

# Ranger 7 Addon for Orbiter

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

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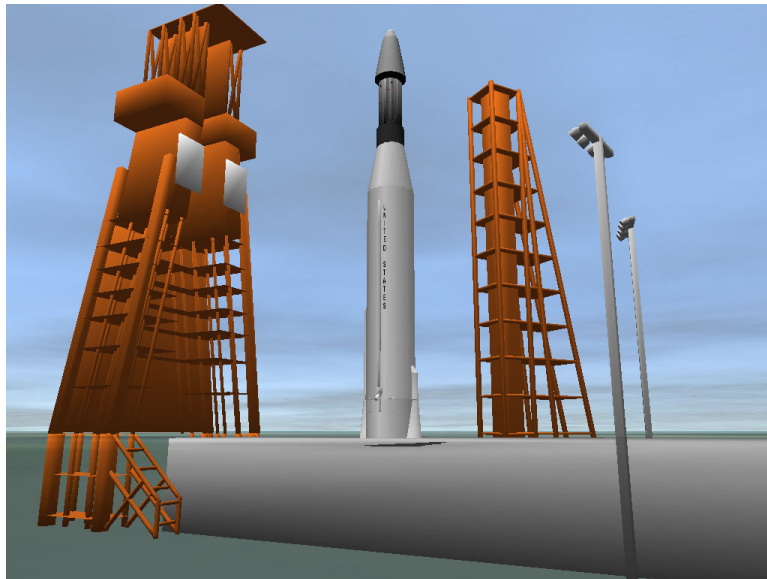
For ORBITER Space Flight Simulator 2004 Edition (c) 2004 Dr. Martin Schweiger

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## What is this?

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Ranger 7 was designed to achieve a lunar impact trajectory and to transmit high-



resolution photographs of the lunar surface during the final minutes of flight up to impact. The spacecraft carried six television vidicon cameras, 2 wide angle (channel F, cameras A and B) and 4 narrow angle (channel P) to accomplish these objectives. The cameras were arranged in two separate chains, or channels, each self-contained with separate power supplies, timers, and transmitters so as to afford the greatest reliability and probability of obtaining

high-quality video pictures. No other experiments were carried on the spacecraft.

The Orbiter version brings to you the historical flight of this unmanned impact probe. The flight plan brings you within 10,000 km of the Lunar surface. With one mid course correction, you can impact the moon.

## 2. WHATS REQUIRED?

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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 Conelys Earth\_1962 addon located at  
[http://prdownloads.sourceforge.net/mscorbaddon/earth\\_1962\\_26.zip?download](http://prdownloads.sourceforge.net/mscorbaddon/earth_1962_26.zip?download)

## 3. KNOWN BUGS

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- 1) Only one known at this time. In one step of the flight process, your vehicle may start to tumble unexpectedly. If this happens, you will be unable to recover and must start the scenario again. This may be due to a problem in Multistage.dll, but it is not known at this time. Fortunately this is a rare occurrence.
- 2) While not a “bug”, you may notice the time in the scenario is not the date or time of the real launch. I picked a date and time that gives you an optimum flight path to the moon based on the flight plan. If you don’t like looking at an incorrect date and time, simple press “I” to remove the information, and pretend. :D

## 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 Ranger7 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 Ranger7 scenario.

## 6. UNINSTALLING

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Simply delete the files installed.

## 7. DISCLAIMER

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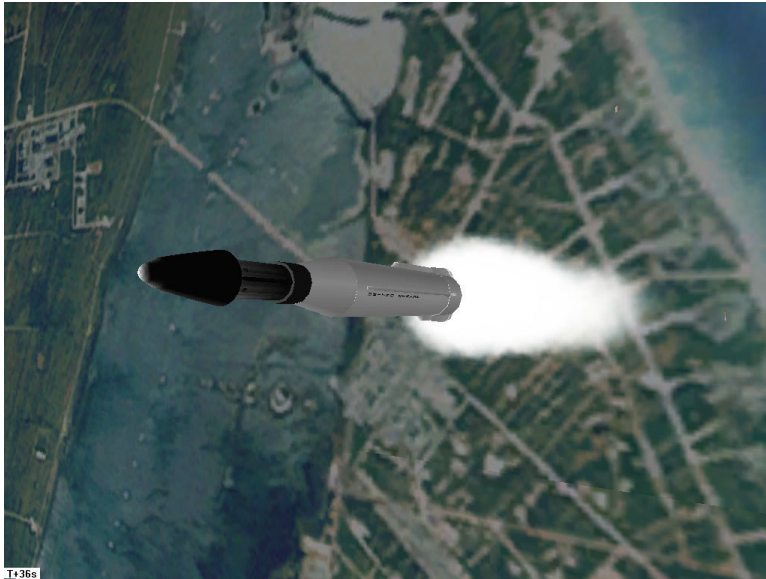
USE THIS AT ON AT YOUR OWN RISK. While the filenames contained within this archive are unique to the STANDARD ORBITER INSTALLATION, I cannot guarantee that it will not overwrite any other files using similar filenames from other third party ORBITER Add-ons.

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 Ranger 7

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Flying Ranger 7 is rather straightforward. When you start the



scenario, you have a launch window of 20 seconds to start the auto launch sequence. The reason you have a 20 second launch window is because while you're sitting there admiring the rocket on the pad, the Moon is in motion. Just like any other real life launch, you have a certain time to launch; otherwise you will need to wait for the next launch window to arrive. Since this version of Ranger 7 has a specific flight plan, you either need to wait 24 hours for the next window, or modify the flight plan to take advantage of another opportunity.

To start the auto-launch sequence, press “**P**”. Your main engines will ignite within 2 seconds and liftoff will occur. The auto launch sequence will place your Ranger probe and Agena booster in LEO (Low Earth Orbit). Once in LEO, you will need to shut down the auto launch sequence by pressing “**P**” again.



*If you do not do this step, Ranger will continue to pitch down and will not be in proper attitude when the TLI (Trans-Lunar Injection) burn takes place.*

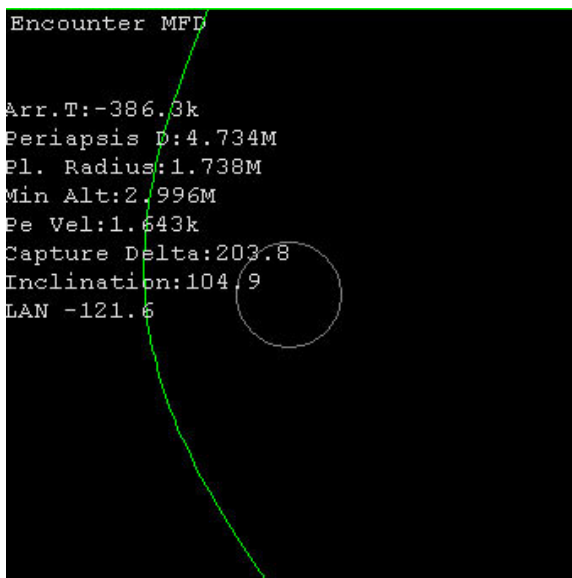
While in LEO, you can either manually fly Ranger PROGRADE, or, if you want to have Orbiter do this for you, press the “[“ key. You have to be PROGRADE at the time of the TLI burn

The Agena will restart to begin the 90 second TLI burn automatically after about 9 minutes of coasting in low Earth orbit. Once the TLI burn is finished, the Ranger 7 payload is jettisoned. Once Ranger 7 is jettisoned, you will need to press “J” to activate the probe. You will arrive at the moon within 4 days.

**NOTE:** *If you do not press “J” to activate Ranger7 after TLI, you will not be able to reorient the spacecraft or fire the main engine.*

**WARNING:** *Do not use time acceleration above 10x during any portion of the powered flight or coasting phase! Once you break free of Earth after TLI, you can accelerate the time.*

## 8a. Tips on Flying Ranger 7



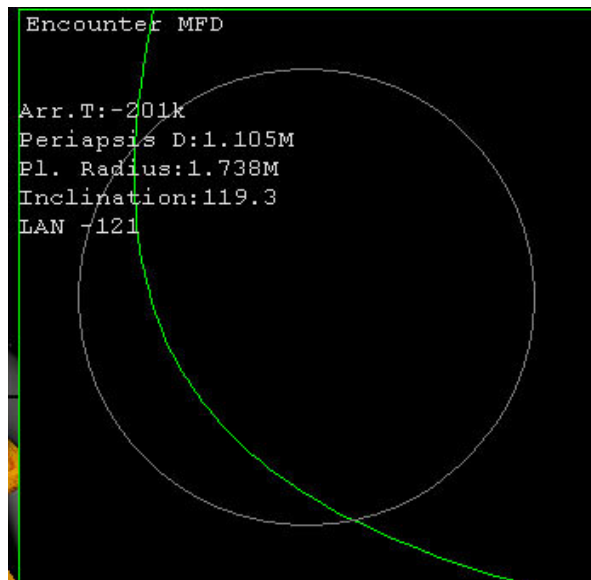
A) After TLI burn, you can use Transfer MFD or TransX (in encounter mode) to get an idea of how well the Atlas/Agena performed. Your results will vary each mission. The amount of the mid course correction burn you need to do is dependant on how well your launch vehicle performed at launch. If you see that you are within 8,000 km of the Moon, you can do a mid course correction burn later in the flight to bring Ranger within striking trajectory.

B) Your mid course correction burn will be dependant on your distance from the Moon after TLI. You can use Encounter MFD to see how well you did. See example on the left.

The **Min Alt** reading is important. This is the minimum altitude you will achieve if you do nothing for the rest of the flight. In the example, it is within 2,996 km of the lunar surface. Not bad at all!

Your goal in the mid course correction is to make that number drop. You will need to reorient Ranger 7 and perform the mid course correction burn. If you reoriented your spacecraft correctly, the MIN ALT number will start to decrease. If you see it INCREASE, then you're not in the correct attitude. Stop thrust and try another attitude.

***WARNING:*** Like the real Ranger, you have very limited fuel! Once you deplete your fuel, you will be unable to reorient the spacecraft again! Your mission is over.



If you are doing a successful mid course correction, the MIN ALT will start to drop and the circle in the middle will start to get larger. When Encounter MFD shows you something like the example on the right, KILL thrust. The green line is your trajectory, and the circle is the Moon. In the example on the left, you are on a direct flight path to impact the Moon!

- C) As mentioned, the best way to see how well you did is by pulling up the Encounter MFD or TransX (in Encounter mode). TransX is included in the latest version of Orbiter. You may download a copy of Encounter MFD from Duncan Sharpe's website <http://www.orbitermars.co.uk/>

*Refer to the documentation for TransX or Encounter MFD for information on the usage of these utilities.*



D) If on the rare chance you should find yourself overshooting the Moon after Agena burnout, you can turn the spacecraft RETROGRADE (press “J”) and burn for a few seconds to bring you closer. If you come up a little short, then fire the Rangers engine while flying PROGRADE.

## 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.
- \* Rob Conely for the original Ranger 7 addon
- \* Vinka for the Multistage.DLL

Enjoy!

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