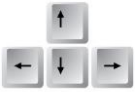


Space Engine controls:



The arrows move your spaceship forward, backward, left and right. The left-right arrows do not turn you to the left or right, but shift you laterally left and right. Like side-stepping. You can also use **w-a-s-d** keys in the same way as the arrow keys.

Left click and drag anywhere on the screen rotates your view around (you turn).

r and f move you up and down

q and e rotate you clockwise and counterclockwise

+ and - keys will increase or decrease your velocity. (you still have to push the up/down or w/s keys to actually move though). You do **not** need to press SHIFT at the same time on our computers when you press the +/- keys.

Left click on an object to select it and find information.

Right click on an object to follow it (checkbox)

Right click and drag on a followed object to rotate around it.

C centers a selected object on the screen – even if it is out of view

g takes you to the selected object on autopilot.

SHIFT-G go to an object's surface or land on a planet/moon

CTRL-g go to an object's center

I and k speeds up or slows down time. **j** reverses time.

**** sets time to 1X

CTRL- resets back to current time

spacebar freezes time, which will stop all things moving, including you if you are traveling through space. You won't be able to go anywhere unless you resume time by pressing the spacebar again

SHIFT-H cycles between Earth, Sun, and Milky Way. You then need to press **G** to go to one of those three locations. This is a quick way to get home when you get lost.

PgUp and PgDn changes your field of view – effectively zooming in and out without causing you to move in space. In other words, you can float in one spot and zoom in to see something. *On our computers, you need to press the Fn key first to get these buttons to work.* This simulates a real telescope with a changing focal length, which means if you zoom in/out way too much you might see fisheye-lens-type distortion on the image. **Home** resets the zoom (*on our computers you need to press Fn-Home*)

F11 – take a screenshot without all the controls present. By default it is saved to C:\SpaceEngine\Screenshots

CTRL-F4 – graphics settings. To see smaller bright stellar objects better (such as pulsars, white dwarfs, etc), I often have students turn off the **diffraction spikes**, and turn down the **bloom**. This is also where you would make adjustments to the overall quality of the graphics if you have a faster computer (increase **LOD** = Level of Detail).

Bottom menu bar:

Move the cursor down to the bottom left and a menu will pop up. The numbers shown (circled below) indicate your current velocity (the top number) and the velocity you will travel when you press the arrow keys (the bottom number)

Clicking the up/down arrows on this strip will increase/decrease your velocity by factors of 10. In the example below, if we pressed the “up” arrow on the keyboard we will move forward at 5186 km/sec. If we want to move faster than that, we need to click the up arrow circled below. Each time you click the up/down arrows, you increase/reduce your speed by 10X. Notice that the units will change as you cycle through them!


Km → c (speed of light) → AU (astronomical unit) → ly (light year) → kly (1000 light years) → Mly (1,000,000 light years)





To make everything brighter, increase the **exposure**. To see more stars and dim objects, increase the **magnitude limit**. Do this by moving to the bottom right corner of the screen and look for these symbols to pop up. →


Most useful tools from **Left Toolbar**:



Use the **magnifying glass**  to search for objects if you know their names. Hint: To find M-objects, use a space between M and the number in the search function. Example: M 101 will find the pinwheel galaxy. M101 will not find anything.


Use the **star browser**  to search for stellar objects of all types that are in your current neighborhood. You can use the “filter settings” to find a particular type of stellar object (such as a black hole). Of the stars that are returned in the search results, any starting with **RS** are randomly generated and are not ‘real’ objects in the known universe.


The **planetary system** tool  will show all of the planets for the current star across the top of the screen. It makes it easy to see the available planets. Click on one, hit **g**, and you will go there.


The **system chart** tool  will drag all of the bodies of a solar system next to each other, and arrange them in order of size. It is a good way to demonstrate the varying scale of objects in the solar system.




Most useful tools from **right toolbar**:



The **orbits** tool  will project the orbital paths as green lines. This can be useful to show the shapes of orbits. For example, you can show the highly eccentric orbit of Pluto vs the nearly circular orbits of the inner planets.

The **markers** tool  is a three-way toggle: simple, detail, and off. Markers will point out nearby objects.

The **labels** tool  will place a label next to most objects on the screen.

Use the **show objects** tool  on the **right toolbar** in conjunction with the orbits, markers, and labels tools. This is where you control what is shown. Usually the problem is that *too much stuff* is being shown at once, which makes things confusing. For example, if you turn on the **orbits** , then use **show objects**  to turn on/off the orbit paths of different objects (planets vs dwarf planets vs comets etc).