

# Vanguard 1 Add-on for Orbiter

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

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For ORBITER Space Flight Simulator 2004 Edition (c) 2004 Dr. Martin Schweiger

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## What is this?

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Originally a simple nose cone was to be carried aloft, but in July of 1957 it was decided that a small



1.47 kilogram (3.25 pound) test satellite would be used instead to exercise the tracking stations. This test satellite would consist of a simple 16 centimeter (6.4 inch) polished aluminum alloy sphere equipped with two transmitters operating at frequencies around 108 MHz, 6 small solar panels, and 6 dowel like antennas.

The satellite was Vanguard I, in which its successes set the pattern for a multitude of other space ventures in this country and abroad. Vanguard also served as a springboard for scientists to launch several series of

space probes to study various aspects of radiation phenomena.

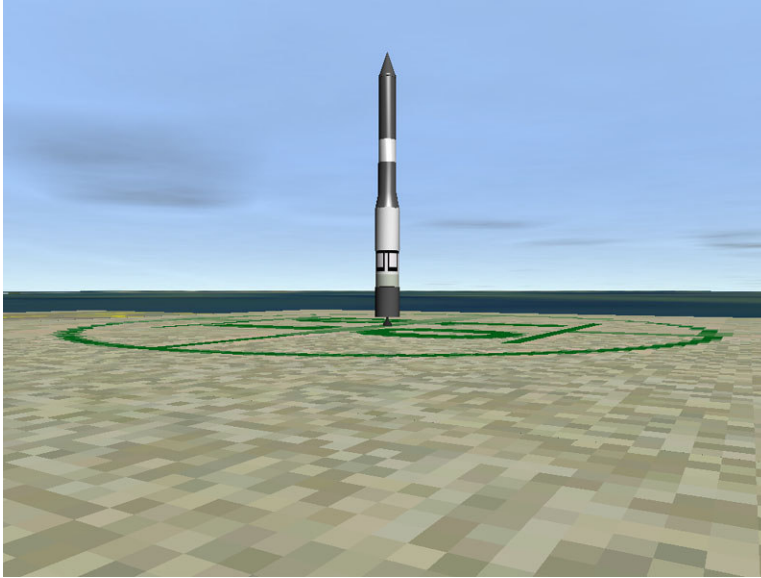
Vanguard I introduced much of the technology that has been applied in other U.S. satellite programs. For example, it proved that solar cells could be used for several years to power radio transmitters. Vanguard's solar cells operated for about seven years, while conventional batteries used to power another onboard transmitter lasted only 20 days.

Now the oldest man-made satellite still in orbit to this day, Vanguard I has been 100 percent successful in meeting all its scientific objectives.

Now you can fly this historical satellite in orbit. Unlike all the US Navy failed attempts, the Orbiter version will always get you there.

## 2. WHATS REQUIRED?

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The ORBITER simulator program, located at <http://www.orbitersim.com>

Vinkas Multistage.DLL add-on. The latest is included in this package.

**OPTIONAL:** Rob Conelys Earth\_1962 addon

## 3. KNOWN BUGS

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During stage separations, the meshes disappear. This is a known issue with the current Orbiter release and Vinkas Multistage.dll. The issue has been fixed for the next release of Orbiter.

## 4. INSTALLATION

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

## 5. OK, WHAT NOW?

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Start ORBITER and go into your scenarios list. You will have a new folder called Vanguard 1. In this folder, are two scenarios, one for use with Rob Conelys 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 Vanguard 1 scenario.

## 6. UNINSTALLING

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Simply delete the files installed.

## 7. DISCLAIMER

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USE THIS AT 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 Vanguard 1

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You can fly Vanguard 1 either manually or with the built in autopilot. Like the real Vanguard 1, it



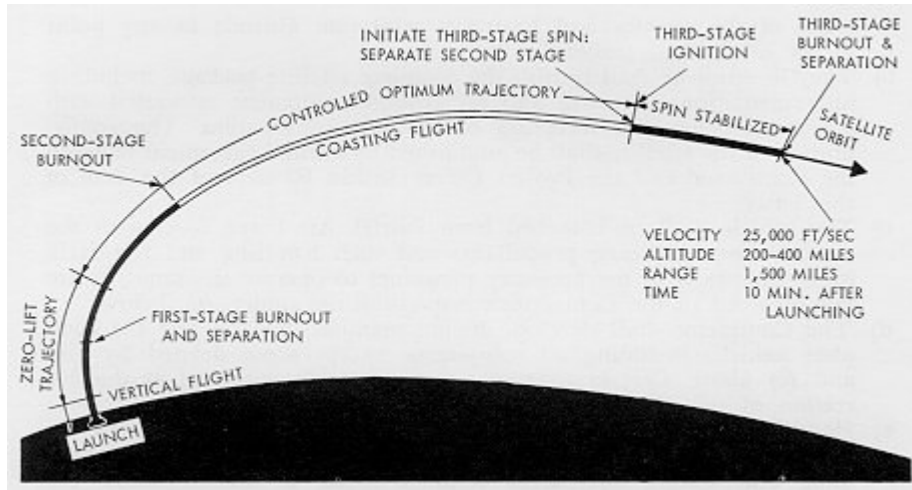
follows a very strict flight plan. If you intend to fly it manually, you will need to make sure you make absolutely no mistakes, or you will not make it into orbit. I suggest flying with the Auto Pilot for a few times and study how it is done. The autopilot will (usually) get Vanguard 1 into a fairly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

To activate the autopilot, press **P**. You may shut down the autopilot at any time by pressing **P** again, however once you shut it off, you will be unable to restart it.

**WARNING:** If you shut off the autopilot during first stage powered ascent, the rocket will start to tumble!

The autopilot rolls the vehicle to the proper heading and pitches the vehicle automatically. It also controls Vanguard 1 to go into the proper pitch during the coasting phase of the flight and finally to the orbital insertion burn at the end of the coasting phase.

**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 Vanguard 1 to fail to achieve orbit!



**Vanguard 1  
Flight Plan**

### **Vanguard 1 Propulsion System**

#### **Stage Number: 1 - Vanguard**

Mass: 7,661 kg  
Empty Mass: 811 kg  
Thrust (vac): 134.7 kN  
Isp: 270 lbf.s/lb (2.6 kNs/kg)  
Burn time: 145 s  
Isp(sea level): 248 lbf.s/lb (2.4 kNs/kg)  
Diameter: 1.14 m  
Span: 1.14 m  
Length: 12.20 m  
Propellants: Lox/Kerosene  
Engines: X-405

#### **Stage Number: 2 - Delta A**

Mass: 2,164 kg  
Empty Mass: 694 kg  
Thrust (vac): 33.8 kN  
Isp: 271 lbf.s/lb (2.7 kNs/kg)  
Burn time: 115 s  
Diameter: 0.84 m  
Span: 0.84 m.  
Length: 5.36 m.  
Propellants: Nitric acid/UDMH  
Engines: AJ10-118

#### **Stage Number: 3 - Vanguard 3**

Mass: 210 kg  
Empty Mass: 31 kg  
Thrust (vac): 11.6 kN  
Isp: 230 lbf.s/lb (2.3 kNs/kg)

Burn time: 31 s  
Isp(sea level): 210 lbf.s/lb (2.1 kNs/kg)  
Diameter: 0.50 m  
Span: 0.50 m  
Length: 2.00 m  
Propellants: Solid  
Engines: GCRC

### VANGUARD FLIGHT SEQUENCE

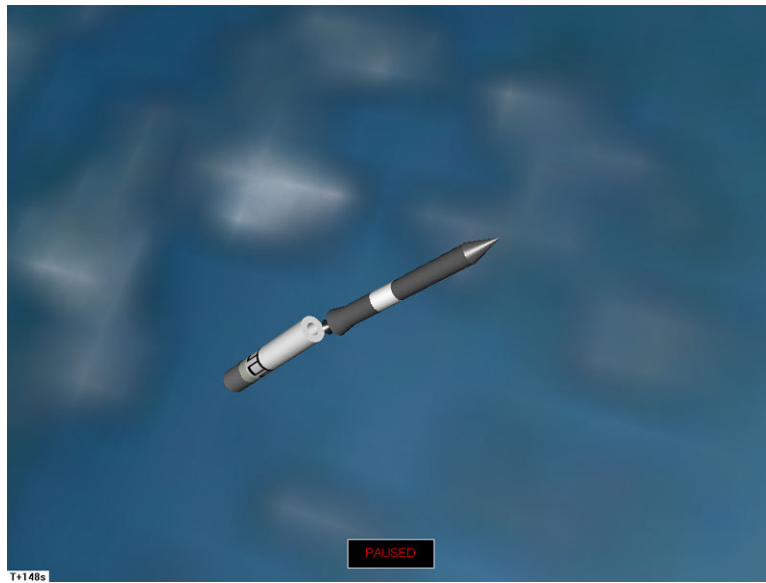
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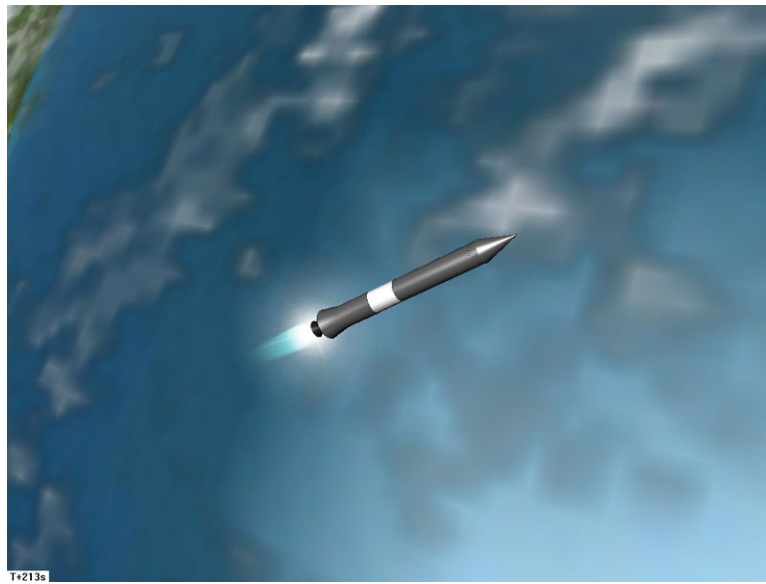
**Figure 1: Just after liftoff**



**Figure 2: Prior to first stage separation**



**Figure 3: First Stage Separation**



**Figure 4: Second Stage Ignition**

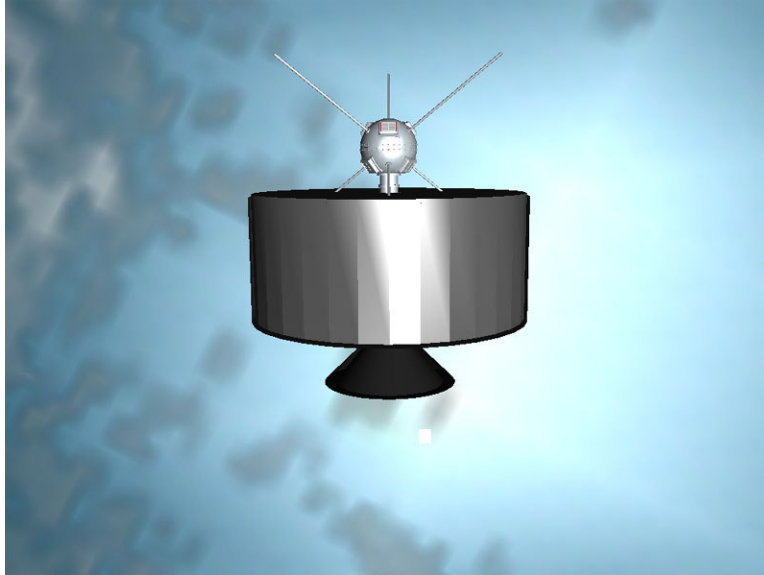




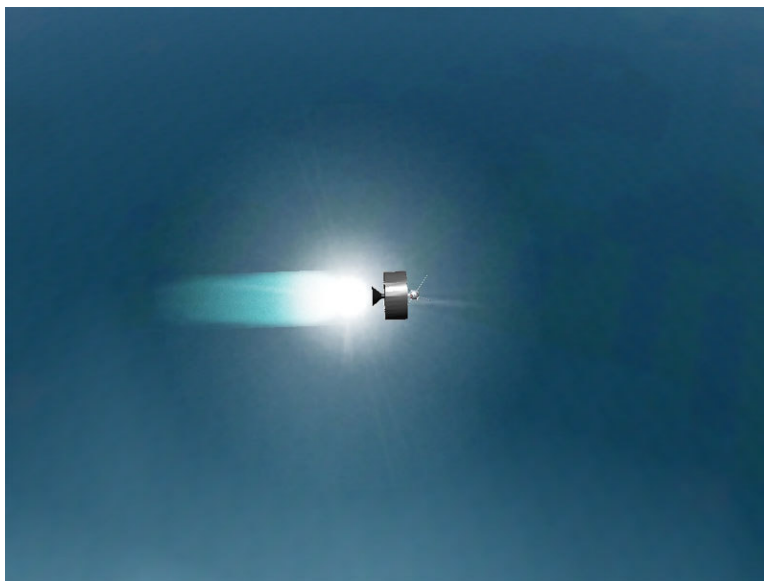
**Figure 5: Second Stage Burnout and Third Stage Jettison**



**Figure 6: Separation Of Nose Cone**

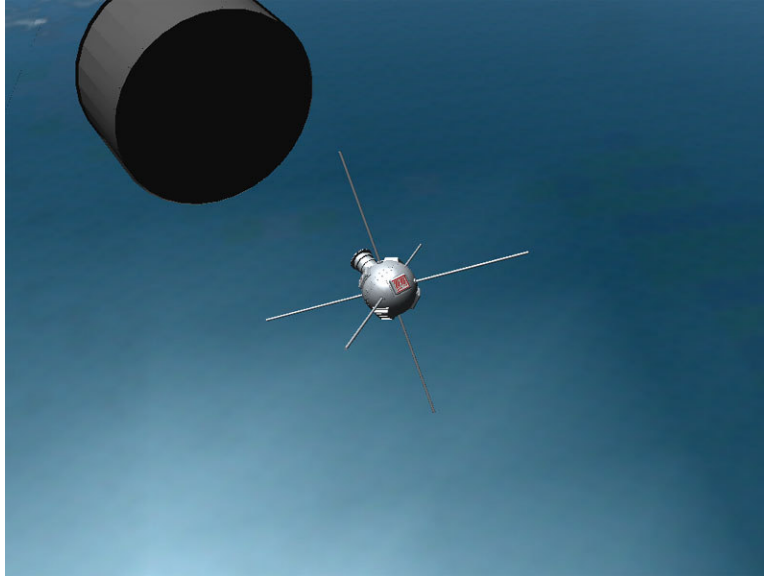


**Figure 7: Coasting Phase**



**Figure 8: Third Stage Ignition**





**Figure 9: Payload Jettison**

#### **9. BUG REPORTS**

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Just drop me an email at [webmaster@moonport.org](mailto: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**

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

\* Rodion Herrera for his work on the excellent Vanguard satellite mesh.

\* Vinka for the Multistage.DLL

Enjoy!

- Jim "BigJimW" Williams