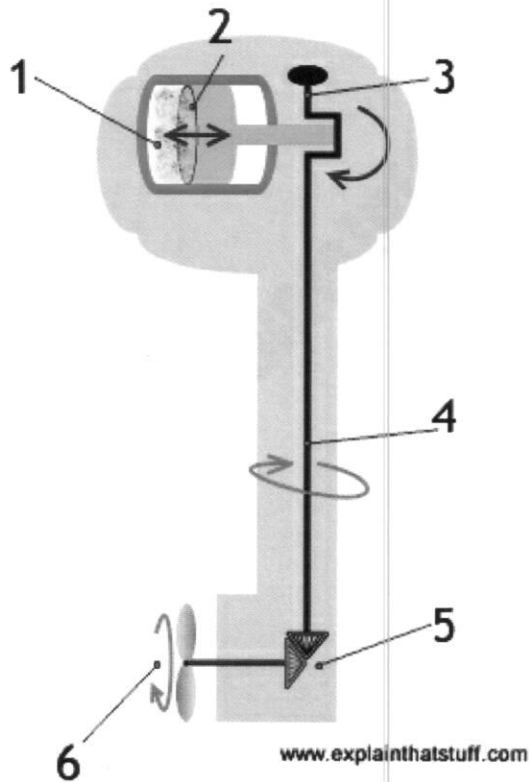


How does an outboard motor work?

In theory



Open up an outboard and this—**hugely simplified**—is what you'll find inside:

1. Fuel burns in the cylinder (or cylinders) to make power. There's a fuel tank (not shown) inside the case of the motor at the top, big enough to hold perhaps 23 liters (6 gallons) of gas. The heavier your boat, the faster you drive it, the choppy the water, the more heavily loaded, or the lower in the water it sits, the more fuel you'll burn.
2. Powered by the burning and expanding fuel gases, a piston moves back and forth in the cylinder. This is just like the piston in a car-engine cylinder and often works through the same four-step process (four-stroke cycle), although some outboards do use a simpler two-stroke cycle.
3. The piston rod turns the crankshaft, converting the back-and-forth (reciprocating) motion of the piston into round-and-round (rotary) motion.

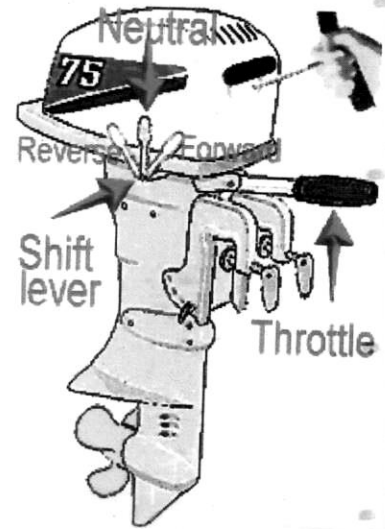
4. The crankshaft turns the main driveshaft running down the long spine of the motor.
5. A small gearbox at the bottom of the driveshaft converts vertical spinning motion into horizontal spinning motion.
6. The propeller powered by horizontally spinning gears powers the boat through the water.

In practice

The very simplified illustration up above is designed to show you the basic operating principle of an outboard motor; real motors are somewhat more complex than this! Here's a very clear cutaway illustration prepared by Suzuki Motor Corporation for a patent application they were granted in 1999 for a new design (US Patent #5,980,341: Outboard Motor). I've colored it and greatly simplified the numbering so you can make sense of it more easily; if you want to know all the details, check out the patent, where you'll find more drawings of the same engine. Here a few of the parts that are worth noting:

Learn How to Start Manual or Pull Start Outboards

1. Make sure the shift lever is in the neutral position. This is usually straight up.
2. If the engine is cold, pull out the choke before attempting to start. If the motor is warm, don't use the choke unless the engine does not start after a few pulls.
3. On the throttle control arm, turn the hand grip until the arrow aligns with the start position.
4. Pull the starter rope slowly until you get resistance from the starter gear, then pull forcefully. Repeat if needed.
5. When the engine starts, if you used the choke push it in slowly until the engine runs smoothly.
6. Turn the throttle control arm until the arrow lines up with the run or shift mark.



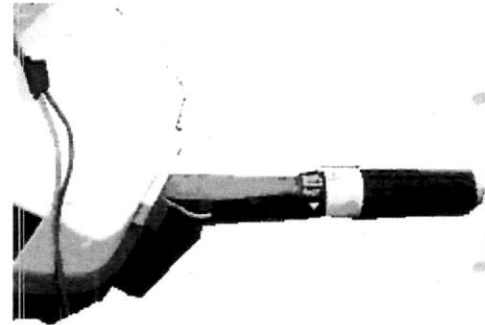
Warning: Do not stand in the boat to pull the starter rope. If the motor is in gear or the starter just spins, you could lose balance and fall overboard.



Learn How to Shift and Steer

Manual or Pull-Start

1. The throttle arm also acts as a tiller to turn the engine which gives you direction.
2. Look out for traffic and find out the direction you want to go. Move the throttle arm/tiller in the opposite direction. This pushes the stern of the boat in the direction of the tiller which in turn makes the bow go in the opposite direction.
3. Turn the throttle arm until the arrow lines up with the run/shift position.
4. Move the shift lever to forward (or reverse) and turn the throttle handle slowly until a comfortable speed is reached.



Warning: Go slowly in reverse to prevent water from spilling in over the transom.

Learn How to Stop

Boats don't have brakes. They do, however, settle quickly and slow down when power is lowered and the engine put in neutral.

Don't aim the boat at a person in the water or at a dock. If you misjudge the speed of the boat you could cause more damage.

As the boat slows you will lose steering control. Aim the boat where you want to stop before you shift to neutral or shut off the engine. Shift to neutral before you think you should, most novices overshoot their mark. You can always shift back to forward briefly if you fall short of your mark.

Killing manual or pull-start engines

Shift to neutral, turn the throttle handle grip to the stop position and push the button (usually red) labeled stop which kills the engine.