Controlling Azimuth Drives V1.2

Azimuth drives are those drives whose propeller shafts can be rotated to point in any horizontal direction in order to push the ship in that direction—the direction of thrust.

They go by various names, such as Azipod, Schottel, Z-Drive, etc. This category **does not** include Voith-Schneider propellers (VSP), such as those on Red Eagle.

Current SS ships with azimuth drives include: Ocean Star, Bugsier 2, and Jumbo Javelin.

There are two separate issues:

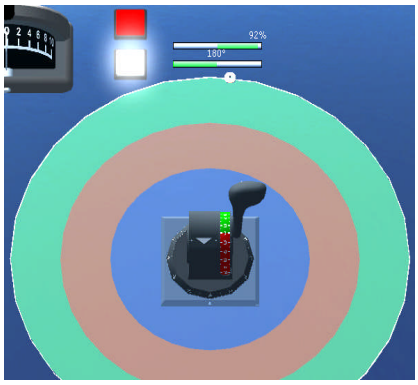
1. Controlling the drive by means of the joystick object adopted by VSTEP. This is done in the same way for all ships.
2. The effect on a particular ship by the drive. This is different for each of the ships.

Manipulating the Joystick with the Mouse

We will use Ocean Star as an example, and discuss differences later.

The joystick object provided by VSTEP was designed to be easily manipulated by the mouse. You might also assign keys or external controllers to manipulate the joystick, but that will not be discussed here.

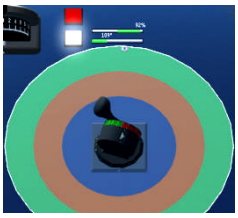
The joysticks commonly used on ships differ from gaming "flight sticks" in one important aspect: While the thrust is controlled by pushing the stick forward, or pulling it back for reverse thrust, the entire joystick platform can be rotated to point the stick in the direction of thrust.



Moving the mouse near a joystick will bring up three colored control rings:

1. The inner blue ring rotates the stick to control the **direction** of thrust.
2. The center red ring moves the stick into the red area to control the amount of **reverse** thrust.
3. The outer green ring moves the stick into the green area to control the amount of **forward** thrust.

The white triangle points to the position of the propeller.
On Ocean Star, the propeller acts like the propeller on a conventional ship—when going forward, it pushes the ship in the opposite direction to where the triangle is pointing. In this picture, the ship is driven forward at 92% thrust.



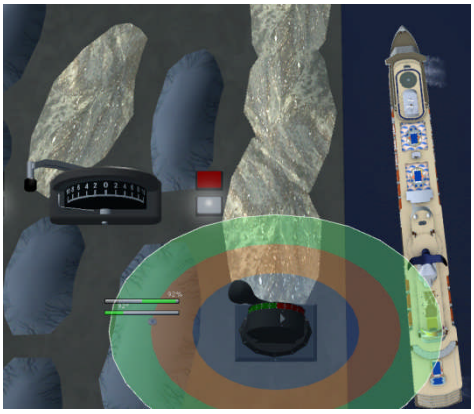
To set the direction of thrust, click in the blue circle where you want the white triangle to point.
In this picture, the screw is at an azimuth of 109 degrees and pushing the stern in the opposite direction—to port. Therefore, Ocean Star is turning to starboard.
To steer OS for small course corrections, you need only change one of the drives—preferably the one on the side to which you are turning, but either will do.

To return the azimuth to **dead ahead**, click on that small white dot on the bottom edge of the joystick base. You can also do that by tapping the Left or Right arrow key **if precision steering is disabled.**

To control the amount of thrust, click in the green circle for forward thrust, or in the red circle for reverse thrust. Only the radius—distance from the border between red and green—matters. You can click at any angle.
The border between red & green is zero thrust. You can also set the thrust to zero quickly by tapping the Up arrow key **if precision steering is disabled.** This will also set the azimuth to dead ahead.
Maximum forward thrust is at the outer edge of the green circle.
Maximum reverse thrust is at the inner edge of the red circle.

You can control azimuth & thrust of both drives together in small increments with the arrow keys **if precision steering is disabled:**
To change the azimuth, hold the **Right Shift Key** down while you tap the Left or Right arrow key to rotate the joystick platform. Release the shift key last.
To return to dead ahead, Release the shift key and tap either the left or right arrow key.
To change the thrust, hold the **Right Shift Key** down while you tap the Up or Down arrow key to move the joystick. Release the shift key last.

Example—Docking Ocean Star portside to:
Set the starboard drive azimuth to 90 degrees so that you can use it as a stern thruster in combination with the bow thruster.
Leave the port drive at 180 degrees to control the forward motion.



One common objection that I hear to using the mouse is that one can't control both drives at the same time. One seldom needs to. With a little practice, the lag will be less than a second in cases where it is necessary. Learn to use the mouse in combination with the arrow keys for precise control.

The reason for disabling the so-called "precision steering" is to allow throttles and steering to be rapidly returned to stop and amidships, respectively, with a single key tap. Something you will appreciate when riding the jetski.
Holding the right shift-key down gives you the same incremental control that you get with precision steering enabled, with fewer headaches. This is also an advantage when steering the hovercraft with the bow ducts.

Bugsier 2

The two Rolls Royce Aquamaster drives are controlled in the same way as for the drives on OS, except that there is no red circle. The rotation of the screw is never reversed; reversing the direction of thrust is done by changing the azimuth by 180 degrees.

There is an important difference in their effect on the ship: The two drives are forward of the center of rotation—making B2, technically, a tractor tug.
Because of that placement, the ship will turn in the direction of thrust. When the white triangle is to port, the thrust and the turn is to starboard.

With precision steering disabled the arrow keys act on both drives together as follows:
You can hold the **Right Shift** key down and tap the Left & Right arrow keys to change the azimuth in increments of about 7 or more degrees. However, the first time you do it, you may get an initial large change. Be prepared for it.
When going ahead, pressing the **left** arrow rotates the drive counterclockwise. This moves the white triangle to the right, but the thrust and the turn will be to **port.**
Pressing the **Right** arrow rotates the drive clockwise. This moves the white triangle to the left, but the thrust and the turn will be to **starboard.**

There is one minor problem: If you start from dead ahead—180 degrees az, (but 0 degrees on the HUD)—and take, say, three taps to the left and three taps to the right, you may be a degree or more off of dead ahead. This is because the az keeps changing rapidly while the key is down; unless you are incredibly consistent with the length of your taps, the increment you get can vary by a degree or more.
To return to dead ahead, Release the shift key and tap either the left or right arrow key.
You could also tap the Up arrow key; but this will also set the thrust to zero.

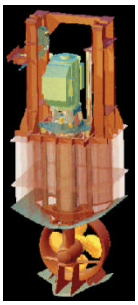
To set the thrust ahead with the Up arrow, hold the right shift key down while you tap it.
For full ahead, press and hold the up arrow, then press and hold the right shift key, then release the up arrow, and then release the shift key. It takes less time to do it than to explain it—especially if you are a pianist and can do it all with one hand.

You can **reduce thrust** while going ahead by holding the right shift key and tapping the down arrow.
In fact, you will find that you can tap your way into the red (reverse screw direction) area of the throttle.
“Who needs the %$#@ red circle?” you say. Sorry; even though the HUD says the screw is doing 250 RPM in reverse, after an agonizingly long wait for the speed to drop to zero, you discover that you have no reverse thrust.
If you need to stop in a hurry, press and hold the down arrow key. This goes full green on the throttle and sets the thrust to dead astern (0 degrees az, 180 degrees on the HUD).

As with Ocean Star, you can make course changes using only one of the drives if you want precise control using the mouse.

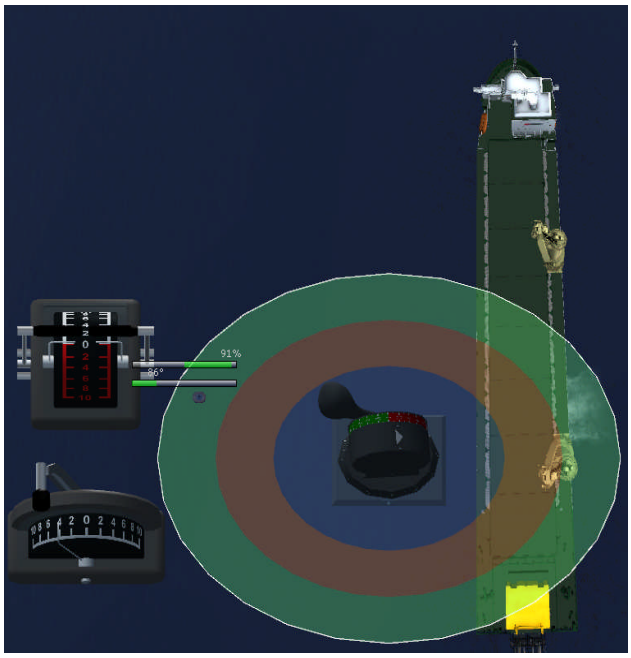
To rotate the ship to **port** while remaining in the same spot, press and hold both the **1** and **9** keys on the **numeric** pad.
To rotate the ship to **starboard** while remaining in the same spot, press and hold both the **3** and **7** keys on the **numeric** pad.

Jumbo Javelin



The azimuth thruster on Javelin differs from those on OS and B2 in that it is a relatively low-power (1700 KW) thruster that is used only for low-speed maneuvering or dynamic positioning.
It is not used for underway propulsion. While underway, it is retracted into the hull to reduce drag and risk of damage.

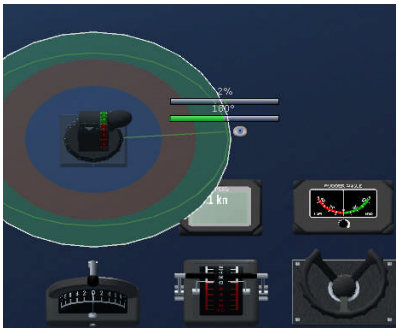
This picture is of a similar drive from a different manufacturer; Javelin has a Wartsila FS225-240/MNR.



In this picture, Javelin is driven crabwise to port by the azimuth thruster and the bow thruster. The wake on the starboard side just forward of the after crane shows the position of the azimuth thruster.
You can see from the position of the white triangle that the thrust is in the opposite direction to the facing of the screw.

Because the drive is positioned close to the center of rotation of the ship, it produces more translation—sideways movement—and less turning moment than it would if it were positioned at the stern. Consequently, less bow thruster is needed to balance the turning moment.

Because Javelin has conventional screws and rudders, the arrow keys are not available to use with the azimuth thruster. No provision has been made for assigning keys.



CAUTION: If you are using the reduced size joystick from the Javelin Super Pak, you need to take care where you click in the Red & green thrust circles. The actual control area is not the same as the visible circles. It is elliptical in shape, like the thin green line which passes through the mouse position.
You should click along a vertical line passing through the center in order for max thrust to be at the edge of the visible circle.
If you click along a horizontal line, you must move the mouse beyond the outer edge of the green area to get max thrust.