

Explorer 1 Addon for Orbiter

Author Jim Williams

Version 2.0

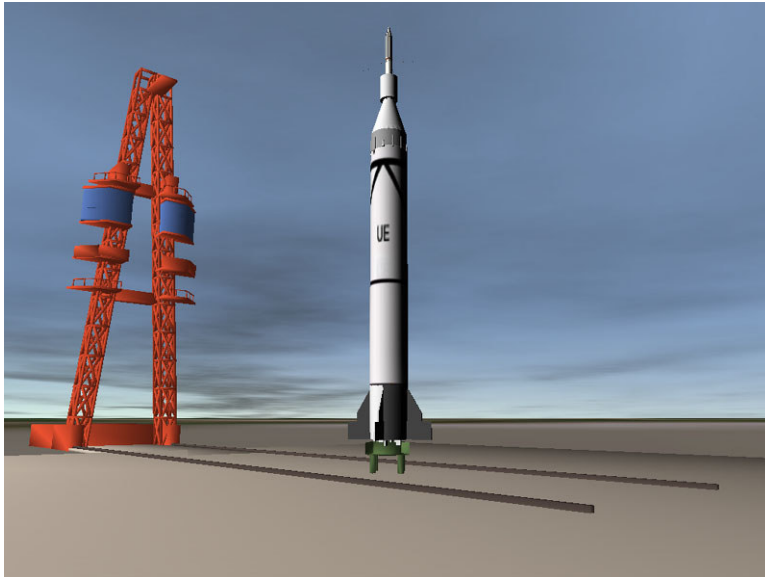
Home Page: <http://www.moonport.org>

Moonport Forums: <http://www.moonport.org/orbiterforums>

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For ORBITER Space Flight Simulator 2005 Edition © 2005 Dr. Martin Schweiger

What is this?



Explorer 1 was the first satellite launched by the United States when it was sent into space on January 31, 1958. Following the launch of the Soviet Union's Sputnik 1 on October 4, 1957, the U.S. Army Ballistic Missile Agency was directed to launch a satellite using its Jupiter C rocket developed under the direction of Dr. Wernher von Braun. The Jet Propulsion Laboratory received the assignment to design, build and operate the artificial satellite that would serve as the rocket's payload. JPL completed this job in less than three months.

The primary science instrument on Explorer 1 was a cosmic ray detector designed to measure the radiation environment in Earth orbit. Once in space this experiment, provided by Dr. James Van Allen of the State University of Iowa, revealed a much lower cosmic ray count than expected. Van Allen theorized that the instrument may have been saturated by very strong radiation from a belt of charged particles trapped in space by Earth's magnetic field. The existence of these radiation belts was confirmed by another U.S. satellite launched two months later, and they became known as the Van Allen Belts in honor of their discoverer.

Explorer 1 revolved around Earth in a looping orbit that took it as close as 354 kilometers (220 miles) to Earth and as far as 2,515 kilometers (1,563 miles). It made one orbit every 114.8 minutes, or a total of 12.54 orbits per day. The satellite itself was 203 centimeters (80 inches) long and 15.9 centimeters (6.25 inches) in diameter. Explorer 1 made its final transmission on May 23, 1958. It entered Earth's atmosphere and burned up on March 31, 1970, after more than 58,000 orbits. The satellite weighed 14 kilograms (30.8 pounds).

2. WHATS REQUIRED?

The ORBITER simulator program, located at <http://www.orbitersim.com>
Vinkas Multistage and Spacecraft DLL add-on. The latest is included in this package.

OPTIONAL: Rob Connelys Earth_1962 add-on located at
http://prdownloads.sourceforge.net/mscorbaddon/earth_1962_26.zip?download

3. Update from version 1.0

- 1) Added realistic liftoff smoke, upper atmospheric contrails, and realistic exhaust particles
- 2) Added transponder to satellite that transmits on 108 KHz when it separates
- 3) Optimized autopilot to more real world flight.
- 4) Added new spin stabilization to the satellite prior to orbital insertion
- 5) Incorporates new Multistage and Spacecraft.dll
- 6) Changed the 4th stage to burn at the realistic 6.5 seconds
- 7) Added customized sounds including countdown and vehicle sounds from the real Explorer 1 liftoff itself!

4. INSTALLATION

Simply unzip the archive in your ORBITER directory. All filenames are unique to the ORBITER STANDARD INSTALLATION.

5. OK, WHAT NOW?



Start ORBITER and go into your scenarios list. You will have a new folder called Explorer1.

In this folder, are two scenarios, one for use with Rob Connelys Earth_1962 add-on.

The other is a scenario that places your vehicle on a default Orbiter launch pad. If you do not have the Earth_1962 add-on installed, use the Explorer1 scenario.

6. UNINSTALLING

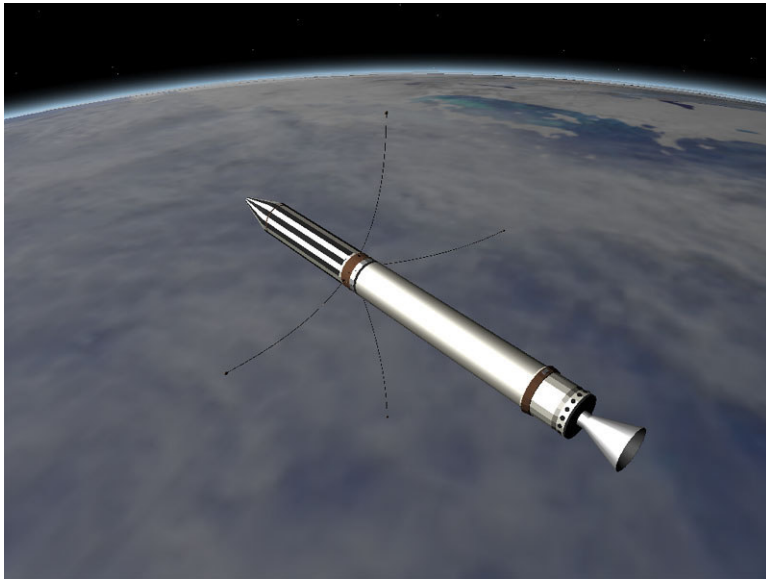
Simply delete the files installed.

7. DISCLAIMER

USE THIS ADD-ON AT YOUR OWN RISK. While the filenames contained within this archive are unique to the STANDARD ORBITER INSTALLATION, I cannot guarantee that it will not overwrite any other files using similar filenames from other third party ORBITER Add-ons.

This add-on has been tested and while it works under our testing, it may not work as planned on your particular installation. Results may vary.

8. Flying Ranger 7



You can fly Explorer 1 either manually or with the built in autopilot. Like the real Explorer 1, it follows a very strict flight plan. If you intend to fly it manually, you will need to make sure you make absolutely no mistakes, or you will not make it into orbit. I suggest flying with the Auto Pilot for a few times and study how it is done. The autopilot will (usually) get Explorer 1 into a fairly stable orbit.

To activate the autopilot, press **P**. You may shut down the autopilot at any time by pressing **P** again, however once the engine starts, it will

go through the automatic flight plan at it's scheduled times. If you shut off the autopilot, you will be unable to turn it on again, so you will need to pitch the vehicle manually. The autopilot rolls the vehicle to the proper heading and pitches the vehicle automatically. It controls the SPIN STABILISATION mode of the flight and places Explorer 1 into the proper pitch during the coasting phase of the flight. The orbital insertion burns start automatically as well.

WARNING: Do not use time acceleration during any portion of the powered flight or coasting phase! The flight plan is very strict and if you use time acceleration, it will cause Explorer 1 to fail to achieve orbit!

JUPITER-C/JUNO-I

Explorer-1 Launch

Weight (in pounds)

Loaded Empty

Overall (takeoff) 64,000 10,260

Stage 1 62,700 9,600

Stage 2 1,020 490

Stage 3 280 140

Stage 4 80 31.5

JupiterC/Explorer 1 Propulsion System

Stage 1: Rocketdyne A-7 engine.--

Thrust, 83,000 lb; *burning time*, 155 seconds; *specific impulse*, 235 seconds; *propellants*, liquid oxygen, as oxidizer, and "Hydyne" (60% unsymmetrical, dimethylhydrazine and 40% diethylenetriamine), as fuel; *propellant feed*, turbopump type; *turbopump drive*, 90% hydrogen peroxide decomposed by catalyst bed to produce steam.

Stage 2: Eleven JPL scaled-down Sergeant rockets.--

Thrust, 16,500 lb; *burning time*, 6.5 seconds; *specific impulse*, 220 lb-sec/lb; *propellant*, polysulfide-aluminum and ammonium perchlorate (solid propellant).

Stage 3: Three JPL scaled-down Sergeant rockets.--

Thrust, 5,400 lb; *burning time*, 6.5 seconds; *specific impulse*, 235 lb-sec/lb; *propellant*, same as for Stage 2.

Stage 4: One JPL scaled-down Sergeant rocket.--

Thrust, 5,400 lb; *burning time*, 6.5 seconds; *specific impulse*, 235 lb-sec/lb; *propellant*, same as for Stage 2.

9. BUG REPORTS

Just drop me an email at webmaster@moonport.org and I'll take a peek. Make sure to give me the who, what, where, when, and hows when the problem occurred so I can try and replicate it.

10. CREDITS

* Thanks go to Dr. Martin Schweiger for creating the best Space Flight simulator for the PC.

* Rob Conely for the original Ranger 7 addon

* Vinka for the new Multistage.DLL

Enjoy!

- Jim Williams
- <http://www.moonport.org>