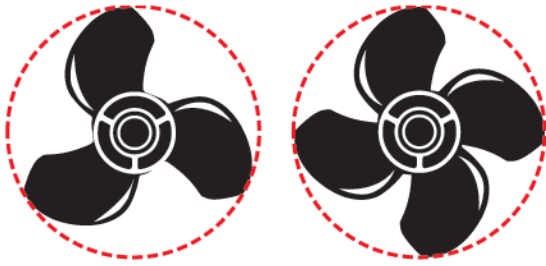
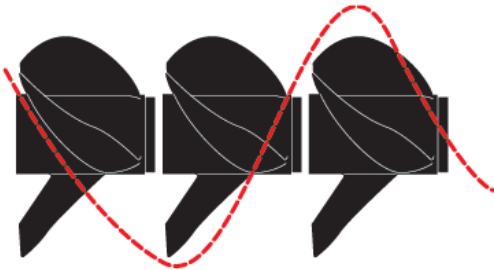


PROPELLER BASICS



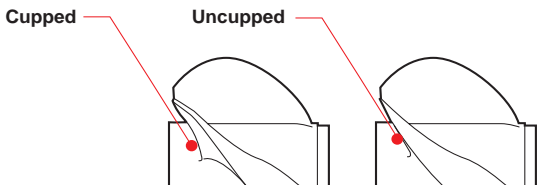
Diameter

Diameter is two times the distance from the center of the hub to the tip of the blade. It also can be looked at as the distance across the circle that the propeller would make when rotating. It is the first number listed when describing a propeller.



Pitch

Pitch is defined as the theoretical forward movement of a propeller during one revolution - assuming there is no “slippage” between the propeller blade and the water. For most boats, there is slippage and therefore the distance advanced is less than the design pitch. The amount of slippage varies from boat to boat. Pitch is the second number listed in the propeller description.



Cupping

Many of today’s propellers incorporate a cup at the trailing edge of the propeller blade. This curved lip on the propeller allows it to get a better bite on the water. This results in reduced ventilation, slippage, and allows for better hole shot in many cases. A cupped propeller also works very well where the motor can be trimmed so that the propeller is near the surface of the water. The cup will typically result in higher top end speed on one of these applications.



Rake

Rake is the degree that the blades slant forward or backwards in relation to the hub. Rake can affect the flow of water through the propeller, and has implications with respect to boat performance.

Aft Rake helps to trim the bow of the boat upwards, which often results in less wetted surface area and therefore higher top end speed. Aft Rake propellers also typically provide better “bite” on ventilating-type applications.

Forward, or Negative Rake, helps hold the bow of the boat down. This is more common in workboat type applications.

Ventilation

Ventilation is a situation where surface air or exhaust gases are drawn into the propeller blades. When this situation occurs, boat speed is lost and engine RPM climbs rapidly. This can result from excessively tight cornering, a motor that is mounted very high on the transom, or by over-trimming the engine.

Cavitation

Cavitation, which is often confused with ventilation, is a phenomena of water vaporizing or “boiling” due to the extreme reduction of pressure on the back of the propeller blade. Many propellers partially cavitate during normal operation, but excessive cavitation can result in physical damage to the propeller’s blade surface due to the collapse of microscopic bubbles on the blade.

There may be numerous causes of cavitation such as incorrect matching of propeller style to application, incorrect pitch, physical damage to the blade edges, etc.

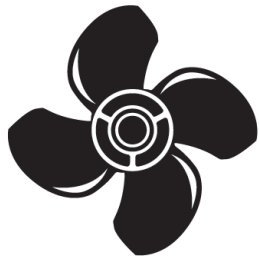
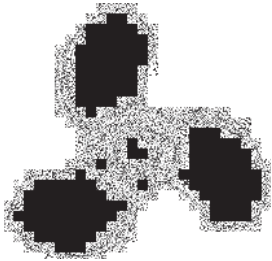
Be advised disturbances in the water flow forward of the propeller can result in blade damage, which appears to be blade cavitation, but is actually due to non-favorable water flow into the propeller.

PROPELLER BASICS

Finding the right match between the propeller, engine type and boat size will optimize the following performance factors:

- Increased Top End Speed
- Faster Planing Speed (Hole Shot)
- Improved Low End Punch
- Load Carrying Capability

If you want to modify your boat's performance, consider the following before making your selection:



3-Blade Propeller vs. 4-Blade Propeller

We recommend 3-Blade propellers for recreational boats with 3, 4, and 6 cylinder outboards and I/O engines. These propellers provide good hole shot and top-speed performance.

We recommend 4-Blade propellers for practical, all-around boat performance. These propellers enhance handling, hole shot, load-carrying performance, and fuel efficiency.



Aluminum vs. Stainless Steel

Most pleasure boats are factory equipped with aluminum propellers. Aluminum propellers are relatively inexpensive, easy to repair, and under normal conditions can last for many years.

Stainless steel is more expensive, but much stronger and durable than aluminum. If you are looking for better performance than can be provided by your aluminum propeller, such as ultimate top speed or better acceleration, a stainless steel propeller may be required.



Advantage of a Left Hand Propeller

Two propellers spinning in the same direction on twin engine boats will create steering torque. In other words, two right-hand propellers pull the stern hard to the right and the bow to the left.

Two opposite-direction (counter-rotating) propellers on twin engines eliminate this steering torque because the left-hand propeller balances out the right-hand propeller. This results in better straight-line tracking and helm control at high speed.



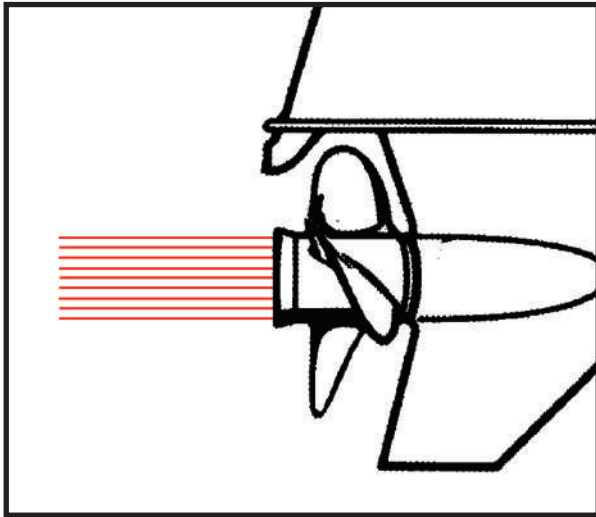
Affect of Slip on Performance

Slip is the difference between actual and theoretical travel of the propeller blades through water. A properly matched propeller will actually move forward about 80 to 90 percent of the theoretical pitch.

Theoretical 
Actual 

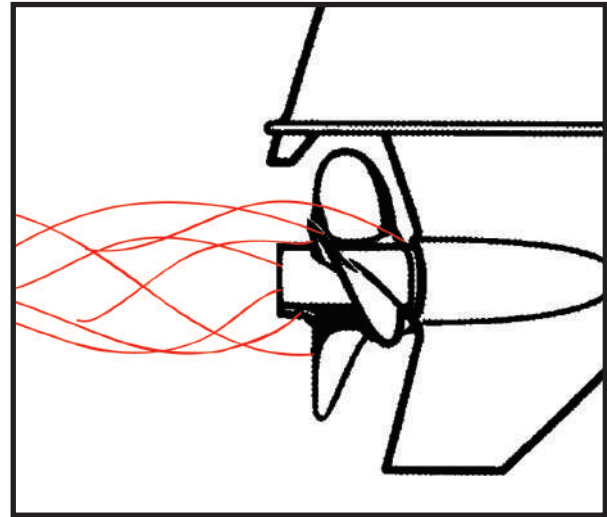
PROPELLER BASICS

What is the difference between thru-hub exhaust, over-hub exhaust, and non thru-hub exhaust?



THRU-HUB EXHAUST

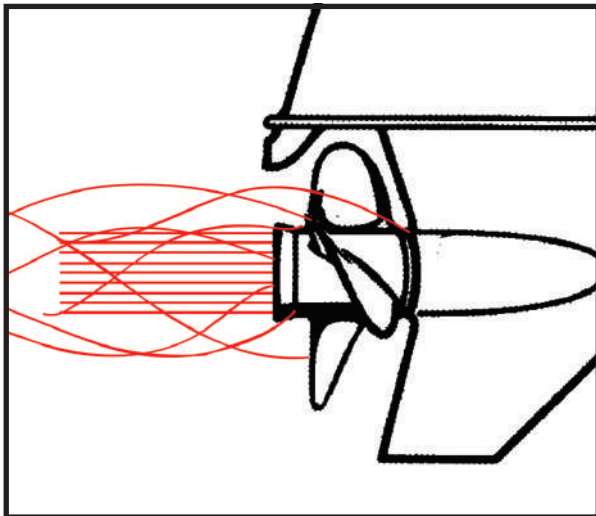
Thru-hub exhaust propellers consist of a round barrel to which the blades are attached. The exhaust passes through the barrel and out the back, without making contact with the propeller blades. This provides a good, clean water flow to the blades, usually resulting in good acceleration and hole shot.



OVER-HUB EXHAUST

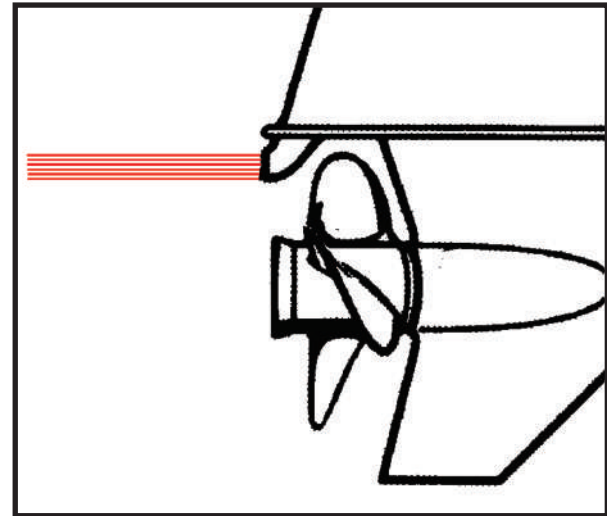
Over-hub exhaust propellers have the blades attached directly to the smaller tube that fits over the propeller shaft, eliminating the larger exhaust tube. These types of propellers are often used for attaining maximum top speeds. (On some boats, the hole shot can often suffer due to the extreme exhaust flooding that occurs around the propeller blades during acceleration.)

THRU-HUB EXHAUST and **OVER-HUB EXHAUST** propellers are used on boats where the exhaust passes out through the rear of the “torpedo” on the lower unit, around the propeller shaft. Most outboards utilize this type of exhaust.



OVER/THRU-HUB EXHAUST

Over/Thru-hub exhaust propellers are a combination of thru-hub and over-hub exhaust propellers. This allows some exhaust to escape at lower RPM, providing a controlled amount of exhaust flooding. These types of propellers will allow the propeller to be slightly easier to turn during initial acceleration, allowing for better hole shot on some engine/boat combinations.



NON THRU-HUB EXHAUST

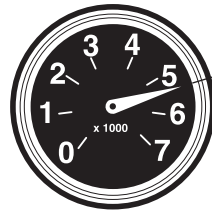
Non thru-hub exhaust propellers are used for inboards using shaft driven propellers, sterndrives using through hull exhaust, and on some outboards that don't route the exhaust through the lower unit torpedo.

CHOOSING THE CORRECT PITCH

For safety and efficient performance, it is critical that your engine operates within the RPM range recommended by the manufacturer. Matching the right prop for the load is the most significant factor when choosing a new propeller.

1) Determine Manufacturer's Recommended RPM

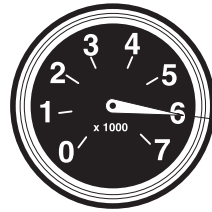
Find the manufacturer's recommended RPM range in the owner's manual or ask your dealer. A reference chart showing common engine applications is shown on Pages A6-A7 of this catalog.



Manufacturer's Recommended WOT RPM's

2) Test for Maximum RPM

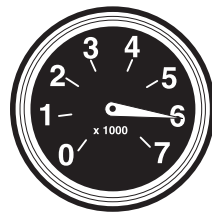
Using the existing propeller or a new propeller, make test runs to determine the maximum RPM and boat speed. Vary the trim angle for optimum performance.



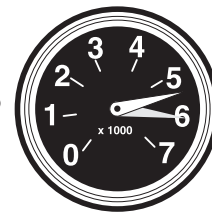
Test Run WOT RPM

3a) If RPM are Higher Than Recommended

If the actual WOT RPM are *above* the recommended RPM range, install the next larger pitch propeller to *decrease* your WOT RPM. Re-test the WOT RPM.



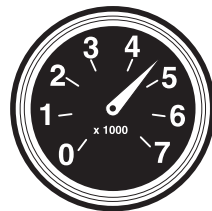
Increase in Prop Pitch Equals...



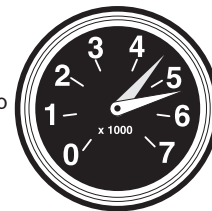
Decrease in WOT RPM's

3b) If RPM are Lower Than Recommended

If the actual WOT RPM range is *below* the recommended range, install the next smaller pitch propeller to *increase* your WOT RPM. Re-test the WOT RPM.



Decrease in Prop Pitch Equals...



Increase in WOT RPM's

When you combine all these factors, you have the information you need to select the correct propeller for maximum performance, safety, and fuel efficiency.

Effect of Propeller Pitch on RPM

A pitch change can increase or decrease the RPM and bring RPM into the recommended range. A 2" increase in pitch (for example, from 21" to 23") typically results in a decrease of approximately 300-400 RPM.

