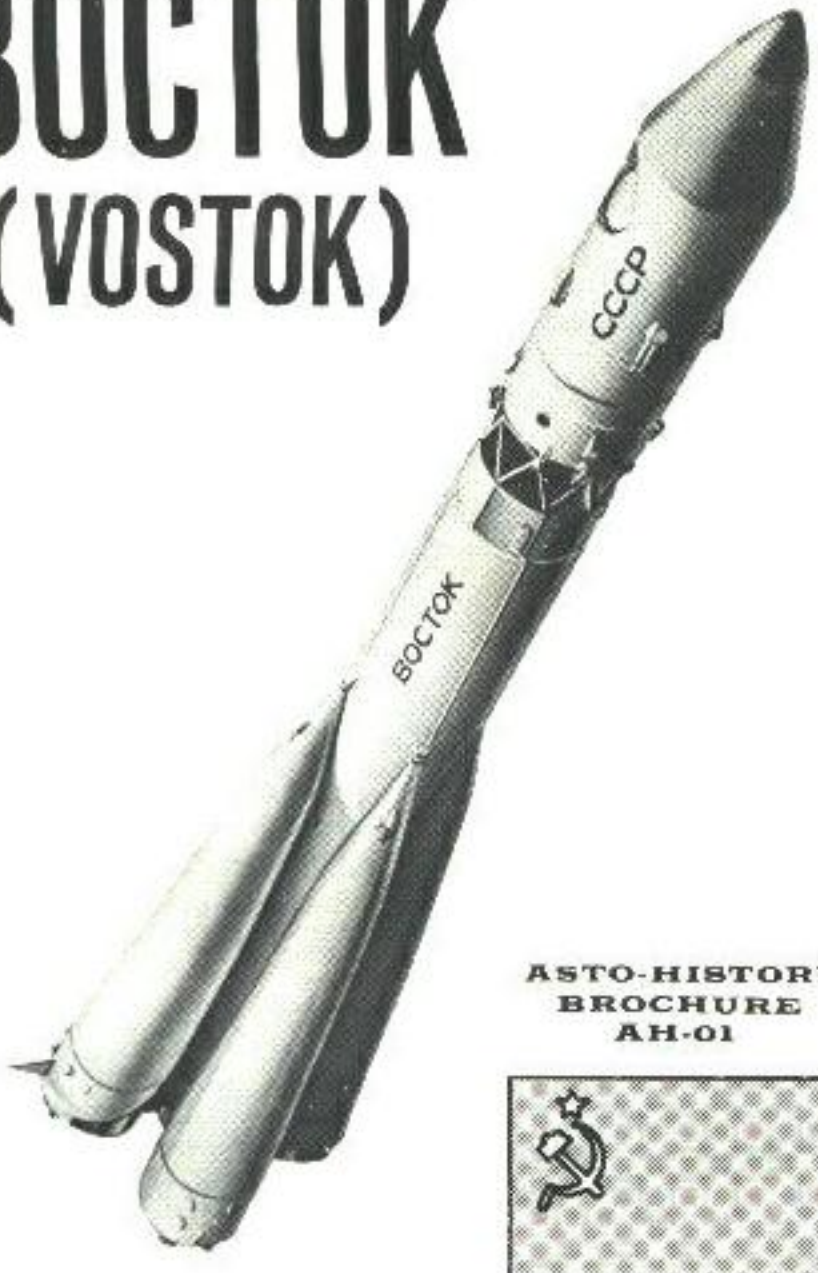
MODEL PRODUCTS

SOVIET RD-107
SPACE CARRIER
ROCKET

BOCTOK
(VOSTOK)



ASTO-HISTORY
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SOVIET RD-107 SPACE CARRIER ROCKET

(Raketi-Nositeli)

The space program of the U.S.S.R. during the first decad of the Space Age was carried out primarily with the RD-10. Carrier Rocket designed by Sergei Pavlovich Korolev, th "chief constructor" of the Soviet space agency. The RD-107 is a development of the Soviet SS-6 ICBM.

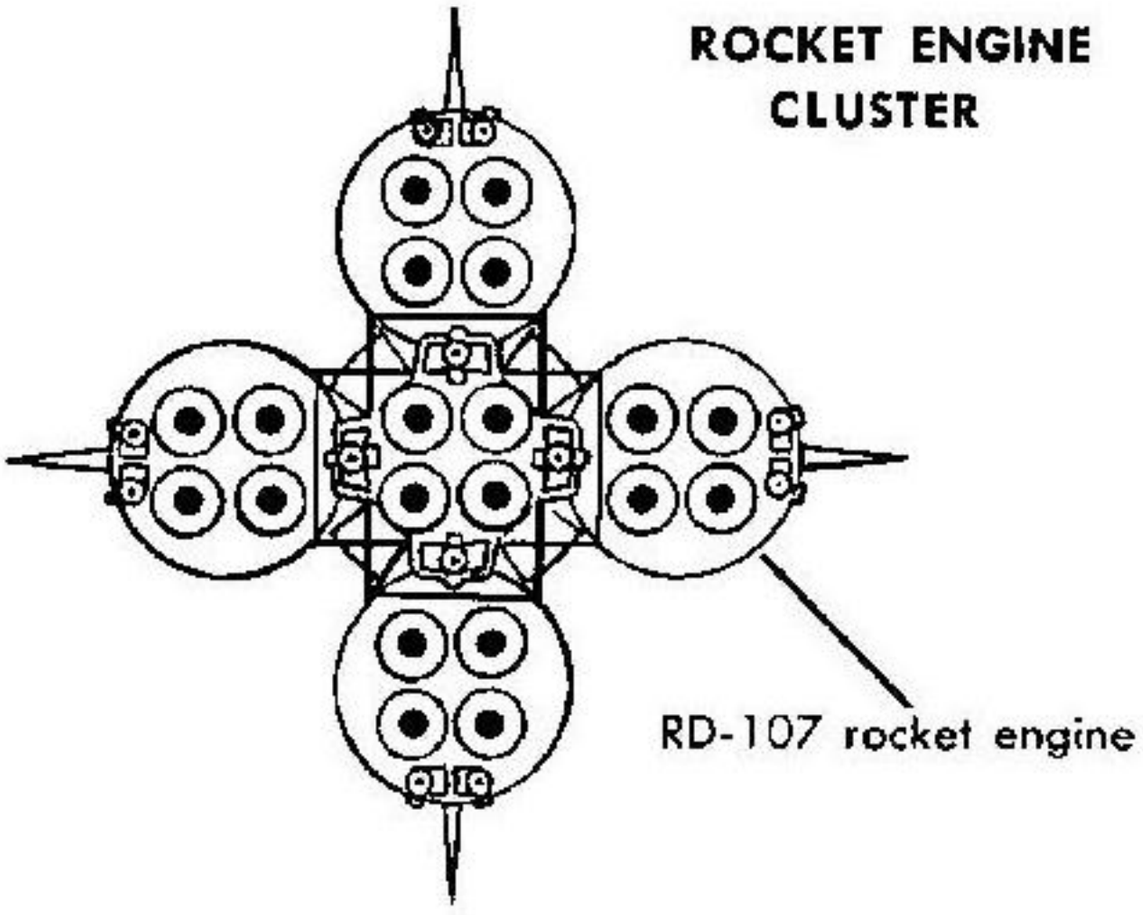
The first launchings of the SS-6 took place in the Spring of 1957 and were tracked by U.S. long-range radars in Turkey. The launch site for these tests and all subsequent SS-6 and RD-107 missions is the Soviet "Cape Kennedy" called Tyuratam near Baikonour northeast of the Aral Sea. On October 4, 1957 the Space Age began; an RD-107 launched Sputnik I into an orbit around the earth. This 184-pound sphere was separated from the 8000-pound core of the RD-107 which was also orbited.

The RD-107 by itself was limited to an orbital payload of about 3000 pounds until Korolev added the upper stage attached by trusses in 1960. This increased the orbital payload to about 10,400 pounds and enabled the RD-107 to launch unmanned probes with a payload of about 1400 pounds to Mars and Venus.

Following six unmanned orbital flights to test the unmanned Vostok spacecraft, Major Yuri A. Gagarin rode once around the world into history in Vostok I on April 12, 1961.

OPERATION OF THE RD-107

To obtain the high thrust necessary for an ICBM, Korolev not only brought together or "clustered" rocket combustion chambers to create the RD-107 rocket engine, but also put together clusters of these clusters to produce a "parallel-staged" rocket. The RD-107 takes off with all rocket engines operating, eliminating the then-difficult "air start" of upper-stage rocket engines in flight.



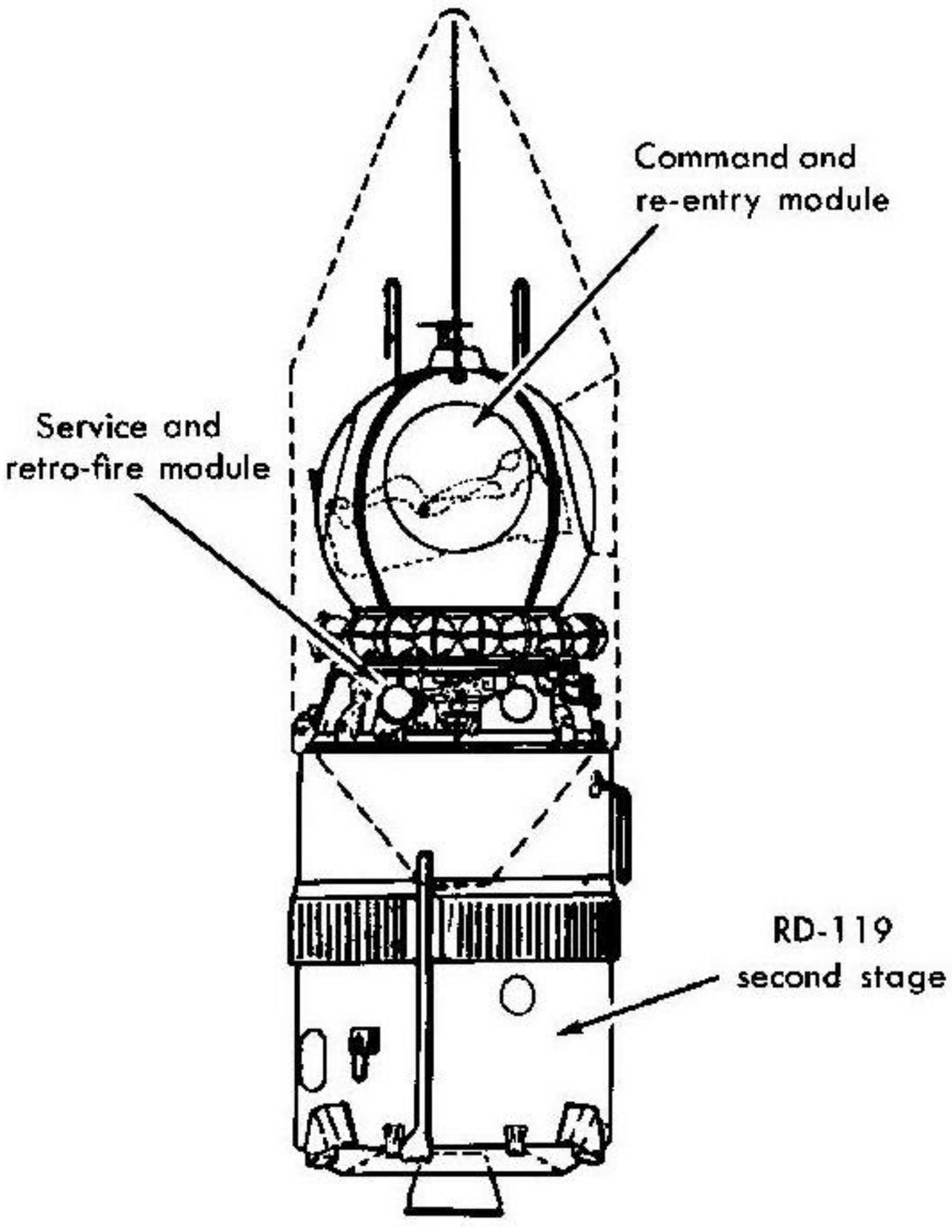
At launch, the RD-107 is supported by swing-back arms attached at the forward booster attach points. All 20 main thrust chambers and 12 vernier or steering thrust chambers are ignited at once. Estimated thrust at lift-off is 950,000 pounds, increasing to 1,150,000 pounds in flight.

At an altitude of approximately 185,000 feet some 130 seconds after lift-off, a velocity of 6600 feet-per-second (about 4500 miles per hour) is attained, and the rocket propellants in the booster tanks are exhausted. Explosive bolts sever the connections between the boosters and the core vehicle at the forward and aft booster attach points. The boosters fall away from the core. The core vehicle continues to be accelerated by its rocket engine until 332 seconds after lift-off.

The early Sputnik-version of the RD-107 had no second stage. Therefore, on the early flights until 1960, the entire 8000-pound core of the RD-107 was orbited with payloads of up to 3000 pounds. When Korolev designed the upper stage, he powered it with the RD-119 rocket engine using liquid oxygen and unsymmetrical-dimethylhydrazine. The RD-119 is a re-startable engine that allows the second stage to enter a parking orbit for interplanetary or lunar shots, thus becoming what the Soviets terms an "orbital platform" or "Nositel-Sputnik."

VOSTOK

In earth orbit, the Vostok spacecraft remains attached to the RD-107 second stage which serves as an attitude control module. The Vostok spacecraft is made up of three modules: (a) a 96-inch diameter spherical command and re-entry module, (b) a service and retro-fire module ringed with air bottles, and (c) the RD-119 second stage which serves as an additional service module.



The entire Vostok spacecraft was an automatic unit capable of carrying out its orbital mission without the cosmonaut's attention. It was controlled by on-board or radio-link devices. However, the cosmonaut could take manual control of the spacecraft.

The re-entry sequence was normally completely automatic. First the second stage was jetissoned. Using sun and horizon sensors, the Vostok was positioned at the correct retro-fire angle. At the proper moment, the retro-fire engine was ignited, then the retro-fire module was separated, leaving only the 8-foot re-entry sphere. The re-entry sphere containing the cosmonaut was coated with a plastic-filled honeycomb material to act as an ablative heat-shield. Korolev chose the spherical shape for the re-entry module because the aerodynamic characteristics of a sphere were well-known.

At an altitude of 23,000 feet following re-entry, the cosmonaut hatch was blown off the sphere by explosive bolts, and the cosmonaut ejected from the sphere in a rocket-boosted ejection seat. He then separated from the seat and landed under his own personal parachute. The Vostok sphere deployed its parachute at 16,000 feet and landed. Major Gargarin landed inside his Vostok 1. All other Vostok pilots elected to land by the ejection method.

SOVIET SPACE CARRIER ROCKET DATA

LENGTH OVERALL: 38 meters (124.678 feet)

DIAMETER OVER FINS: 10.3 meters (33.794 feet)

SUSTAINER LENGTH: 28 meters (91.868 feet)

MAXIMUM DIAMETER OF SUSTAINER: 2.95 meters (9.679 feet)

LENGTH OF BOOSTERS: 19 meters (62.339 feet)

MAXIMUM DIAMETER OF BOOSTERS: 3 meters (9.843 feet)

TOP STAGE LENGTH OVER NOSE FAIRING: 10 meters (32.81 feet)

MAXIMUM DIAMETER, TOP STAGE: 2.58 meters (8.465 feet)

NOMINAL VOSTOK WEIGHT, INCLUDING PILOT: 4725 Kilograms (10,400 pounds)

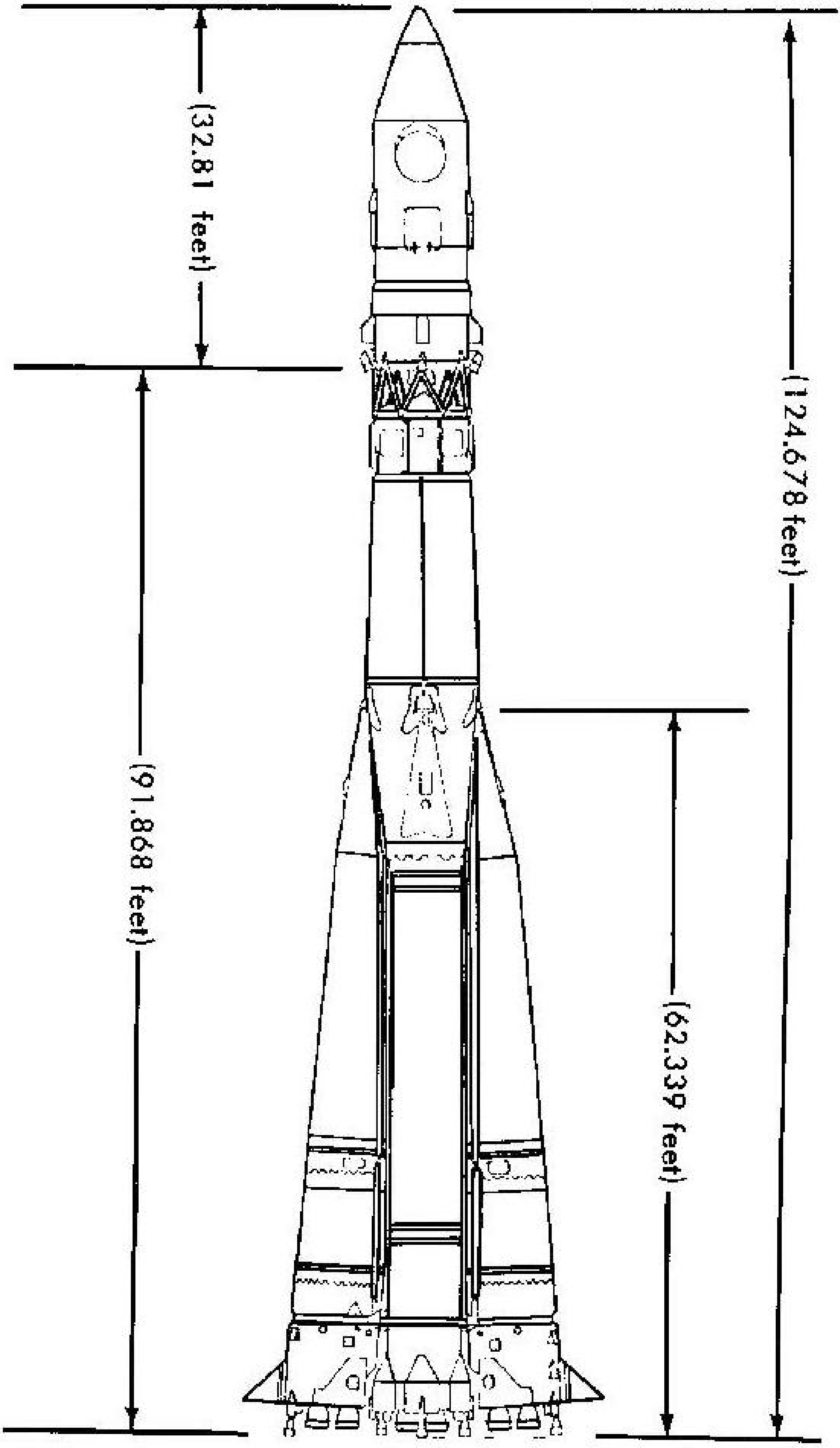
TOTAL THRUST, LIFTOFF: 950,000 pounds.

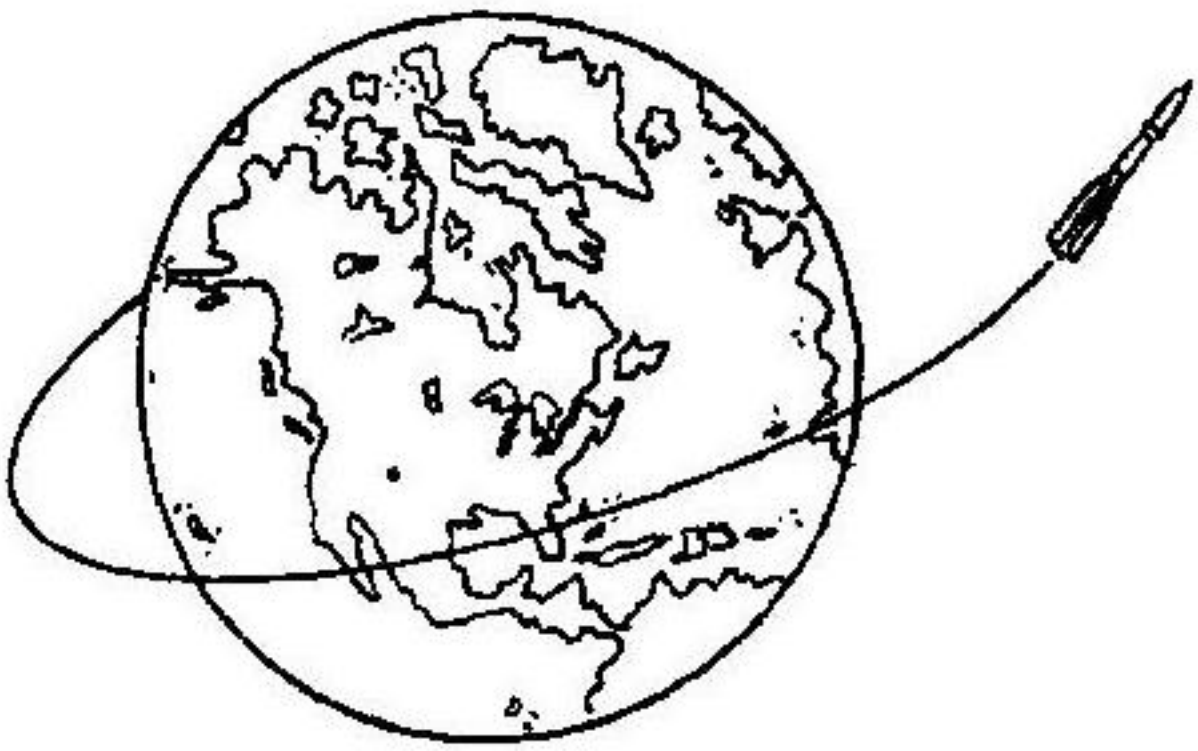
TOTAL THRUST, VACUUM: 1,150,000 pounds.

ESTIMATED WEIGHTS:

Propellants in 4 boosters:	375,000 lb.
Propellants in sustainer:	240,000 lb.
Propellants in top stage:	32,000 lb.
Total Propellants:	647,000 lb.
Vostok spacecraft:	10,400 lb.
Empty vehicle:	61,400 lb.
Total empty weight:	71,800 lb.
Lift-off weight:	718,800 lb.

LIFT-OFF ACCELERATION: 1.3 g's


(32.81 feet)
(124.678 feet)
(91.868 feet)
(62.339 feet)



SOVIET RD 107 ROCKET ENGINE DATA

TYPE: Liquid-propellant, multi-chamber, turbo-pump fed.

THRUST IN VACUUM: 102 t (228,480 pounds).

VACUUM SPECIFIC IMPULSE: 314 sec.

CHAMBER PRESSURE: 60 atmospheres (885 pounds per square inch).

PROPELLANTS: Liquid oxygen and hydrocarbon.

CONFIGURATION: Four main thrust chambers, regeneratively-cooled, and two or four vernier chambers, regeneratively-cooled, supplied with propellants by single turbo-pump.

TURBO-PUMP DETAILS: Single-shaft. Double-sided LOX pump. Single-sided fuel pump. Centrifugal type. Driven by gas generator which in turn is fed by smaller centrifugal pump. Gas generator apparently driven by decomposition of hydrogen peroxide.

INJECTOR DESIGN: Single-plate injector in each chamber. Welded construction.

THRUST CHAMBER MATERIALS: External walls apparently steel. Internal chamber walls of high copper alloy.

SOVIET SPACE CARRIER ROCKET FLIGHT HISTORY
(Unmanned Program)

AUGUST 30, 1957: Department of Defense (U.S.) announced 4 to 6 Soviet ICBM tests during Spring 1957.
OCTOBER 4, 1957: Orbited Sputnik-I, 184 pounds of instruments. 8000 pounds in orbit. 142 x 588 miles, 65° inclination. Down January 4, 1958. *First man made Satellite.*
NOVEMBER 3, 1957: Orbited Sputnik-II, 1,120 pounds. 8000 pounds in orbit. 140 x 1038 miles. 65° inclination. Down April 4, 1958. *First Astro Biological flight with dog "Laika."*
MAY 15, 1958: Sputnik-III in orbit, 2925 pounds. 7000 pounds orbited. 135 x 1167 miles. 65.3° inclination. Down May 6, 1960.
JANUARY 2, 1959: Launched Lunik-I into solar orbit. 3245-pound capsule, 800 pounds of instrumentation.
SEPTEMBER 12, 1959: Launched Lunik-II to lunar impact. 858.4 pounds of instruments on moon.
OCTOBER 4, 1959: Launched Lunik-III to lunar orbit for photography of backside of Moon. 614-pound spacecraft. 3423-pound empty stage with 345 pounds of instruments aboard.
FEBRUARY 12, 1961: Sputnik-V orbited. 1419-pound Venus probe into 115 x 155 mile parking orbit.
SEPTEMBER 1, 1962: Orbited Venus-I failed in parking orbit.
NOVEMBER 1, 1962: Orbited Mars-I, 1980 pounds.
JANUARY 4, 1963: Orbited 3080-pound un-named spacecraft which failed in parking orbit.
APRIL 2, 1963: Launched Luna-4, 3136-pound soft-lander, failed.
MARCH 12, 1964: Launched Kosmos-60, 3200-pound lunar soft lander, failed in parking orbit.
MAY 9, 1965: Launched Luna-5, 3255 pounds, impacted on Moon.
JUNE 8, 1965: Launched Luna-6, 3180 pounds, missed lunar impact.
JUNE 18, 1965: Launched Zond-3, 2000-pounds, lunar photographic orbiter, 25 photos of lunar farside.
OCTOBER 4, 1965: Launched Luna-7, 3321 pounds, impact on Moon.
DECEMBER 3, 1965: Launched Luna-8, 3422 pounds, impact on Moon.

JANUARY 31, 1966: Launched Luna-9, 3491 pounds, soft-landed on Moon. 27 photos returned.
MARCH 1, 1966: Launched Kosmos-III, 3500 pounds, lunar shot failed in parking orbit.
MARCH 31, 1966: Launched Luna-10, 3588 pounds, orbited Moon.
AUGUST 24, 1966: Launched Luna-11, 3616 pounds, orbited Moon.
OCTOBER 22, 1966: Launched Luna-12, 3600 pounds, returned photos from lunar orbit.
DECEMBER 21, 1966: Launched Luna-13, 3600 pounds, soft landed on Moon, returned photos.

MANNED PROGRAM

MAY 15, 1960: Launched Spacecraft-I, 10,008 pounds. Recovery failed. Still in orbit.
AUGUST 19, 1960: Launched Spacecraft-II, 10,120 pounds, 2 dogs, rats, mice, flies, plants, seeds, fungus, etc. 190 x 211 miles. 64.57° inclination. Recovered 7 miles from target on August 20, 1960.
DECEMBER 1, 1960: Launched Spacecraft-III, 10,060 lb. Vostok, 117 x 165 miles, 65° inclination. Recovered December 2, 1960.
FEBRUARY 4, 1961: Orbited Sputnik-IV, 14,292-pound Vostok, 138 x 203 miles, 64° inclination. Down February 26, 1961.
MARCH 9, 1961: Orbited Spacecraft-IV, 10,340-pound Vostok with dog. 115 x 155 miles. Recovered March 9, 1961.
MARCH 25, 1961: Orbited Spacecraft-V, 10,300-pound Vostok, 111 x 150 miles, 65° inclination with dog aboard. Recovered.
APRIL 12, 1961: Orbited Vostok 1 with Major Yuri Gagarin aboard. 108 x 187 miles. 65° inclination. Recovered after 1 orbit. *First manned orbital flight.*
AUGUST 6, 1961: Orbited Vostok 2 with Major German Titov aboard. 110 x 115 miles. 65° inclination. Recovered after 17 orbits.
AUGUST 11, 1962: Orbited Vostok 3 with Nikolayev aboard. 105 x 156 miles. 65° inclination. Recovered after 64 orbits.
AUGUST 12, 1962: Orbited Vostok 4 with Popovich aboard. 111 x 158 miles. 65° inclination. Recovered after 48 orbits.
JUNE 14, 1963: Orbited Vostok 5 with Bykovskiy aboard.
JUNE 16, 1963: Orbited Vostok 6 with Valentina Treshkova aboard.

SOVIET COSMONAUTICS TERMS

CARRIER ROCKET—Raketi-Nositeli
SATELLITE—Sputnik
CARRIER SATELLITE—Nositel-Sputnik
SPACESHIP—Korabl
MANNED SPACESHIP SATELLITE—Chelovek Korabl Sputnik

A NOTE FROM MPC

Model Products is proud to present a world's first authentic scale model of the RD-107 Space Carrier Rocket and the Vostok Spacecraft.

Much research and time consuming labor went into the reproducing of the Soviet Union's most celebrated Space Vehicle.

The making of a rocket kit was a new challenge to MPC, long a leader in model car kits, and we feel it will open a whole new horizon for you the Model Builder.

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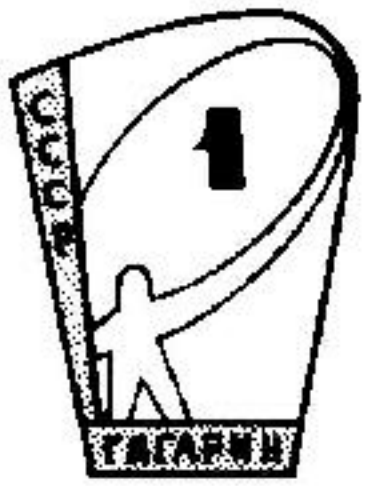
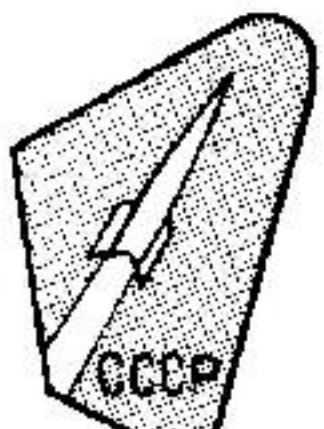


1. Mission pin for Vostok I with Major Yuri A. Gagarin in man's first orbital flight.

2. Mission pin for Vostok 3 & 4 in 1962.



3. This pin is the Soviet equivalent to the NASA seal.

SOVIET COUNTDOWN

5—"pyaht"
4—"chetee-reh"
3—"tree"
2—"dvah"
1—"ohdeen"
START—"start"