

# NASA Major Launch Record

1958

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
<b>1958</b>								<b>1958</b>
Pioneer I (U) Eta I	Thor-Able I 130 (U)	Oct 11		DOWN OCT 12, 1958			34.2	Measure magnetic fields around Earth or Moon. Error in burnout velocity and angle; did not reach Moon. Returned 43 hours of data on extent of radiation band, hydromagnetic oscillations of magnetic field, density of micrometeors in interplanetary space, and interplanetary magnetic field.
Beacon I (U)	Jupiter C (U)	Oct 23		DID NOT ACHIEVE ORBIT			4.2	Thin plastic sphere (12-feet in diameter after inflation) to study atmosphere density at various levels. Upper stages and payload separated prior to first-stage burnout.
Pioneer II (U)	Thor-Able I 129 (U)	Nov 8		DID NOT ACHIEVE ORBIT			39.1	Measurement of magnetic fields around Earth or Moon. Third stage failed to ignite. Its brief data provided evidence that equatorial region about Earth has higher flux and higher energy radiation than previously considered.
Pioneer III (U)	Juno II (U)	Dec 6		DOWN DEC 7, 1958			5.9	Measurement of radiation in space. Error in burnout velocity and angle; did not reach Moon. During its flight, discovered second radiation belt around Earth.
<b>1959</b>								<b>1959</b>
Vanguard II (U) Alpha 1	Vanguard (SLV-4) (U)	Feb 17	122.8	3054	557	32.9	9.4	Sphere (20 inches in diameter) to measure cloud cover. First Earth photo from satellite. Interpretation of data difficult because satellite developed precessing motion.
Pioneer IV (S) Nu 1	Juno II (S)	Mar 3		HELIOCENTRIC ORBIT			6.1	Measurement of radiation in space. Achieved Earth-Moon trajectory; returned excellent radiation data. Passed within 37,300 miles of the Moon on March 4, 1959.
Vanguard (U)	Vanguard (SLV-5) (U)	Apr 13		DID NOT ACHIEVE ORBIT			10.6	Payload consisted of two independent spheres: Sphere A contained a precise magnetometer to map Earth's magnetic field, Sphere B was a 30-inch inflatable sphere for optical tracking. Second stage failed because of damage at stage separation.
Vanguard (U)	Vanguard (SLV-6) (U)	Jun 22		DID NOT ACHIEVE ORBIT			9.8	Magnesium alloy sphere (20 inches in diameter), to measure solar-Earth heating process which generates weather. Faulty second-stage pressure valve caused failure.
Explorer (S-1) (U)	Juno II (U)	Jul 16		DID NOT ACHIEVE ORBIT			41.5	To measure Earth's radiation balance. Destroyed by Range Safety Officer 5-1/2 seconds after liftoff; failure of power supply to guidance system.

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Explorer 6 (S-2) (S) Delta 1	Thor-Able III 134 (S)	Aug 7		DOWN PRIOR TO JULY 1961			64.4	Carried instruments to study particles and meteorology. Helped in the discovery of three radiation levels, a ring of electric current circling the Earth, and obtained crude cloud cover images.
Beacon II (U)	Juno II (U)	Aug 14		DID NOT ACHIEVE ORBIT			4.5	Thin plastic inflatable sphere (12-feet in diameter) to study atmosphere density at various levels. Premature fuel depletion in first stage caused upper stage malfunction.
Big Joe (Mercury) (S)	Atlas 10 (S)	Sep 9		SUBORBITAL FLIGHT				Suborbital test of the Mercury Capsule. Capsule recovered successfully after reentry test. (WFF)
Vanguard III (S) Eta 1	Vanguard (SLV-7) (S)	Sep 18	127.4	3417	512	33.4	45.4	Solar-powered magnesium sphere with magnetometer boom; provided a comprehensive survey of the Earth's magnetic field, surveyed location of lower edge of radiation belts, and provided an accurate count of micrometeorite impacts. Last transmission December 8, 1959.
Little Joe 1 (S)	Little Joe (L/V #6) (S)	Oct 4		SUBORBITAL FLIGHT				Suborbital test of the Mercury Capsule to qualify the booster for use with the Mercury Test Program.
Explorer 7 (S-1a) (S) Iota 1	Juno II (S)	Oct 13		DOWN JULY 16, 1959			41.5	Provided data on energetic particles, radiation, and magnetic storms. Also recorded the first micrometeorite penetration of a sensor.
Little Joe 2 (S)	Little Joe (L/V #1A) (S)	Nov 4		SUBORBITAL FLIGHT				Suborbital test of Mercury Capsule to test the escape system. Vehicle functioned perfectly, but escape rocket ignited several seconds too late. (WFF)
Pioneer P-3 (U)	Atlas-Able 20 (U)	Nov 26		DID NOT ACHIEVE ORBIT			168.7	Lunar Orbiter Probe; payload shroud broke away after 45 seconds.
Little Joe 3 (S)	Little Joe (L/V #2)(S)	Dec 4		SUBORBITAL FLIGHT				Suborbital test of the Mercury Capsule, included escape system and biomedical tests with monkey (Sam) aboard, to demonstrate high altitude abort at max q. (WFF)
<b>1960</b>								<b>1960</b>
Little Joe 4 (S)	Little Joe (L/V #1B)(S)	Jan 21		SUBORBITAL FLIGHT				Suborbital test of Mercury Capsule included escape system and biomedical test with monkey (Miss Sam) aboard. (WFF)
Pioneer V (P-2) (S) Alpha 1	Thor-Able IV 219 (S)	Mar 11		HELIOCENTRIC ORBIT			43.0	Sphere, 26 inches in diameter, to investigate interplanetary space between orbits of Earth and Venus; test long-range communications; and determine strength of magnetic fields.
Explorer (S-46) (U)	Juno II (U)	Mar 23		DID NOT ACHIEVE ORBIT			16.0	Analyze electron and proton radiation energies in a highly elliptical orbit. Telemetry lost shortly after first stage burnout; one of the upper stages failed to fire.

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Tiros I (S) Beta 2	Thor-Able II 148 (S)	Apr 1	98.3	695	658	48.4	122.5	First successful weather-study satellite. Demonstrated that satellites could be used to survey global weather conditions and study other surface features from space. Transmitted 22,952 good-quality cloud-cover photographs.
Scout X (U)	Scout X (U)	Apr 18		SUBORBITAL FLIGHT				Suborbital Launch Vehicle Development Test with live first and third stages. Vehicles broke up after first-stage burnout.
Echo A-10 (U)	Thor-Delta (1) (U)	May 13		DID NOT ACHIEVE ORBIT			75.3	100-foot passive reflector sphere to be used in a series of communications experiments. During coast period, attitude control jets on second stage failed.
Scout I (S)	Scout 1 (S)	Jul 1		SUBORBITAL FLIGHT				Launch Vehicle Development Test; first complete Scout vehicle. (WFF)
Mercury (MA-1) (U)	Atlas 50 (U)	Jul 29		DID NOT ACHIEVE ORBIT				Suborbital test of Mercury Capsule Reentry. The Atlas exploded 65 seconds after launch.
Echo I (A-11) (S) Iota 1	Thor-Delta (2) (S)	Aug 12		DOWN MAY 24, 1968			75.3	First passive communications satellite (100-foot sphere). Reflected a pre-taped message from President Eisenhower across the Nation, demonstrating feasibility of global radio communications via satellite.
Pioneer (P-30) (U)	Atlas-Able 80 (U)	Sep 25		DID NOT ACHIEVE ORBIT			175.5	Highly instrumented probe, in lunar orbit, to investigate the environment between the Earth and the Moon. Second stage failed due to malfunction in oxidizer system.
Scout II (S)	Scout 2 (S)	Oct 4		SUBORBITAL FLIGHT				Launch Vehicle Development Test; second complete Scout vehicle, reached an altitude of 3,500 mi. (WFF)
Explorer 8 (S-30) (S) Xi 1	Juno II (S)	Nov 3	102.5	1361	395	49.9	40.8	Contained instrumentation for detailed measurements of the ionosphere. Confirmed the existence of a helium layer in the upper atmosphere.
Little Joe 5 (U)	Little Joe (LV #5)(S)	Nov 8		SUBORBITAL FLIGHT				Suborbital test of Mercury Capsule to qualify capsule system. Capsule did not separate from booster. (WFF)
Tiros II (S) Pi 1	Thor-Delta (3) (S)	Nov 23	96.3	614	549	48.5	127.0	Test of experimental television techniques and infrared equipment for global meteorological information system.
Explorer (S-56) (U)	Scout 3 (U)	Dec 4		DID NOT ACHIEVE ORBIT			6.4	12-foot sphere to determine the density of the Earth's atmosphere. Second stage failed to ignite.
Pioneer (P-31) (U)	Atlas-Able 91 (U)	Dec 15		DID NOT ACHIEVE ORBIT			175.9	Highly instrumented probe, in lunar orbit, to investigate the environment between the Earth and the Moon. Vehicle exploded about 70 seconds after launch due to malfunction in first stage.
Mercury (MR-1A) (S)	Redstone (S)	Dec 19		SUBORBITAL FLIGHT				Unmanned Mercury spacecraft, in suborbital trajectory, impacted 235 miles down range after reaching an altitude of 135 miles and a speed of near 4,200 mph. Capsule recovered about 50 minutes after launch.

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				Apogee (km)	Perigee (km)	Incl (deg)		
<b>1961</b>								
Mercury (MR-2) (S)	Redstone (S)	Jan 31		SUBORBITAL FLIGHT			1315.0	Suborbital test of Mercury Capsule; 16-minute flight included biomedical test with chimpanzee (Ham) aboard.
Explorer 9 (S) Delta 1	Scout 4 (S)	Feb 16		DOWN APR 9, 1964			6.8	12-foot sphere to determine the density of the Earth's Atmosphere. First spacecraft orbited by an all-solid rocket. (WFF)
Mercury (MA-2) (S)	Atlas 67 (S)	Feb 21		SUBORBITAL FLIGHT			1315.0	Suborbital test of Mercury Capsule; upper part of Atlas strengthened by an 8-inch wide stainless steel band. Capsule recovered less than 1 hour after launch.
Explorer (S-45) (U)	Juno II (U)	Feb 24		DID NOT ACHIEVE ORBIT			33.6	Investigate the shape of the ionosphere. A malfunction following booster separation resulted in loss of payload telemetry; third and forth stages failed to ignite.
Little Joe 5A (U)	Little Joe (L/V #5A) (U)	Mar 18		SUBORBITAL FLIGHT			1315.0	Suborbital test of Mercury Capsule. Escape rocket motor fired prematurely and prior to capsule release. (WFF)
Mercury (MR-BD) (S)	Redstone (S)	Mar 24		SUBORBITAL FLIGHT			1315.0	Suborbital test of launch vehicle for Mercury flight to acquire further experience with booster before manned flight was attempted.
Explorer 10 (S) Kappa 1	Thor-Delta (4) (S)	Mar 25		DOWN JUN 1968			35.8	Injected into highly elliptical orbit. Provided information on solar winds, hydromagnetic shock waves, and reaction of the Earth's magnetic field to solar flares.
Mercury (MA-3) (U)	Atlas 100 (U)	Apr 25		DID NOT ACHIEVE ORBIT			907.2	Orbital flight test of Mercury capsule. Destroyed after 40 seconds by Range Safety Officer when the inertial guidance system failed to pitch the vehicle over toward the horizon.
Explorer 11 (S) Nu 1	Juno II (S) (4 stages)	Apr 27	14.5	1465	479	28.8	37.2	Placed in elliptical orbit to detect high energy gamma rays from cosmic sources and map their distribution in the sky.
Little Joe 5B (S)	Little Joe (L/V #5B)(S)	Apr 28		SUBORBITAL FLIGHT			1315.0	Suborbital flight test to demonstrate the ability of the escape and sequence systems to function properly at max q. (WFF)
Mercury (S) (Freedom 7)	Mercury- Redstone-3 (S)	May 5		SUBORBITAL FLIGHT LANDED MAY 5, 1961			1315.0	First manned suborbital flight with Alan B. Shepard, Jr. Pilot and spacecraft recovered after 15 minute 22 second flight.
Explorer (S-45a) (U)	Juno II (U)	May 24		DID NOT ACHIEVE ORBIT			33.6	Investigate the shape of the ionosphere. Second stage ignition system malfunctioned.
Meteoroid Sat A Explorer (S-55) (U)	Scout 5 (U)	Jun 30		DID NOT ACHIEVE ORBIT			84.8	Evaluate launch vehicle; investigate micrometeoroid impact and penetration. Third stage failed to ignite. (WFF)
Tiros III (S) Rho 1	Thor-Delta (5) (S)	Jul 12	100.0	791	723	47.9	129.3	Development of meteorological satellite system. Provided excellent photos and infrared data. Photographed many tropical storms during 1961 hurricane season; credited with discovering Hurricane Esther.

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Mercury (S) (Liberty Bell 7)	Mercury- Redstone-4 (S)	Jul 21		SUBORBITAL FLIGHT LANDED JUL 21, 1961			1470.0	Second manned suborbital flight with Virgil I. Grissom. After landing, spacecraft was lost but pilot was rescued from surface of water. Mission Duration 15 minutes 37 seconds.
Explorer 12 (S-3) (S) Upsilon 1	Thor-Delta (6) (S)	Aug 16		DOWN SEP 1963			37.6	First of a series to investigate solar winds, interplanetary magnetic fields, and energetic particles. Identified the Van Allen Belts as a magnetosphere.
Ranger I (U) Phi 1	Atlas-Agena B 111 (U)	Aug 23		DOWN AUG 30, 1961			306.2	Flight test of lunar spacecraft carrying experiments to investigate cosmic rays, magnetic fields, and energetic particles. Agena failed to restart, resulting in low Earth orbit.
Explorer 13 (U) Chi 1	Scout 6 (U)	Aug 25		DOWN AUG 28, 1961			84.8	Evaluate launch vehicle; investigate micrometeoroid impact and penetration. Third stage failed to ignite. (WFF)
Mercury (MA-4) (S) A-Alpha 1	Atlas 88 (S)	Sep 13		DOWN SEP 13, 1961			1224.7	Orbital test of Mercury capsule to test systems and ability to return capsule to predetermined recovery area after one orbit. All capsule, tracking, and recovery objectives met.
Probe A (P-21) (S)	Scout 7 (S)	Oct 19		SUBORBITAL FLIGHT				Vehicle test/scientific Geoprobe. Reached altitude of 4,261 miles; provided electron density measurements. (WFF)
Saturn Test (SA-1) (S)	Saturn I (S)	Oct 27		SUBORBITAL FLIGHT				Suborbital launch vehicle development test of S-1 booster propulsion system; verification of aerodynamic/structural design of entire vehicle.
Mercury (MS-1) (U)	AF 609A Blue Scout (U)	Nov 1		DID NOT ACHIEVE ORBIT			97.1	Orbital test of the Mercury Tracking Network. First Stage exploded 26 seconds after liftoff; other three stages destroyed by Range Safety Officer 44 seconds after launch.
Ranger II (U) A-Theta 1	Atlas-Agena B 117 (U)	Nov 18		DOWN NOV 20, 1961			306.2	Flight test of spacecraft systems designed for future lunar and interplanetary missions. Inoperative roll gyro prevented Agena restart resulting in a low Earth orbit.
Mercury (MA-5) (S) A-Iota 1	Atlas 93 (S)	Nov 29		DOWN NOV 29, 1961			1315.4	Final flight test of all Mercury systems prior to manned orbital flight; chimpanzee Enos on board. Spacecraft and chimpanzee recovered after two orbits.
<b>1962</b>								<b>1962</b>
Echo (AVT-1) (S)	Thor 338 (S)	Jan 15		SUBORBITAL FLIGHT			256.0	Suborbital Communications Test. Canister ejection and opening successful, but 135-foot sphere ruptured.
Ranger III (U) Alpha 1	Atlas-Agena B 121 (U)	Jan 26		HELIOCENTRIC ORBIT			329.8	Rough land instrumented capsule on the Moon. Booster malfunction resulted in the spacecraft missing the Moon by 22,862 miles and going into solar orbit. TV pictures were unusable.

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Tiros IV (S) Beta 1	Thor-Delta (7) (S)	Feb 8	99.9	812	694	48.3	129.3	Continued research and development of meteorological satellite system. U.S. Weather Bureau initiated international radio facsimile transmission of cloud maps based on data received.
Mercury (MA-6) (Friendship 7) (S) Gamma 1	Atlas 109 (S)	Feb 20		LANDED FEB 20, 1962			1354.9	First U.S. manned orbital flight. John H. Glenn, Jr. made three orbits of the Earth. Capsule and pilot recovered after 21 minutes in the water. Mission Duration 4 hours 55 minutes 23 seconds.
Reentry I (U)	Scout 8 (S)	Mar 1		SUBORBITAL FLIGHT				Launch vehicle development test/Reentry test. Desired speed was not achieved. (WFF)
OSO-I (S) Zeta 1	Thor-Delta (8) (S)	Mar 7		DOWN OCT 8, 1981			207.7	Carried 13 instruments to study Sun-Earth relationships. Transmitted almost 1,000 hours of information on solar phenomena, including measurements of 75 solar flares.
Probe B (P-21a) (S)	Scout 9 (S)	Mar 29		SUBORBITAL FLIGHT				Suborbital vehicle test/scientific geoprobe. Reached an altitude of 3,910 miles; provided electron density measurements. (WFF)
Ranger 4 (U) Mu 1	Atlas-Agena B (S)	Apr 23		IMPACTED MOON ON APR 26, 1962			331.1	Second attempt to rough land instrumented capsule on Moon. Failure of central computer and sequencer system rendered experiments useless. Impacted on far side of Moon after flight of 64 hours.
Saturn Test (SA-2) (S)	Saturn I (S)	Apr 25		SUBORBITAL FLIGHT			86167.0	Suborbital launch vehicle test; carried 95 tons of ballast water in upper stages which was released at an altitude of 65 miles to observe the effect on the upper region of the atmosphere (Project High Water).
Ariel I (S) Omicron 1	Thor-Delta (9) (S)	Apr 26		DOWN MAY 24, 1976			59.9	Carried six British experiments to study the ionosphere, solar radiation, and cosmic rays. First International Satellite. Cooperative with UK.
Centaur Test 1 (AC-1)(U)	Atlas-Centaur (F-1) (U)	May 8		SUBORBITAL FLIGHT				Launch vehicle development test. Centaur exploded before separation.
Mercury (MA-7) (Aurora 7) (S) Tau 1	Atlas 107 (S)	May 24		LANDED MAY 24, 1962			1349.5	Second orbital Manned Flight with M. Scott Carpenter. Reentered under manual control after three orbits. Mission Duration 4 hours 56 minutes 5 seconds.
Tiros V (S) A-Alpha	Thor-Delta (S)	Jun 19	99.4	889	573	58.1	129.3	Continued research and development of meteorological satellite system. Extended observations to higher latitudes. Observed ice breakup in northern latitudes and storms originating in these areas.
Telstar 1 (S) A-Epsilon	Thor-Delta (10) (S)	Jul 10	157.8	5642	947	44.8	77.1	First privately built satellite to conduct communication experiments. First telephone and TV experiments transmitted. Reimbursable (AT&T).
Echo (AVT-2) (S)	Thor-Delta (11) (S)	Jul 18		SUBORBITAL FLIGHT			256.0	Suborbital communications test. Inflation successful; radar indicated that the sphere surface was not as smooth as planned.

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Mariner I (P-37) (U)	Atlas-Agena B 145 (U)	Jul 22		DID NOT ACHIEVE ORBIT			202.8	Venus Flyby. Vehicle destroyed by Range Safety Officer about 290 seconds after launch when it veered off course.
Mariner II (P-38) (S) A-Rho 1	Atlas-Agena B 179 (S)	Aug 27		HELIOCENTRIC ORBIT			202.8	Second Venus flyby. First successful interplanetary probe. Passed Venus on December 14, 1962, at 21,648 miles; 109 days after launch. Provided data on solar wind, cosmic dust density, and particle and magnetic field variations.
Reentry II (U)	Scout 13 (U)	Aug 31		SUBORBITAL FLIGHT				Reentry test at 28,000 fps: late third stage ignition; desired speed was not achieved. (WFF)
Tiros VI (S) A-Psi 1	Thor-Delta (12) (S)	Sep 18	97.6	652	635	58.3	127.5	Provide coverage of the 1962 hurricane season. Returned high quality cloud cover photographs.
Alouette I (S) B-Alpha 1	Thor-Agena B (S)	Sep 29	105.2	1022	987	80.5	145.2	Designed and built by Canada to measure variations in the ionosphere electron density distribution. Returned excellent data to 13 Canadian, British, and U.S. stations. Cooperative with Canada.
Explorer 14 (S-3a)(S) B-Gamma 1	Thor-Delta (13) (S)	Oct 2		DOWN JULY 1, 1966			40.4	Monitor trapped corpuscular radiation, solar particles, cosmic radiation, and solar winds. Placed into a highly elliptical orbit; excellent data received.
Mercury(MA-8) (Sigma 7) (S) B-Delta 1	Atlas 113 (S)	Oct 3		LANDED OCT 3, 1962			1360.8	Manned Orbital Flight with Walter M. Schirra, Jr. Made six orbits of the Earth. Mission Duration 9 hours 13 minutes 11 seconds.
Ranger V (U) B-Eta 1	Atlas-Agena B 215 (S)	Oct 18		HELIOCENTRIC ORBIT			342.5	Rough land instrumented capsule on the Moon. Malfunction caused power supply loss after 8 hours 44 minutes. Passed within 450 miles of the Moon.
Explorer 15 (S-3b) (S) B-Lambda	Thor-Delta (14) (S)	Oct 27		DOWN OCT 5, 1967			44.5	Study location, composition, and decay rate of artificial radiation belt created by high altitude nuclear explosion over the Pacific Ocean. Despin device failed; considerable useful data transmitted.
Saturn (SA-3) (S)	Saturn I (S)	Nov 16		SUBORBITAL FLIGHT			86167.0	Suborbital launch vehicle development flight. Second "Project High Water" using 95 tons of water released at an altitude of 90 n.mi.
Relay I (S) B-Upsilon 1	Thor-Delta (15) (S)	Dec 13	185.1	7436	1323	47.5	78.0	Test intercontinental microwave communication by low-altitude active repeater satellite. Initial power failure overcome. Over 500 communication tests and demonstrations conducted.
Explorer 16 (S-55b) (S) B-Chi 1	Scout 14 (S)	Dec 16	104.1	1159	745	52.0	100.7	Measure micrometeoroid puncture hazard to structural skin samples. First statistical sample; flux level found to lie between estimated extremes. (WFF)

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<b>1963</b>								
Syncom I (U) 1963 04A	Thor-Delta (16) (S)	Feb 14		CURRENT ELEMENTS NOT MAINTAINED			39.0	First test of a communication satellite in geosynchronous orbit. Initial communication tests successful; all contact was lost 20 seconds after command to fire apogee motor.
Saturn Test (SA-4) (S)	Saturn I (S)	Mar 28		SUBORBITAL FLIGHT				Suborbital launch vehicle development test. Programmed in-flight cutoff of one of eight engines; successfully demonstrated propellant utilization system function.
Explorer 17 (SA-4) (S) 1963 09A	Thor-Delta (17) (S)	Apr 3		DOWN NOV 24, 1966			183.7	Measure density, composition, pressure and temperature of the Earth's atmosphere. Discovered a belt of neutral helium around the Earth.
Telstar II (S) 1963 13A	Thor-Delta (18) (S)	May 7	225.3	10807	967	42.8	79.4	Conduct wideband communication experiments. Color and black and white television successfully transmitted to Great Britain and France. Reimbursable (AT&T).
Mercury (MA-9) (Faith 7) (S) 1963 15A	Atlas 130 (S)	May 15		LANDED MAY 16, 1963			1360.8	Fourth Orbital Manned flight with L. Gordon Cooper, Jr. Various tests and experiments were performed. Capsule reentered after 22 orbits. Mission Duration 34 hours 19 minutes 49 seconds.
RFD-1 (S)	Scout 19 (S)	May 22		SUBORBITAL FLIGHT			217.6	Suborbital reentry flight test; carried AEC Reactor mockup. Reimbursable (AEC). (WFF)
Tiros VII (S) 1963 24A	Thor-Delta (19) (S)	Jun 19	92.7	415	398	58.2	134.7	Continued meteorological satellite development. Furnished over 30,000 useful cloud cover photographs, including pictures of Hurricane Ginny in its early stages in mid-October.
CRL (USAF) (S) 1963 26A	Scout 21 (S)	Jun 28		DOWN DEC 14, 1963			99.8	Cambridge Research Lab geophysics experiment test. Reimbursable (DOD). (WFF)
Reentry III (U)	Scout 22 (U)	Jul 20		SUBORBITAL FLIGHT				Suborbital reentry flight demonstration test of an ablation material at reentry speeds. Vehicle failed. (WFF)
Syncom II (S) 1963 31A	Thor-Delta (20) (S)	Jul 26		CURRENT ELEMENTS NOT MAINTAINED			39.0	Geosynchronous communication satellite test. Voice, teletype, facsimile, and data transmission tests were conducted.
Little Joe II Test (S)	Little Joe II #1 (S)	Aug 28		SUBORBITAL FLIGHT				Suborbital Apollo launch vehicle test. Booster qualification test with dummy payload. (White Sands)
Explorer 18 (S) (IMP-A) 1963 46A	Thor-Delta (21) (S)	Nov 27		DOWN DEC 30, 1965			62.6	First in a series of Interplanetary Monitoring Platforms to observe interplanetary space over an extended period of the solar cycle. Discovered a region of high-energy radiation beyond the Van Allen belts; reported stationary shock wave created by the interaction of the solar wind and geomagnetic field.



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Centaur Test II (S) 1963 47A	Atlas-Centaur (AC-2) (S)	Nov 27	104.6	1485	468	30.4	4620.8	Launch vehicle development test. Instrumented with 2,000 pounds of sensors, equipment, and telemetry; performance and structural integrity test.
Explorer 19 (AD-A) (S) 1963 53A	Scout 24 (S)	Dec 19		DOWN MAY 10, 1981			7.7	Sphere, 12 feet in diameter, was optically tracked after tracking beacon failed, to obtain long-term atmospheric density data and study density changes. (WSMC)
Tiros VIII (S) 1963 54A	Delta 22 (S)	Dec 21	98.5	711	663	58.5	120.2	Continued meteorological satellite development; initial flight test of Automatic Picture Transmission camera system which made it possible to obtain local cloud cover pictures using inexpensive ground stations.
<b>1964</b>								<b>1964</b>
Relay II (S) 1964 03A	Delta 23 (S)	Jan 21	194.7	7535	1966	46.4	85.3	Modified communication satellite with a capability of TV or 300 one-way voice transmissions or 12 two-way narrowband communication. Completed more than 230 demonstrations and tests; also obtained over 600 hours of radiation data.
Echo II (S) 1964 04A	Thor-Agena B (S)	Jan 25		DOWN JUN 7, 1969			348.4	Rigidized sphere, 135 feet in diameter, to conduct passive communication experiments (radio, teletype, facsimile tests). Good experiment results obtained; data exchanged with USSR. (WSMC)
Saturn I (SA-5) (S) 1964 05A	Saturn I (S)	Jan 29		DOWN APR 30, 1966			17,554.2	Launch vehicle development test. Fifth flight of Saturn, first Block II Saturn, first live flight of the LOX/LH2 fueled second stage (S-IV). 11,146 measurements taken.
Ranger VI (U) 1964 07A	Atlas-Agena B 199 (S)	Jan 30		IMPACTED MOON ON FEB 2, 1964			364.7	Photograph lunar surface before hard impact. No video signals received. Impacted on west side of Sea of Tranquility, within 20 miles of target, after 65.6 hour flight.
Beacon Explorer A (S-66) (U)	Delta 24 (U)	Mar 19		DID NOT ACHIEVE ORBIT			54.7	Provide data on ionosphere; conduct laser and Doppler shift geodetic tracking experiments. Vehicle third stage malfunctioned.
Ariel II (UK) (S) 1964 15A	Scout 25 (S)	Mar 27		DOWN NOV 18, 1967			74.8	Carried three British experiments to measure galactic radio noise. Cooperative with UK. (WFF)
Gemini I (S) 1964 18A	Titan II 1 (S)	Apr 8		DOWN APR 12, 1964			3175.2	Qualification of Gemini spacecraft configuration/Gemini launch vehicle combination in launch environment through orbital insertion phase.
Fire I (S)	Atlas-Antares 263 (S)	Apr 14		SUBORBITAL FLIGHT			1995.8	Reentry Test to study the heating environment encountered by a body entering the Earth's atmosphere at high speed.
Apollo Abort A-001 (S)	Little Joe II (S)	May 13		SUBORBITAL FLIGHT				Vehicle development test to demonstrate Apollo spacecraft atmospheric abort system capabilities. (White Sands)

# NASA Major Launch Record

1963

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
Centaur Test II (S) 1963 47A	Atlas-Centaur (AC-2) (S)	Nov 27	104.6	1485	468	30.4	4620.8	Launch vehicle development test. Instrumented with 2,000 pounds of sensors, equipment, and telemetry; performance and structural integrity test.
Explorer 19 (AD-A) (S) 1963 53A	Scout 24 (S)	Dec 19		DOWN MAY 10, 1981			7.7	Sphere, 12 feet in diameter, was optically tracked after tracking beacon failed, to obtain long-term atmospheric density data and study density changes. (WSMC)
Tiros VIII (S) 1963 54A	Delta 22 (S)	Dec 21	98.5	711	663	58.5	120.2	Continued meteorological satellite development; initial flight test of Automatic Picture Transmission camera system which made it possible to obtain local cloud cover pictures using inexpensive ground stations.
<b>1964</b>								<b>1964</b>
Relay II (S) 1964 03A	Delta 23 (S)	Jan 21	194.7	7535	1966	46.4	85.3	Modified communication satellite with a capability of TV or 300 one-way voice transmissions or 12 two-way narrowband communication. Completed more than 230 demonstrations and tests; also obtained over 600 hours of radiation data.
Echo II (S) 1964 04A	Thor-Agena B (S)	Jan 25		DOWN JUN 7, 1969			348.4	Rigidized sphere, 135 feet in diameter, to conduct passive communication experiments (radio, teletype, facsimile tests). Good experiment results obtained; data exchanged with USSR. (WSMC)
Saturn I (SA-5) (S) 1964 05A	Saturn I (S)	Jan 29		DOWN APR 30, 1966			17,554.2	Launch vehicle development test. Fifth flight of Saturn, first Block II Saturn, first live flight of the LOX/LH2 fueled second stage (S-IV). 11,146 measurements taken.
Ranger VI (U) 1964 07A	Atlas-Agena B 199 (S)	Jan 30		IMPACTED MOON ON FEB 2, 1964			364.7	Photograph lunar surface before hard impact. No video signals received. Impacted on west side of Sea of Tranquility, within 20 miles of target, after 65.6 hour flight.
Beacon Explorer A (S-66) (U)	Delta 24 (U)	Mar 19		DID NOT ACHIEVE ORBIT			54.7	Provide data on ionosphere; conduct laser and Doppler shift geodetic tracking experiments. Vehicle third stage malfunctioned.
Ariel II (UK) (S) 1964 15A	Scout 25 (S)	Mar 27		DOWN NOV 18, 1967			74.8	Carried three British experiments to measure galactic radio noise. Cooperative with UK. (WFF)
Gemini I (S) 1964 18A	Titan II 1 (S)	Apr 8		DOWN APR 12, 1964			3175.2	Qualification of Gemini spacecraft configuration/Gemini launch vehicle combination in launch environment through orbital insertion phase.
Fire I (S)	Atlas-Antares 263 (S)	Apr 14		SUBORBITAL FLIGHT			1995.8	Reentry Test to study the heating environment encountered by a body entering the Earth's atmosphere at high speed.
Apollo Abort A-001 (S)	Little Joe II (S)	May 13		SUBORBITAL FLIGHT				Vehicle development test to demonstrate Apollo spacecraft atmospheric abort system capabilities. (White Sands)

# NASA Major Launch Record

1964

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
Saturn I (SA-6) (S) 1964 25A	Saturn I (SA-6) (S)	May 28		DOWN JUN 1, 1964			17644.9	Vehicle development test. First flight of unmanned model of the Apollo spacecraft. 106 measurements obtained.
Centaur Test III (S)	Atlas-Centaur (AC-3) (S)	Jun 30		SUBORBITAL FLIGHT				Launch vehicle development test; performance and guidance evaluation.
SERT I (S)	Scout 28 (S)	Jul 20		SUBORBITAL FLIGHT				Test ion engine performance in space. Confirmed that high prevalence ion beams could be neutralized in space. (WFF)
Ranger VII (S) 1964 41A	Atlas-Agena B 250 (S)	Jul 28		IMPACTED MOON ON JUL 31, 1964			364.7	Photograph lunar surface before hard impact. Transmitted 4,316 high quality photographs showing amazing detail before impacting in Sea of Clouds; flight time 68 hours 35 minutes 55 seconds.
Reentry IV (S)	Scout 29 (S)	Aug 18		SUBORBITAL FLIGHT				Reentry Test. Demonstrated the ability of the Apollo spacecraft to withstand reentry conditions at 27,950 fps.
Syncom III (S) 1964 47A	Delta 25 (S)	Aug 19		CURRENT ELEMENTS NOT MAINTAINED			65.8	Experimental geosynchronous communications satellite. Provided live TV coverage of the Olympic games in Tokyo and conducted various communications tests.
Explorer 20 (S) 1964 51A	Scout 30 (S)	Aug 25	103.6	1001	855	79.9	44.5	Ionosphere Explorer to obtain radio soundings of upper ionosphere as part of the Topside Sounder program.
Nimbus I (S) 1964 52A	Thor-Agena B (S)	Aug 28		DOWN MAY 16, 1974			376.5	Improved meteorological satellite; Earth oriented to provide complete global cloud cover images. Returned more than 27,000 excellent photographs; APT system supplied daytime photos to low-cost ground stations.
OGO I (U) 1964 54A	Atlas-Agena B 195 (S)	Sep 4		CURRENT ELEMENTS NOT MAINTAINED			487.2	Standardized spacecraft capable of conducting related experiments. Carried 20 instruments to investigate geophysical and solar phenomena. Boom deployment anomaly obscured horizon scanner's view of Earth. Varying quality data received from all experiments.
Saturn I (SA-7) (S) 1964 57A	Saturn I (S)	Sep 18		DOWN SEP 22, 1964				Demonstrate Launch Vehicle/spacecraft compatibility and test launch escape system. Telemetry obtained from 131 separate and continuous measurements.
Explorer 21 (U) 1964 60A	Delta 26 (U)	Oct 4		DOWN JAN 30, 1966				Interplanetary Monitoring Platform to obtain magnetic fields, radiation, and solar wind data. Failed to reach planned apogee; provided good data
RFD-2 (S)	Scout 31 (S)	Oct 9		SUBORBITAL FLIGHT			217.6	Reentry flight carried AEC Reactor Mockup. Reimbursable (AEC).
Explorer 22 (S) 1964 64A	Scout 32 (S)	Oct 10	104.3	1054	872	79.7	52.6	Beacon Explorer; to provide data on variations in the ionosphere's structure and relate ionospheric behavior to solar radiation. Low-cost ground stations throughout the world received uncoded radio signals. Laser tracking accomplished on October 11, 1964. (WSMC)

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# NASA Major Launch Record

1964

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
Mariner III (U) 1964 73A	Atlas-Agena D 289 (U)	Nov 5		HELIOCENTRIC ORBIT			260.8	Mars flyby. Fiberglass shroud failed to jettison properly, solar panels failed to extend, Sun and Canopus not acquired. Transmissions ceased 9 hours after launch.
Explorer 23 (S-55C) (S) 1964 74A	Scout 33 (S)	Nov 6		DOWN JUN 29, 1983			133.8	Provided data on meteoroid penetration and resistance of various materials to penetration.
Explorer 24 (S) 1964 76A	Scout 34 (S)	Nov 21		DOWN OCT 18, 1968			8.6	First dual payload (Air Density/Injun); two satellites provided detailed information on complex radiation-air density relationships in the upper atmospheres. (WSMC)
Explorer 25 (S) 1964 76B			114.6	2354	522	81.3	34.0	
Mariner IV (S) 1964 77A	Atlas-Agena D 288 (S)	Nov 28		HELIOCENTRIC ORBIT			260.8	Second of two 1964 Mars flyby launches. Encounter occurred on July 14, 1965, with closest approach at 6,118 miles of the planet. Transmitted 22 pictures.
Apollo Abort A-002 (S)	Little Joe II (S)	Dec 8		SUBORBITAL FLIGHT			42593.0	First test of Apollo emergency detection system at abort altitude. (White Sands)
Centaur 1964 82A	Atlas-Centaur (AC-4) (S)	Dec 11		DOWN DEC 12, 1964			2993.0	Vehicle development flight carried mass model of Surveyor spacecraft; propulsion and stage separation test.
San Marco 1 (S) 1964 84A	Scout 35 (S)	Dec 15		DOWN SEP 13, 1965			115.2	Flight test of satellite to furnish data on air density and ionosphere characteristics. Launch vehicle provided by NASA; launched by Italian launch crew. Cooperative with Italy. (WFF)
Explorer 26 (S) 1964 86A	Delta 27 (S)	Dec 21		CURRENT ELEMENTS NOT MAINTAINED			45.8	Energetic Particles Explorer; carried five experiments to provide data on high-energy particles.
<b>1965</b>								<b>1965</b>
Gemini II (S)	Titan II 2 (S)	Jan 19		SUBORBITAL FLIGHT			3133.9	Demonstrate structural integrity of reentry module heat protection during maximum heating rate reentry and demonstrate variable lift on reentry module.
Tiros IX (S) 1965 04A	Delta 28 (S)	Jan 22	118.9	2564	702	96.4	138.3	First "Cartwheel" configuration for Weather Bureau's Operational system. Provided increased coverage of global cloud cover with pictures of excellent quality.
OSO B-2 (S) 1965 07A	Delta 29 (S)	Feb 3		DOWN AUG 9, 1989			244.9	Second in a series to measure the frequency and energy of solar electromagnetic radiation in the ultraviolet, X-ray and gamma-ray regions of the spectrum.
Pegasus I (S) 1965 09A	Saturn I (SA-9) (S)	Feb 16		DOWN SEP 17, 1978			1451.5	Obtained scientific and engineering data on the magnitude and direction of meteoroids in near-Earth orbit.

# NASA Major Launch Record

1965

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
Ranger VIII (S) 1965 10A	Atlas-Agena B 196 (S)	Feb 17		IMPACTED MOON ON FEB 20, 1965			364.7	Photograph lunar surface before hard impact. Transmitted 7,137 high quality photographs before impacting in the Sea of Tranquility; flight time 64.54 hours.
Centaur Test (U)	Atlas-Centaur (AC-5) (U)	Mar 2		SUBORBITAL FLIGHT			2548.0	Vehicle development test; Atlas stage failed 4 seconds after liftoff.
Ranger IX (S) 1965 23A	Atlas-Agena B 204 (S)	Mar 21		IMPACTED MOON ON MAR 24, 1965			364.7	Photograph lunar surface before hard impact. Transmitted 5,814 excellent quality pictures; about 200 pictures relayed live via commercial TV. Flight time 64.52 hours.
Gemini III (S) 1965 24A	Titan II 3 (S)	Mar 23		LANDED MAR 23, 1965			3236.9	First manned orbital flight of the Gemini program, with astronauts Virgil I. Grissom and John W. Young. Manually controlled reentry after three orbits. Mission Duration 4 hours 52 minutes 31 seconds.
Intelsat 1 (F-1) (S) 1965 28A	Delta 30 (S)	Apr 6		CURRENT ELEMENTS NOT MAINTAINED			38.5	First operational satellite for Comsat Corp., to provide commercial trans-Atlantic communications. Reimbursable (Comsat).
Explorer 27 (S) 1965 32A	Scout 36 (S)	Apr 29	107.7	1312	929	41.2	60.8	Beacon Explorer; obtained data on Earth's gravitational field. Also carried laser tracking experiments.
Apollo Abort A-003 (U)	Little Joe II (U)	May 19		SUBORBITAL FLIGHT				Demonstration of abort capability of Apollo spacecraft. Launch escape vehicle at high altitude not accomplished due to malfunction of Little Joe II Booster. (White Sands)
Fire II (S)	Atlas-Antares 264 (S)	May 22		SUBORBITAL FLIGHT			2005.8	Second Reentry Test to study heating environment encountered by a body entering the Earth's atmosphere at high speed.
Pegasus II (S) 1965 39A	Saturn I (SA-8) (S)	May 25		DOWN NOV 3, 1979			1451.5	Micrometeoroid detection experiment confirmed lower meteoroid density than expected.
Explorer 28 (S) 1965 42A	Delta 31 (S)	May 29		DOWN JUL 4, 1968			59.0	Third Interplanetary Monitoring Platform, carrying eight scientific instruments, to measure magnetic fields, cosmic rays, and solar wind beyond the Earth's magnetosphere.
Gemini IV (S) 1965 43A	Titan II 4 (S)	Jun 3		LANDED JUN 7, 1965			3537.6	Second manned Gemini flight with James A. McDivitt and Edward H. White. During flight, White performed a 22 minute EVA using the Zero-G Integral Propulsion Unit. Mission Duration: 97 hrs 56 mins 12 secs.
Tiros X (S) 1965 51A	Delta 32 (S)	Jul 1	100.1	807	722	98.8	127.0	First U.S. Weather Bureau-funded Tiros; obtained maximum coverage of 1965 hurricane and typhoon season.
Pegasus III (S) 1965 60A	Saturn I (SA-10) (S)	Jul 30		DOWN AUG 4, 1969			1451.5	Final micrometeoroid detection experiment. Results of Pegasus program indicated that the flux of small particles was less than expected, the flux of large particles was more than expected, and the flux of medium-sized particles was about as predicted.

# NASA Major Launch Record

1965

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
Scout Test (S) Secor (S) 1965 63A	Scout 37 (S)	Aug 10	122.2	2419	1134	69.2	20.0	Vehicle development test. Carried U.S. Army Secor geodetic satellite. Reimbursable (DOD).
Centaur Test (S) 1965 64A	Atlas-Centaur (AC-6) (S)	Aug 11		BARYCENTRIC ORBIT			952.6	Vehicle development test. Carried Surveyor dynamic model. Direct-ascent test for guidance evaluation.
Gemini V (S) 1965 68A REP 1965 68C	Titan II 5 (S)	Aug 21		LANDED AUG 29, 1965  DOWN AUG 27, 1965			3175.2	Third manned orbital flight with L. Gordon Cooper and Charles Conrad, Jr. Ejected Rendezvous Evaluation Pod (REP) for simulated rendezvous maneuvers experiment; participated in communications and other on-board experiments. Mission Duration: 190 hours 55 minutes 14 seconds.
OSO-C (U)	Delta 33 (U)	Aug 25		DID NOT ACHIEVE ORBIT			281.2	Third in a series to maintain continuity of observations during solar activity cycle. Vehicle third stage ignited prematurely.
OGO II (U) 1965 81A	Thor-Agena D (S)	Oct 14		DOWN SEP 17, 1981			507.1	Carried 20 experiments to investigate near-Earth space phenomena on an interdisciplinary basis. Failure of primary launch vehicle guidance resulted in higher than planned orbit. Nineteen experiments returned useful data. (WSMC)
Gemini VI (U)	Atlas-Agena D 5301 (U)	Oct 25		DID NOT ACHIEVE ORBIT				Agenda target vehicle. Simultaneous countdown of the Gemini spacecraft and Atlas-Agena Target Vehicle. Telemetry was lost 375 seconds after launch of the target vehicle; Gemini launch was terminated at T-42 minutes.
Explorer 29 (S) 1965 89A	Delta 34 (S)	Nov 6	120.3	2274	1113	59.4	174.6	GEOS-A, part of U.S. Geodetic Satellite Program to provide new geodetic data about the Earth.
Explorer 30 (S) 1965 93A	Scout 38 (S)	Nov 18	100.4	881	664	59.7	56.7	Monitor solar X-rays and ultraviolet emissions during final portion of IQSY. Data acquired by NRL and foreign stations in 13 countries. Cooperative with NRL. (WFF)
Explorer 31 (S) 1965 98B Alouette II (S) 1965 98A	Thor-Agena B (S)	Nov 29	120.0 118.3	2859 2708	501 501	79.8 79.8	98.9 146.5	Make related studies of ionospheric composition and temperature variations. Provided excellent data from regions of the ionosphere never before investigated. Cooperative with Canada. (WSMC)
Gemini VII (S) 1965 100A	Titan II 6 (S)	Dec 4		LANDED DEC 18, 1965			3628.8	Fourth manned mission with Frank Borman and James A. Lovell, Jr. Astronauts flew part of the mission without wearing pressure suits. Mission Duration: 330 hours 35 minutes 01 seconds.
French 1A (S) 1965 101A	Scout 39 (S)	Dec 6	98.8	708	696	75.9	71.7	Study VLF wave propagation in the ionosphere and magnetosphere and measure electron densities. Cooperative with France. (WSMC)

# NASA Major Launch Record

1965

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
Gemini VI-A (S) 1965 104A	Titan II 7 (S)	Dec 15		LANDED DEC 16, 1965			3175.2	Fifth manned mission with Walter M. Schirra, Jr. and Thomas P. Stafford. First rendezvous in space accomplished with Gemini VII spacecraft. Mission Duration 25 hours 51 minutes 24 seconds.
Pioneer VI (S) 1965 105A	Delta 35 (S)	Dec 16		HELIOCENTRIC ORBIT			63.5	Operated in solar orbit to provide data on solar wind, interplanetary magnetic fields, solar physics, and high-energy charged particles and magnetic fields.
<b>1966</b>								<b>1966</b>
Apollo Abort A-004 (S)	Little Joe II (S)	Jan 20		SUBORBITAL FLIGHT			4989.0	Apollo development flight to demonstrate launch escape vehicle performance. Last unmanned ballistic flight. (White Sands)
ESSA I (S) 1966 08A	Delta 36 (S)	Feb 3	99.7	806	684	97.8	138.3	Sun-synchronous orbit permitted satellite to view weather in each area of the globe each day, photographing a given area at the same local time every day. First Advanced Vidicon Camera System provided valuable information about weather patterns and conditions. Reimbursable (NOAA). (WSMC)
Reentry V (S)	Scout 42 (S)	Feb 9		SUBORBITAL FLIGHT			95.0	Test to investigate the heating environment of a body reentering the Earth's atmosphere at 27,000 fps. (WFF)
Apollo Saturn (AS-201) (S)	Saturn IB (S)	Feb 26		SUBORBITAL FLIGHT			20820.1	Launch Vehicle development flight; carried unmanned Apollo spacecraft.
ESSA II (S) 1966 16A	Delta 37 (S)	Feb 28	113.4	1412	1352	101.0	131.5	Provided direct readout of cloud cover photos to local users. Along with ESSA I, completed the initial global weather satellite system. Reimbursable (NOAA). (WSMC)
Gemini VIII (U) 1966 20A	Titan II 8 (S)	Mar 16		LANDED MAR 17, 1966			3788.0	Agena Target Vehicle launched from Complex 14 and manned Gemini launched from Complex 19. Astronauts Neil A. Armstrong and David R. Scott accomplished rendezvous and docking. Attitude and maneuver thruster malfunction caused the docked spacecraft to tumble. Astronauts separated the vehicles and terminated the mission early; EVA was not accomplished. First Pacific Ocean landing. Mission Duration 10 hours 41 minutes 26 seconds.
GATV (S) 1966 19A	Atlas-Agena D 5302 (S)	Mar 16		DOWN SEP 15, 1967				
Centaur Test (U) 1966 30A	Atlas-Centaur (AC-8) (U)	Apr 8		DOWN MAY 5, 1966			784.7	Launch vehicle development flight; carried Surveyor model. Second Centaur Engine firing unsuccessful.
OA0 I (U) 1966 31A	Atlas-Agena D 5002C (S)	Apr 8	100.6	793	783	35.0	1769.0	Carried four experiments to study UV, X-ray and gamma-ray regions. Primary battery malfunctioned.
Nimbus II (S) 1966 40A	Thor-Agena D D 5303 (S)	May 14	108.0	1174	1091	100.6	413.7	Provided global weather photography on 24-hour basis for meteorological research and operational use. (WSMC)

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# NASA Major Launch Record

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MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
Gemini IX (U)	Atlas-Agena D 5303 (U)	May 17		DID NOT ACHIEVE ORBIT			3252.0	Target vehicle for Gemini IX; vehicle failure caused by a short in the servo control circuit.
Explorer 32 (S) 1966 44A	Delta 38 (S)	May 25		DOWN FEB 22, 1985			224.5	Atmosphere Explorer; carried 8 experiments to measure temperatures, composition, density and pressures in the upper atmosphere.
Surveyor I (S) 1966 45A	Atlas-Centaur (AC-10) (S)	May 30		LANDED ON MOON JUN 2, 1966			995.2	Achieved soft lunar landing in Ocean of Storms. Performed engineering tests and transmitted photography. Landing pads penetrated the lunar surface to a maximum depth of 1 inch.
Gemini IXA (U) 1966 47A	Titan II 9 (S)	Jun 3		LANDED JUN 6, 1966			3705.3	Seventh manned mission with Thomas P. Stafford and Eugene A. Cernan. Target vehicle shroud failed to separate; docking was not achieved. EVA was successful, but evaluation of AMU was not achieved. Mission Duration 72 hours 20 minutes 50 seconds.
GATV (U) 1966 46A	Atlas-Agena D 5304 (S)	Jun 1		DOWN JUN 11, 1966				
OGO III (S) 1966 49A	Atlas-Agena B 5601 (S)	Jun 7		CURRENT ELEMENTS NOT MAINTAINED			514.8	Carried 21 experiments to obtain correlated data on geophysical and solar phenomena in the Earth's atmosphere. First 3-axis stabilization in highly elliptical orbit.
OV-3 (S) 1966 52A	Scout 46 (S)	Jun 9	142.9	4703	645	40.8	173.0	Radiation research satellite for the USAF. Reimbursable (DOD). (WFF)
Pageos I (S) 1966 56A	Thor-Agena D (S)	Jun 23	177.0	5599	2533	84.5	56.7	Sphere, 100 feet in diameter, to determine the location of continents, land masses, and other geographic points using a world-wide triangulation network of stations. (WSMC)
Explorer 33 (S) 1966 58A	Delta 39 (S)	Jul 1		CURRENT ELEMENTS NOT MAINTAINED			93.4	Interplanetary Monitoring Platform to study, at lunar distance, the Earth's magnetosphere and magnetic tail. Planned anchored lunar orbit was not achieved; useful data obtained from Earth orbit.
Apollo Saturn AS-203 (S) 1966 59A	Saturn IB (S)	Jul 5		DOWN JUL 5, 1966			2635.4	Launch vehicle development flight to evaluate the S-IVB stage vent and restart capability.
Gemini X (S) 1966 66A	Titan II 10 (S)	Jul 18		LANDED JUL 21, 1966			3762.6	Eighth manned mission with John W. Young and Michael Collins. Performed first docked vehicle maneuvers; standup EVA of 89 minutes; umbilical EVA of 27 minutes. Mission duration 70 hours 46 minutes 39 seconds.
GATV (S) 1966 65A	Atlas-Agena D 5305 (S)	Jul 18		DOWN DEC 29, 1966				
Lunar Orbiter I (S) 1966 73A	Atlas-Agena D 5801 (S)	Aug 10		DOWN OCT 29, 1966			385.6	Photograph landing sites for Apollo and Surveyor missions from lunar orbit. Photographed over 2 million square miles of the Moon's surface; took the first two photos of the Earth from the distance of the Moon. Demonstrated maneuverability in lunar orbit.



# NASA Major Launch Record

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MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
Pioneer VII (S) 1966 75A	Delta 40 (S)	Aug 17		HELIOCENTRIC ORBIT			63.5	Second in a series of interplanetary probes to provide data on solar wind, magnetic fields, and cosmic rays.
Apollo Saturn AS-202 (S)	Saturn IB (S)	Aug 25		SUBORBITAL FLIGHT			25809.7	Apollo launch vehicle/spacecraft development flight to test Command Module heat shield and obtain launch vehicle and spacecraft data.
Gemini XI (S) 1966 81A	Titan II 11 (S)	Sep 12		LANDED SEP 15, 1966			3798.4	Ninth manned mission with Charles Conrad, Jr. and Richard F. Gordon, Jr. Rendezvous and docking achieved. Umbilical and standup EVA performed and as well as tethered spacecraft experiment. Mission Duration 71 hours 17 minutes 8 seconds.
GATV (S) 1966 80A	Atlas-Agena D 5306 (S)	Sep 12		DOWN DEC 30, 1966				
Surveyor II (U) 1966 84A	Atlas-Centaur (AC-7) (S)	Sep 20		IMPACTED MOON ON SEP 23, 1966			1000.2	Second soft lunar landing planned. One vernier engine did not fire for midcourse correction, sending the spacecraft into a tumbling mode. Crashed southeast of crater Copernicus after 62.8 hour flight.
ESSA III (S) 1966 87A	Delta 41 (S)	Oct 2	114.5	1483	1384	100.9	147.4	Replaced ESSA I in Tiros Operational Satellite (TOS) system. Sophisticated cameras and sensors provided valuable information about the world's weather patterns/conditions. Reimbursable (NOAA).(WSMC)
Centaur Test (AC-9) (S) 1966 95A	Atlas-Centaur (AC-9) (S)	Oct 26		DOWN NOV 6, 1966			952.6	Launch vehicle development flight; Surveyor model injected into simulated lunar transfer orbit. Demonstrated two-burn parking orbit operational capability.
Intelsat II F-1 (U) 1966 96A	Delta 42 (S)	Oct 26	717.7	37229	3123	16.9	87.1	Comsat commercial communications satellite. Apogee monitor malfunction resulted in elliptical orbit. Reimbursable (Comsat).
Lunar Orbiter 2 (S) 1966 100A	Atlas-Agena D 5802 (S)	Nov 6		DOWN OCT 11, 1967			385.6	Photographed lunar landing sites from lunar orbit; provided new data on lunar gravitational field; photographed Ranger VIII landing point and surface debris tossed out at impact.
Gemini XII (S) 1966 104A	Titan II 12 (S)	Nov 11		LANDED NOV 15, 1966			3762.1	Tenth and last manned Gemini flight with James A. Lovell, Jr. and Edwin E. Aldrin, Jr. Rendezvous and docking achieved. Two EVA's performed. Mission duration 94 hours 34 minutes 31 seconds.
GATV (S) 1966 103A	Atlas-Agena D 5307 (S)	Nov 11		DOWN DEC 23, 1966				
ATS I (S) 1966 110A	Atlas-Agena D 5101 (S)	Dec 7	1436.0	35817	35750	14.3	703.1	Perform various communication, meteorology, and control technology experiments and carry out scientific measurements of orbital environment. Experiments results outstanding. Spin-scan cloud camera photographed changing weather patterns; air-to-ground and air-to-air communications demonstrated for the first time.
Biosatellite I (U) 1966 114A	Delta 43 (S)	Dec 14		DOWN FEB 15, 1967			426.4	Carried biological specimens to determine the effects of the space environment on life processes. Reentry vehicle separated but rocket failed, leaving the capsule in orbit. No useful scientific data obtained.

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# NASA Major Launch Record

1967

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
<b>1967</b>								
Intelsat I F-2 (S) 1967 01A	Delta 44 (S)	Jan 11		CURRENT ELEMENTS NOT MAINTAINED			87.1	Comsat commercial communication satellite. Reached intended location on February 4, 1967. Reimbursable (Comsat).
ESSA IV (S) 1967 06A	Delta 45 (S)	Jan 26	113.4	1437	1323	102.0	131.5	Replaced ESSA II in TOS system. Provided daily coverage of local weather systems to APT receivers. Shutter malfunction rendered one camera inoperative. Reimbursable (NOAA). (WSMC)
Lunar Orbiter 3 (S) 1967 08A	Atlas-Agena D 5803 (S)	Feb 5		DOWN OCT 9, 1967			385.6	Photographed lunar landing sites from lunar orbit; also returned 600,000 sq. mi. of front and 250,000 sq. mi. of back side lunar photography; provided gravitational field and lunar environment data.
OSO III (S) 1967 20A	Delta 46 (S)	Mar 8		DOWN APR 4, 1982			284.4	Carried 9 experiments to study structure, dynamics and chemical composition of the outer solar atmosphere through X-ray, visible, and UV radiation measurements.
Intelsat II F-3 (S) 1967 26A	Delta 47 (S)	Mar 22		CURRENT ELEMENTS NOT MAINTAINED				87.1 Comsat commercial communication satellite. Completed Intelsat II system. Reimbursable (Comsat).
ATS II (U) 1967 31A	Atlas-Agena D 5102 (U)	Apr 6		DOWN SEP 2, 1969			324.3	Test of the gravity gradient control system; carried microwave communications, meteorological cameras, and eight scientific experiments. Second stage failed to restart, resulting in an elliptical orbit. Limited data obtained.
Surveyor III (S) 1967 35A	Atlas-Centaur (AC-12) (S)	Apr 17		LANDED ON MOON APR 20, 1967			1035.6	Vernier engines failed to cut off as planned; spacecraft bounced twice before landing. Surface sampler was used for pressing, digging, trenching, scooping, and depositing surface material in view of the camera. Returned over 6,300 photographs, including pictures of the Earth during lunar eclipse.
ESSA V (S) 1967 36A	Delta 48 (S)	Apr 20	113.5	1419	1352	102.0	147.4	Replaced ESSA III in TOS System. Furnished daily global coverage of weather systems. Reimbursable (NOAA). (WSMC)
San Marco II (S) 1967 38A	Scout 52 (S)	Apr 26		DOWN OCT 14, 1967			129.3	First satellite launch attempt from a mobile sea-based platform in the Indian Ocean; launched conducted by Italian crew. Provided continuous equatorial air density measurements. Cooperative with Italy. (SM)
Lunar Orbiter IV (S) 1967 41A	Atlas-Agena D 5804 (S)	May 4		DOWN OCT 6, 1967			385.6	Lunar orbit achieved. Photographed 99% of the Moon's front side and additional back side areas.
Ariel III (S) 1967 42A	Scout 53 (S)	May 5		DOWN DEC 14, 1970			102.5	First UK-built satellite to extend atmospheric and ionospheric investigations. Cooperative with UK. (WSMC)
Explorer 34 (S) 1967 51A	Delta 49 (S)	May 24		DOWN MAY 3, 1969			73.9	Fifth in Interplanetary Monitoring Platform series to study Sun-Earth relationships. Elliptical orbit achieved. Useful data returned. (WSMC)

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# NASA Major Launch Record

1967

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
ESRO II-A (U)	Scout 55 (U)	May 29		DID NOT ACHIEVE ORBIT			89.1	Carried 7 experiments to study solar and cosmic radiation. Third stage vehicle failure. Cooperative with ESRO. (WSMC)
Mariner V (S) 1967 60A	Atlas-Agena D 5401 (S)	Jun 14		HELIOCENTRIC ORBIT			244.9	Venus flyby. Returned data on planet's atmosphere, radiation, and magnetic field environment.
Surveyor IV (U) 1967 68A	Atlas-Centaur (AC-11) (S)	Jul 14		IMPACTED MOON ON JUL 17, 1967			1037.4	Lunar soft landing mission. All systems were normal until 2 seconds before retro rocket burnout (2-1/2 minutes before touchdown) when the signal was abruptly lost.
Explorer 35 (S) 1967 70A	Delta 50 (S)	Jul 19		SELENOCENTRIC ORBIT			104.4	Interplanetary Monitoring Platform to study solar wind and interplanetary fields at lunar distances. Lunar orbit achieved. Results indicated no shock front precedes the Moon, no magnetic field, no radiation belts or evidence of lunar ionosphere.
OGO IV (S) 1967 73A	Thor-Agena D (S)	Jul 28		DOWN AUG 16, 1972			551.6	Study relationship between Sun and Earth's environment. Near-polar orbit achieved, 3-axis stabilized. (WSMC)
Lunar Orbiter V (S) 1967 75A	Atlas-Agena D 5805 (S)	Aug 1		DOWN JAN 31, 1968			385.6	Fifth and final mission to photograph potential landing sites from lunar orbit. Increased lunar photographic coverage to better than 99%.
Biosatellite II (S) 1967 83A	Delta 51 (S)	Sep 7		DOWN SEP 9, 1967			425.4	Carried 13 experiments to conduct biological experiments in low Earth orbit. Reentry initiated 17 orbits early because of communications difficulties and storm in recovery area. Air recovery successful.
Surveyor V (S) 1967 84A	Atlas-Centaur (AC-13) (S)	Sep 8		LANDED ON MOON SEP 11, 1967			1006.1	Lunar soft landing accomplished; returned TV photos of lunar surface and data on chemical characteristics of lunar soil.
Intelsat II (S) 1967 94A	Delta 52 (S)	Sep 28		CURRENT ELEMENTS NOT MAINTAINED			87.1	Comsat commercial communications satellite to provide 24-hour transoceanic service. Reimbursable (Comsat).
OSO-IV (S) 1967 100A	Delta 53 (S)	Oct 18		DOWN JAN 15, 1982			276.7	Continuation of OSO program to better understand the Sun's structure and determine the solar influence upon the Earth. Obtained the first pictures made of the Sun in extreme ultraviolet.
RAM C-1 (S)	Scout 57 (S)	Oct 19		SUBORBITAL FLIGHT			116.6	Reentry test to investigate communications problems experienced during reentry. (WFF)
ATS III (S) 1967 111A	Atlas-Agena D 5103 (S)	Nov 5	1436.1	35844	35730	14.2	714.0	Further development of experiments and concepts in useful applications of space technology to communications, meteorology, navigation, and Earth resources management.
Surveyor VI (S) 1967 112A	Atlas-Centaur (AC-14) (S)	Nov 7		LANDED ON MOON NOV 10, 1967			1008.3	Lunar soft landing achieved; pictures and soil analysis data transmitted. Vernier engines restarted, lifting spacecraft 10 feet from the surface and landing 8 feet from the original landing site, performing the first rocket-powered takeoff from the lunar surface.

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# NASA Major Launch Record

1967

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
Apollo 4 (S) 1967 113A	Saturn V AS-501 (S)	Nov 9		DOWN NOV 9, 1967			45506.0	Launch vehicle/spacecraft development flight. First launch of the Saturn V; carried unmanned Apollo Command/Service Module.
ESSA VI (S) 1967 114A	Delta 54 (S)	Nov 10	114.8	1482	1407	102.2	129.7	Replaced ESSA II and ESSA IV in the TOS system; used in central analysis of global weather. Reimbursable (NOAA). (WSMC)
Pioneer VIII (S) 1967 123A	Delta 55 (S)	Dec 13		HELIOCENTRIC ORBIT			65.8	Third in a series of interplanetary probes to provide data on the solar wind, magnetic fields, and cosmic rays. Carried TETR-1, the first NASA piggyback payload.
TETR-1 (S) 1967 123B				DOWN APR 28, 1968			20.0	
<b>1968</b>								<b>1968</b>
Surveyor VII (S) 1968 01A	Atlas-Centaur (AC-15) (S)	Jan 7		LANDED ON MOON JAN 9, 1968			1040.1	Lunar soft landing achieved; provided pictures of lunar terrain, portions of spacecraft, experiment operations, stars, planets, crescent Earth as it changed phases, and first observation of artificial light from the Earth.
Explorer 36 (S) 1968 02A	Delta 56 (S)	Jan 11	112.2	1572	1079	105.8	212.3	GEOS spacecraft to provide precise information about the size and shape of the Earth and strength of an variations in its gravitational field; part of the National Geodetic Program. (WSMC)
Apollo 5 (S) 1968 07A	Saturn IB AS-204 (S)	Jan 22		DOWN JAN 24, 1968			42,506.0	First flight test of the Lunar Module; verified the ascent and descent stages, propulsion systems, and restart operations.
OGO V (S) 1968 14A	Atlas-Agena D 5602A (S)	Mar 4		CURRENT ELEMENTS NOT MAINTAINED			611.0	Provided measurements of energy characteristics in the Earth's radiation belts; first evidence of electric fields in the bow shock.
Explorer 37 (S) 1968 17A	Scout 60 (S)	Mar 5		DOWN NOV 16, 1990			89.8	Solar Explorer to provided data on selected solar X-ray and ultraviolet emissions. Cooperative with NRL. (WFF)
Apollo 6 (U) 1968 25A	Saturn V AS-502 (U)	Apr 4		DOWN APR 4, 1968			42856.0	Launch vehicle and spacecraft development flight. Launch vehicle engines malfunctioned; spacecraft systems performed normally.
Reentry VI (S)	Scout 61 (S)	Apr 27		SUBORBITAL FLIGHT			272.0	Turbulent heating experiment to obtain heat transfer measurements at 20,000 fps. (WFF)
ESRO IIB (S) 1968 41A	Scout 62 (S)	May 17		DOWN MAY 8, 1971			89.1	Carried seven experiments to study solar and cosmic radiation in the lower Van Allen belt. Cooperative with ESRO. (WSMC)
Nimbus B (U) Secor 10 (U)	Thor-Agena D (U)	May 18		DID NOT ACHIEVE ORBIT			571.5	Experimental meteorological satellite; also carried Secor 10 (DOD) as a secondary payload. Booster malfunctioned; destruct signal sent by Range Safety Officer. (WSMC)
Explorer 38 (S) 1968 55A	Delta 57 (S)	Jul 4	224.2	5869	5825	120.8	275.4	Radio Astronomy Explorer to monitor low-frequency radio signals originating in our own solar system and the Earth's magnetosphere and radiation belts.

# NASA Major Launch Record

1969

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
<b>1969</b>								
OSO V (S) 1969 06A	Delta 64 (S)	Jan 22		DOWN APR 2, 1984			288.5	Continuation of OSO program to study Sun's X-rays, gamma rays, and radio emissions.
ISIS-A (S) 1969 09A	Delta 65 (S)	Jan 30	127.7	3471	574	88.4	235.9	Satellite built by Canada: carried 10 experiments to study the ionosphere. Cooperative with Canada. (WSMC)
Intelsat III F-3 (S) 1969 11A	Delta 66 (S)	Feb 5		CURRENT ELEMENTS NOT MAINTAINED			286.7	Second increment of Comsat's operational commercial communication satellite system. Reimbursable (Comsat).
Mariner VI (S) 1969 14A	Atlas-Centaur (AC-20) (S)	Feb 25		HELIOCENTRIC ORBIT			411.8	Mars flyby; provided high resolution photographs of the Martian surface. Closest approach was 2,120 miles on July 31, 1969.
ESSA IX (S) 1969 16A	Delta 67 (S)	Feb 26	115.2	1503	1422	101.4	157.4	Ninth and last in the TOS series of meteorological satellites. Reimbursable (NOAA).
Apollo 9 (S) 1969 18A	Saturn V SA-504 (S)	Mar 3		LANDED MAR 13, 1969			51655.0	Earth orbital flight with James A. McDivitt, David R. Scott, and Russell Schweickart. First flight of the lunar module. Performed rendezvous, docking, and EVA. Mission Duration 241 hours 0 minute 54 seconds.
Mariner VII (S) 1969 30A	Atlas-Centaur (AC-19) (S)	Mar 27		HELIOCENTRIC ORBIT			411.8	Mars flyby; provided high resolution photographs of the Martian surface. Closest approach was 2,190 miles on August 5, 1969.
Nimbus III (S) 1969 37A	Thor-Agena (S)	Apr 14	107.2	1128	1069	100.0	575.6	Provided night and day global meteorological measurements from space. Secor (DOD) provided geodetic position determination measurements. (WSMC)
Secor 13 (S) 1969 37B			107.2	1127	1067	100.0	20.4	
Apollo 10 (S) 1969 43A	Saturn V SA-505 (S)	May 18		LANDED MAY 26, 1969			51655.0	Manned lunar orbital flight with Thomas P. Stafford, John W. Young, and Eugene A. Cernan to test all aspects of an actual manned lunar landing except the landing. Mission Duration 192 hrs 3 mins 23 secs.
Intelsat III F-4 (S) 1969 45A	Delta 68 (S)	May 21		CURRENT ELEMENTS NOT MAINTAINED			143.8	Third increment of Comsat's operational commercial communication satellite system. Reimbursable (Comsat).
OGO VI (S) 1969 51A	Thor-Agena (S)	Jun 5		DOWN OCT 12, 1979			631.8	Last in the OGO series to provide measurements of the energy characteristics in the Earth's radiation belts; provided the first evidence of electric fields in the bow shock. (WSMC)
Explorer 41 (S) 1969 53A	Delta 69 (S)	Jun 21		DOWN DEC 23, 1972			78.7	Seventh Interplanetary Monitoring Platform to continue study of the environment within and beyond Earth's magnetosphere. (WSMC)
Biosatellite III (U) 1969 56A	Delta 70 (S)	Jun 28		DOWN JUL 7, 1969			696.3	Conduct intensive experiments to evaluate effects of weightlessness with a pigtail monkey onboard. Spacecraft deorbited after 9 days because the monkey's metabolic condition was deteriorating rapidly. Monkey expired 8 hours after recovery, presumably from a massive heart attack brought on by dehydration.

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# NASA Major Launch Record

1969

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
Apollo 11 (S) 1969 59A	Saturn V SA-506 (S)	Jul 16		LANDED JUL 24, 1969			51655.0	First manned lunar landing and return to Earth with Neil A. Armstrong, Michael Collins, and Edwin A. Aldrin. Landed in the Sea of Tranquility on July 20, 1969; deployed TV camera and EASEP experiments, performed lunar surface EVA, returned lunar soil samples. Mission Duration 195 hours 18 minutes 35 seconds.
Intelsat III F-5 (U) 1969 64A	Delta 71 (S)	Jul 26		DOWN OCT 14, 1988			146.1	Fourth increment of Comsat's operational commercial communication satellite system. Third-stage malfunctioned; satellite did not achieve desired orbit. Reimbursable (Comsat).
OSO VI (S) 1969 68A PAC (S) 1969 68B	Delta 72 (S)	Aug 9		DOWN MAR 7, 1981			173.7	Continuing study of Sun's X-rays, gamma rays, and radio emissions. Carried PAC experiment to stabilize spent Delta stage.
				DOWN APR 28, 1977			117.9	
ATS V (U) 1969 69A	Atlas-Centaur (AC-18) (S)	Aug 12	1447.5	36031	35986	13.9	432.7	Evaluate gravity-gradient stabilization for geosynchronous satellites. Anomaly after apogee motor firing resulted in counterclockwise spin; gravity-gradient booms could not be deployed. Nine of 13 experiments returned useful data.
Pioneer E (U) (TETR C) (U)	Delta 73 (U)	Aug 27		DID NOT ACHIEVE ORBIT			67.1	Deep space probe to study magnetic disturbances in interplanetary space. Vehicle malfunctioned; destroyed 8 minutes 3 seconds into powered flight by Range Safety Officer.
						18.1		
ESRO 1B (S) 1969 83A	Scout 66 (S)	Oct 1		DOWN NOV 23, 1969			85.8	Fourth European-designed and built satellite to study ionospheric and auroral phenomena over the northern polar regions. Reimbursable (ESA). (WSMC)
GRS-A (S) 1969 97A	Scout 67 (S)	Nov 7	110.8	2155	371	102.8	72.1	Study the inner Van Allen belt and auroral zones of the Northern Hemisphere. Cooperative with Germany. (WSMC)
Apollo 12 (S) 1969 99A	Saturn V SA-507 (S)	Nov 14		LANDED NOV 24, 1969			51655.0	Second Manned lunar landing and return with Charles Conrad, Jr., Richard F. Gordon, and Alan F. Bean. Landed in the Ocean of Storms on November 19, 1969; deployed TV camera and ALSEP experiments; two EVA's performed; collected core sample and lunar materials; photographed and retrieved parts from Surveyor III spacecraft. Mission duration 244 hours 36 minutes 24 seconds.
Skynet A (S) 1969 101A	Delta 74 (S)	Nov 21		ELEMENTS NOT AVAILABLE			242.7	Communication satellite for the United Kingdom. Reimbursable (UK).

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# NASA Major Launch Record

1970

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
ITOS A (S) 1970 106A	Delta 81 (S)	Dec 11	114.8	1471	1421	101.5	306.2	To augment NOAA's satellite world-wide weather observation capabilities. Reimbursable (NOAA). (WSMC)
Explorer 42 (S) 1970 107A	Scout 71 (S)	Dec 12		DOWN APR 5, 1979			142.0	Small Astronomy Satellite to catalog celestial X-ray sources within and outside the Milky Way. First X-ray satellite. (San Marco)
<b>1971</b>								<b>1971</b>
Intelsat IV F-2 (S) 1971 06A	Atlas-Centaur (AC-25) (S)	Jan 25		ELEMENTS NOT AVAILABLE			1387.1	Fourth generation satellite to provide increased capacity for Comsat's global commercial communications network. Reimbursable (Comsat).
Apollo 14 (S) 1971 08A	Saturn V SA-509 (S)	Jan 31		LANDED FEB 9, 1971			51655.0	Third Manned lunar landing with Alan B. Shepard, Jr., Stuart A. Roosa, and Edgar D. Mitchell. Landed in the Fra Mauro area on February 5, 1971; performed EVA, deployed lunar experiments, returned lunar samples. Mission duration 216 hours 1 minute 58 seconds.
NATOSAT 2 (S) 1971 09A	Delta 82 (S)	Feb 2	1436.1	35830	35744	13.7	242.7	Second communications satellite for NATO. Reimbursable (NATO)
Explorer 43 (S) 1971 19A	Delta 83 (S)	Mar 13		DOWN OCT 2, 1974			288.0	Second generation Interplanetary Monitoring Platform to extend man's knowledge of solar-lunar relationships.
ISIS B (S) 1971 24A	Delta 84 (S)	Mar 31	113.5	1421	1355	8.2	264.0	Study electron production and loss, and large scale transport of ionization in the ionosphere. Cooperative with Canada. (WSMC)
San Marco C (S) 1971 36A	Scout 72 (S)	Apr 24		DOWN NOV 29, 1971			163.3	Study atmosphere drag, density, neutral composition, and temperature. Cooperative with Italy. (SM)
Mariner H (U)	Atlas-Centaur (AC-24) (U)	May 8		DID NOT ACHIEVE ORBIT			997.9	Mariner Mars '71 Orbiter mission to map the Martian surface. Centaur stage malfunctioned shortly after launch.
Mariner I (S) 1971 051A	Atlas-Centaur (AC-23) (U)	May 30		AEROCENTRIC ORBIT			997.9	Second Mariner Mars '71 Orbiter mission to map the Martian surface. Achieved orbit around Mars on November 13, 1971. Transmitted 6,876 pictures.
PAET (S)	Scout 73 (S)	Jun 20		SUBORBITAL FLIGHT			62.1	Test to determine the structure and composition of an atmosphere from a probe entering at high speed.
Explorer 44 (S) 1971 58A	Scout 74 (S)	Jul 8		DOWN DEC 15, 1979			115.0	Solar radiation spacecraft to monitor the Sun's X-ray and ultraviolet emissions. Cooperative with NRL. (WFF)
Apollo 15 (S) 1971 63A	Saturn V SA-510 (S)	Jul 26		LANDED AUG 7, 1971			51655.0	Fourth manned lunar landing with David R. Scott, Alfred M. Worden, and James B. Irwin. Landed at Hadley Rille on July 30, 1971;
P&F Subsat (S) 1971 63D	SM	Aug 4		IMPACTED MOON JUL 30, 1971			36.3	performed EVA with Lunar Roving Vehicle; deployed experiments. P&F Subsatellite spring-launched from SM in lunar orbit. Mission Duration 295 hours 11 minutes 53 seconds.

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# NASA Major Launch Record

1971

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
CAS/EOLE (S) 1971 71A	Scout 75 (S)	Aug 16	99.7	837	652	50.2	85.0	Obtain data on winds, temperatures, and pressures using instrumented balloons launched from Argentina and a satellite. Cooperative with France. (WFF)
BIC (S)	Scout 76 (S)	Sep 20		SUBORBITAL FLIGHT			31.7	Barium Ion Cloud Project to study the Earth's magnetic field. Cooperative with Germany. (WFF)
OSO 7 (S) 1971 83A	Delta 85 (S)	Sep 29		DOWN JUL 9, 1974			635.0	Observe active physical processes on the Sun and how it influences the Earth and its space environment.
TETR4 (S) 1971 83B				DOWN SEP 21, 1978			20.4	
ITOS B (U) 1971 91A	Delta 86 (U)	Oct 21		DOWN JUL 21, 1972			31.7	To augment NOAA's satellite world-wide weather observation capabilities. Second stage failed. Reimbursable (NOAA). (WSMC)
Explorer 45 (S) 1971 96A	Scout 77 (S)	Nov 15		DOWN JAN 10, 1992			50.0	Small Scientific Satellite to study magnetic storms and acceleration of charged particles within the inner magnetosphere. (San Marco)
UK-4 (S) 1971 109A	Scout 78 (S)	Dec 11		DOWN DEC 12, 1978			102.4	Study the interactions between plasma and charged particle streams in the atmosphere. Cooperative with UK. (WSMC)
Intelsat IV F-3 (S) 1971 116A	Atlas-Centaur (AC-26) (S)	Dec 20	1445.5	36013	35928	10.3	1387.1	Fourth generation satellite to provide increased capacity for Comsat's global commercial communications network. Reimbursable (Comsat).
<b>1972</b>								<b>1972</b>
Intelsat IV F-4 (S) 1972 03A	Atlas-Centaur (AC-28) (S)	Jan 22	1442.4	35921	35896	9.7	1387.1	Fourth generation satellite to provide increased capacity for Comsat's global commercial communications network. Reimbursable (Comsat).
HEOS A-2 (S) 1972 05A	Delta 87 (S)	Jan 31		DOWN AUG 2, 1974			117.0	Carried seven experiments provided by various European organizations to investigate particles and micrometeorites in space. Reimbursable (ESA). (WSMC)
Pioneer 10 (S) 1972 12A	Atlas-Centaur (AC-27) (S)	Mar 2		SOLAR SYSTEM ESCAPE TRAJECTORY			258.0	Jupiter Flyby. First spacecraft to flyby Jupiter and return scientific data.
TD-1 (S) 1972 14A	Delta 88 (S)	Mar 11		DOWN JAN 9, 1980			470.8	Western European satellite to obtain data on high-energy emissions from stellar and galactic sources. Reimbursable (ESA). (WSMC)
Apollo 16 (S) 1972 31A	Saturn V SA-511 (S)	Apr 16		LANDED APR 27, 1972			5655.0	Fifth manned lunar landing mission with John W. Young, Ken Mattingly, and Charles M. Duke. Landed at Descartes on Apr 20, 1972. Deployed camera and experiments; performed EVA with lunar roving vehicle. Deployed P&F Subsatellite in lunar orbit. Mission Duration 265 hours 51 minutes 5 seconds.
P&F Subsat (S) 1972 31D	SM	Apr 16		IMPACTED MOON MAY 29, 1972			36.3	
Intelsat IV F-5 (S) 1972 41A	Atlas-Centaur (AC-29) (S)	Jun 13	1438.6	35858	35811	10.7	1387.1	Fourth generation satellite to provide increased capacity for Comsat's global commercial communications network. Reimbursable (Comsat).

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# NASA Major Launch Record

1972

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
ERTS-A (S) 1972 58A	Delta 89 (S)	Jul 23	103.0	908	896	99.3	941.0	Demonstrate remote sensing technology of the Earth's surface on a global scale and on a repetitive basis. (WSMC)
Explorer 46 (S) 1972 61A	Scout 79 (S)	Aug 13		DOWN NOV 2, 1979			206.4	Meteoroid Technology Satellite to measure meteoroid penetration rates and velocity. (WFF)
OA0 3 (S) 1972 65A	Atlas-Centaur (AC-22) (S)	Aug 21	99.2	725	713	35.0	2200.0	Study interstellar absorption of common elements in the interstellar gas, and investigate ultraviolet radiation emitted from young hot stars.
Transit (S) 1972 69A	Scout 80 (S)	Sep 2	99.9	796	707	90.0	94.0	Navigation Satellite for the U.S. Navy. Reimbursable (DOD). (WSMC)
Explorer 47 (S) 1972 73A	Delta 90 (S)	Sep 22		CURRENT ELEMENTS NOT MAINTAINED			375.9	Interplanetary Monitoring Platform; an automated space physics lab to study interplanetary radiation, solar wind, and energetic particles.
ITOS D (S) 1972 82A	Delta 91 (S)	Oct 15	114.9	1453	1446	102.0	34.5	To augment NOAA's satellite world-wide weather observation capabilities. Oscar, an amateur radio satellite, was carried as a piggyback. Reimbursable (ITOS/NOAA; Oscar/AMSAT). (WSMC)
Oscar (S) 1972 82B		Oct 15	114.9	1452	1446	102.0	15.9	
Telesat A (ANIK) (S) 1972 90A	Delta 92 (S)	Nov 9	1457.1	36258	36136	10.8	544.3	First of a series of domestic communications satellites for Canada. Reimbursable (Canada). (WSMC)
Explorer 48 (S) 1972 91A	Scout 81 (S)	Nov 15		DOWN AUG 20, 1980			186.0	Small Astronomy Satellite; carried a gamma ray telescope in a bulbous dome to study gamma rays. Launched by an Italian crew from San Marco. (SM)
ESRO IV (S) 1972 92A	Scout 82 (S)	Nov 21		DOWN APR 15, 1974			114.0	Carried five experiments to investigate the ionosphere, the near magnetosphere, auroral, and solar particles. Reimbursable (ESA). (WSMC)
Apollo 17 (S) (AS-512/CSM- 114/LM-12) 1972 96A	Saturn V SA-512 (S)	Dec 7		LANDED DEC 19, 1972			51655.0	Sixth and last manned lunar landing mission in the Apollo series with Eugene A. Cernan, Ronald E. Evans, and Harrison H. (Jack) Schmitt. Landed at Taurus-Littrow on Dec 11., 1972. Deployed camera and experiments; performed EVA with lunar roving vehicle. Returned lunar samples. Mission duration 301 hours 51 minutes 59 seconds.
Nimbus E (S) 1972 97A	Delta 93 (S)	Dec 11	107.1	1099	1086	99.8	716.8	Stabilized, Earth-oriented platform to test advanced systems for collecting meteorological and geological data. (WSMC)
AEROS (S) 1972 100A	Scout 83 (S)	Dec 16		DOWN AUG 22, 1973			125.7	Study the state and behavior of the upper atmosphere and ionosphere. Cooperative with Germany. (WSMC)
<b>1973</b>								<b>1973</b>
Pioneer G (S) 1973 19A	Atlas-Centaur (AC-30) (S)	Apr 5		SOLAR SYSTEM ESCAPE TRAJECTORY			259.0	Investigate the interplanetary medium beyond the orbit of Mars, the Asteroid Belt, and the near-Jupiter environment.

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# NASA Major Launch Record

1973

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
Telesat B (ANIK-2) (S) 1973 23A	Delta 94 (S)	Apr 20	1443.0	35970	35873	9.4	544.3	Second domestic communications satellite for Canada. Reimbursable (Canada).
Skylab Workshop (S) 1973 27A	Saturn V SA-513 (S)	May 14		DOWN JUL 11, 1979			71500.0	Unmanned launch of the first U.S. Space Station. Workshop incurred damage during launch. Repaired during follow-on manned missions.
Skylab 2 206/CSM-116 (S) 1973 32A	Saturn IB SA-206 (S)	May 25		LANDED JUN 22, 1973			29750.0	First manned visit to Skylab workshop with Charles (Pete) Conrad, Jr., Joseph P. Kerwin, and Paul J. Weitz. Deployed parasol-like thermal blanket to protect the hull and reduce temperatures within the workshop; freed solar wing that was jammed with debris. Mission duration 672 hours 49 minutes 49 seconds.
Explorer 49 (S) 1973 39A	Delta 95 (S)	Jun 10		SELENOCENTRIC ORBIT			328.0	Radio Astronomy Explorer to measure low frequency radio noise from galactic and extragalactic sources and from the Sun, Earth and Jupiter.
ITOS E (U)	Delta 96 (U)	Jul 16		DID NOT ACHIEVE ORBIT			333.8	Augment NOAA's satellite world-wide weather observation capabilities. Vehicle second stage malfunctioned. Reimbursable (NOAA). (WSMC)
Skylab 3 207/CSM-117 (S) 1973 50A	Saturn IB SA-207 (S)	Jul 28		LANDED SEP 25, 1973			29750.0	Second manned visit to Skylab Workshop with Alan L. Bean, Owen K. Garriott, and Jack R. Lousma. Performed systems and operational tests, conducted experiments, deployed thermal shield. Mission Duration 1416 hours 11 minutes 9 seconds.
Intelsat IV F-7 (S) 1973 58A	Atlas-Centaur (AC-31) (S)	Aug 23	1452.4	36138	36072	9.7	1387.1	Fourth generation satellite to provide increased capacity for Comsat's global commercial communications network. Reimbursable (Comsat).
Explorer 50 (S) 1973 78A	Delta 97 (S)	Oct 25		ELEMENTS NOT AVAILABLE			397.2	Last Interplanetary Monitoring Platform to investigate the Earth's radiation environment.
Transit (S) 1973 81A	Scout 84 (S)	Oct 30	105.2	1123	885	89.9	95.0	Navigation satellite for the U.S. Navy. Reimbursable (DOD). (WSMC)
Mariner 10 (Mariner/Venus/ Mercury) (S) 1973 85A	Atlas-Centaur (AC-34) (S)	Nov 3		HELIOCENTRIC ORBIT			504.0	Venus and Mercury flyby mission; first dual-planet mission. Photographed the Earth and the Moon on its flight to Venus; Venus encounter (at 5,800 km) on February 5, 1973; Mercury encounter (at 704 km) on March 29, 1974; second Mercury encounter (at 48,069 km) on September 21, 1974; third Mercury encounter (at 327 km) on March 16, 1975. Engineering tests conducted before attitude control gas was depleted and transmitter commanded off on March 24, 1975.
ITOS F (S) 1973 86A	Delta 98 (S)	Nov 6	116.1	1508	1499	116.1	345.0	To augment NOAA's satellite world-wide weather observation capabilities. Reimbursable (NOAA). (WSMC)
Skylab 4 (S) 1973 90A	Saturn IB SA-208 (S)	Nov 16		LANDED FEB 8, 1974			29,750.0	Third manned visit to Skylab Workshop with Gerald P. Carr, Edward G. Gibson, and William R. Pogue. Performed inflight experiments; obtained medical data on crew; performed four EVA's. Mission duration: 2016 hours 1 minute 16 seconds.

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# NASA Major Launch Record

1973

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
Explorer 51 (S) 1973 101A	Delta 99 (S)	Dec 16		DOWN DEC 12, 1978			663.0	Atmosphere Explorer; carried 14 instruments to study energy transfer, atomic and molecular processes, and chemical reactions in the atmosphere. (WSMC)
<b>1974</b>								<b>1974</b>
Skynet II-A (U) 1974 02A	Delta 100 (U)	Jan 18		DOWN JAN 25, 1974			435.5	Communication satellite for the United Kingdom. Short circuit in electronics package caused vehicle failure. Reimbursable (UK).
Centaur Proof Flight (U)	Titan IIIE Centaur (76) (U)	Feb 11		DID NOT ACHIEVE ORBIT				Launch vehicle development test of the Titan IIIE/Centaur (TC-1); carried simulated Viking spacecraft and Sphinx. Liquid oxygen boost pump failed to operate during Centaur starts. Destruct command sent 748 seconds after liftoff.
San Marco C-2 (S) 1974 09A	Scout 85 (S)	Feb 18		DOWN MAY 4, 1976			170.0	Measure variations of equatorial neutral atmosphere density, composition, and temperature. Cooperative with Italy. (San Marco)
UK-X4 (S) 1974 13A	Scout 86 (S)	Mar 8	100.3	867	677	97.9	91.6	Three-axis stabilized spacecraft to demonstrate the technology involved in the design and manufacture of this type platform for use on small spacecraft. Reimbursable (UK). (WSMC)
Westar A (S) 1974 13A	Delta 101 (S)	Apr 13	1441.6	35907	35907	9.1	571.5	Domestic communications satellite for Western Union. Reimbursable (WU).
SMS A (S) 1974 33A	Delta 102 (S)	May 17		ELEMENTS NOT AVAILABLE			628.0	Geostationary environmental satellite to provide Earth imaging in visible and IR spectrum. First weather observer to operate in a fixed geosynchronous orbit about the Equator. Cooperative with NOAA.
ATS F (S) 1974 39A	Titan III C Centaur 79 (S)	May 30	1412.1	35440	35190	12.5	1403.0	Applications Technology Satellite capable of providing good quality TV signals to small, inexpensive ground receivers. Carried over 20 technology and science experiments.
Explorer 52 (S) 1974 40A	Scout 87 (S)	Jun 3		DOWN APR 28, 1978			26.6	"Hawkeye" spacecraft to investigate the interaction of the solar wind with the Earth's magnetic field. (WSMC)
AEROS B (S) 1974 55A	Scout 88 (S)	Jul 16		DOWN SEP 25, 1975			125.7	German-built satellite to study the state and behavior of the upper atmosphere and ionosphere. Reimbursable (Germany). (WSMC)
ANS A (S) 1974 70A	Scout 89 (S)	Aug 30		DOWN JUN 14, 1977			129.8	Study the sky in ultraviolet and X-ray from above the atmosphere. Cooperative with the Netherlands. (WSMC)
Westar B (S) 1974 75A	Delta 103 (S)	Oct 10	1442.2	35928	35883	8.9	571.5	Domestic communications satellite for Western Union. Reimbursable (WU).
UK-5 (S) 1974 77A	Scout 90 (S)	Oct 15		DOWN MAR 14, 1980			130.3	Measure the spectrum, polarization and pulsar features of non-solar X-ray sources. Cooperative with UK. (San Marco)

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# NASA Major Launch Record

1974

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
ITOS-G (S) 1974 89A	Delta 104 (S)	Nov 15	114.9	1457	1442	101.9	345.0	ITOS-G - To augment NOAA's satellite world-wide weather observation capabilities. Reimbursable (NOAA).
Intasat (S) 1974 89B			114.8	1457	1439	101.9	20.4	Intasat - Conduct worldwide observations of ionospheric total electron counts. Cooperative with Spain.
Oscar (S) 1974 89C			114.8	1457	1437	101.9	28.6	Oscar - provide communications capability for amateur radio enthusiasts around the world. Reimbursable (AMSAT) (WSMC)
Intelsat IV F-8 (S) 1974 93A	Atlas-Centaur (AC-32) (S)	Nov 21	1443.0	35949	35894	8.1	1387.1	Fourth generation satellite to provide increased capacity for Comsat's global commercial communications network. Reimbursable (Comsat).
Skynet II-B (S) 1974 94A	Delta 105 (S)	Nov 22	1436.9	35828	35775	11.6	435.0	Communication satellite for the United Kingdom. Reimbursable (UK).
Helios A (S) 1974 97A	Titan IIIE Centaur 83 (S)	Dec 10	HELIOCENTRIC ORBIT				370.0	Study the Sun from an orbit near the center of the solar system. Cooperative with West Germany.
Symphonie A (S) 1974 101A	Delta 106 (S)	Dec 18	1440.6	35896	35853	11.9	402.0	Joint French-German communications satellite to serve North and South America, Europe, Africa and the Middle East. Reimbursable (France/Germany).
<b>1975</b>								<b>1975</b>
Landsat 2 (S) 1975 04A	Delta 107 (S)	Jan 22	103.1	911	899	98.8	953.0	Second Earth Resources Technology Satellite to locate, map, and measure Earth resources parameters from space and demonstrate the applicability of this approach to the management of the worlds resources. (WSMC)
SMS-B (S) 1975 11A	Delta 108 (S)	Feb 6	ELEMENTS NOT AVAILABLE				628.0	Together with SMS-A, provide cloud-cover pictures every 30 minutes to weathermen at NOAA. Cooperative with NOAA.
Intelsat IV F-6 (U) 1975 38A	Atlas-Centaur (AC-33) (U)	Feb 20	DID NOT ACHIEVE ORBIT				1387.1	Fourth generation satellite to provide increased capacity for Comsat's global commercial communications network. Launch vehicle malfunctioned. Reimbursable (Comsat).
GEOS C (S) 1975 27A	Delta 109 (S)	Apr 9	101.6	851	815	115.0	340.0	Oceanographic and geodetic satellite to measure ocean topography, sea state, and other features. (WSMC)
Explorer 53 (S) 1975 37A	Scout 91 (S)	May 7	DOWN APR 9, 1979				196.7	Small Astronomy Satellite to study X-ray sources within and beyond the Milky Way galaxy. (San Marco)
Telesat C (S) 1975 38A	Delta 110 (S)	May 7	1439.5	35872	35833	8.2	544.3	Third domestic communications satellite for Canada. Reimbursable (Canada).
Intelsat IV F-1 (S) 1975 42A	Atlas-Centaur (AC-35) (S)	May 22	1450.8	36133	36015	8.1	1387.1	Fourth generation satellite to provide increased capacity for Comsat's commercial communications network. Last of the IV series. Reimbursable (Comsat).

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# NASA Major Launch Record

1975

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
Nimbus F (S) 1975 52A	Delta 111 (S)	Jun 12	107.4	1111	1098	99.8	827.0	Stabilized, Earth-oriented platform to test advanced systems for collecting meteorological and geological data. (WSMC)
OSO I (S) 1975 57A	Delta 112 (S)	Jun 21		DOWN JUL 9, 1986			1088.4	Observe active physical processes on the Sun and how it influences the Earth and its space environment.
Apollo Soyuz Test Project (S) 1975 66A	Saturn IB SA-210 (S)	Jul 15		DOWN JUL 24, 1975			14,856.0	Manned Apollo spacecraft with Thomas P. Stafford, Vance D. Brand and Donald K. Slayton Rendezvoused and docked with Soyuz 19 spacecraft (also launched July 15, 1975) with Aleksey Leonov and Valeriy Kubasov on July 17, 1975. Mission Duration 217 hours 28 minutes 23 seconds.
COS B (S) 1975 72A	Delta 113 (S)	Aug 8		CURRENT ELEMENTS NOT MAINTAINED			277.5	Cosmic ray satellite to study extraterrestrial gamma radiation. Reimbursable (ESA ). (WSMC)
Viking A Orbiter(S) 1975 75A	Titan IIIE Centaur 88 (S)	Aug 20		AEROCENTRIC ORBIT			2324.7	Mars Orbiter and Lander mission to conduct systematic investigation of Mars. U.S. first attempt to soft land a spacecraft on another planet achieved on July 20, 1976. First analysis of surface material on another planet.
Viking A Lander (S) 1975 75C				LANDED ON MARS JUL 20, 1976			571.5	
Symphonie B (S) 1975 77A	Delta 114 (S)	Aug 29	1440.4	35880	35861	12.1	402.0	Second joint French-German communications satellite to serve North and South America, Europe, Africa and the Middle East. Reimbursable (France/Germany).
Viking B Orbiter(S) 1975 83A	Titan IIIE Centaur 89 (S)	Sep 9		AEROCENTRIC ORBIT			2324.7	Second Mars Orbiter and Lander mission to conduct systematic investigation of Mars. Soft landed on Mars on September 3, 1976.
Viking B Lander 1975 83C				LANDED ON MARS SEP 3, 1976			571.5	Returned excellent scientific data.
Intelsat IVA F-1 (S) 1975 91A	Atlas-Centaur (AC-36) (S)	Sept 25	1441.0	35914	35852	8.1	1515.0	Improved satellite with double the capacity of previous Intelsats for Comsat's global commercial communications network. Reimbursable (Comsat).
Explorer 54 (S) 1975 96A	Delta 115 (S)	Oct 6		DOWN MAR 12, 1976			675.0	Atmosphere Explorer to investigate chemical processes and energy transfer mechanisms which control the Earth's atmosphere. (WSMC)
Transit (S) 1975 99A	Scout 92 (S)	Oct 12		DOWN MAY 26, 1991			161.9	Second in a series of improved navigation satellite for the U.S. Navy. Reimbursable. (WSMC)
SMS-C/GOES A (S) 1975 100A	Delta 116 (S)	Oct 16	1435.7	35801	35756	7.6	628.0	First operational satellite in NOAA's geosynchronous weather satellite system. Reimbursable (NOAA).
Explorer 55 (S) 1975 107A	Delta 117 (S)	Nov 20		DOWN JUN 10, 1981			719.6	Atmosphere Explorer to investigate the chemical processes and energy transfer mechanisms which control Earth's atmosphere.

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# NASA Major Launch Record

1975

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
Dual Air Density Explorer (U)	Scout 93 (U)	Dec 5		DID NOT ACHIEVE ORBIT			35.3	Measure global density of upper atmosphere and lower exosphere. Malfunction during third stage burn resulted in loss of vehicle control; destroyed by Range Safety Officer at 341 seconds. (WSMC)
RCA A (S) 1975 117A	Delta 118 (S)	Dec 13	1445.8	36084	35873	8.2	867.7	First RCA domestic communications satellite. Reimbursable (RCA).
<b>1976</b>								<b>1976</b>
Helios B (S) 1976 03A	Titan IIIE Centaur 93 (S)	Jan 15		HELIOCENTRIC ORBIT			374.7	Carried 11 scientific instruments to study the Sun. Cooperative with Germany.
CTS (S) 1976 04A	Delta 119 (S)	Jan 17	1437.1	35887	35726	12.2	347.0	Experimental high-powered communication satellite to provide communications in remote areas. Cooperative with Canada.
Intelsat IVA F-2 (S) 1976 10A	Atlas-Centaur (AC-37) (S)	Jan 29	1444.5	35968	35933	8.3	1515.0	Second improved satellite with double the capacity of previous Intelsats for Comsat's global commercial communications network. Reimbursable (Comsat).
Marisat A (S) 1976 17A	Delta 120 (S)	Feb 19	1436.1	35797	35777	10.4	655.4	Comsat Maritime Satellite to provide rapid, high-quality communications between ships at sea and home offices. Reimbursable (Comsat).
RCA B (S) 1976 29A	Delta 121 (S)	Mar 26	1460.1	36501	36010	7.8	867.7	Second RCA domestic communications Satellite. Reimbursable (RCA).
NATO IIIA (S) 1976 35A	Delta 122 (S)	Apr 22	1442.3	36008	35806	10.1	670.0	Third-generation communications satellite for NATO. Reimbursable (NATO)
LAGEOS (S) 1976 39A	Delta 123 (S)	May 4	225.4	5945	5838	109.9	411.0	Solid, spherical passive satellite to provide a reference point for laser ranging experiments. (WSMC)
Comstar 1A (S) 1976 42A	Atlas-Centaur (AC-38) (S)	May 13	1442.6	35921	35905	8.0	1490.1	First domestic communications satellite for Comsat. Reimbursable (Comsat).
Air Force P76-5 (S) 1976 47A	Scout 94 (S)	May 22	105.4	1044	981	99.6	72.6	Evaluate propagation effects of disturbed plasmas on radar and communications systems. Reimbursable (DOD). (WSMC)
Marisat B (S) 1976 53A	Delta 124 (S)	Jun 9	1436.1	35813	35760	9.5	655.4	Second Comsat Maritime Satellite to provide rapid, high-quality communications between ships at sea and home offices. Reimbursable (Comsat).
Gravity Probe A (S)	Scout 95 (S)	Jun 18		SUBORBITAL FLIGHT			102.5	Scientific probe to test Einstein's Theory of Relativity. (WFF)
Palapa A (S) 1976 66A	Delta 125 (S)	Jul 8	1439.1	35867	35821	8.0	573.8	Communication Satellite for Indonesia. Reimbursable (Indonesia).
Comstar B (S) 1976 73A	Atlas-Centaur (AC-40) (S)	Jul 22	1436.2	35791	35784	7.9	1490.1	Second domestic communications satellite for Comsat. Reimbursable (Comsat).

# NASA Major Launch Record

1976

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
ITOS H (S) 1976 77A	Delta 126 (S)	Jul 29	116.2	1518	1505	102.1	345.0	Second generation satellite for NOAA's world-wide weather observation. Reimbursable (NOAA). (WSMC)
TIP III (S) 1976 89A	Scout 96 (S)	Sep 1		DOWN MAY 30, 1981			166.0	Improved Transit Navigation Satellite for the U.S. Navy. Reimbursable (DOD). (WSMC)
Marisat C (S) 1976 101A	Delta 127 (S)	Oct 14	1436.0	35791	35779	10.9	655.4	Third Comsat Maritime Satellite to provide rapid, high-quality communications between ships at sea and home offices. Reimbursable (Comsat).
<b>1977</b>								<b>1977</b>
NATO IIIB (S) 1977 05A	Delta 128 (S)	Jan 27	1436.2	35789	35788	9.9	670.0	Third-generation communications satellite for NATO. Reimbursable (NATO).
Palapa B (S) 1977 18A	Delta 129 (S)	Mar 10	1439.5	35873	35831	6.9	573.8	Second Communication Satellite for Indonesia. Reimbursable (Indonesia).
GEOS/ESA (U) 1977 29A	Delta 130 (U)	Apr 20	734.1	38283	2874	26.6	571.5	ESA scientific satellite; carried seven experiments to investigate the Earth's magnetosphere. Malfunction during second stage/third stage spinup placed GEOS in unusable orbit. Reimbursable (ESA).
Intelsat IVA F-4 (S) 1977 41A	Atlas-Centaur (AC-39) (S)	May 26	1448.1	36075	35966	7.0	1515.0	Improved satellite with double the capacity of previous Intelsats for Comsat's global commercial communications network. Reimbursable (Comsat).
GOES/NOAA (S) 1977 48A	Delta 131 (S)	Jun 16	1435.8	35797	35762	10.2	635.0	Visible/infrared spin-scan radiometer provided day and night global weather pictures for NOAA. Reimbursable (NOAA).
GMS (S) 1977 65A	Delta 132 (S)	Jul 14	1451.0	36152	36001	10.4	669.5	Operational weather satellite; Japan's contribution to the Global Atmosphere Research Program (GARP). Reimbursable (Japan).
HEAO A (S) 1977 75A	Atlas-Centaur (AC-45) (S)	Aug 12		DOWN MAR 15, 1979			2551.9	High Energy Astronomy Observatory to study and map X-rays and gamma rays.
Voyager 2 (S) 1977 76A	TITAN III E Centaur 106 (S)	Aug 20		SOLAR SYSTEM ESCAPE TRAJECTORY			2086.5	Investigate the Jupiter and Saturn planetary systems and the interplanetary medium between the Earth and Saturn. Jupiter flyby occurred on July 9, 1979; Saturn flyby occurred on August 25, 1981; Uranus flyby occurred on January 24, 1986; and Neptune flyby occurred on August 25, 1989. Will continue into interstellar space
SIRIO (S) 1977 80A	Delta 133 (S)	Aug 25	1438.7	35925	35750	8.3	398.0	Italian scientific satellite to study the propagation characteristics of radio waves transmitted at super high frequencies during adverse weather. Reimbursable (Italy).

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# NASA Major Launch Record

1977

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
Voyager 1 (S) 1977 84A	Titan III E Centaur 107 (S)	Sep 5		HELIOCENTRIC ORBIT			2086.5	Investigate the Jupiter and Saturn planetary systems and the interplanetary medium between the Earth and Saturn. Jupiter flyby occurred on March 5, 1979; Saturn flyby occurred on November 12, 1980; departed Saturn at a high angle to the ecliptic plane to observe the large cloud-covered moon Titan. Will not be involved in any more planetary encounters.
ESA/OTS (U)	Delta 134 (U)	Sep 13		DID NOT ACHIEVE ORBIT			865.0	ESA experimental communications satellite. Vehicle exploded at 54 seconds after liftoff. Reimbursable (ESA).
Intelsat IVA F-5 (U)	Atlas-Centaur (AC-43) (U)	Sep 29		DID NOT ACHIEVE ORBIT			1515.0	Improved satellite with double the capacity of previous Intelsats for Comsat's global commercial communications network. Launch vehicle failed. Reimbursable (Comsat).
ISEE A/B 1977 102A (S) 1977 102B (S)	Delta 135 (S)	Oct 22		DOWN SEP 26, 1987 DOWN SEP 26, 1987			329.0 157.7	Dual payload International Sun Earth Explorer to the study interaction of the interplanetary medium with the Earth's immediate environment. Cooperative with ESA.
Transat (S) 1977 106A	Scout 97 (S)	Oct 27	106.8	1096	1060	89.7	93.9	Improved Transit navigation satellite for the U.S. Navy. Reimbursable (DOD). (WSMC)
Meteosat (S) 1977 108A	Delta 136 (S)	Nov 22	1435.9	35815	35748	11.3	695.3	ESA Meteorological satellite; Europe's contribution to the Global Atmospheric Research Program (GARP). Reimbursable (ESA).
CS/Japan (S) 1977 118A	Delta 137 (S)	Dec 14	1455.8	36182	36162	9.8	677.0	Experimental communication satellite for Japan. Reimbursable (Japan).
<b>1978</b>								<b>1978</b>
Intelsat IVA F-3 (S) 1978 02A	Atlas-Centaur (AC-46) (S)	Jan 6	1441.4	35901	35877	6.5	1515.0	Provide increased telecommunications capacity for Intelsat's global network. Reimbursable (Comsat).
IUE-A (S) 1978 12A	Delta 138 (S)	Jan 26	1435.6	41343	30210	33.8	698.5	International Ultraviolet Explorer to obtain high resolution data of stars and planets in the UV region of the spectrum. Cooperative with ESA.
Fltsatcom-A (S) 1978 16A	Atlas-Centaur (AC-44) (S)	Feb 9	1436.1	35798	35776	10.5	1863.3	Provide communications capability for the USAF and the USN for fleet relay and fleet broadcast. Reimbursable (DOD).
Landsat-C (S) 1978 26A	Delta 139 (S)	Mar 5	103.1	916	894	98.8	900.0	Third Earth Resources Technology Satellite to study the Earth's natural resources; measure water, agricultural fields, and mineral deposits. Carried Lewis Research Center Plasma Interaction Experiment (PIX-I) and AMSAT Oscar Amateur Radio communications relay satellite. Reimbursable (Oscar/AMSAT).
Oscar-8 (S) 1978 26B			103.0	904	893	99.2	27.3	
PIX-I (S) 1978 26C				CURRENT ELEMENTS NOT MAINTAINED			34.0	
Intelsat IVA F-6 (S) 1978 35A	Atlas-Centaur (AC-48) (S)	Mar 31	1435.6	35801	35753	6.5	1515.0	Provide increased telecommunications capacity for Intelsat's global network. Reimbursable (Comsat).

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# NASA Major Launch Record

1978

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
BSE/Japan (S) 1978 39A	Delta 140	Apr 7	1435.2	35796	35740	11.0	665.0	Japan's Broadcasting Satellite/Experimental for conducting TV broadcast experiments. Reimbursable (Japan).
HCMM/AEM-A (S) 1978 41A	Scout 98 (S)	Apr 26		DOWN DEC 22, 1981			134.3	Heat Capacity Mapping Mission to test the feasibility of measuring variations in the Earth's temperatures. (WSMC)
OTS-B (S) 1978 44A	Delta 141	May 11	1452.6	36124	36092	8.5	865.0	Orbital Test Satellite to conduct communications experiments for ESA. Reimbursable (ESA).
Pioneer Venus-A (Orbiter) (S) 1978 51A	Atlas-Centaur (AC-50) (S)	May 20		ELEMENTS NOT AVAILABLE			582.0	One of two Pioneer flights to Venus in 1978; was placed in orbit around Venus for remote sensing and direct measurements of the planet and its surrounding environment.
GOES-C/NOAA (S) 1978 62A	Delta 142 (S)	Jun 16	1436.0	35808	35761	9.1	635.0	Part of NOAA's global network of geostationary environmental satellites to provide Earth imaging, monitor the space environment, and relay meteorological data to users. Reimbursable (NOAA).
Seasat-A (S) 1978 64A	Atlas-F (S)	Jun 26	100.1	765	761	108.0	2300.0	Demonstrate techniques for global monitoring of oceanographic phenomena and features. After 106 days of returning data, contact was lost when a short circuit drained all power from the batteries. (WSMC)
Comstar C (S) 1978 68A	Atlas-Centaur (AC-41) (S)	Jun 29	1451.8	36181	36004	6.3	1516.0	Third domestic communications satellite for Comsat. Reimbursable (Comsat).
GEOS-B/ESA (S) 1978 71A	Delta 143 (S)	Jul 14	1449.1	36056	36033	11.1	575.0	Positioned on magnetic field lines to study the magnetosphere and correlate data with ground station, balloon, and sounding rocket measurements. Reimbursable (ESA).
Pioneer/Venus-B (Multiprobe) 1978 78A	Atlas-Centaur (AC-51) (S)	Aug 8		PROBES LANDED DEC 9, 1978			904.0	Second Pioneer flight to Venus in 1978 to determine the nature and composition of the atmosphere of Venus. All four probes and the bus transmitted scientific data. The large probe, north probe, and night probe went dead upon impact; the day probe continued to transmit for 68 minutes after impact.
ISEE-C (S) 1978 79A ICE (S)	Delta 144 (S)	Aug 12		HELIOCENTRIC ORBIT			479.0	Monitored the characteristics of solar phenomena about 1 hour before ISEE-A and B to gain knowledge of how the Sun controls the Earth's near space environment. The spacecraft was renamed ICE in 1985 and its orbit was changed to encounter the Comet Giacobini-Zinner on September 11, 1985. Cooperative with ESA.
Tiros-N (S) 1978 96A	Atlas-F (S)	Oct 13	101.7	845	829	98.7	1405.0	Third generation polar orbiting environmental spacecraft to provide improved meteorological and environmental data. Operated by NOAA. (WSMC)

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# NASA Major Launch Record

1978

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
Nimbus-G (S) 1978 98A Cameo 1978 98B	Delta 145 (S)	Oct 24	104.0  104.0	955  966	940  924	99.1  99.6	987.0	Carried advanced sensors and technology to conduct experiments in pollution monitoring, oceanography, and meteorology. ESA received and processed data direct. After separation from Nimbus-G, the Delta vehicle released lithium over Northern Scandinavia and barium over Northern Alaska as part of Project CAMEO (Chemically Active Material Ejected in Orbit).
HEAO-B (S) 1978 103A	Atlas-Centaur (AC-52) (S)	Nov 13		DOWN MAR 25, 1982			3152.0	Second High Energy Astronomical Observatory; carried a large X-ray telescope to study the high energy universe, pulsars, neutron stars, black holes, quasars, radio galaxies, and supernovas.
NATO IIIC (S) 1978 106A	Delta 146 (S)	Nov 18	1462.2	36307	36283	6.9	706.0	Third-generation communications satellite for NATO. Reimbursable (NATO).
Telesat D (S) 1978 116A	Delta 147 (S)	Dec 15	1442.7	35943	35887	5.8	887.2	Fourth domestic communications satellite for Canada. Reimbursable (Canada).
<b>1979</b>								<b>1979</b>
SCATHA (S) 1979 07A	Delta 148 (S)	Jan 30	1418.4	42737	28140	9.4	658.6	Spacecraft Charging at High Altitudes (SCATHA) carried 12 experiments to investigate electrical static discharges that affect satellites. Reimbursable (DOD).
SAGE/AEM-2 (S) 1979 13A	Scout 99 (S)	Feb 18		DOWN APR 11, 1989			127.0	Stratospheric Aerosol and Gas Experiment Applications Explorer Mission, to map vertical profiles of ozone, aerosol, nitrogen dioxide, and Rayleigh molecular extinction around the globe. (WFF)
Filtsatcom B (S) 1979 38A	Atlas-Centaur (AC-47) (S)	May 4	1461.3	36334	36222	9.2	1876.1	Provide communications capability for the USAF and the USN for fleet relay and fleet broadcast. Reimbursable (DOD). (WFF)
UK-6 (S) 1979 47A	Scout 100 (S)			DOWN SEP 23, 1990			154.5	Measure ultra-heavy cosmic ray particles and study low-energy cosmic X-rays. Reimbursable (UK). (WSMC)
NOAA-6 (S) 1979 57A	Atlas-F (S)	Jun 27	100.7	801	786	98.6	1405.0	To provide continuous coverage of the Earth and high-accuracy world-wide meteorological data. Reimbursable (NOAA). (WSMC)
Westar C (S) 1979 72A	Delta 149 (S)	Aug 9	1441.0	35889	35874	4.6	571.5	Domestic communications satellite for Western Union. Reimbursable (WU).
HEAO 3 (S) 1979 82A	Atlas-Centaur (AC-53) (S)	Sep 20		DOWN DEC 7, 1981			2898.5	High Energy Astronomy Observatory carried two cosmic ray experiments and one gamma ray spectrometer to obtain data on cosmic rays observed across the far reaches of space.
MAGSAT/AEM-3 (S) 1979 94A	Scout 101 (S)	Oct 30		DOWN JUN 11, 1980			183.0	Magnetic Field Satellite, Applications Explorer Mission to map the magnetic field of the Earth. (WSMC)
RCA-C (U) 1979 101A	Delta 150 (S)	Dec 6	788.9	35423	8385	8.2	895.4	Third RCA domestic communications satellite. Contact was lost shortly after apogee motor firing. Reimbursable (RCA).

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# NASA Major Launch Record

1980

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
<b>1980</b>								
Filtsatcom C (S) 1980 04A	Atlas-Centaur (AC-49) (S)	Jan 17	1436.7	35885	35710	8.4	1864.7	Provide communications capability for the USAF and the USN for fleet relay and fleet broadcast. Reimbursable (DOD).
SMM-A (S) 1980 14A	Delta 151 (S)	Feb 14		DOWN DEC 2, 1989			2315.0	Solar Maximum Mission; first solar satellite designed to study specific solar phenomena using a coordinated set of instruments; performed a detailed study of solar flares, active regions, sunspots, and other solar activity. Also measured the total output of radiation from the Sun.
NOAA-7 (U) 1980 43A	Atlas 19F (U)	May 29		DOWN MAY 3, 1981			1405.0	A companion to TIROS N to provide continuous coverage of the Earth and provide high-accuracy worldwide meteorological data. Launch vehicle malfunctioned; failed to place satellite into proper orbit. Reimbursable (NOAA). (WSMC)
GOES D (S) 1980 74A	Delta 152 (S)	Sep 9	1451.3	36713	35453	8.6	832.0	Part of NOAA's global network of geostationary environmental satellites to provide Earth imaging, monitor the space environment, and relay meteorological data. Reimbursable (NOAA).
Filtsatcom D (S) 1980 87A	Atlas-Centaur (AC-57) (S)	Oct 30	1436.1	35798	35775	8.5	1863.8	Provide communications capability for the USAF and the USN for fleet relay and fleet broadcast. Reimbursable (DOD).
SBS-A (S) 1980 91A	Delta 153 (S)	Nov 15	1442.5	35946	35878	5.3	1057.0	Satellite Business Systems (SBS) to provide fully switched private networks to businesses, government agencies, and other organizations with large, varied communications requirements. Reimbursable (SBS).
Intelsat V-A F-2 (S) 1980 98A	Atlas-Centaur (AC-54) (S)	Dec 6	1436.2	35806	35769	3.8	1928.2	Advanced series of spacecraft to provide increased telecommunications capacity for Intelsat's global network. Reimbursable (Comsat).
<b>1981</b>								
Comstar D (S) 1981 18A	Atlas-Centaur (AC-42) (S)	Feb 21	1436.2	35791	35785	6.4	1484.0	Fourth domestic communications satellite for Comsat. Reimbursable (Comsat).
STS-1 (S) 1981 34A	Shuttle (S) (Columbia)	Apr 12		LANDED AT DFRF APR 14, 1981				First Manned orbital test flight of the Space Transportation System with John W. Young and Robert L. Crippen to verify the combined performance of the Space Shuttle Vehicle. Mission duration 54 hours 20 minutes 53 seconds.
NOVA-1 (S) 1981 44A	Scout 102 (S)	May 15		ELEMENTS NOT AVAILABLE			166.9	Improved Transit satellite for the Navy's operational navigation system. Reimbursable (DOD).
GOES E (S) 1981 49A	Delta 154 (S)	May 22	1436.6	35808	35785	5.7	837.0	Part of NOAA's Geostationary Operational Environmental Satellite system to provide near continual, high resolution visual and infrared imaging over large areas. Reimbursable (NOAA).

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# NASA Major Launch Record

1981

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
Intelsat V-8 F-1 (S) 1981 50A	Atlas-Centaur (AC-56) (S)	May 23	1438.2	35856	35799	4.4	1928.2	Advanced series of spacecraft to provide increased telecommunications capacity for Intelsat's global network. Reimbursable (Comsat).
NOAA-C (S) 1981 59A	Atlas 87F (S)	Jun 23	101.7	847	829	98.9	1405.0	To provide continuous coverage of the Earth and provide high-accuracy worldwide meteorological data. Reimbursable (NOAA) (WSMC)
DE A & B(S) 1981 70A (S) 1981 70B (S)	Delta 155	Aug 3	410.4	23286	505	88.8	424.0 420.0	Dynamic Explorer (DE-A & B); dual spacecraft to study the Earth's electromagnetic fields. (WSMC)
Fltsatcom E (U) 1981 73A	Atlas-Centaur (AC-59) (S)	Aug 6	1460.4	36311	36209	8.1	1863.8	Provide communications capability for the USAF and the USN for fleet relay and fleet broadcast. Reimbursable (DOD).
SBS-B 1981 96A	Delta 156 (S)	Sep 24	1436.2	35797	35778	4.4	1057.0	Satellite Business Systems (SBS) to provide fully switched private networks to businesses, government agencies, and other organizations with large, varied communications requirements. Reimbursable (SBS).
SME (S) 1981 100A	Delta 157 (S)	Oct 6		DOWN MAR 5, 1991			437.0	Solar Mesosphere Explorer, an atmospheric research satellite to study reactions between sunlight, ozone and other chemicals in the atmosphere. Carried UoSat-Oscar 9 (UK) Amateur Radio Satellite as secondary payload. Reimbursable (UoSat-Oscar 9)
UoSAT 1 (S) 1981 100B				DOWN OCT 13, 1989			52.0	
STS 2 (S) 1981 111A	Shuttle (S) (Columbia)	Nov 12		LANDED AT DFRF NOV 14, 1981				Second Manned orbital test flight of the Space Transportation System with Joe E. Engle and Richard H. Truly to verify the combined performance of the Space Shuttle vehicle. OSTA-1 payload demonstrated capability to conduct scientific research in the attached mode. Mission duration 54 hours 13 minutes 12 seconds.
RCA-D (S) 1981 114A	Delta 158 (S)	Nov 19	1438.6	35846	35826	1.8	1081.8	Fourth RCA domestic communications satellite. Reimbursable (RCA).
Intelsat V F-3 (S) 1981 119A	Atlas-Centaur (AC-55) (S)	Dec 15	1436.1	35801	35770	3.4	1928.2	Advanced series of spacecraft to provide increased telecommunications capacity for Intelsat's global network. Reimbursable (Comsat).
<b>1982</b>								<b>1982</b>
RCA C' (S) 1982 04A	Delta 159 (S)	Jan 16	1446.0	35988	35970	1.1	1081.8	RCA domestic communications satellite. Reimbursable (RCA).
Westar IV (S) 1982 14A	Delta 160 (S)	Feb 25	1443.4	35934	35923	1.1	1072.0	Second generation domestic communications satellite for Western Union. Reimbursable (WU).
Intelsat V-D F-4 (S) 1982 17A	Atlas-Centaur (AC-58) (S)	Mar 4	1435.3	35791	35751	3.4	1928.2	Advanced series of spacecraft to provide increased telecommunications capacity for Intelsat's global network. Reimbursable (Comsat).

# NASA Major Launch Record

1983

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)	
				Apogee (km)	Perigee (km)	Incl (deg)			
NOAA-8 (S) 1983 22A	Atlas 73E (S)	Mar 28	101.0	817	793	98.5	1712.0	Advanced Tiros spacecraft to provide continuous coverage of the Earth and provide high-accuracy worldwide meteorological data. Reimbursable (NOAA). (WSMC)	
STS 6 (S) 1983 26A TDRS-A (S) 1983 26B	Shuttle (S) (Challenger)	Apr 4		LANDED AT DFRF APR 9, 1983					Second operational flight of the STS with Paul Weitz, Karol Bobko, Donald Peterson, Story Musgrave. Deployed Tracking and Data Relay Satellite (TDRS) to provide improved tracking and data acquisition services to spacecraft in low Earth orbit; performed EVA. Mission duration 120 hours 23 minutes 42 seconds.
RCA F (S) 1983 30A	Delta 167 (S)	Apr 11	1442.0	35956	357847	0.1	1116.3	RCA domestic communications satellite. Reimbursable (RCA).	
GOES 6 (S) 1983 41A	Delta 168 (S)	Apr 28	1435.4	35785	35758	4.5	838.0	Part of NOAA's Geostationary Operational Environmental Satellite system to provide near continual, high resolution visual and infrared imaging over large areas. Reimbursable (NOAA).	
Intelsat V-F F-6 (S) 1983 47A	Atlas-Centaur (AC-61) (S)	May 19	1436.2	35797	35779	1.9	1928.2	Advanced series of spacecraft to provide increased telecommunications capacity for Intelsat's global network. Carried Maritime Communications Services (MCS) package for INMARSAT. Reimbursable (Comsat).	
EXOSAT (S) 1983 51A	Delta 169 (S)	May 26		DOWN MAY 6, 1986				500.0	X-ray satellite to provide continuous observations of X-ray sources. Reimbursable (ESA).
STS 7 (S) 1983 59A Telesat-F (S) 1983 59B Palapa-B-1 (S) 1983 59C SPAS-01 (S) 1983 59F	Shuttle (S) (Challenger)	Jun 18		LANDED AT DFRF JUN 24, 1983					Third operational flight of STS with Robert L. Crippen, Frederick H. Hauck, John M. Fabian, Sally K. Ride (first woman astronaut), and Norman E. Thagard. Deployed two communications satellites. Telesat (Reimbursable - Canada) and Palapa (Reimbursable - Indonesia ). Carried out experiments including launching and recovering SPAS 01 (Reimbursable - Germany). Mission duration 146 hours 23 minutes 59 seconds.
AF P83-1 (S) 1983 63A	Scout 103 (S)	Jun 27	100.6	819	754	82.0	112.6	Air Force HILAT satellite to evaluate propagation effects of disturbed plasmas on radar and communication systems. Reimbursable (DOD). (WSMC)	
Galaxy 1 (S) 1983 65A	Delta 170 (S)	Jun 28	1436.1	35791	35782	0.0	519.0	Hughes Communications, Inc. communications satellite. Reimbursable (Hughes).	
Telsat 3A (S) 1983 77A	Delta 171 (S)	Jul 28	1436.2	35796	35780	0.1	635.0	AT&T communications satellite. Reimbursable (AT&T).	

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# NASA Major Launch Record

1983

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)	
				Apogee (km)	Perigee (km)	Incl (deg)			
STS 8 (S) 1983 89A INSAT-B (S) 1983 89B	Shuttle (S) (Challenger)	Aug 30		LANDED AT DFRF SEP 5, 1983				Fourth operational flight of STS with Richard H. Truly, Daniel C. Brandenstein, Dale A. Gardner, Guion S. Bluford (first black astronaut), and William E. Thornton. First night launch and landing. Deployed satellite, INSAT (Reimbursable - India), performed tests and experiments. Mission duration 145 hours 8 minutes 43 seconds.	
		Aug 31	1436.2	35811	35765	3.0	3391.0		
RCA G (S) 1983 94A	Delta 172 (S)	Sep 8	1436.2	35803	35772	0.0	1121.3	RCA domestic communications Satellite. Reimbursable (RCA).	
Galaxy 2 (S) 1983 98A	Delta 173 (S)	Sep 22	1436.2	35792	35783	0.0	579.0	Hughes Communications satellite. Reimbursable (Hughes).	
STS-9 (S) Spacelab-1 1983 116A	Shuttle (S) (Columbia)	Nov 28		LANDED AT DFRF DEC 8, 1983				Fifth operational flight of STS with John W. Young, Brewster W. Shaw, Jr., Owen K. Garriott, Robert A. R. Parker, Byron K. Lichtenberg, and Ulf Merbold (ESA). Spacelab-1, a multi-discipline science payload, carried in Shuttle Cargo Bay. Cooperative with ESA. Mission Duration 247 hours 47 minutes 24 seconds.	
<b>1984</b>								<b>1984</b>	
STS 41-B (S) 1984 11A Westar 6 (U) 1984 11B IRT (S) 1984 11C Palapa B-2 (U) 1984 11D	Shuttle (S) (Challenger)	Feb 3		LANDED AT KSC FEB 11, 1984				Fourth Challenger flight with Vance D. Brand, Robert L. Gibson, Bruce McCandless, Ronald E. McNair and Robert L. Stewart. Deployed Westar (Reimbursable - WU), and Palapa B-2 (Reimbursable - Indonesia). Both PAM's failed; both satellites retrieved on STS 51-A mission. Rendezvous tests performed with IRT, using deflated target. Evaluated Manned Maneuvering Unit (MMU) and Manipulator Foot Restraint (MFR). First STS landing at KSC. Mission duration 191 hours 15 minutes 55 seconds.	
		Feb 3		RETRIEVED NOV 16, 1984 (51-A)			3309.0		
		Feb 3		DOWN FEB 11, 1984			234.0		
		Feb 6		RETRIEVED NOV 16, 1984 (51-A)			3419.0		
Landsat 5 (S) 1984 21A UoSAT (S) 1984 21B	Delta 174 (S)	Mar 1	98.8	703	695	98.2	1947.0	Earth resources technology satellite to provide continuing Earth remote sensing data. Instruments included a multispectral scanner and thematic mapper. Reimbursable (NOAA). UoSAT sponsored by AMSAT (Reimbursable - AMSAT). (WSMC)	
			98.0	670	653	97.8	52.0		
STS 41-C (S) 1984 34A LDEF (S) 1984 34B	Shuttle (S) (Challenger)	Apr 6		LANDED AT DFRF APR 13, 1984				Fifth Challenger flight with Robert L. Crippen, Frances R. Scobee, Terry J. Hart, George D. Nelson and James D. Van Hoften. Deployed LDEF; SMM retrieved and repaired in Cargo Bay; redeployed April 12. Mission duration 167 hours 40 minutes 7 seconds	
		Apr 6		RETRIEVED JAN 20, 1990 (STS-32)			9670.0		
Intelsat V-G F-9 (U) 1984 57A	Atlas-Centaur (AC-62) (U)	Jun 9		DOWN OCT 24, 1984				1928.2	Advanced series of spacecraft to provide increased telecommunications capacity for Intelsat's global network. Carried Maritime Communications Services (MCS) package for INMARSAT. Vehicle failed to place satellite in useful orbit. Reimbursable (Comsat).

# NASA Major Launch Record

1984

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
AMPTE CCE (S) 1984 88A IRM (S) 1984 88B UKS (S) 1984 88C	Delta 175 (S)	Aug 16	730.9	39217	1784	64.4	242.0	Three active magnetospheric particle tracer explorers: Charge Composition Explorer (CCE) provided by the U.S.; Ion Release Module (IRM) provided by the Federal Republic of Germany; and the United Kingdom Subsatellite (UKS) provided by the UK; to study the transfer of mass from the solar wind to the magnetosphere. International Cooperative.
			2653.4	113818	402	27.0	605.0	
			2659.6	113417	1002	26.9	77.0	
STS 41-D (S) 1984 93A SBS-4 (S) 1984 93B Syncom IV-2 (S) 1984 93C Telstar 3-C (S) 1984 93D	Shuttle (S) (Discovery)	Aug 30	LANDED AT EAFB SEP 5, 1984					First Discovery flight with Henry W. Hartsfield, Michael L. Coats, Richard M. Mullane, Steven Hawley, Judith A. Resnik, and Charles D. Walker. Deployed SBS (Reimbursable - SBS), Leasat (Reimbursable - Hughes), and Telstar (Reimbursable - AT&T), carried out experiments including OAST-1 solar array structural testing. Mission duration 144 hours 56 minutes 4 seconds.
		Aug 31	1436.2	35795	35780	0.0	3344.0	
		Aug 31	1463.0	35787	35779	04.1	6889.0	
		Sep 1	1436.2	35793	35783	0.0	3402.0	
Galaxy C (S) 1984 101A	Delta 176 (S)	Sep 21	1436.2	35793	35782	0.1	519.0	Hughes Communications Satellite. Reimbursable (Hughes).
STS 41-G (S) 1984 108A ERBS (S) 1984 108B	Shuttle (S) (Challenger)	Oct 5	LANDED AT KSC OCT 13, 1984					Sixth Challenger flight with Robert L. Crippen, Jon A. McBride, Kathryn D. Sullivan, Sally K. Ride, David C. Leestma, Paul D. Scully-Power, and Marc Garneau (Canada). Deployed ERBS to provide global measurements of the Sun's radiation reflected and absorbed by the Earth; performed scientific experiments using OSTA-3 and other instruments. Mission duration 197 hours 23 minutes 33 seconds.
		Oct 5	96.4	590	578	57.0	2449.0	
NOVA III (S) 1984 110A	Scout 104 (S)	Oct 11	108.9	1199	1149	89.9	173.7	Improved Transit Navigation Satellite for the U.S. Navy. Reimbursable (DOD). (WSMC)
STS 51-A (S) 1984 113A Telesat-H (S) 1984 113B Syncom IV-1 (S) 1984 113C	Shuttle (S) (Discovery)	Nov 8	LANDED AT KSC NOV 16, 1984					Second Discovery flight with Frederick H. Hauck, David M. Walker, Joseph P. Allen, Anna L. Fisher, Dale A. Gardner. Deployed Telesat (Reimbursable - Canada) and Syncom IV-1 (Reimbursable - Hughes). Retrieved and returned Palapa B-2 and Westar 6 (Launched on 41-B). Mission duration 191 hours 44 minutes 56 seconds.
		Nov 9	1436.2	35796	35780	0.0	3420.0	
		Nov 10	1466.8	36427	36341	2.8	6889.0	
NATO III-D (S) 1984 115A	Delta 177 (S)	Nov 13	1436.2	35796	35780	1.4	761.0	Fourth in a series of communication satellites for NATO. Reimbursable (NATO).
NOAA-9 (S) 1984 123A	Atlas 39E (S)	Dec 12	101.8	854	834	99.1	1712.0	Advanced TIROS-N spacecraft to provide continuous coverage of the Earth and provide high-accuracy worldwide meteorological data. Reimbursable (NOAA). (WSMC)

# NASA Major Launch Record

1985

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
<b>1985</b>								
STS 51-C (S) 1985 10A DOD (S) 1985 10B	Shuttle (S) (Discovery)	Jan 24		LANDED AT KSC JAN 27, 1984				Third Discovery flight with Thomas K. Mattingly, Loren J. Shriver, Ellison S. Onizuka, James F. Buchli, and Gary E. Payton. Deployed unannounced payload for DOD. (Reimbursable - (DOD)). Mission duration 73 hours 33 minutes 23 seconds.
Intelsat V-A F-10 (S) 1985 25A	Atlas-Centaur (AC-63) (S)	Mar 22	1436.1	35807	35768	0.0	1996.7	First in a series of improved Commercial Communication satellites for Intelsat. Reimbursable (Comsat).
STS 51-D (S) 1985 28A Telesat-I (S) 1985 28B Syncom IV-3 (S) 1985 28C	Shuttle (S) (Discovery)	Apr 12		LANDED AT KSC APR 19, 1985				Fourth Discovery flight with Karol K. Bobko, Donald F. Williams, M. Rhea Seddon, S. David Griggs, Jeffrey A. Hoffman, Charles D. Walker, and E. J. "Jake" Garn (U.S. Senator). Deployed Syncom (Reimbursable - Hughes) and Telesat (Reimbursable - Canada). Syncom Sequencer failed to start, despite attempts by crew; remained inoperable until restarted by crew of 51-I (August 1985). Mission duration 167 hours 55 minutes 23 seconds.
STS 51-B (S) Spacelab-3 1985 34A	Shuttle (S) (Challenger)	Apr 29		LANDED AT DFRF MAY 6, 1985				Sixth Challenger flight with Robert F. Overmeyer, Frederick D. Gregory, Don Lind, Norman E. Thagard, William E. Thornton, Lodewijk Vanderberg, and Taylor Wang. Spacelab-3 (Cooperative with ESA) mission to conduct applications, science and technology experiments. Deployed Northern Utah Satellite (NUSAT) (Reimbursable - Northern Utah University). Global Low Orbiting Message Relay Satellite (GLOMR) (Reimbursable - DOD) failed to deploy and was returned. Mission duration 168 hours 8 minutes 46 seconds.
STS 51-G (S) 1985 48A Morelos-A (S) 1985 48B ARABSAT-A (S) 1985 48C TELSTAR 3-D (S) 1985 48D SPARTAN 1 (S) 1985 48E	Shuttle (S) (Discovery)	Jun 17		LANDED AT EAFB JUN 24, 1985				Fifth Discovery flight with Daniel C. Brandenstein, John O. Creighton, Shannon W. Lucid, John M. Fabian, Steven R. Nagel, Patrick Baudry (France), and Prince Sultan Salman Al-Saud (Saudi Arabia). Deployed Morelos (Reimbursable - Mexico), Arabsat (Reimbursable - ASCO) and Telstar (Reimbursable - AT&T). Deployed and retrieved Spartan 1. Mission duration 169 hours 38 minutes 52 seconds.
Intelsat VA F-11 (S) 1985 55A	Atlas-Centaur (AC-64) (S)	Jun 29	1436.1	35804	35769	0.1	1996.7	Second in a series of improved Commercial Communications Satellites for Intelsat. Reimbursable (Comsat).

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# NASA Major Launch Record

1985

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
STS 51-F (S) Spacelab-2 1985 63A PDP (S) 1985 63B	Shuttle (S) (Challenger)	Jul 29		LANDED AT EAFB AUG 6, 1985				Seventh Challenger flight with Charles G. Fullerton, Roy D. Bridges, Jr., Karl G. Heinze, Anthony W. England, F. Story Musgrave, Loren W. Acton, and John-David F. Bartow/. Conducted experiments in Spacelab-2 (Cooperative with ESA). Deployed Plasma Diagnostic Package (PDP) which was retrieved 6 hours later. Mission duration 190 hours 45 minutes 26 seconds.
Navy SOOS-I 1985 66A (S) 1985 66B (S)	Scout 105 (S)	Aug 2	107.9 107.9	1255 1256	999 999	89.9 89.9	64.2 64.2	Two Navigation Satellites for the U.S. Navy. Reimbursable (DOD). (WSMC)
STS 51-I (S) 1985 76A Aussat-1 (S) 1985 76B ASC (S) 1985 76C Syncom IV-4 (U) 1985 76D	Shuttle (S) (Discovery)	Aug 27		LANDED AT EAFB SEP 3, 1985				Sixth Discovery flight with Joe H. Engle, Richard O. Covey, James D. VanHoyten, William F. Fisher, John M. Lounge. Deployed Aussat (Reimbursable - Australia), ASC (Reimbursable - American Satellite Co.), and Syncom IV-4 (Reimbursable - Hughes). After reaching Geosynchronous Orbit, Syncom IV-4 ceased functioning. Repaired Syncom IV-3 (launched by 51-D, April 1985). Mission duration 170 hours 17 minutes 42 seconds.
Intelsat VA F-12 (S) 1985 87A	Atlas-Centaur (AC-65) (S)	Sep 28	1436.1	35801	35772	0.1	1996.7	Third in a series of improved commercial Communications Satellites for Intelsat. Reimbursable (Comsat).
STS 51-J (S) (DOD) 1985 92A	Shuttle (S) (Atlantis)	Oct 3		LANDED AT EAFB OCT 7, 1985				First Atlantis flight with Karol J. Bobko, Ronald J. Grabe, Robert A. Stewart, David C. Hilmers, and William A. Pailles. DOD mission. Mission duration 97 hours 44 minutes 38 seconds.
STS 61-A (S) Spacelab D-1 1985 104A GLOMR (S) 1985 104B	Shuttle (S) (Challenger)	Oct 30		LANDED AT EAFB NOV 6, 1985				Eighth Challenger flight with Henry W. Hartsfield, Steven R. Nagel, Bonnie J. Dunbar, James F. Buchli, Guion S. Bluford, Ernst Messerschmid (Germany), Reinhard Furrer (Germany), and Wubbo Ockels (Dutch). Spacelab D-1 mission (Cooperative with ESA) to conduct scientific experiments. Deployed GLOMR (Reimbursable - DOD). Carried Materials Experiment Assembly (MEA) for on-orbit processing of materials science experiment specimens. Mission duration 168 hours 44 minutes 51 seconds.
				DOWN DEC 26, 1986			267.6	

# NASA Major Launch Record

1985

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
STS 61-B (S) 1985 109A	Shuttle (S) (Atlantis)	Nov 26		LANDED AT EAFB DEC 3, 1985				Second Atlantis Flight with Brewster H. Shaw, Bryan D. O'Conner, Mary L. Cleave, Sherwood C. Spring, Jerry L. Ross, Rudolfo Neri Vela (Morelos), Charles D. Walker (MDAC). Deployed Morelos (Reimbursable - Mexico), Aussat (Reimbursable - Australia), and
Morelos-B (S) 1985 109B		Nov 27	1436.1	35793	35780	0.0	4539.6	Satcom (Reimbursable - RCA). Demonstrated construction in space by manually assembling EASE and ACCESS Experiments. Deployed
Aussat-2 (S) 1985 109C		Nov 27	1436.2	35796	35779	0.0	4569.1	Station Keeping Target (OEX) to conduct advanced Station Keeping Tests. Mission duration 165 hours 4 minutes 49 seconds.
Satcom (S) 1985 109D OEX Target 1985 109E		Nov 28	1436.2	35797	35779	0.0	7225.3	
				DOWN MAR 2, 1987				
AF-16 1985 114A (S) 1985 114B (S)	Scout 106 (S)	Dec 12		DOWN MAY 11, 1989 DOWN AUG 9, 1987				Air Force instrumented test vehicle. (Dual Payload) Reimbursable (DOD). (WFF)
<b>1986</b>								<b>1986</b>
STS 61-C (S) 1986 03A	Shuttle (S) (Columbia)	Jan 12		LANDED AT EAFB JAN 18, 1986				Seventh Columbia flight with Robert L. Gibson, Charles F. Bolden, Jr., Franklin R. Chang-Diaz, George D. Nelson, Steven A. Hawley, Robert J. Cenker (RCA), and C. William Nelson (Congressman). Deployed
SATCOM (S) 1986 03B		Jan 12	1436.2	35796	35780	0.0	7225.3	Satcom (Reimbursable - RCA). Evaluated material science lab payload carrier and processing facilities. Carried HHG-1 to accommodate GAS payloads. Mission duration 146 hours 3 minutes 51 seconds.
STS 51-L (U) TDRS-B (U)	Shuttle (U) (Challenger)	Jan 28		DID NOT ACHIEVE ORBIT			2103.3	Ninth Challenger flight with Francis R. Scobee, Michael J. Smith, Judith A. Resnik, Ellison S. Onizuka, Ronald E. McNair, Gregory Jarvis (Hughes), S. Christie McAuliffe (Teacher). Approximately 73 seconds into flight, the Shuttle exploded.
GOES-G (U)	Delta 178 (U)	May 5		DID NOT ACHIEVE ORBIT			840.0	Provide systematic world-wide weather coverage for NOAA. Vehicle failed. Reimbursable NOAA.
DOD (U) 1986 69A	Delta 180 (U)	Sep 5		DOWN SEP 28, 1986				Carried DOD experiment. Reimbursable (DOD).
NOAA-G (S)	Atlas 52E	Sep 17	101.0	816	796	98.5	1712.0	Operational environmental satellite for NOAA. Included ERBE instrument to complement data being acquired by ERBS, launched in 1984. Carried search and rescue instruments provided by Canada and France. Reimbursable (NOAA). (WSMC)

# NASA Major Launch Record

1986

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
AF P87-11 (S) Polar Bear 1986 88A	Scout 107 (S)	Nov 13	104.8	1014	954	89.6	Scientific satellite to study the atmospheric effect on electromagnetic propagation. Reimbursable (DOD). (WSMC)	
Fltsatcom (F-7) (S) 1986 96A	Atlas-Centaur (AC-66) (S)	Dec 4	1436.2	35849	35728	0.4	1128.5 Provide communication between aircraft, ships, and ground stations for DOD. Reimbursable (DOD).	
<b>1987</b>								
GOES-H (S) 1987 22A	Delta 179 (S)	Feb 26	1436.2	35800	35775	0.4	840.0 Operational environmental satellite to provide systematic worldwide weather coverage. Reimbursable (NOAA ).	
Palapa B2-P 1987 29A	Delta 182	Mar 20	1436.2	35788	35788	0.0	652.0 Provide communication coverage over Indonesia and the Asian countries. Reimbursable (Indonesia).	
Fltsatcom (F-6) (U)	Atlas-Centaur (AC-67) (U)	Mar 26	DID NOT ACHIEVE ORBIT			1038.7	Part of the worldwide communications system between aircraft, ships, and ground stations for the DOD. Telemetry lost shortly after launch; destruct signal sent at 70.7 seconds into flight. An electrical transient, caused by a lightning strike on the launch vehicle, most probable cause of loss. Reimbursable (DOD).	
SOOS-2 1987 80A (S) 1987 80B (S)	Scout 108 (S)	Sep 16	107.1 107.2	1178 1180	1011 1010	90.4 90.4	64.5 64.5 Two Transit navigation satellites in a stacked configuration for the U.S. Navy. Reimbursable (DOD). (WSMC)	
<b>1988</b>								
DOD (SDI) (S) 1988 08A	Delta 181 (S)	Feb 8	DOWN MAR 1, 1988				Strategic Defense Initiative Organization (SDIO) Payload. Reimbursable (DOD).	
San Marco D/L (S) 1988 26A	Scout 109 (S)	Mar 25	DOWN DEC 6, 1988			273.0	Explore the relationship between solar activity and meteorological phenomena. Cooperative with Italy. (San Marco)	
SOOS-3 1988 33A (S) 1988 33B (S)	Scout 110 (S)	Apr 25	108.5 108.5	1302 1300	1013 1012	90.3 90.3	129.6 Two Transit navigation satellites in a stacked configuration for the U.S. Navy. Reimbursable (DOD). (WSMC)	
Nova II 1988 52A	Scout 111 (S)	Jun 16	108.9	1199	1149	90.0	170.5 Improved Transit Navigation Satellite for the U.S. Navy. Reimbursable (DOD). (WSMC)	
SOOS-4 1988 74A (S) 1988 74B (S)	Scout 112 (S)	Aug 25	107.3 107.3	1175 1173	1030 1031	89.9 89.9	128.2 Two Transit navigation satellites in a stacked configuration for the U.S. Navy. Reimbursable (DOD). (WSMC)	
NOAA-H (S) 1988 89A	Atlas 63E (S)	Sep 24	101.9	855	838	99.1	1712.0 Operational environmental satellite for NOAA. Carried Search and Rescue instruments provided by Canada and France. Reimbursable (NOAA). (WSMC)	

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# NASA Major Launch Record

1988

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
STS-26 (S) 1988 91A	Shuttle (S) (Discovery)	Sep 29		LANDED AT EAFB OCT 3, 1988				Sixth Discovery flight with Frederick H. Hauck, Richard O. Covey, John M. Lounge, David C. Hilmers, and George D. Nelson. Deployed TDRS-3. Performed experiment activities for commercial and scientific middeck experiments. Mission Duration 97 hours 0 minutes 11 seconds.
TDRS-3 (S) 1988 91B		Sep 29	1436.2	35804	35772	0.1	2224.9	
STS-27 (S) 1988 106A	Shuttle (S) (Atlantis)	Sep 29		LANDED AT EAFB DEC 6, 1988				Third Atlantis flight with Robert L. Gibson, Guy S. Gardner, Richard M. Mullane, Jerry L. Ross and William M. Shepherd. DOD Mission. Mission Duration 105 hours 05 minutes 37 seconds.
DOD (S) 1988 106B				ELEMENTS NOT AVAILABLE				
<b>1989</b>								<b>1989</b>
STS-29 (S) 1989 21A	Shuttle (S) (Discovery)	Mar 13		LANDED AT EAFB MAR 18, 1989				Eighth Discovery flight with Michael L. Coats, John E. Blaha, James Bagian, James F. Buchli, Robert Springer. Deployed a new Tracking and Data Relay Satellite. Performed commercial and scientific experiments. Mission Duration 119 hours 38 minutes 52 seconds.
TDRS-D (S) 1989 21B			1436.1	35808	35768	0.0	2224	
STS-30 (S) 1989 33A	Shuttle (S) (Atlantis)	May 4		LANDED AT EAFB MAY 8, 1989				Fourth Atlantis flight with David M. Walker, Ronald J. Grabe, Mary L. Cleave, Mark C. Lee, Norman E. Thagard. Deployed the Magellan spacecraft on a mission toward Venus. Performed commercial and scientific middeck experiments. Mission Duration: 96 hours 56 minutes 28 seconds.
Magellan (S) 1989 33B				TRANS-VENUS TRAJECTORY				
STS-28 (S) 1989 61A	Shuttle (S) (Columbia)	Aug 8		LANDED AT EAFB AUG 13, 1989				Ninth Columbia flight with Brewster H. Shaw, Richard N. Richards, David C. Leetsma, James C. Adamson, and Mark N. Brown. DOD Mission. Mission Duration: 121 hours 0 minutes 08 seconds.
Fltsatcom (S) 1989 77A	Atlas-Centaur (AC-68) (S)	Sep 25	1436.1	35701	35774	2.9	1863	Navy Communications satellite to provide communications between aircraft, ships and ground stations for DOD. Reimbursable (DOD).
STS-34 (S) 1989 84A	Shuttle (S) (Atlantis)	Oct 18		LANDED AT EAFB OCT 23, 1989				Fifth Atlantis flight with Donald E. Williams, Michael J. McCulley, Ellen Baker, Shannon N. Lucid, and Franklin Chang-Diaz. Deployed the Galileo spacecraft on a mission toward Jupiter. Performed experiment activities for commercial and scientific middeck experiments. Mission Duration: 119 hours 39 minutes 22 seconds.
Galileo (S) 1989 84B				ELEMENTS NOT AVAILABLE				
COBE (S) 1989 89A	Delta 2 (S)	Nov 18	102.6	885	873	99.0	2206	Cosmic Background Explorer spacecraft to provide the most comprehensive observations to date of radiative content of the universe.
STS-33 (S) 1989 90A	Shuttle (S) (Discovery)	Nov 23		LANDED AT EAFB NOV 28, 1989				Ninth Discovery flight with Frederick Gregory, John E. Blaha, Manly L. Carter, Franklin S. Musgrave and Kathryn C. Thornton. DOD Mission. Mission Duration: 120 hours 6 minutes 46 seconds.
DOD (S) 1989 90B				ELEMENTS NOT AVAILABLE				

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# NASA Major Launch Record

1990

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
<b>1990</b>								
STS-32 (S) 1990 2A Syncom IV-5 (S) 1990 2B	Shuttle (S) (Columbia)	Jan 9		LANDED AT EAFB JAN 20, 1990			6953.4	Tenth Columbia flight with Daniel C. Brandenstein, James D. Wetherbee, Bonnie J. Dunbar, Marsha S. Ivins and G. David Low. Deployed Syncom IV-5 (Reimbursable - DOD), a geostationary communications satellite also known as Leasat, for the U.S. Navy. Also retrieved the Long Duration Exposures Facility (LDEF) deployed on STS-41C on April 6, 1984. Mission Duration: 261 hrs 0 mins 37 secs.
STS-36 (S) 1990 19A DOD (S) 1990 19B	Shuttle (S) (Atlantis)	Feb 28		LANDED AT EAFB MAR 4, 1990				Sixth Atlantis flight with John D. Creighton John H. Casper, David C. Hilmers, Richard M. Mullane and Pierre J. Thuot. DOD Mission. Mission Duration: 106 hours 18 minutes 22 seconds.
Pegsat (S) 1990 28A	Pegasus (S) (Orb Sci)	Apr 5	94.1	539	410	94.1		A 50-foot rocket (Pegasus), dropped from the wing of a B-52 aircraft flying over the Pacific Ocean, launched the Pegasus satellite in the first demonstration flight of the Pegasus launch vehicle. The Pegasus science investigations are part of the Combined Release and Radiation Effects Satellite (CRRES), a joint NASA/DOD program.
STS-31 (S) 1990 37A HST (S) 1990 37B	Shuttle (S) (Discovery)	Apr 24		LANDED AT EAFB APR 29, 1990			11355.4	Tenth Discovery flight with Loren J. Shriver, Charles F. Bolden, Bruce McCandless, Steven A. Hawley, and Kathryn D. Sullivan. Deployed the Edwin P. Hubble Space Telescope (HST) astronomical observatory. Designed to operate above the Earth's turbulent and obscuring atmosphere to observe celestial objects at ultraviolet, visible and near-infrared wavelengths. Joint NASA/ESA mission. Mission Duration: 121 hours 16 minutes 6 seconds.
Macsat (S) 1990 43A 1990 43B	Scout 113 (S)	May 9	98.3	755	601	89.9	89.9	Two Multiple Access Communications Satellites (MACSATs) to provide global store-and-forward message relay capability for DOD Users. Reimbursable (DOD). (VAFB)
ROSAT (S) 1990 49A	Delta 2 (S)	Jun 1	95.6	557	542	53.0	2421.1	Roentgen Satellite (ROSAT), an Explorer class scientific satellite configured to accommodate a large X-ray telescope, to study X-ray emissions from non-solar celestial objects. International cooperative program with NASA, Germany, and the UK.
CRRES (S) 1990 65A	Atlas-Centaur (AC-69) (S)	Jul 25	614.4	34781	345	18.0		Combined Release and Radiation Effects Satellite (CRRES) which uses chemical releases to study the Earth's magnetic fields and the plasmas, or ionized gases, that travel through them. Joint NASA/DOD program.

# NASA Major Launch Record

1990

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
STS-41 (S) 1990 90A Ulysses (S) 1990 90B	Shuttle (S) (Discovery)	Oct 6		LANDED AT EAFB OCT 10, 1990			20079.5	Eleventh Discovery flight with Richard N. Richards, Robert D. Cabana, Bruce E. Melnick, William M. Shepherd, and Thomas D. Akers. Deployed the Ulysses spacecraft, a joint NASA/ESA mission to study the poles of the Sun and the interplanetary space above and below the poles. Mission Duration: 98 hours 10 minutes 3 seconds.
				HELIOCENTRIC ORBIT				
STS-38 (S) 1990 97A DOD (S) 1990 97B	Shuttle (S) (Atlantis)	Nov 15		LANDED AT KSC NOV 20, 1990				Seventh Atlantis flight with Richard O. Covey, Robert C. Springer, Carl J. Meade, Frank L. Culbertson and Charles D. Gemar. DOD Mission. Mission Duration: 117 hours 54 minutes 27 seconds.
				ELEMENTS NOT AVAILABLE				
STS-35 (S) 1990 106A	Shuttle (S) (Columbia)	Dec 2		LANDED AT EAFB DEC 11, 1990				Eleventh Columbia flight with Vance D. Brand, John M. Lounge, Jeffrey A. Hoffman, Robert A. Parker, Guy S. Gardner, Ronald A. Parise, and Samuel T. Durrance. Carried Astro-1, a Space Shuttle attached payload to acquire high priority astrophysical data on a variety of celestial objects. Mission Duration: 215 hours 5 minutes 7 seconds.
<b>1991</b>								<b>1991</b>
STS-37 (S) 1991 27A GRO (S) 1991 27B	Shuttle (S) (Atlantis)	Apr 5		LANDED AT EAFB APR 11, 1991			15900.0	Eighth Atlantis flight with Steven R. Nagel, Kenneth D. Cameron, Linda M. Godwin, Jerome Apt, and Jerry L. Ross. An unplanned EVA took place to help with the deployment of GRO's high gain antenna. Also demonstrated were mobility aids which will be used on Space Station Freedom. Mission Duration: 143 hrs 32 min 45 sec.
			92.0	376	370	28.5		
STS-39 (S) 1991 31A IBSS (S) 1991 31B	Shuttle (S) (Discovery)	Apr 28		LANDED AT KSC MAY 6, 1991				Twelfth Discovery flight with Michael L. Coats, Blaine L. Hammond, Jr., Guion S. Bluford, Gregory J. Harbaugh, Richard J. Hieb, Donald R. McMonagle, and Charles L. Veach. Discovery performed dozens of maneuvers, deploying canisters from the cargo bay, releasing and retrieving a payload with the RMS, allowing the Department of Defense to gather important plume observation data and information for the SDIO. Mission Duration: 199 hrs 26 min 17 sec.
				DOWN MAY 6, 1991				
NOAA-12 (S) 1991 32A	Atlas-E (S)	May 14	101.2	824	806	98.7	1418.0	Third-generation operational spacecraft to provide systematic global weather observations. Will replace NOAA-10 as the morning satellite in NOAA's two polar satellite system. Joint NASA/NOAA effort. (WSMC)

# NASA Major Launch Record

1991

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
STS-40 (S) Spacelab (SLS-1) 1991 40A	Shuttle (S) (Columbia)	Jun 5		LANDED AT EAFB JUN 14, 1991				Twelfth Columbia flight with Bryan D. O'Connor, Sidney M. Gutierrez, M. Rhea Seddon, James P. Bagian, Tamara E. Jerrigan, F. Drew Gaffney, and Millie Hughes-Fulford. The first mission since Skylab to do intensive investigations into the effects of weightlessness on humans. Data learned from this flight will be used in NASA's planning for longer Shuttle missions set for 1992, and in the planning of Space Station Freedom. Mission Duration: 218 hrs 15 mins 14 secs.
REX (S) 1991 45A	Scout (S)	Jun 29	101.3	867	769	89.6	96.7	Radiation Experiment to do further research to overcome and understand the physics of the electron density irregularities that cause disruptive scintillation effects on transionospheric radio signals. Reimbursable - DOD. (VAFB)
STS-43 (S) 1991 54A TDRS-E (S) 1991 54B	Shuttle (S) (Atlantis)	Aug 2		LANDED AT KSC AUG 11, 1991				Ninth Atlantis flight with John E. Blaha, Michael A. Baker, James C. Adamson, G. David Low, and Shannon E. Lucid. A TDRS satellite was deployed, keeping the network which supports Shuttle missions and other spacecraft at full operational capability. Mission Duration: 213 hours 22 minutes 27 seconds.
STS-48 (S) 1991 63A UARS (S) 1991 63B	Shuttle (S) (Discovery)	Sep 12		LANDED AT EAFB SEP 18, 1991				Thirteenth Discovery flight with John O. Creighton, Kenneth S. Reightler, Mark F. Brown, James F. Buchli, and Charles D. Gemar. The Upper Atmosphere Research Satellite (UARS) will study physical processes acting within and upon the stratosphere, mesosphere, and lower thermosphere. Mission Duration: 128 hrs 27 mins 51 secs.
STS-44 (S) 1991 80A DSP (S) 1991 80B	Shuttle (S) (Atlantis)	Nov 24 Nov 25	96.2	580	573	57.0	6532.2	Tenth Atlantis flight with Frederick D. Gregory, Terence T. Henricks, F. Story Musgrave, Mario Runco, Jr., James S. Voss, and Thomas J. Hennen. A dedicated mission for the Department of Defense to gather data for their programs. Deployed Defense Support Program satellite (DSP). The mission was shortened when an inertial measurement unit failed on the sixth day of the mission. Mission Duration: 166 hrs 52 mins 27 secs.
<b>1992</b>								<b>1992</b>
STS-42 (S) 1992 2A	Shuttle (S) (Discovery)	Jan 22		LANDED AT EAFB JAN 30, 1992				Fourteenth Discovery flight with Ronald J. Grabe, Steven S. Oswald, Norman E. Thagard, William F. Readdy, David C. Hilmers, Roberta L. Bondar, and Ulf D. Merbold. The International Microgravity Laboratory (IML-1) studied the effects of microgravity on living organisms and materials processes. Mission duration: 193 hrs 15 mins 43 secs.

# NASA Major Launch Record

1992

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
STS-45 (S) 1992 15A	Shuttle (S) (Atlantis)	Mar 24		LANDED AT KSC APR 2, 1992				Eleventh Atlantis flight with Charles F. Bolden, Brian K. Duffy, Kathryn D. Sullivan, David C. Leetsma, C. Michael Foale, Dirk D. Frimout and Bryon K. Lichtenburg. The Atmospheric Laboratory for Applications and Science (ATLAS 1) studied stmospheric science, solar science, space physics and astronomy. Mission Duration: 214 hrs 10 mins 24 secs.
STS-49 (S) 1992 26A	Shuttle (S) (Endeavour)	May 2		LANDED AT EAFB MAY 16, 1992				First flight of Endeavour with Daniel C. Brandenstein, Kevin P. Chilton, Richard J. Hieb, Bruce E. Melnick, Pierre J. Thout, Kathryn C. Thornton, and Thomas D. Akers. On orbit repair of the Intelsat VI satellite and redeployment with new kick motor. Assembly of Station by Extravehicular Activity Methods (ASEM), while attached to the cargo bay. Mission duration: 213 hrs 17 mins 38 secs.
EUVE (S) 1992 31A	Delta II (S)	Jun 7	95.1	529	514	28.4	3250	The Extreme Ultraviolet Explorer (EUVE), designed to study the extreme ultraviolet (EUV) portion of the electromagnetic spectrum as well as selected EUV targets, in order to create a definitive map and catalog of these sources.
STS-50 (S) 1992 34A	Shuttle (S) (Columbia)	Jun 25		LANDED AT KSC JUL 9, 1992				Twelfth Columbia flight with Richard N. Richards, Kenneth D. Bowersox, Bonnie J. Dunbar, Carl J. Meade, Ellen S. Baker, and Lawrence J. Delucas. The First United States Microgravity Laboratory (USML-1) studied scientific and technical questions in materials science, fluid dynamics, biotechnology and combustion science. Mission duration: 331 hrs 30 mins 4 secs.
SAMPEX (S) 1992 38A	Scout (S)	Jul 3	96.6	679	509	81.7		First of the Small Explorer (SMEX) fleet, carrying four cosmic ray monitoring instruments, to study solar energetic particles, anomalous cosmic rays, galactic cosmic rays, and magnetospheric electrons.
GEOTAIL (S) 1992 44A	Delta II (S)	Jul 24	4750.6	508542	41363	22.4	1009	Joint mission between the United States and Japan to study the geomagnetic tail region of the magnetosphere. Geotail will also measure the physics of the magnetosphere, the plasma sheet, reconnection and neutral line formation to better understand fundamental magnetosphere processes.
STS-46 (S) 1992 49A EURECA 1992 49B	Shuttle (S) (Atlantis)	Jul 31		LANDED AT AUG 8, 1992				Twelfth Atlantis flight with Loren J. Shriver, Andrew M. Allen, Jeffrey A. Hoffman, Franklin R. Chang-Diaz, Claude Nicollier, Marsha S. Ivins, and Franco Malerba. Deployed ESA'S European Retrievable Carrier (EURECA), a platform placed in orbit for 6 months offering conventional services to experimenters. Tested Tethered Satellite System (TSS-1), a joint program between the United States and Italy. Mission duration: 191 hrs 16 mins 7 secs.



# NASA Major Launch Record

1992

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
STS-47 (S) (Spacelab-J) 1992 61A	Shuttle (S) (Endeavour)	Sep 12		LANDED AT KSC SEP 20, 1992				Second Endeavour flight with Robert L. Gibson, Curtis L. Brown, Mark C. Lee, N. Jan Davis, Mae C. Jemison, Jerome Apt, and Mamoru Mohri. The Spacelab J mission, a joint mission between the U.S. and Japan, performed a series of 43 explore the effects of producing new materials in the microgravity of space, and the study of living organisms in the organisms in the environission duration: 190 hrs 30 mins 23 secs.
Topex/Poseidon (S) 1992 52A	Ariane 42P (S)	Aug 10	112.4	1342	1330	66.0		U.S. French Satellite to help define the relationship between the Earth's oceans and climate. NASA payload launched on commercial Ariane vehicle. Joint NASA/CNES mission.
Mars Observer (S) 1992 63A	Titan III (S)	Sep 25		TRANS-MARTIAN TRAJECTORY				After an 11-month cruise, the Mars Observer (MO) will arrive at Mars and be inserted into orbit to examine the surface for elemental and mineralogical composition, global surface topography, gravity field and magnetic field determination and climatological conditions. The Mars Balloon Relay (MBR), on the Mars Observer, will relay communications from Mars landers that will be sent by the Russians in 1995.
STS-52 (S) 1992 70A LAGEOS (S) 1992 70B	Shuttle (S) (Columbia)	Oct 22	222.5	5950	5616	52.7		LANDED AT KSC NOV 1, 1992 Thirteenth Columbia flight with James D. Wetherbee, Michael A. Baker, William M. Sheperd, Tamara E. Jernigan, and Charles L. Veach. The Laser Geodynamics Satellite (LAGEOS) is a cooperative mission of the U.S. and Italy to obtain precise measurements of the crustal movement and gravitational field. The U.S. Microgravity Payload-2 (USMP-2), carried in the cargo bay, is one in a series of payloads for scientific experimentation and material processing in a reduced gravity. Mission duration: 236 hrs 56 mins 13 secs.
MSTI-1 (S) 1992 78A	Scout (S)	Nov 21	91.2	378	292	96.7		DOD/SDIO payload.
STS-53 (S) 1992 86A	Shuttle (S) (Discovery)	Dec 2		LANDED AT EAFB DEC 9, 1992				Fifteenth Discovery flight with David M. Walker, Robert Cabana, Guion S. Bluford, James Voss, and M. Richard Clifford. This was a DOD mission. Mission duration: 175 hrs 19 mins 47 secs.
<b>1993</b>								<b>1993</b>
STS-54(S) 1993 3A TDRS F 1993 3B	Shuttle(S) (Endeavour)	Jan 13		LANDED AT KSC JAN 19, 1993				Third Endeavour flight with John H. Casper, Donald R. McMonagle, Mario Runco, Jr., Gregory Harbaugh, Susan Helms. A TDRS satellite was deployed to continue support of the Shuttle network systems. Mission duration: 143 hrs 38 mins 19 secs.

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# NASA Major Launch Record

1993

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
<b>1993</b>								
STS-56(S) 1993 23A SPARTAN-201 1993 23B	Shuttle (S) (Discovery)	Apr 8		LANDED AT KSC APR 17, 1993				Sixteenth Discovery flight with Kenneth Cameron, Steven S. Oswald, C. Michael Foale, Kenneth Cockrell and Eileen Ochoa. A Spartan satellite was deployed to study the solar corona. The ATLAS-2 was used to measure upper atmospheric variations around the Earth. Mission Duration: 222 hs 08 min 24 secs.
		Apr 8	90.3	311	295	57.0		
STS-55 (S) 1993 27A	Shuttle (S) (Columbia)	Apr 26		LANDED AT KSC MAY 6, 1993				Fourteenth Columbia flight with Steven R. Nagel, Terence T. Henricks, Charles Precourt, Bernard Harris, Jr., Ulrich Walter and Hans Schlegel. The German, Spacelab D-2, was flown to study automation and robotics, material and life sciences, the Earth and its atmosphere and astronomy. Mission Duration: 239 hrs 39 min 59 secs
STS-57(S) 1993 37A	Shuttle (S) (Endeavour)	Jun 21		LANDED AT EAFB Jul 1, 1993				Fourth Endeavour flight with Ronald J. Grabe, Brian J. Duffy, G. David Low, Nancy J. Sherlock, Peter J. K. Wisoff and Janice E. Voss. Retrieved ESA's European Retrievable Carrier (EURECA), a platform placed in orbit on STS-46. SPACEHAB-1 was carried in the cargo bay for experiments sponsored by NASA, the U.S. Commerce and ESA. Mission Duration: 23hrs 44 mins 54 secs.
RADCAL (S) 1993 41A	Scout (S)	Jun 25	101.3	885	750	89.3	Radar Calibration Satellite(RADCAL) will be used to calibrate U.S. radar tracking stations Expected life of this satellite is 24 months.	
NOAA-13(S) 1993-50A	Atlas-G(S)	Aug 9	102.0	861	845	98.9	This weather observation satellite failed to function in orbit and was determined to be a failure.	
STS-51 (S) 1993 58A ACTS 1993-58B ORFEUS-SPA 1993-58C	Shuttle (S) (Discovery)	Sep 12		LANDED AT KSC Sep 22, 1993				Seventeenth Discovery flight with Frank Culbertson, William F. Readdy, James H. Newman, Daniel W. Bursch and Carl E. Walz. The Advanced Communications Technology Satellite(ACTS) will be used to pioneer new initiatives in communications technology. The Orbiting and Retrievable Far and Extreme Ultraviolet Spectrometer-Shuttle Pallet System(ORFEUS-SPA) , is as astrophysics mission designed to study very hot and cold matter in the universe Mission duration 236 hrs 11 mins 11 secs
			1437.8	35929	35709	0.2	DOWN SEP 22, 1993	

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# NASA Major Launch Record

1993

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
<b>1993</b>								
STS-58(S) 1993 65A	Shuttle (S) (Columbia)	Oct 18		LANDED AT EAFB NOV 1, 1993				Fifteenth Columbia flight with John E. Blaha, Richard Searfoss, David A. Wolf, Margaret Rhea Seddon, Shannon W. Lucid, William McArthur, Jr. and Martin J. Fettman. Spacelab Life Sciences-2(SLS-2) was a mission dedicated to the study of cardiovascular, regulatory, neurovestibular and musculoskeletal systems, to gain more knowledge on how the human body adapts to the space environment. Mission Duration: 336 hrs 12 min 32 sec.
STS-61(S) 1993 75A	Shuttle (S) (Endeavour)	Dec 2		LANDED AT KSC Dec 13, 1993				Fifth Endeavour flight with Richard O. Covey, Kenneth D. Bowersox, F. Story Musgrave, Thomas D. Akers, Jeffery A. Hoffman, Kathryn C. Thornton and Claude Nicollier. This flight was the first on-orbit service of the Hubble Space Telescope(HST). The Solar Array(SA's), the Wide Field/Planetary Camera(WFPC-II), and the Corrective Optics Space Telescope Axial Replacement(COSTAR) were some of the major units serviced. Mission duration: 259 hrs 58 mins 35 secs.
<b>1994</b>								
STS-60(S) 1994 6A	Shuttle (S) (Discovery)	Feb 3		LANDED AT KSC FEB 11, 1994				Eighteenth Discovery flight , with Charles Bolden, Ken Reightler, Ronald Sega, Franklin Chang-Diaz, Jan Davis and Sergei Krikalev as flight crew members. This was the first flight with a Russian cosmonaut on board. The Wake Shield Facility was unsuccessful when it failed to deploy its 3 meter shield. SPACEHAB-2 carried 12 payloads for experimentation in materials processing and biotechnology. Mission duration 199 hrs 09 mins 22 secs.
Galaxy 1R	Delta II (S)	Feb 19	713.1	37253	2871	25.6	A geostationary satellite, Galaxy 1R, was put into orbit to replace the aging Galaxy 1. It will operate with 24 C-band transponders.	
STS-62(S) 1994 15A	Shuttle (S) (Columbia)	Mar 4		LANDED AT KSC MAR 18, 1994				Sixteenth Columbia flight, with John Gasper, Andrew Allen, Pieree Thuot, Charles Gemar and Marsha Ivins as flight crew members. The United States Microgravity Payload-2 (USMP-2) made its second flight to study microgravity on materials and fundamental science. Mission duration 335 hrs 16 mins 41 secs.

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# NASA Major Launch Record

1994

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
<b>1994</b>								
STS-59 1994 20A	Shuttle (S) Endeavour	Apr 9		LANDED AT KSC APRIL 20, 1994				Sixth Endeavour flight, with Sidney M. Gutierrez, Kevin P. Chilton, M.R. Clifford, Linda M. Godwin, Jay Apt and Thomas D. Jones as flight crew members. The Space Radar Laboratory-1(SRL-1) payload in the cargo bay gave scientist detailed information on human-induced environmental changes from the natural forms of global change. The Measurement of Air Pollution From Satellite(MAPS) was also in the cargo bay . It measured carbon monoxide in the troposphere and lower atmosphere. Mission duration: 269 hrs 49 mins 30 secs
GOES 8 1994-22A	Atlas 1	Apr 13	192.4	42687	191	27.4		The GOES-8 meteorological geostationary spacecraft has instruments on board for high resolution visible and UV imagers and "sounders" for temperature and moisture profiles
STS-65 1994 39A	Shuttle Columbia	Jul 8		LANDED AT KSC JULY 23, 1994				Seventeenth Columbia flight, with Robert D. Cabana, James D. Halsell Richard J. Hieb, Carl E. Walz, Leroy Chiao, Donald A. Thomas and Chiaki Naito-Mukai as crew members. The International Microgravity Laboratory-2(IML-2) will use furnaces and other facilities to produce a variety of material structures, from crystals to metal alloys. Over 80 investigations will be studied as prepared by over 200 scientist from six space agencies. Mission duration: 353 hrs 55 mins 00 secs
STS 64 1994 59A SPARTAN 1 1994 59B	Shuttle Discovery	Sep 9		LANDED AT EDW SEPTEMBER 20, 1994				Nineteenth Discovery flight, with Richard N. Richards, Susan J. Helms, L. Blaine Hammond, Jerry M. Linenger, Carl J. Meade and Mark C. Lee as crew members. The Lidar in Space Technology Experiment(LITE) will be used to better explain our climate. LITE will help us understand the human impact on the atmosphere and enable us to improve our measurements of the clouds, particles in the atmosphere and the Earth. SPARTAN will be deployed from the Shuttle to study the acceleration and velocity of the solar wind and it will also measure the Sun's corona. Mission duration: 262 hrs 49 mins 57 secs
				DOWN SEPTEMBER 20, 1994				

# NASA Major Launch Record

1994

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
<b>1994</b>								
STS-68(S) 1994 62A	Shuttle (S) (Endeavour)	Sep 30		LANDED AT EDW OCT 11, 1994				Seventh Endeavour flight with, Michael A. Baker, Terence W. Wilcutt, Steven L. Smith, Daniel W. Bursch, Peter J.K. Wisoff and Thomas D. Jones as flight crew members. The Space Radar Laboratory-2 is comprised of the Spaceborne Imaging Radar-C/X Band Synthetic Aperture Radar (SIR-C/X-SAR). and the Measurement of Air Pollution from Satellite (MAPS). Mission Duration 269 hrs 46 mins 08 secs
WIND(S) 1994 71A	Delta II	Nov 1		VARIABLE ORBITAL PARAMETERS			1250 .0	Measure the solar wind plasma and magnetic field besides several instruments to measure every energetic particles and gamma rays.
STS-66 (S) 1994 73A CRISTA-SPAS 1994 73B	Shuttle (S) (Atlantis)	Nov 3		LANDED AT EDW NOV 14, 1994  DOWN NOV 14, 1994				Thirteenth Atlantis flight with, Donald R. McMonagle, Ellen Ochoa, Curtis L. Brown, Joseph R. Tanner, Jean-Francois Clervoy and Scott Parazynski as flight crew members. The Atmospheric Laboratory for Applications and Science Spacelab(ATLAS) studied the middle atmosphere's chemical makeup. Seven experiments made up this science experiment. CRISTA-SPAS operated independently of the Shuttle after its release from the Remote Manipulator System. This experiment studied the trace gases in the middle atmosphere and measured winds, wave interaction, turbulence and other processes. Mission Duration: 262 hrs 32 mins 20 secs
NOAA-14 (S) 1994-89 A	Atlas-E	Dec 30		472	468		1030.0	The primary objective is to acquire daily global information for short and long term forecasting. The satellite will be part of the operational polar satellite system.

# NASA Major Launch Record

1995

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
INTELSAT 704 1995-001A	Atlas-2AS	Jan 10						Geostationary communications spacecraft launched from Cape Canaveral. It is parked over the Indian Ocean to provide radio and TV coverage to the Middle East, Africa and parts of Europe.
STS-63 1995-004A	Shuttle(S) (Discovery)	Feb 3					LANDED AS KSC FEB 11, 1995	Twentieth Discovery flight, with James D. Wetherbee, Eileen M. Collen, Bernard A. Harris, Jr., Michael C. Foale, Janice Voss, and Vladimir Georgievich Titov as flight crew members. The cargo bay deployable payloads were Shuttle-Mir Rendezvous and fly around, SPARTAN 204 Science, and EVA activities. In-cabin payloads were SPACEHAB-3 and AMOS. Mission Duration: 196 hrs 29 mins 36 secs
STS-67 1995-007A	Shuttle(S) (Endeavour)	Mar 2					LANDED AT EDW MAR 18, 1995	Eighth Endeavour flight, with Steven S. Oswald, William G Gregory, John M. Grunsfeld, Wendy B. Lawrence, Tamare E. Jerrigan, Samuel T. Durrance, and Ronald Parise as flight crew members. Cargo Bay Payloads consisted of ASTRO-2 Spacelab with three UV telescopes. Crew cabin Payloads consisted of Commercial MDA ITA (CMIX), Protein Crystal Growth Experiments, Middeck Active Control Experiment (MACE), and Shuttle Amateur Radio Experiment (SAREX). Mission Duration: 399 hrs 09 mins 47 secs
GOES-J 1995-025A	Atlas-1	May 23						Named GOES-9 after launch, this geostationary meteorological spacecraft will first cover the central United States. Later the spacecraft will be moved to cover either the east or west coast. The instruments onboard will provide cloud cover images and monitor atmospheric temperatures and moisture at many altitudes.

# NASA Major Launch Record

1995

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
STS-73 1995-56A	Shuttle Columbia	Oct 20		LANDED AT KSC NOV 5, 1995				Eighteenth Columbia flight with Kenneth D. Bowersox, Kent Rominger, Kathryn Thornton, Catherine Coleman, Michael Lopez-Alegria, Albert Sacco and Fred Leslie as crew members. The United States Micro-gravity Laboratory -2 (USML-2) was the prime payload on this flight. Experiments on gravity in combustion flame spreading, semiconductor crystals and theoretical models of fluid physics were tested. The Orbital Acceleration Measurement System (SAMS), High-Packed Digital Television Demonstration and Three Dimensional Microgravity Accelerometer (3DMA) were on this flight. Mission Duration: 381 hrs 52 mins 21 secs
STS-74 1995-61A	Shuttle Atlantis	Nov 12		LANDED AT KSC NOV 20, 1995				Fifteenth Atlantis flight with Kenneth Cameron, James Halsell, Jerry Ross, William McArthur and Chris Hadfield as crew members. This was the second mission to link up with the MIR space station. The Russian built Docking Module was attached to the Kristall module of the MIR. This Docking module will be used in future docking between the Shuttle and MIR Space Station. The cargo bay also carried the Photogrammetric Appendage Structural Dynamics Experiment (PASDE) Mission Duration 196 hrs 30 mins 54 secs
SOHO 1995-65A	Atlas-2AS	Dec 2				1,850 kg	An ESA-NASA spacecraft was launched from Cape Canaveral Air Station. It carried three American and nine European instruments to observe the sun and its corona. It was maneuvered to orbit around the first Lagrangian point(L-1) at 1,500,000 km in the sunward direction. The instruments will measure the intensity and polarization of light scattered by the coronal electrons, and the composition of cold and hot plasma ejected by the Sun.	
GALAXY 3R 1995-69A	Atlas-2A	Dec 15					A Geostationary communications spacecraft launched from Cape Canaveral Air Station. After parking at 95 degrees W longitude the spacecraft provided 140 television channels to Mexico, the Caribbean, and Central American countries through its 24 C-band and 324 Ku-band transponders.	

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# NASA Major Launch Record

1996

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
STS-72 1996 01A	Shuttle (Endeavour)	Jan 11		LANDED AT KSC JAN 20, 1996				Tenth Endeavour flight with Brian Duffy, Brent Jett, Winston Scott Daniel Barry and Kiochi Wakata as flight crew members. The Japanese Space Flyer Unit (SFU) was captured after being launched on March 17, 1995. The deployment and retrieval of the OAST-Flyer with four experiments on board. Also carried on the flight was the Shuttle Solar Backscatter Ultraviolet Experiment, Shuttle Laser Altimeter Payload, Space Tissue Loss Experiment and three Getaway Specials. Mission Duration: 218hrs 00mins 41secs
NEAR 1996-008A	Delta 2	Feb 17					818kg	NEAR (Near Earth Astroid Rendezvous) will orbit around the Eros asteroid. This satellite will first pass by the asteroid 253-Mathild and return by Earth for a gravity boosted speed increase to make the final voyage to Eros. Once in orbit it will provide infrared images, x-ray, gamma-ray spectrometer and magnetometer data. Also on board is a laser range finder and a radioscience instrument.
STS-75 1996-012A	Shuttle (Columbia)	Feb 22		LANDED AT KSC MAR 7, 1996				Nineteenth Columbia flight with Andrew Allen, Scott Horowitz, Jeff Hoffman, Maurizio Cheli, Claude Nicollier, Franklin Chang-Diaz and Umberto Guidoni as the crew members. The deployment of the Tether Satellite System (TSS) ended when the tether broke. The satellite was lost when it reentered the atmosphere. As part of the USMP-3 cargo bay experiments where the Advanced Automated Directional Solidification Furnace (AASDF), Critical Fluid Light Scattering Experiment (Zeno) and the IDGE, OARE, MEPHISTO experiments. There were also three Middeck Glovebox Facility Combustion Investigations (MGBX). Mission Duration: 328 hrs 14 mins 00 secs
Polar 1996-013A	Delta 2	Feb 24	938.1	50,551	5,100	85.9	1,300 kg	Last element of the International Solar-Terrestrial Program (ISTP/ GGS). The satellite is in a polar orbit with eleven instruments to measure magnetospheric hot plasma, plasma waves, electric/magnetic fields, x-rays, energetic particles and visible light and UV cameras to map auroral displays.



# NASA Major Launch Record

1996

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
STS-76 1996-018A	Shuttle (Atlantis)	March 22		LANDED AT KSC MAR 30 1996				Sixteenth Atlantis flight with Kevin Chilton, Rick Searfoss, Ron Sega, Rich Clifford and Linda Godwin as crew members while Shannon Lucid, Yuri Onufriendo and Yuri Usachev were being taken to the Space Station MIR. The third docking with MIR included over 1,900 lbs of supplies. The mission would include the SPACEHAB module, middeck experiments and a Get Away Special. Mission Duration: 221hrs 15 mins 53 secs
STS-77 1996-032A	Shuttle (Endeavour)	May 19		LANDED AT KSC MAY 29, 1996				Eleventh Endeavour flight with John H Casper, Curtis Brown, Daniel Bursch, Mario Runco, Marc Garneau and Andrew Thomas as crew members. A Spartan 207 platform was released from the shuttle, with the Inflatable Antenna Experiment (IAE). The PAMS-STU spacecraft was also released from the Shuttle to test attitude stabilization then re-enter the atmosphere. Mission Duration: 240 hrs 40 mins 10 secs
STS-78 1996-036A	Shuttle (Columbia)	June 20		LANDED AT KSC JUL 7, 1996				Twentieth Columbia flight with Terence Henricks, Kevin Kregel, Susan Helms, Richard Linneham, Charles Brady, Jean-Jacques Faver and Robert Thirsk as crew members. This flight carried the Life and Microgravity Spacelab (LMS-1) in its cargo bay. There were 22 experiments conducted in the LMS involving fish embryos, rats, Bonzai plants, fluid dynamics, metallurgy and protein crystal growth. Thirteen of the life science experiments were devoted to the study of microgravity and its effects on the human physiology. Mission Duration: 405 hrs 47 mins 30 secs

# NASA Major Launch Record

1996

MISSION/ Intl Design	LAUNCH VEHICLE	LAUNCH DATE	PERIOD (Mins.)	CURRENT ORBITAL PARAMETERS			WEIGHT (kg)	REMARKS  (All Launches from ESMC, unless otherwise noted)
				Apogee (km)	Perigee (km)	Incl (deg)		
STS-79 1996-57A	Shuttle (Atlantis)	Sept 19		LANDED AT KSC SEPT 26, 1996				Seventeenth Atlantis flight with William Readdy, Terrence Wilcutt, Thomas Akers, John Blaha, Jay Apt and Carl Walz as flight crew members. This flight will be the fourth to rendezvous and dock with the MIR space station. This was the first exchange of astronaut when John Blaha replaced Shannon Lucid, who had been on the MIR since late March. This was the first Shuttle to carry a double SPACEHAB module. The forward portion of this module was used to conduct experiments while on orbit, while the aft portion was used to house food, clothing, experimental supplies and spare equipment to be transferred to the MIR. Mission Duration: 243 hrs 18 mins 26 secs
MGS 1997-62A	Delta 2	Nov 7		DUE TO ARRIVE AT MARS SEP, 1997				The Mars Global Surveyor (MGS) is being sent to Mars to remote-sense the atmosphere and soil composition. After completing 180 days of high apogee sensing, an "aerobraking orbit" will descend the MGS to a low circular "mapping orbit". The surface of Mars will be mapped by a thermal emission spectrometer, a laser altimeter and three linescan cameras at visual wavelengths.
STS-80 1996-65A	Shuttle (Columbia)	Nov 19		LANDED AT KSC DEC 7, 1996				Twenty first Columbia flight with Kenneth Cockrell, Kent Rominger, Tamara Jernigan, Thomas Jones and F. Story Musgrave as the flight crew members. Two satellites, the Wake Shield Facility (WSF) and the Retrieval Far & Extreme Ultraviolet Spectrograph-Shuttle Pallet Satellite II (ORFEUS-SPAS II) were both deployed and retrieved on this flight. The WSF was flown to test the growth of thin semiconductor films for advanced electronics. The ORFEUS-SPAS II will observe the evolution of stars, structure of galaxies and the nature of interstellar mediums. The astronauts will test a variety of tools and instruments for future station operations. Mission Duration: 426 hrs 53 mins 18 secs
Mars Pathfinder 1996-68A	Delta 2	Dec 4		DUE TO ARRIVE ON MARS JUL 4, 1997				The Pathfinder will land on Mars cushioned by inflatable airbags. The Sojourner, Pathfinder microver, with Alpha, Proton, X-ray Spectrometer and color cameras will transmit data to the Pathfinder Lander. The solar powered Lander will then transmit its research data and Sojourner data from Mars.