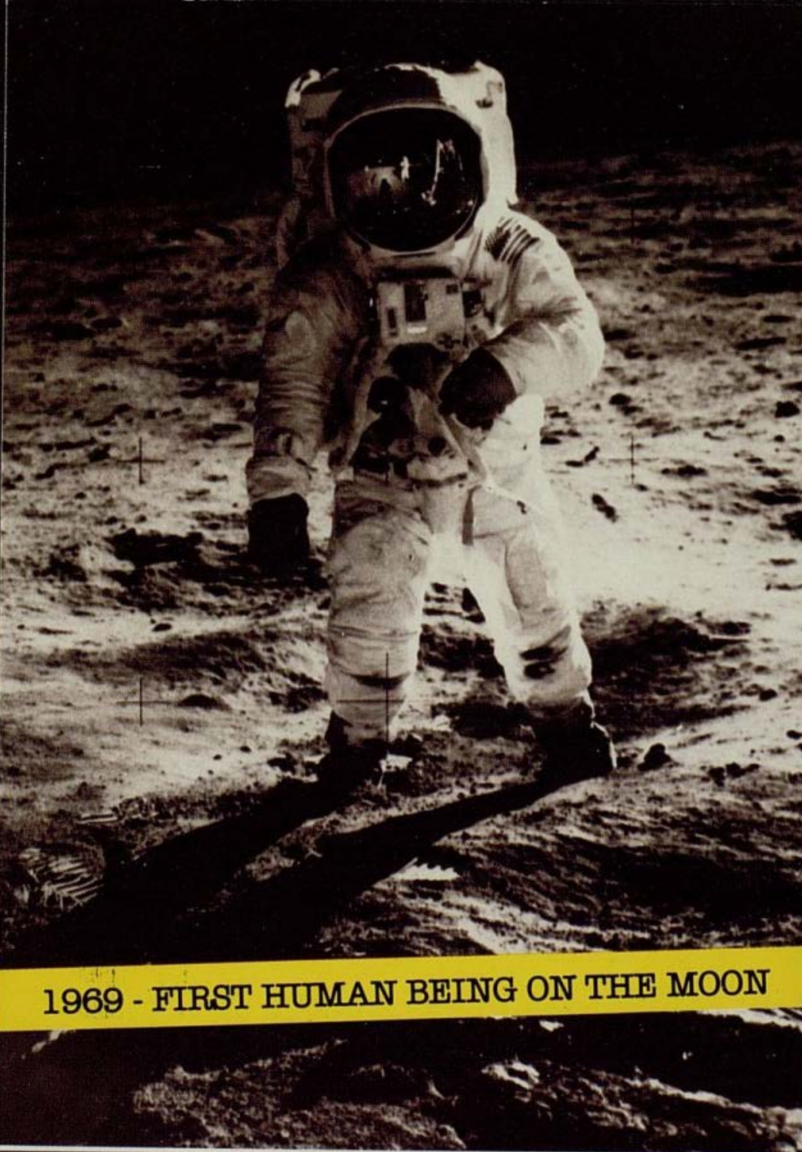

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LA CONQUÊTE DE LA LUNE
par APOLLO XI
du 16 Juillet au 24 Juillet 1969

Le départ d'Apollo XI
de Cap Kennedy
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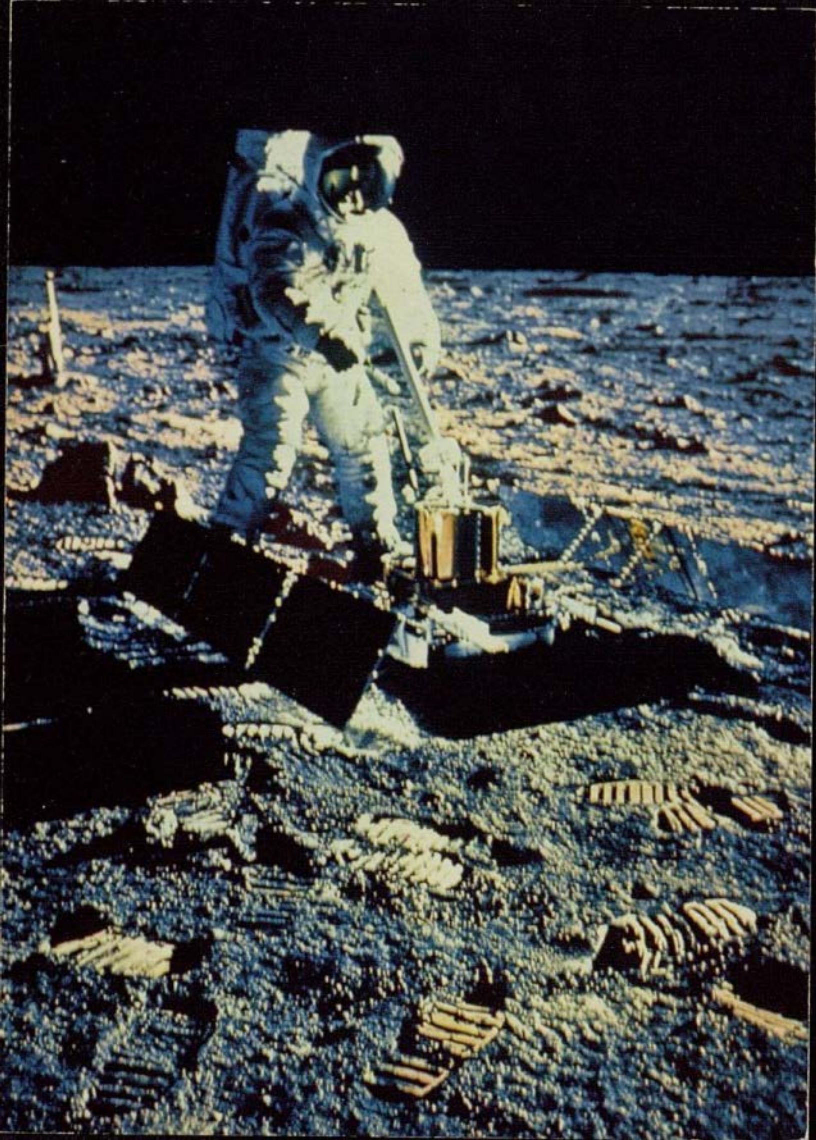

LA CONQUÊTE DE LA LUNE
par APOLLO XI
du 16 Juillet au 24 Juillet 1969
Aldrin installe le sismographe
ultra-sensible
(Photo communiquée par la NASA)

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LA CONQUÊTE DE LA LUNE
par APOLLO XI
du 16 Juillet au 24 Juillet 1969
La fusée en vol vers la Lune
et une photo de la face cachée
de la Lune
(Photos communiquées par la NASA)

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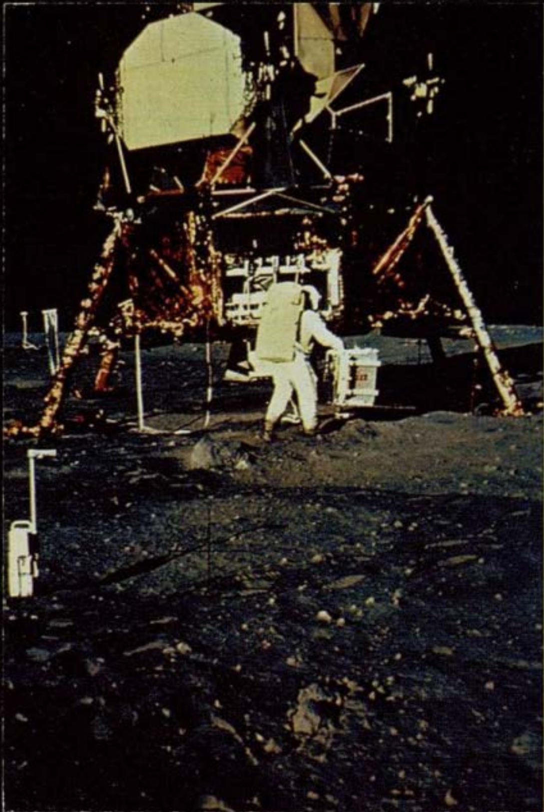

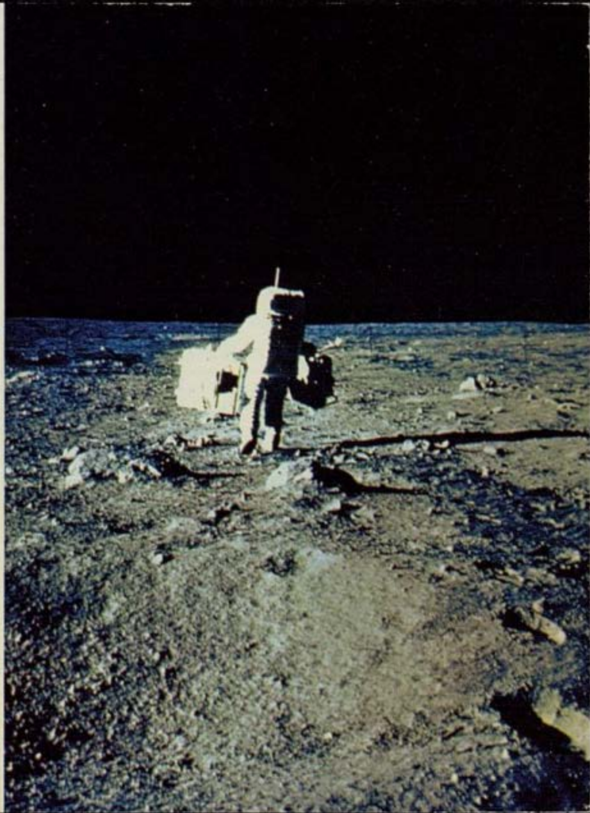

LA CONQUÊTE DE LA LUNE
par APOLLO XI
du 16 Juillet au 24 Juillet 1969
Aldrin quitte le LEM
avec ses instruments
et s'éloigne sur la surface lunaire
(Photos communiquées par la NASA)
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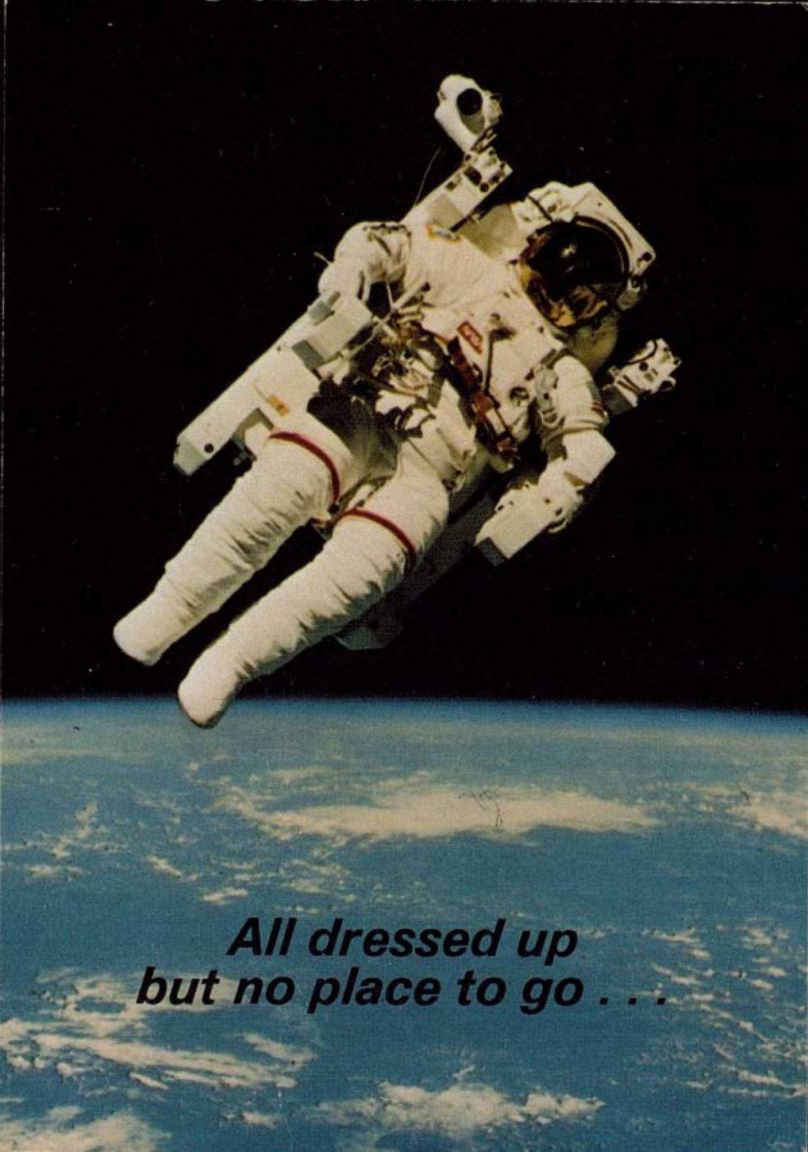
All dressed up
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LUNAR PENGUIN *BY TREVOR WEBB AT MEIKLEJOHN ILLUSTRATION*

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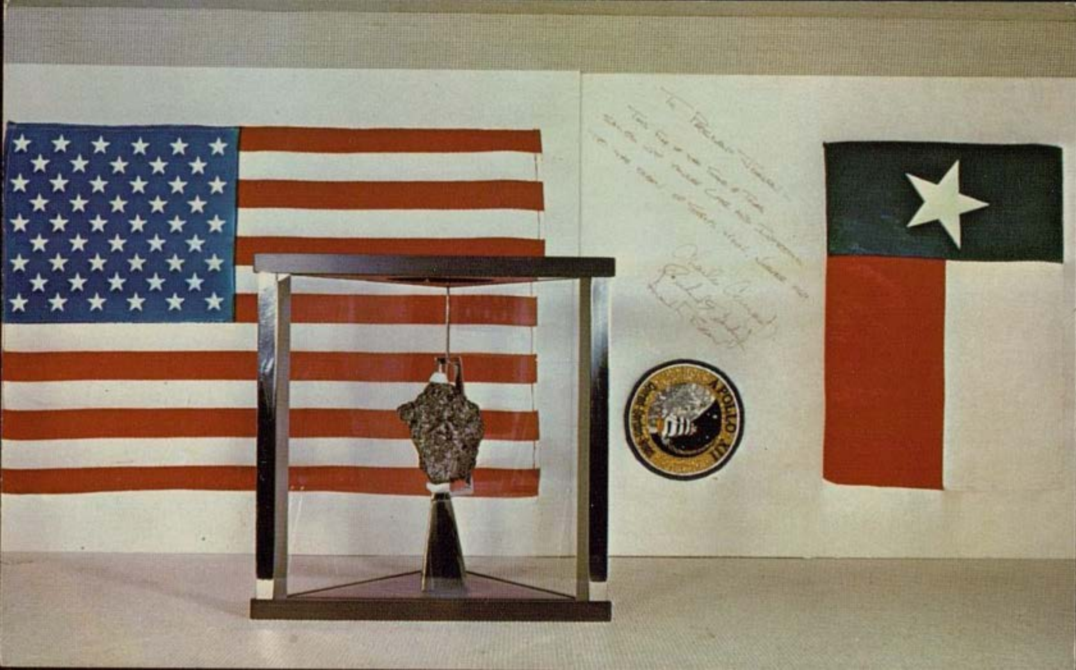
APOLLO XII

Moon Rock from the 1971 Apollo XV Mission. Loaned by the Manned Spacecraft Center, Houston, Texas.

American Flag carried on the 1965 Gemini IV flight, and Texas flag from the 1969 Apollo XII flight. Presented to President Johnson from Astronauts Conrad, Gordon, Bean, White, and McDivitt.

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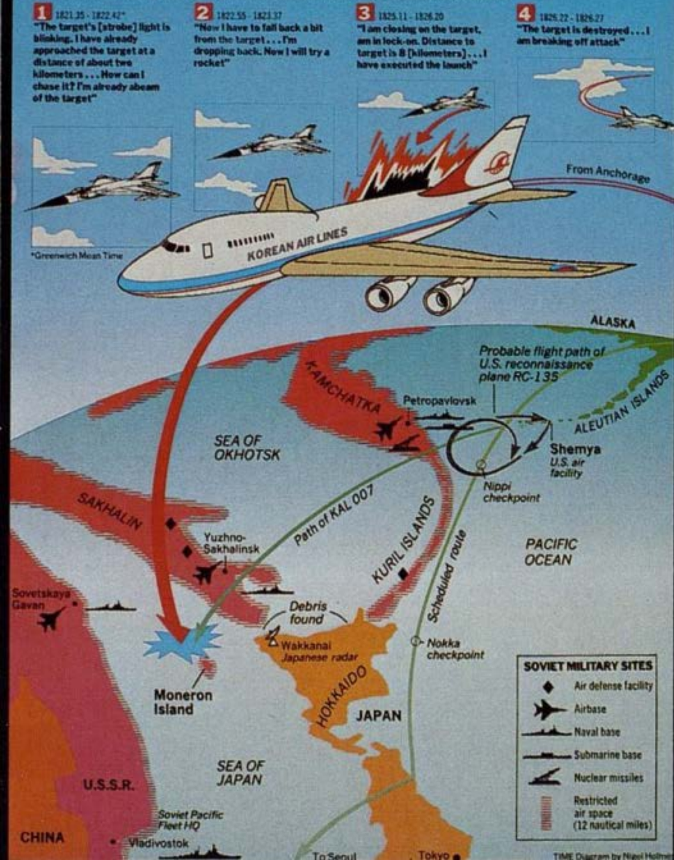
The Last Minutes of Flight 007

How the pilot of the Soviet SU-15 described his attack on the Korean Airlines jumbo jet.



On September 1, 1983, a Korean Air Liner, flight 007, from the U.S. was shot down off the coast of Hokkaido by a Soviet Su-15 supersonic fighter plane killing 269 who were aboard, including some Americans. Anti Russian protests erupted outside the White House, in Korea, and elsewhere around the world and sparked a widespread search by Japanese and American navies — first for survivors, then sadly for bodies and evidence of the disaster. The Russians claimed their territory had been violated by this "so-called spy plane." President Reagan was busy denying that it was a U-2 spy plane as he expressed sorrow and warned that this was not the time for the retaliation many patriots demanded.

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COME SIAMO ANDATI SULLA LUNA - 1 - La partenza

Brooke Bond Liebig Italiana S.p.A. - Milano

1ª SERIE - N. 320

COME SIAMO ANDATI SULLA LUNA - 1 - La partenza

Il 16 luglio 1969 alle ore 15,32, da una rampa del Centro Spaziale di Capo Kennedy in Florida, parte il gigantesco razzo Saturno V; destinazione Luna. Porta sulla cima la capsula Apollo 11 con a bordo i tre astronauti statunitensi Neil Armstrong, Edwin Aldrin e Michael Collins. E' una data storica e memorabile; la partenza viene seguita da 8.000 spettatori, fra i quali il presidente americano Lyndon B. Johnson, da circa 2.000 giornalisti e dalle televisioni di tutto il mondo collegate per via satellite.

L'intero complesso Saturno, comprendente tre stadi, è alto 110,30 metri, come un grattacielo di 36 piani e pesa circa tremila tonnellate. I suoi 5 potentissimi motori del primo stadio sono alimentati da due milioni di litri di carburante (1.254.490 di ossigeno liquido e 769.370 di kerosene) e tutto viene consumato in 2 minuti e mezzo dopo l'accensione per imprimere al razzo una velocità di 8.570 Km. ora.

A 61 Km di altezza, staccato il primo stadio, si accende il secondo che bruciando in sei minuti altri 1 milione e 300 mila litri di carburante porterà la velocità a 24.622 Km. ora. A questo punto viene espulsa la torretta di salvataggio posta sulla cima della capsula Apollo; essa poteva servire a portare in salvo gli astronauti, nel caso si fosse verificato un guasto alla partenza.

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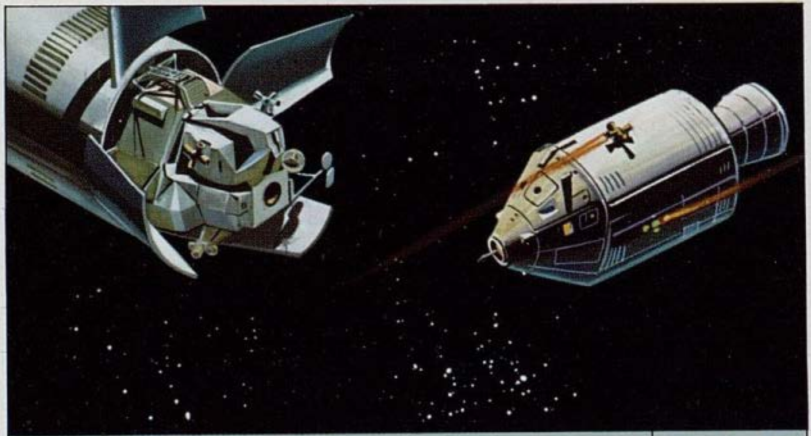

COME SIAMO ANDATI SULLA LUNA - 3 - La manovra di aggancio

Brooke Bond Liebig Italiana S.p.A. - Milano

J. v. Liebig

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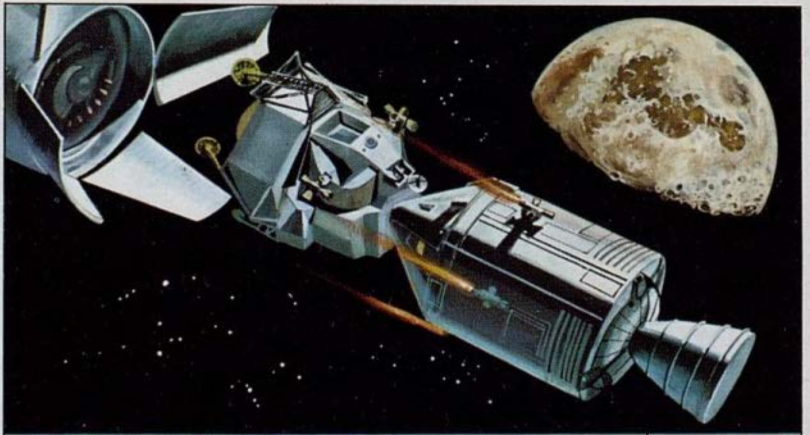
COME SIAMO ANDATI SULLA LUNA - 3 - La manovra di aggancio

A questo punto la capsula Apollo, con a bordo i tre astronauti, accendendo opportunamente i piccoli razzi direzionali si porta a breve distanza dal LEM che rimane sempre nell'imboccatura del terzo stadio. Compie una rotazione di 180 gradi, cioè un giro completo su se stessa in modo che la sua punta si trovi in corrispondenza del dispositivo di aggancio del LEM.
E' un'operazione estremamente delicata e difficile, da essa dipenderà in gran parte il successo oppure il fallimento dell'impresa.
La capsula Apollo, come si può vedere dal disegno, è formata da due parti; una cilindrica chiamata MODULO DI SERVIZIO che è alta 7 metri ed una conica alta 3 metri e mezzo, chiamata MODULO DI COMANDO dove sono alloggiati i tre astronauti.
Queste due sezioni viaggeranno sempre unite fino al rientro negli strati superiori dell'atmosfera terrestre.

grafiche rekord



COME SIAMO ANDATI SULLA LUNA - 4 - La congiunzione con il LEM

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COME SIAMO ANDATI SULLA LUNA - 4 - La congiunzione con il LEM

La manovra di aggancio viene completata. L'Apollo « estrae » il LEM dal terzo stadio che viene definitivamente abbandonato nello spazio cosmico; gli astronauti continuano il viaggio verso la Luna.
La velocità si aggira intorno ai 40.000 Km. orari; si viaggia in stato di « imponderabilità » cioè in assenza completa di peso le persone e gli oggetti all'interno dell'astronave volteggiano nell'aria ed i liquidi si raccolgono in tante bollicine.
Gli astronauti si dispongono per il lungo viaggio, alternando turni di riposo a turni di vigilanza; due di loro indossano una tuta leggera aderente al corpo che permette libertà di movimenti, mentre il terzo indossa la tuta spaziale con casco e visiera pronto ad uscire all'esterno in caso di emergenza per riparare guasti eventuali.
A bordo c'è una telecamera portatile, di semplice uso; con essa vengono trasmesse a Terra le emozionanti immagini a colori della vita di bordo e della Luna che si sta avvicinando.

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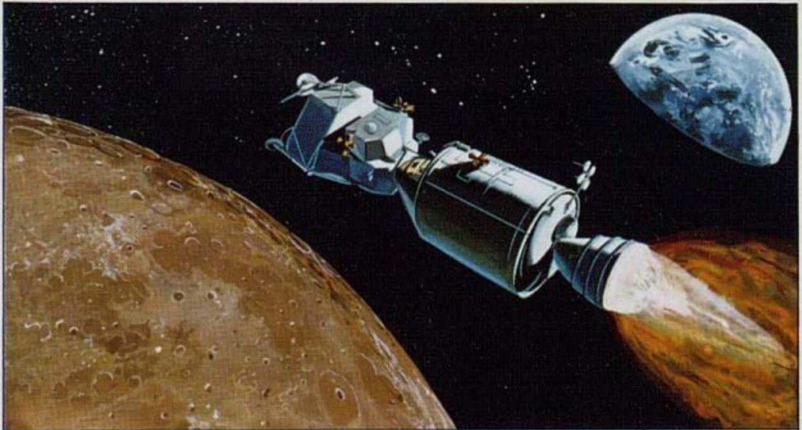

COME SIAMO ANDATI SULLA LUNA - 5 - In viaggio verso la luna

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COME SIAMO ANDATI SULLA LUNA - 5 - In viaggio verso la Luna

Prosegue il viaggio verso la Luna che durerà tre giorni circa. A bordo vengono compiute varie operazioni, fra le quali, delle correzioni di rotta per mantenersi sempre sulla traiettoria giusta.
Tutti i calcoli relativi vengono eseguiti a Terra e poi trasmessi agli astronauti. La prima correzione viene effettuata dopo circa cinque ore dalla partenza, la seconda più piccola dopo 55 ore e mezza e la terza dopo 63 ore ed un quarto. Un altro compito è quello di controllare l'equipaggiamento e le attrezzature del MODULO LUNARE. Dopo aver portato questo alla stessa pressione del MODULO DI COMANDO, due astronauti e precisamente Armstrong e Aldrin, strisciando attraverso l'angusto cunicolo che unisce i due veicoli spaziali, si portano nel LEM. Assicuratisi che tutto è in ordine rientrano in cabina.
Anche gli equipaggiamenti posti nel MODULO DI SERVIZIO vengono tenuti costantemente sotto controllo; da essi dipende l'erogazione dell'energia elettrica e dell'acqua, indispensabili per la sopravvivenza degli astronauti.

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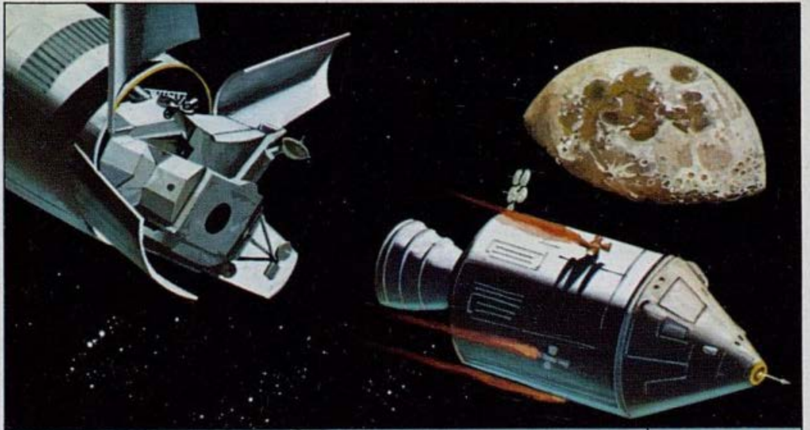

COME SIAMO ANDATI SULLA LUNA - 2 - Il distacco della capsula

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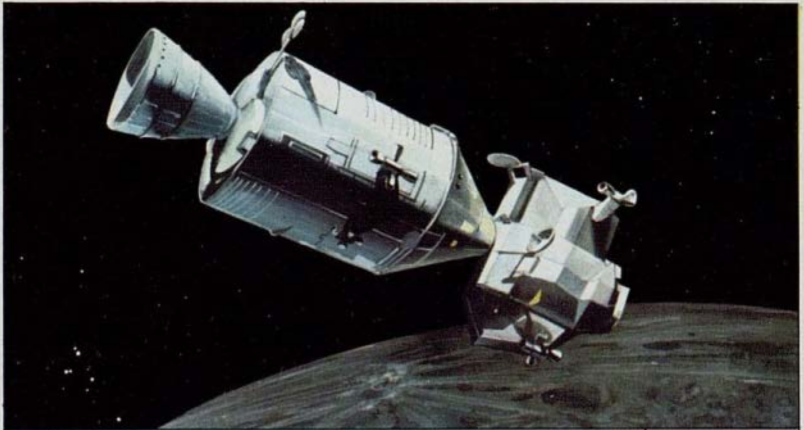
COME SIAMO ANDATI SULLA LUNA - 2 - Il distacco della capsula

Esaurito il secondo stadio, si accende il terzo che in soli 2 minuti e 45 secondi porterà la velocità del veicolo spaziale a 28.000 Km. orari e ad un'altezza dalla Terra di 185 Km.
Così l'astronave dopo circa 12 minuti dalla partenza si pone in orbita, vale a dire che non salirà ancora; ma girerà attorno alla Terra e questa operazione viene chiamata « orbita di parcheggio ».
Essa permetterà alle stazioni di controllo della NASA, poste a Terra, di seguire il veicolo e calcolare il momento esatto per accendere il motore del terzo stadio che porterà l'astronave sulla traiettoria translunare.
Dopo circa tre ore l'Apollo viene strappato dall'attrazione terrestre e diretto verso la Luna.
Incominciano poco dopo i preparativi da parte degli astronauti per agganciare alla capsula Apollo (chiamato anche MODULO DI SERVIZIO) il LEM (o MODULO LUNARE) che è alloggiato nel terzo stadio.
La capsula si distacca in seguito all'accensione di piccoli razzi direzionali lasciando però il LEM all'imboccatura del terzo stadio munito di quattro pannelli che si aprono a fiore.

grafiche rekord



COME SIAMO ANDATI SULLA LUNA - 4 - Il LEM si riaggancia all'Apollo

J. v. Liebig

2ª SERIE - N. 326

COME SIAMO ANDATI SULLA LUNA - 4 - Il LEM si riaggancia all'Apollo

La messa in orbita del LEM richiede meno di 8 minuti di accensione del razzo di salita. Mike Collins, che in questo periodo è stato l'uomo più solo di tutto il sistema solare, osserva il LEM che si avvicina alla capsula da lui pilotata, con una gioia che non riesce a trattenere. Si nota dapprima un puntino luminoso, quando si accende il faro traccia; poi il LEM appare sempre più grande. « E' bellissimo » dice Collins entusiasta. E' il momento del « docking » cioè dell'aggancio ed il LEM si porta nella posizione corretta per effettuare la manovra. Per alcuni minuti le due navicelle non riescono ad allinearsi; ma l'abilità dei piloti risolve brillantemente il problema.
Ora Collins può attraversare il tunnel tra il modulo di comando ed il LEM e raggiungere i compagni per stringere loro la mano.
Dopo aver trasferito nel modulo di comando l'apparecchiatura scientifica e i campioni lunari, i tre astronauti sistematisi nel modulo di comando staccano il LEM che viene lasciato alla deriva in orbita solare dove rimarrà in eterno. Ha inizio il viaggio di ritorno verso la Terra, viaggio che durerà altre 60 ore.

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COME SIAMO ANDATI SULLA LUNA - 1 - L'allunaggio

2ª SERIE - N. 326

COME SIAMO ANDATI SULLA LUNA - 1 - L'allunaggio

A 600 metri sopra il Mare della Tranquillità il veicolo lunare LEM (chiamato in inglese Fagle cioè Aquila) frena la sua corsa con i retrorazi puntando decisamente verso la superficie lunare.
A pochi metri dal suolo i due astronauti Armstrong e Aldrin si accorgono di essere sopra un cratere largo circa 200 metri e dai contorni molto accidentati, contemporaneamente il contatto radio con il centro di Houston si interrompe a tratti ed i calcolatori elettronici registrano un pericoloso sovraccarico.
Armstrong è troppo occupato per avvertire la base della presenza del cratere. La discesa continua mentre la voce di Aldrin legge gli strumenti: 500 metri, 400 metri, 300 metri. La velocità continua a diminuire, a 250 metri è di 25 Km/ora a 100 metri di 3,6; poi improvvisamente sale a 90 Km/ora. A terra si teme il peggio, non sapendo che si tratta della manovra per evitare il cratere.
Finalmente quando mancano appena 20 secondi si annuncia il contatto; le gambe del LEM hanno toccato la superficie lunare, i retrorazi vengono spenti. Si ode la voce di Armstrong che pronuncia le parole ormai storiche « Qui base della Tranquillità. L'Aquila è atterrata ». Sono le ore 4, 17 minuti e 43 secondi del 20 luglio 1969, esattamente dopo 102 ore, 45 minuti e 43 secondi dal lancio.

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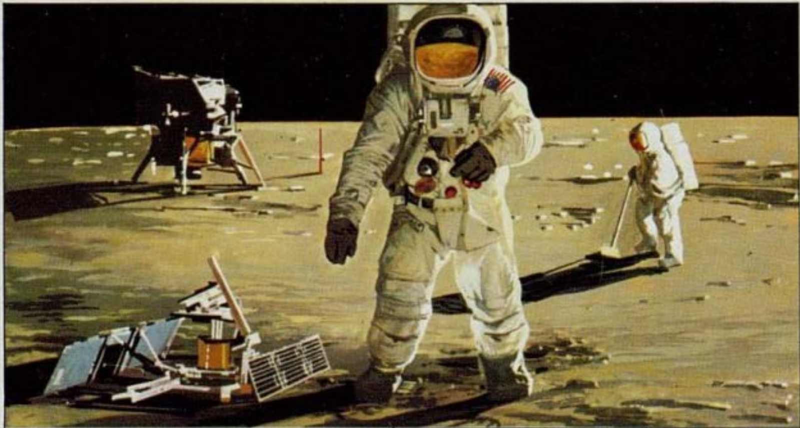
COME SIAMO ANDATI SULLA LUNA - 6 - Ammaraggio nel Pacifico

2ª SERIE - N. 326

COME SIAMO ANDATI SULLA LUNA - 6 - Ammaraggio nel Pacifico

24 luglio 1969. Superati gli strati alti dell'atmosfera terrestre gli astronauti continuano sicuri la discesa collegati via radio con Houston e la portaerei Hornet. A poco più di 7.500 Km di altezza quando la velocità si è ridotta a circa quella del suono, si aprono i primi due paracadute poi a circa 4.500 metri si aprono i tre principali e la navicella scende lentamente fino a tuffarsi nel Pacifico, 2.500 Km a sud ovest delle Hawai. Un elicottero provvede a trasportare gli astronauti (che ora indossano una speciale tuta di isolamento biologico, per evitare contaminazioni con eventuali germi lunari) alla portaerei Hornet, dove vengono ricevuti con tutti gli onori dell'equipaggio.
Armstrong, Aldrin e Collins devono rimanere isolati per quaranta giorni in una speciale roulotte con la presenza del solo medico. Più tardi il 10 agosto dopo che tutti i test eseguiti sugli astronauti e sui campioni lunari hanno dato esito negativo per l'esistenza di qualsiasi microrganismo, gli uomini dell'Apollo 11 possono finalmente raggiungere i familiari.
Si conclude così l'impresa più emozionante della sua storia: L'ESPLORAZIONE DELLA LUNA DA PARTE DELL'UOMO.

grafiche emme/print - milano



COME SIAMO ANDATI SULLA LUNA - 2 - Sbarco degli astronauti sulla Luna

RISO FLORA LIEBIG: Il riso che non scuoce

2ª SERIE - N. 326

COME SIAMO ANDATI SULLA LUNA - 2 - Sbarco degli astronauti sulla Luna

« Fantastico » dice Collins dal modulo di comando che è rimasto a ruotare attorno alla Luna ad una distanza di circa 100 Km. Collins ha potuto seguire ogni fase della manovra grazie al collegamento con Houston e l'equipaggio del LEM. Armstrong e Aldrin descrivono ora lo spettacolo che si presenta dal finestrino del LEM: « Rocce grandi circa mezzo metro sparse un po' dovunque, piccoli crateri, colori che vanno dal grigio al marrone chiaro ». Poi Aldrin chiede una pausa per permettere di effettuare i preparativi per l'uscita.
A 6 ore e mezza dall'allunaggio Armstrong annuncia « il portello si sta aprendo ». Entra in funzione la telecamera e tutto il mondo può seguire i movimenti del primo uomo sulla Luna.
« Questo piccolo passo per un uomo è un balzo da gigante per l'umanità », sono le parole storiche di Armstrong quando pone il piede sulla Luna. Dopo 20 minuti esce Aldrin. Gli astronauti si muovono con relativa facilità sul suolo coperto da uno strato di polvere finissima e si adattano presto alla gravità lunare che è un sesto di quella terrestre. Gli astronauti devono ora raccogliere campioni del suolo lunare, scattare fotografie, sistemare il complesso di apparecchiature scientfiche che comprendono: un riflettore laser, un sensibilissimo sismografo, un foglio di alluminio per catturare il cosidetto « vento solare ».

grafiche emme/print - milano

Brooke Bond Liebig Italiana S.p.A. - Milano

COME SIAMO ANDATI SULLA LUNA - 5 - Il modulo di comando entra negli strati alti dell'atmosfera

ORTOFRESCO LIEBIG: 11 verdure da buttare in pentola

J. v. Liebig

2ª SERIE - N. 326

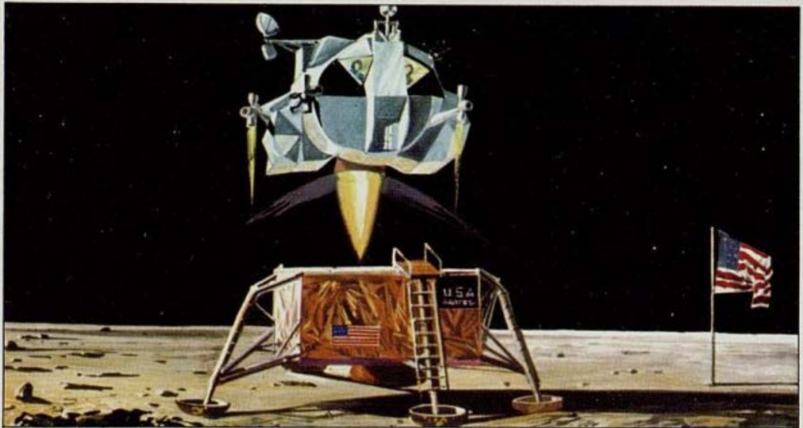
COME SIAMO ANDATI SULLA LUNA

5 - Il modulo di comando entra negli strati alti dell'atmosfera

Man mano che il modulo di comando si avvicina alla Terra, la velocità aumenta vertiginosamente. Da 2.000 Km/ora si passa a 40.000 Km/ora a causa dell'attrazione gravitazionale.
La manovra di rientro è estremamente delicata e pericolosa. L'astronave deve entrare nel cosidetto « corridoio di rientro » largo solamente 40 Km, naturalmente con l'aiuto dei calcolatori a terra. Se l'inclinazione della traiettoria fosse errata non ci sarebbe più speranza per gli astronauti che potrebbero rimbalzare sull'atmosfera terrestre e perdersi nello spazio cosmico.
Imboccato ormai il corridoio giusto, il modulo di servizio si stacca e il piccolo cono di tre metri e mezzo del modulo di comando con i tre astronauti volge la base verso l'atmosfera per opporre all'attrito lo speciale scudo termico, che proteggerà l'equipaggio dall'enorme calore aggirantesi sui 2.700 e più gradi. Per breve tempo nell'alta atmosfera si accende una scia luminosa come prodotta da una meteora.

grafiche emme/print - milano

Brooke Bond Liebig Italiana S.p.A. - Milano



COME SIAMO ANDATI SULLA LUNA - 3 - Si stacca il LEM con i due Astronauti

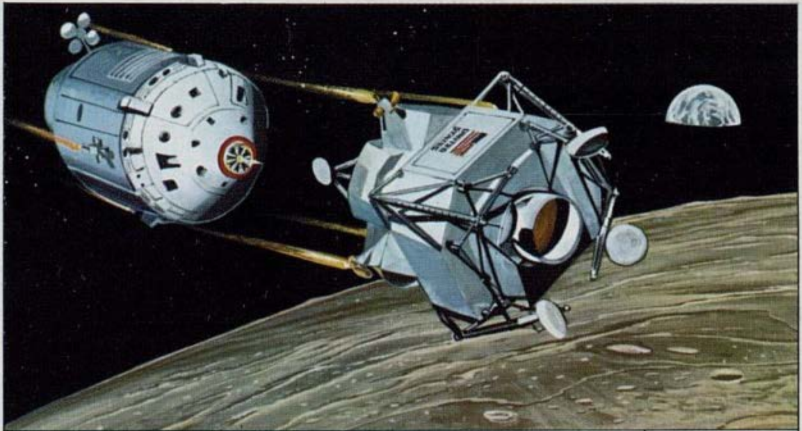
2ª SERIE - N. 326

COME SIAMO ANDATI SULLA LUNA - 3 - Si stacca il LEM con i due Astronauti

La passeggiata lunare si conclude. Armstrong scattata un'ultima fotografia al cratere che avevano sorvolato, risale, preceduto da Aldrin la scaletta che porta all'abitacolo. Il portello del LEM si chiude dopo 2 ore e 20 minuti di passeggiata lunare « E' stato molto meno che giocare una partita di football » dice Armstrong che non si sente per niente affaticato. Prima di lasciare la Luna i due astronauti aprono di nuovo il portello e gettano sulla superficie lunare gli zaini e altre cose ormai inservibili per il rientro a terra. Bisogna ora azionare i motori per l'ascesa, il momento è particolarmente emozionante perchè se per qualsiasi motivo questa manovra non riuscisse non ci sarebbe più ritorno a Terra per i due astronauti. Ma il razzo si accende regolarmente e con una graduale accelerazione la parte superiore del LEM abbandona la superficie del satellite. Gli astronauti portano con se circa 22 chili di rocce lunari e lasciano sulla Luna, oltre agli strumenti scientifici, la bandiera americana e lo stadio di discesa del LEM con una targa che porta incisa la frase « VENIAMO IN PACE PER TUTTO IL GENERE UMANO ».

grafiche emme/print - milano

Brooke Bond Liebig Italiana S.p.A. - Milano



COME SIAMO ANDATI SULLA LUNA - 6 - Lo sgancio del LEM

Brooke Bond Liebig Italiana S.p.A. - Milano

J. v. Liebig

1ª SERIE - N. 320

COME SIAMO ANDATI SULLA LUNA - 6 - Lo sgancio del LEM

L'astronave, attraversata la zona neutra che segna il punto in cui i campi gravitazionali della Terra e della Luna si compensano, si dispone ad inserirsi in orbita lunare.

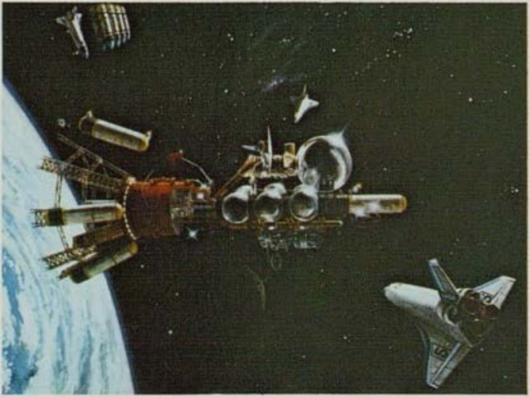
Acceso il retrorazzo dell'Apollo per rallentarne la corsa si ruota intorno alla Luna alla velocità di 5.600 Km. all'ora compiendo una rivoluzione completa ogni 2 ore ad un'altezza dalla superficie lunare di 145 Km.

Armstrong e Aldrin si trasferiscono nel MODULO LUNARE e dopo aver nuovamente controllato le apparecchiature ricevono il « GO » dal centro di Houston per l'inizio dell'operazione.

Si stendono le gambe del LEM, si rimettono a posto i sistemi di aggancio con il Modulo di Comando, infine si richiudono i boccaporti a tenuta stagna.

Alle ore 18,56 del 20 luglio 1969 dopo la 13ª orbita lunare il LEM si stacca dal Modulo di Comando in cui è rimasto l'astronauta Collins; inizia l'operazione discesa.

grafiche rekord



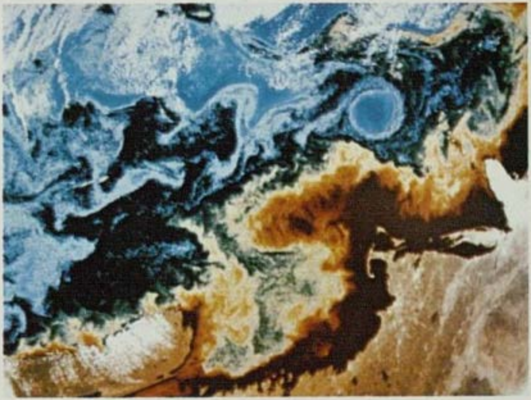
Tom Thumb EXPLORATION OF SPACE

SERIES OF 32 **Future Space Station** No. 32

The immediate role of America's space shuttles – at the moment there are plans to build four – is that of cargo carrying vehicles that can place satellites into orbit and which can act as science platforms in relatively low Earth orbit, where non-astronaut scientists can work in "shirt-sleeve" conditions.

There are many plans for vast space stations in the further future but what form these will take and when they will be constructed is open to speculation. Certainly, in the recent past, the Russians have been far more active than the Americans in gaining practical experience in this area with their Salyut space stations. Nonetheless NASA is now actively studying space station concepts. This is one artist's impression of such a future station under construction, built partly with shuttle expended fuel tanks. At least four shuttles can be seen ferrying supplies to the station.

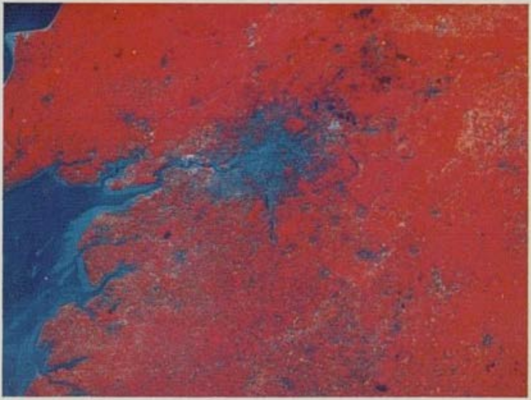
Picture courtesy of N.A.S.A.



Tom Thumb
EXPLORATION OF SPACE

SERIES OF 32 **Nimbus Colour Image** No. 31

NASA's Nimbus 7 satellite is a research vehicle for studying the Earth's atmosphere and oceans. One of the instruments carried is the Coastal Zone Colour Scanner (CZCS) which, by discriminating between different colours of ocean water, allows scientists to map, for example, chlorophyll concentrations. Plankton use chlorophyll for photosynthesis; fish feed on plankton; so locating chlorophyll-rich areas of the ocean is of great importance to fishing fleets.
This is a CZCS image of the coast of the North Eastern United States with the Atlantic Ocean to the east. In this picture, different characteristics of coastal and ocean water are given an entirely arbitrary colour. The dark brown area immediately offshore indicates the chlorophyll-rich water but further research has now shown that the area where dark red changes to orange is richer still in fish life.
The darker blue area, further out in the Atlantic, marks the nutrient-poor Gulf Stream. *Picture courtesy of N.A.S.A.*



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EXPLORATION OF SPACE

SERIES OF 32 **London Infra-red** No. 30

Since 1972 the surface of the Earth has been studied in detail by a number of NASA satellites called Landsats. Orbiting at a height of about 575 miles, their instruments are dedicated to increasing greatly our knowledge of geology, hydrology, land-use and so on.

Many of the images transmitted are in what is called "false" colour: this is not natural colour but shows the visible infra-red being emitted by natural and man-made objects on the Earth's surface.

This picture, centred on London, is a "false" colour image where the widespread red colour on the surface indicates flourishing crops and natural vegetation during the summer of 1975, when the picture was taken. The London area and other much smaller towns appear as grey/blue and the sea (which largely absorbs infra-red except where there are sand dunes or mud flats in coastal regions) as blue/black.

Picture courtesy of N.A.S.A.

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EXPLORATION OF SPACE

SERIES OF 32 No. 29

Earth

When journeying to the Moon, at least some of the Apollo astronauts were struck by the fragile-looking nature of the Earth. This picture is without doubt the most detailed and perfect colour image of a full disc Earth obtained in the space age to date. It was secured by the Apollo 17 crew from some 21,000 miles away on the outward journey to the Moon in December 1972.

The continent of Africa fills much of the upper half of the disc but, because it was summer in the southern hemisphere, a clear view of much of Antarctica was also obtained.

While there is considerable hard scientific knowledge to be gained from studying such a picture, the delicate beauty of our "blue planet" cannot help but appeal to the heart and the emotions too.

Picture courtesy of N.A.S.A.

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SERIES OF 32

No. 28

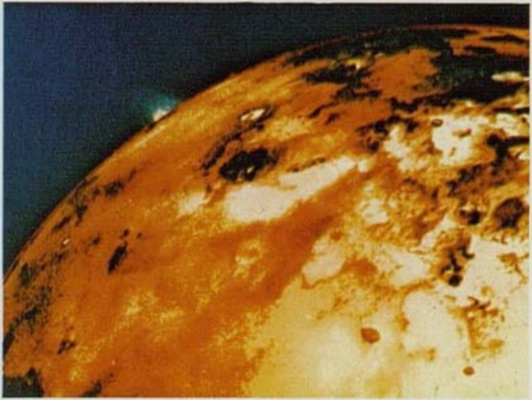
Saturn

In November 1980 and August 1981 respectively, the Voyager 1 and 2 spacecraft flew by the beautifully ringed planet of Saturn. This was one of the best views of the entire planet, obtained by Voyager 2 on 21st July 1981 from a range of 21 million miles.

The zones and belts of Saturn's clouds are not as distinctly and as brightly coloured as those of Jupiter but nonetheless considerable detail in the atmosphere can be distinguished, including two bright cloud patterns in the mid-northern hemisphere.

Two of Saturn's satellites, Rhea and Dione, appear as blue dots to the south and south east (bottom right) of the planet. Whereas only a few broad separate rings can be seen from Earth, the cameras and other instruments aboard the Voyagers revealed literally hundreds upon hundreds of separate rings.

Picture courtesy of N.A.S.A.



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SERIES OF 32 **Volcano on Io** No. 27

The brilliantly successful Voyager missions to Jupiter and Saturn brought to an end an intense period of planetary exploration.

The two spacecraft – largely automated vehicles operating years after launch and hundreds of millions of miles away from the control centre at the Jet Propulsion Laboratory in California – radioed back vast quantities of data and thousands of detailed pictures.

One of the most exciting surprises for the scientists was the discovery of active volcanoes on Io (one of Jupiter's four major satellites), the first observation of current volcanic activity on a body other than the Earth in the solar system.

This image was taken by Voyager 1 from a distance of 300,000 miles on 4th March 1979. An enormous volcanic explosion can be seen silhouetted against the darkness of space on the limb (or edge) of Io, with solid material being thrown up to a height of about 100 miles. *Picture courtesy of N.A.S.A.*

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SERIES OF 32 **Venus** No. 26

Because of superficial similarities, Venus used to be regarded as the "Sister Planet" of the Earth. It is, however, more akin to Dante's Inferno with a temperature at the surface of around 900°F, a carbon dioxide atmosphere almost one hundred times as dense as that of Earth and clouds composed of sulphuric acid droplets.

The planet has been the subject of intensive study by American and Soviet spacecraft and NASA's Pioneer Orbiter (which reached Venus in December 1978) is still operating. Seen from Earth, the cloud shrouded planet is largely featureless but in the ultra-violet, as shown in this Pioneer image, distinct markings are shown up within the clouds.

The spacecraft has radar instrumentation aboard which, in conjunction with data from radio telescopes on Earth, has enabled the surface to be mapped despite the clouds. A number of distinct, elevated, continent-sized regions have now been identified.

Picture courtesy of N.A.S.A.

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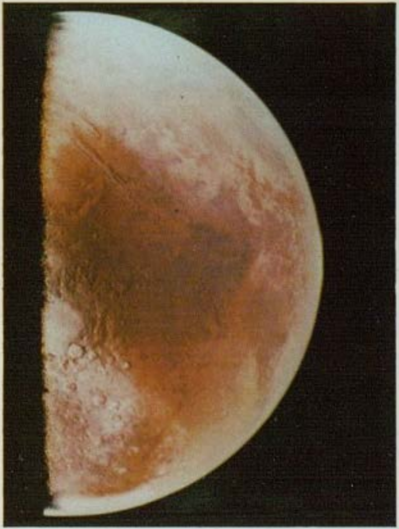

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SERIES OF 32 | No. 25

Mars

In 1976 two NASA Viking lander-orbiter spacecraft arrived at Mars. The landers' major task was to conduct a search for possible forms of micro-organic life on the planet. The results of these experiments were inconclusive but vast amounts of geological, meteorological and other scientific information were returned by radio to Earth.

The orbiters supported the landers during their operations and also conducted their own imaging programme. Seen here from 200,000 miles away, Viking Orbiter 1 recorded Mars as indeed a "Red Planet".

Part of the huge (approximately 3,000 miles long) Valles Marineris can be seen towards the bottom left whilst to its right is Argyre, a large impact basin, whose brightness has been attributed either to haze or ground frost.

Picture courtesy of N.A.S.A.

Issued by John Player & Sons, Imperial Group plc.

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SERIES OF 32 No. 24

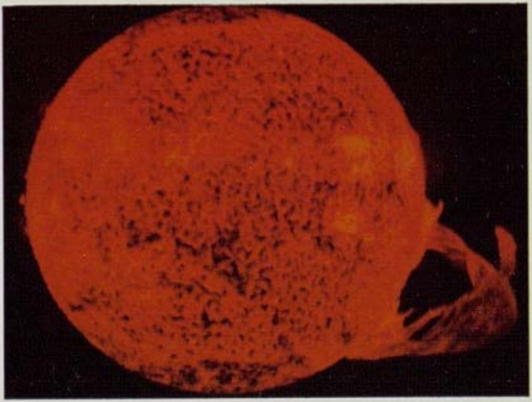
Comet Kohoutek

Comet Kohoutek, which reached its closest point to the Sun in December 1973, was a major disappointment for those who had been led to believe it would be one of the most spectacular comet sightings for many years.

But the last crew of astronauts aboard Skylab had a superb view. One of the cameras they used to photograph it recorded not visible light wavelengths but those in the far ultra-violet region of the spectrum. This has yielded valuable additional information about the composition of comets, which scientists now believe to be basically ice and dust ("dirty snow balls").

This "false" colour enhancement was produced from a black and white original picture obtained during a space walk outside Skylab on Christmas Day 1973. The tail of the Comet streams for some 3 million miles and a number of stars in the background constellation Sagittarius also appear in the image.

Picture courtesy of US Naval Research Laboratory



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SERIES OF 32 — No. 23

The Sun

The Earth's atmosphere nurtures and protects life on the surface from harmful radiations from space – but it is also a great impediment to astronomers and other scientists studying the Sun, the planets and beyond.

From an altitude of 270 miles, however, the telescopes aboard Skylab had an unrestricted view and this is just one of some 180,000 solar images obtained. A record of extreme ultra-violet radiation emitted from the Sun by ionised helium, the picture shows a spectacular prominence spanning more than 350,000 miles across the top left of the solar surface and acknowledged to be one of the largest for two decades. The prominence is believed to be a twisted sheet of gas in the process of unwinding itself.

The poles of the Sun are much darker in tone than large areas of the central disc but several very active, brighter regions are located to the lower right of the prominence.

Picture courtesy of US Naval Research Laboratory

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NASA
United States

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EXPLORATION OF SPACE

SERIES OF 32 — No. 22

Columbia Landing

At the conclusion of their two day mission, astronauts John Young (a Gemini and Apollo veteran) and Bob Crippen bring the first ever reusable space vehicle, Columbia, back to a perfect landing in California's Mojave Desert.

In a typical descent from orbit during the early test missions, the shuttle's orbital manoeuvring system engines were fired over the Indian Ocean and it began to encounter the atmosphere 4,000 miles away from the landing site in California. In the ensuing half an hour, the craft flew a complex pattern of manoeuvres, partly controlled by the crew and partly by computers. This required extreme accuracy, since the vehicle is not powered by engines from the moment it commences descent from orbit and is in fact a high speed glider. Thus there is only one chance to land successfully.

Picture courtesy of N.A.S.A.

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SERIES OF 32 No. 21

Space Shuttle Launch

Most space missions have used launchers which are expendable and manned spacecraft have been so damaged during return to the Earth's surface that their only subsequent use was for display in museums.

A new era began on 12th April 1981 (20 years to the day after Yuri Gagarin's first ever flight in space) when NASA's space shuttle Columbia lifted off from the Kennedy Space Centre. The shuttle – as its name suggests – is a reusable spacecraft which goes into orbit powered by two solid rocket boosters and its own three main engines. It subsequently flies back to the surface for an (almost) conventional landing.

The solid rocket boosters parachute into the sea and can be refurbished for later flights; the only element of the launch vehicle which is expended currently is the tank containing the shuttle engines' supply of oxygen and hydrogen.

Picture courtesy of N.A.S.A.

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SERIES OF 32 — No. 20

Soyuz Spacecraft

The Soviet Soyuz 19 spacecraft photographed from the American Apollo command module during the joint mission of July 1975.

The two craft were docked for almost forty eight hours. Soviet mission pictures were (and still are) limited in number, so a close-up detailed view like this is of great interest. The three major components of the Soyuz (from right to left) are the spherically shaped orbital module, the bell shaped descent vehicle and the cylindrically shaped instrument assembly module from which two solar array panels protrude.

Green insulation material covers much of the vehicle. Extending from the extreme right are docking ring guides, while the two white discs are TV, radio and trajectory measuring antennae. The vehicle was some twenty six feet long with a width across the solar panels of twenty seven feet.

Picture courtesy of N.A.S.A.

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EXPLORATION OF SPACE

SERIES OF 32 No. 19

Apollo/Soyuz Mission

July 1975 witnessed an historic event when an American Apollo spacecraft and a Russian Soyuz counterpart docked in space – the first occasion on which manned vehicles of two nations had met in orbit.

Detailed planning of the mission began after a visit of the then President Nixon to Moscow in 1972. When cosmonauts Aleksei Leonov and Valeri Kubasov lifted off from the launch complex in Soviet Central Asia on the afternoon of 15th July, another record was set, since this was the first time that a Soviet launch had been televised live. The launcher/spacecraft combination pictured here was over 160 feet in height and was held by four support arms until just before ignition. Total initial thrust was 1,130,000 lbs.

Picture courtesy of N.A.S.A./Soviet Academy of Sciences

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EXPLORATION OF SPACE

SERIES OF 32

No. 18

Weightless Conditions

The Skylab missions of 1973/1974 – when three crews each of three men occupied the vehicle for a total duration of over 170 days – were important for three principal reasons. They demonstrated that man could undergo lengthy periods in the weightless conditions of space and return to Earth without serious problems; they conducted a study of the Sun through special telescopes which revolutionised knowledge of our nearest star; and they took over 46,000 pictures of the Earth's surface – many of which are still being studied today.

But it was not always serious work. In this picture, zero gravity enables astronaut Gerald Carr to pose as a strongman as he appears to lift fellow astronaut Ed Gibson on the tip of one finger.

Picture courtesy of N.A.S.A.

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EXPLORATION OF SPACE

SERIES OF 32 No. 17

Skylab

The U.S. Skylab space station pictured in orbit as the last of its three visiting crews left it to return to Earth in February 1974.

The cluster was just over 118 feet in length, weighed almost 200,000 lbs, and the working space within was equal to that of a three roomed house.

The vehicle was damaged during launch in May 1973: one entire solar "wing" (generating electricity) was torn away and damage to the outside of the main workshop area required astronauts to erect plastic sheeting to protect the interior from the Sun's heat. Both the plastic coverings and the absence of a solar array on the left are noticeable in this picture.

The windmill shaped array panels provided power for solar telescopes.

Picture courtesy of N.A.S.A.

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SERIES OF 32 No. 16

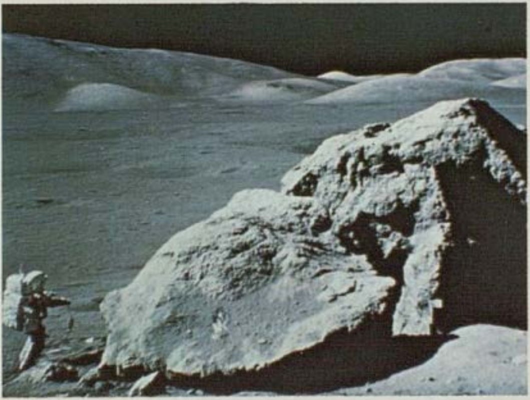
Apollo 17 Return

The Apollo 17 command module nears the surface of the sea beneath three fully opened parachutes, a little over half a mile from the targeted splashdown area. This was a scene always greeted with great delight, if not relief, by the flight controllers at mission control in Houston.

The flight path of the returning modules needed to be within critical limits for the crews to be safe. The Earth's atmosphere was encountered at a height of about 400,000 feet and at a speed of some 25,000 mph. The angle of the spacecraft's flight through the atmosphere was varied to control descent rate and the intense heat generated by friction was reduced sufficiently for safety by an ablative shield on the forward end of the module.

Each of the three main parachutes was over 80 feet in diameter and two were sufficient for a safe, if hard, landing.

Picture courtesy of N.A.S.A.



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SERIES OF 32 No. 15

Lunar Surface

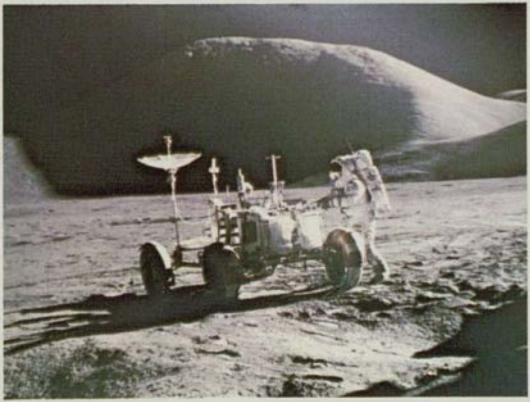
December 1972 – and during the Apollo 17 mission to the Taurus Littrow region of the Moon, astronauts leave their bootprints in the lunar dust for the last time at the conclusion of this historic period of exploration.

This picture is a reminder of the totally different nature of the lunar surface compared with that of Earth. Beneath the black sky there are none of the bright colours, vegetation and ubiquitous signs of man's presence. Alongside an enormous fragmented boulder, scientist-astronaut Harrison Schmitt conducts geological work.

The achievements of Apollo 17 demonstrate the development in missions since Apollo 11: five times as many rocks by weight were brought back in December 1972 and the astronauts spent almost ten times longer out on the lunar surface.

Picture courtesy of N.A.S.A.

Issued by John Player & Sons, Imperial Group plc.



Tom Thumb
EXPLORATION OF SPACE

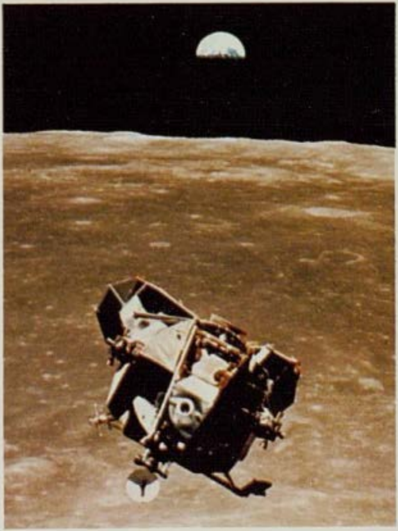
SERIES OF 32 No. 14

Moon Rover

During their relatively short stay on the lunar surface, Apollo astronauts fought a continual battle with time. The last three Apollo lunar landing missions benefited greatly from the provision of an electrically powered, four wheeled vehicle – the lunar rover. The rover enabled astronauts to carry more geological equipment and specimens and to cover more ground. However, mission safety rules required that they always be close enough to the lunar module to be able to walk back before their space suit oxygen was exhausted, should the lunar rover break down.

Here Apollo 15 astronaut James Irwin works by the rover, with the magnificent Mount Hadley rising behind him. A colour TV camera, which could be remotely controlled from Houston, aboard the rover enabled the lift-off of the ascent stage of the lunar module during each of the last three Apollo missions to be shown live.

Picture courtesy of N.A.S.A.



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EXPLORATION OF SPACE

SERIES OF 32

Leaving the Moon

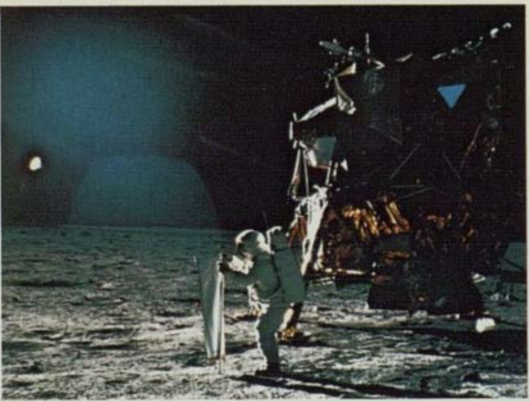
No. 13

After 21 hours 37 minutes on the lunar surface, Armstrong and Aldrin fired the engine of the ascent stage of the Apollo 11 lunar module Eagle and, using the descent stage as a launch pad, climbed into orbit to rendezvous and dock with the command module Columbia.

Michael Collins, in Columbia, took this picture of Eagle as the two craft manoeuvred prior to docking. This took place on the far side of the Moon and over seven hours later, with Eagle having been cast off, the engine of the service module was fired to begin the journey home.

Throughout history, epics of exploration could not be seen directly by the ordinary public: the most that could be hoped for were subsequent artist sketches and eventually photographs. Through the medium of television, however, the epoch-making activities of Apollo 11 were observed back on Earth (which here appears at the top of the picture) by an audience estimated at 500 million people.

Picture courtesy of N.A.S.A.



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SERIES OF 32 No. 12

Lunar Experiments

While on the lunar surface, Apollo 11 astronauts Neil Armstrong and "Buzz" Aldrin collected around 50 lbs (Earth weight) of lunar rocks and soil, described the lunar topography in some detail and set up scientific experiments.

The two main experiments were placed up to 80 feet south of the lunar module to prevent damage during lift-off. One was a seismometer, sensitive enough to pick up the impact of the astronauts' boots, and the other a laser reflector to provide precise information on the Moon's distance from Earth.

Here – with the Sun shining out of an atmosphereless sky – Aldrin sets up a third experiment which was to be brought back to Earth: a sheet of aluminium foil is positioned to trap particles of the solar wind which reaches the lunar surface, but not that of Earth, because of our planet's magnetic field.

Picture courtesy of N.A.S.A.

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EXPLORATION OF SPACE

SERIES OF 32 No. 11

"Buzz" Aldrin

If one image only from the exploration of the Moon – indeed from spaceflight history so far – had to be selected to typify the endeavour, this would be the most popular choice. Neil Armstrong took many fine colour pictures of Aldrin while they were working on the lunar surface but this is the classic image which has been reprinted time and time again.

Aldrin wears his space suit ("Extravehicular Mobility Unit" in the jargon) and on his back is the pack supplying him with suit pressurisation, oxygen – which was recycled through the suit – and coolant liquids. Hoses connect the back pack to the suit. Reflected in the convex visor of "Buzz" Aldrin's helmet are the lunar module Eagle, Neil Armstrong taking the picture, Aldrin's own shadow, the U.S. flag and the black and white TV camera.

Picture courtesy of N.A.S.A.

Tom Thumb
EXPLORATION OF SPACE

SERIES OF 32 No. 9

Moon Lift-off

16th July 1969 – and a Saturn V rocket begins the journey that will carry Apollo 11 astronauts Neil Armstrong, "Buzz" Aldrin and Michael Collins to the Moon.

The awe-inspiring power unleashed by Saturn V at launch has never been rivalled and, although the vehicle is now an item of space history, will never be forgotten by any who witnessed a launch in person at the Kennedy Space Centre.

The three stage rocket stood over 360 feet high and the thrust of its first stage was 7.6 million lbs. This accelerated the approximately 45 tons of space vehicle and crew to over 6,000 mph and an altitude of around 40 miles before shutting down. Second and third stages combined to place the spacecraft making the journey to the Moon in orbit at an initial speed of some 17,500 mph.

Picture courtesy of N.A.S.A.

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EXPLORATION OF SPACE

SERIES OF 32 No. 10

Neil Armstrong

Late on the night of Sunday 20th July 1969 (U.S. time) Neil Armstrong set foot on the Moon as the representative of the 300,000 people in American industry, government and universities who had made the project possible, and also of mankind.

Armstrong walked on the surface for a little over 2½ hours, his lunar module pilot "Buzz" Aldrin for some 40 minutes less. Orbiting above, command module pilot Mike Collins kept up a lonely vigil.

Armstrong is shown here inside the lunar module on the Moon's surface. This is a rare view of the Apollo 11 commander for, during his activities out on the lunar surface, he operated the one Hasselblad still camera all of the time. So the historic pictures from the lunar surface that we traditionally see show Aldrin only and not "the first man on the Moon".

Picture courtesy of N.A.S.A.

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SERIES OF 32 — No. 8

Apollo 9 CM

The Apollo command and service modules (shown here during the Apollo 9 mission) and the lunar module performed very different functions and their appearance reflected this.
The lunar module was built to fly down to and up from the surface of the Moon, which has no atmosphere effectively and only one sixth the gravity of Earth. Therefore the LM did not need to have an aerodynamic shape, nor did it need to be structurally robust enough to withstand gravity at the Earth's surface.
The service/command modules differed greatly: they supplied life-sustaining "consumables" such as oxygen and water for the crew throughout the whole mission and the CM had to withstand the intense heat of re-entry into the Earth's atmosphere. The CM was thus as aerodynamic and symmetrical in shape as the LM was ungainly and asymmetrical.

Picture courtesy of N.A.S.A.

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SERIES OF 32 No. 7

Apollo Tests in Orbit

NASA followed a careful programme of step-by-step trials before man was to land on the Moon. Thus the Apollo 9 mission in March 1969 tested the (initially) strange looking lunar module in the relative safety of Earth orbit before the same tests were conducted by Apollo 10 in orbit around the Moon some weeks later.

This picture was taken from the hatchway of the lunar module "Spider" and shows in the foreground the top sections of the LM (with hand rails to aid space walking) which is still docked with the command and service modules. Astronaut Dave Scott stands in the open hatchway of the command module with a beautiful sweep of Earth in the background.

Besides the crucial testing of the LM, Apollo 9 conducted an intensive and successful programme of Earth photography.

Picture courtesy of N.A.S.A.

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SERIES OF 32 No. 5

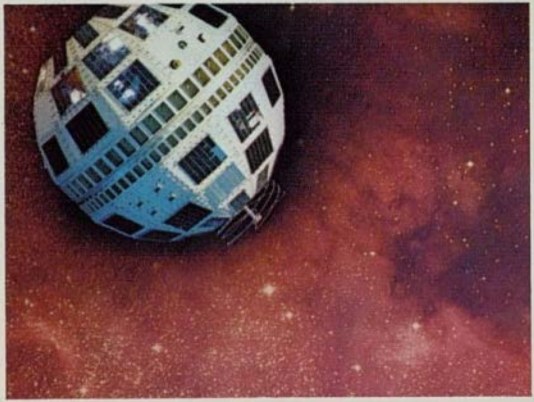
Space Walk

NASA's Project Gemini (1965–1966) tested important procedures which had to be perfected before man could journey to the moon, land there and return safely during Project Apollo. Gemini spacecraft therefore practised rendezvous and docking with other vehicles in space.

The astronauts also "walked" in space outside their vehicles to show that, protected by special suits, man was not only safe in the dangerous environment of space but, given adequate equipment, could perform useful work.

America's first space walk took place during the Gemini 4 mission in June 1965. Astronaut Ed White spent over twenty minutes outside the spacecraft, from which his suit was pressurised and supplied with oxygen and coolants through an umbilical cord. Shown in White's hands is a small manoeuvring unit on top of which is a 35mm camera.

Picture courtesy of N.A.S.A.



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SERIES OF 32 **Telstar** No. 4

Viewing a major sporting event or a war as it happens on television is made possible by modern communications satellites, which can handle 12,000 simultaneous telephone conversations each and carry several TV transmissions. Illustrated here, Telstar 1 – whose delightfully sounding name was subsequently celebrated in a very popular musical composition – may be regarded as the first true communications satellite. Launched on 10th July 1962, the small 170 lbs satellite (compared with the 4,300 lbs weight of some contemporary satellites) relayed the first TV pictures westward to the U.S. from Britain and France just over twenty years ago. Subsequently, on 23rd July 1962, audiences on both sides of the Atlantic watched the first international exchange of a live TV programme via the satellite. In well under a year, however, the first Telstar had been disabled by radiation in space – but not before it had inaugurated a revolution in modern communications.

Picture courtesy of N.A.S.A.

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SERIES OF 32 No. 3

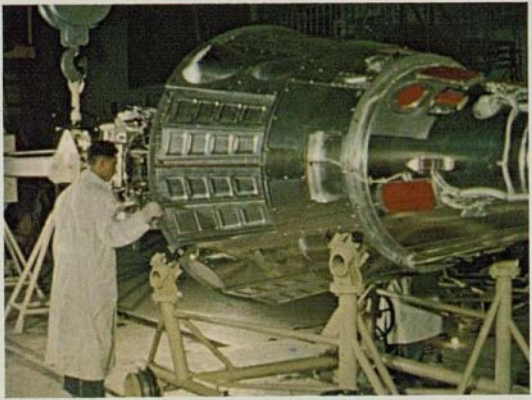
Yuri Gagarin

Following on from their successes in orbiting the world's first man-made satellites, the Russians opened the era of manned space flight on 12th April 1961 when Soviet air force major Yuri Gagarin was launched for a one orbit mission lasting 108 minutes and covering a distance of 25,400 miles.

The flight was an enormous boost for the Soviet space programme and for the Soviet system – both facts being fully exploited by the Soviet authorities. The handsome, frequently smiling Gagarin made a splendid ambassador for his country as he subsequently toured the world. Gagarin (who died in a training flight at the early age of 34) is seen here in a spacecraft trainer.

America's first orbital flight – by John Glenn in a Mercury spacecraft – did not take place until 20th February 1962.

Picture courtesy of TASS



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SPACE

SERIES OF 32 | No. 2

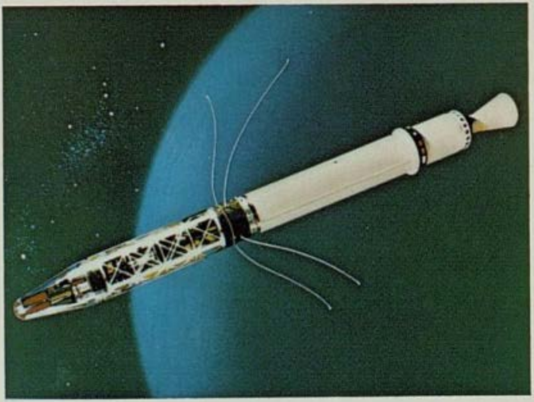
Sputnik 3

A total of ten Sputnik satellites were launched by the Soviet Union. The trail-blazing Sputnik 1 weighed a mere 184 lbs but Sputnik 3 (shown here) weighed well over a ton and later versions were as heavy as 14,000 lbs.

In the early years of space flight, the Soviet space authorities had available to them far more powerful launchers than the Americans, thus enabling them to put these heavy payloads into space. In order to keep pace, the Americans were compelled to concentrate on miniaturisation and sophistication in their payloads, the benefits of which they still enjoy to this day.

The Sputniks were used to prepare the way for man in space by the use of dogs, to conduct atmospheric and other research tests and to support the early Soviet flights to Venus. Sputnik 3, launched on 15th May 1958, eventually spent almost two years in orbit.

Picture courtesy of TASS



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EXPLORATION OF SPACE

SERIES OF 32 No. 1

Explorer 1

The space age dawned on 4th October 1957 when signals from the Soviet Union's Sputnik 1 satellite announced its presence in orbit.

Explorer 1 (illustrated here) was the American reply to the Soviet initiative. Responsibility for progressing the American satellite had been given to the former V2 rocket specialist, Wernher von Braun. He used a development of the Jupiter-C missile to successfully launch Explorer 1 into orbit on 31st January 1958.

U.S. technology produced far more versatile and compact vehicles than the heavy Soviet satellites and their scientific returns were high. Explorer 1, for example, made a major contribution by confirming the existence of radiation belts around the Earth, as predicted by and then named after Dr. James Van Allen.

Picture courtesy of N.A.S.A.

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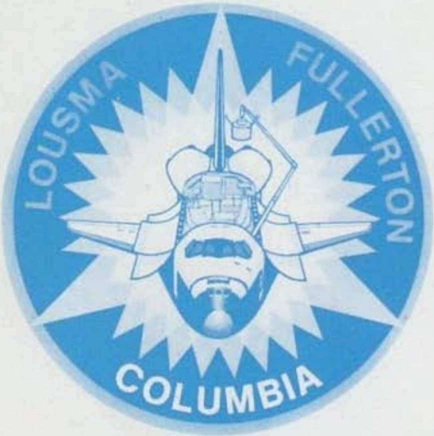

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