

Munshot II Owner's Manual (page 1)

"Three-Dimensional Thinking": Directions in Space

Load the save file titled "2 - Kerbin Orbit" and try experimenting with the rotation controls: W/S for pitch, A/D for yaw, Q/E for roll. Pay close attention to what happens to both your ship and the navball (bottom center of screen) as you press each key.

In orbit, directions like "northwest" or "left" are not especially useful. Instead we use a set of six directions related to orbit:

prograde / retrograde radial in / radial out normal / anti-normal

Notice that the navball is half blue and half brown. The blue portion means your ship is generally pointing away from the planet (skywards); the brown portion means generally toward the planet (groundwards). In the exact center of the blue region is a dark blue circular symbol with a dot and four outward fins; this represents the radial out direction and means your ship is pointing directly away from the center of the planet. Likewise, in the center of the orange region is a dark blue circle with four inward fins; this is the radial in direction, meaning directly towards the planet's center.

You should also be able to find a yellow circle with a dot and three fins; this is called prograde and simply means your ship's current forward direction of travel. (Note that your ship could be *facing* in any direction; prograde means the direction of its *velocity*.) Exactly opposite to that is a yellow circle with an X and three fins, representing retrograde, which is opposite to direction of travel.

We live in a three-dimensional universe, so there is one more pair of directions: they are called normal and anti-normal because they are perpendicular ("normal") to the other directions. The upward-pointing pink triangle on the navball is normal and means that your ship is facing towards the northern hemisphere of the planet; the downward-pointing pink triangle with three fins is anti-normal and means that your ship is facing towards the southern hemisphere.

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"Forward Takes You Out": Maps in Space

Press M to see a map of local space. You should be able to see your home planet Kerbin, its moon Mun (you may need to zoom out), a gray capsule-shaped icon representing your ship's current location, and a blue curve representing your current orbital trajectory. This represents **the path you will take if you make no further maneuvers**. If you do make any maneuvers, your orbital trajectory will change.

Let's try this! Press M again to return to the main view. Rotate the ship so it is pointing in one of the directions listed above. (You can also click on any of the symbols to the left of the navball.) Turn on the engine (shift for a gradual increase, or Z for instant full throttle; the slider on the left side of the navball displays throttle level), and immediately switch back to map view. Watch your blue orbital trajectory closely: what happens to it as your engine burns? When you have a good idea what's happening, switch back to the main view and turn off the engine (control for a gradual decrease, or X to cut off throttle immediately).

Load the saved game again (alt F9), and repeat for each of the six directions. Keep experimenting; learn how to manipulate your orbit! If you ever run out of fuel or end up on an unrecoverable impact trajectory, you can always go back to the saved game. Once you get the hang of it, see if you can put your ship on a transfer orbit to the moon!

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"Halfway to Anywhere": Launching into Orbit

Now that you have a basic understanding of the ship's control system, it's time for you to try starting from scratch. Load the save file titled "1 - Kerbin Launch." This is the same ship you have been trying out in space, plus two stages of heavy booster rockets that should be sufficient to launch it into orbit. Refer to the attached "Munshot II Stage Schematics" diagrams to see what each stage does. Pressing the spacebar will launch the vessel; pressing spacebar again will activate the next stage. Usually this means jettisoning the previous stage's parts and igniting the engine for the next stage. Do not do this if the previous stage's engine is still burning!!! If you are worried about pressing spacebar by accident, you can press alt L to activate "stage lock," which will ignore spacebar until you deactivate the lock (by pressing alt L again).

Reaching orbit requires getting enough altitude (to be above all obstacles, such as mountains and atmosphere) and enough forward speed (so as not to fall back into the atmosphere). Kerbin's atmosphere is 70 km thick, so to be on the safe side you should try to get your ship up to 75 or 80 km. Refer to your previous calculations to find how fast your ship needs to go in order to reach a stable circular orbit at that altitude. Your speed is shown just above the navball.

The "simple" way to get to orbit would be to go straight up until you are above the atmosphere, then rotate 90° and accelerate to orbital speed. However, there is a much more efficient trajectory. Experiment with different ways to turn during the launch and try to get to orbit with the available fuel in the three big tanks.

"Per Aspera Ad Astra": Putting it All Together

The Munshot II is capable of getting from the launchpad to the moon and back safely. Load save file #1 again and see how far you can go!

Keyboard Commands Reference Sheet

Camera and Interface:

- right-click & drag, or arrow keys : move view around
- scroll wheel, or + / - (on number pad) : zoom in/out
- M : show/hide orbital map view
- double-click on a body (map view) : center map on that body
- backspace (map view) : center map on your ship
- . (on number pad) : show/hide navball
- F5 : quicksave
- F9 : quickload
- alt F5 : save game (with title)
- alt F9 : load game (from title)
- escape : pause and menu

Rotation:

- W / S : pitch up/down
- A / D : yaw left/right
- Q / E : roll counter/clockwise
- T : activate/deactivate stability assist

Engine:

- left shift : increase throttle
- left control : decrease throttle
- Z : set throttle to FULL
- X : set throttle to ZERO

Utilities:

- G : extend/retract landing gear
- U : turn landing lights on/off
- right-click on any part : view a pop-up menu for that part

Staging:

- spacebar : activate next stage
- alt L : turn "stage lock" on or off (to prevent accidents)

Time:

- > / < : increase/decrease the rate at which time passes
- alt > / alt < : slightly change time rate while engine is on
- (From map view, click on your own trajectory and select "warp to here" to rapidly advance time to that point.)