YAMAHA MARINE POWER
**PRODUCT INFORMATION GUIDE**
Effective February 1, 2010

# YAMAHA
# PROPELLERS


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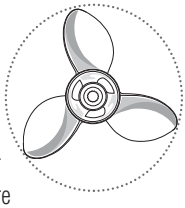
Reviewed and/or revised 10/1/10

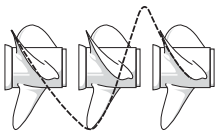
## YAMAHA PROPELLER TERMINOLOGY

### DIAMETER



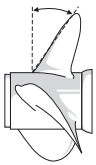
Diameter means the total width of the "circle" at the blade tips as the propeller spins. A larger diameter pushes more water and reaches deeper into the water, so they're typically used on large, heavy boats or ones with high engine-mounting heights. A smaller diameter is usually used on lighter-weight boats, where the prop operates lower in the water or when a gain in engine RPM is desired. Proper diameter for each prop model is determined by the propeller's design and intended application.

### PITCH



Pitch is the distance (in inches) a particular prop would theoretically travel in one full revolution, as if traveling through a solid.
A lower pitch will have greater acceleration and "pushing power" but a lower top speed, while a higher pitch prop will provide less acceleration, but a greater potential for higher top speeds. The correct propeller will allow your engine to reach the upper portion of the WOT range specified by the manufacturer with a normal-to-heavy load (without exceeding it). Each inch of pitch is equal to approximately 200 RPM.

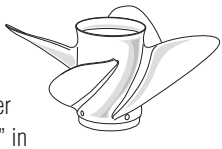
### RAKE



Rake is the angle of the blades in relation to the propeller's barrel, or center, and is expressed in degrees. A high-rake propeller is best-suited for high engine-mount applications by helping reduce ventilation and increasing bow lift.
Too much rake, however, strains the engine, decreases hole shot and can produce negative performance and handling results.

## YAMAHA PROPELLER TERMINOLOGY (CONTINUED)

### SIZE

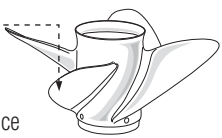


Propeller size is characteristically expressed in two numbers: diameter and pitch (expressed in inches). The diameter is the first number. The second number is the pitch. So a 14" x 17" prop would measure 14" in diameter with 17" of pitch. This same propeller may be expressed as 14" x 17"x 3, which would indicate a three-blade design.

### CUP

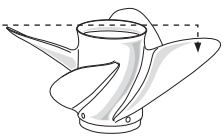
Cup is the small curved lip on the blade tip and/or trailing edge. Used in proper amounts, cup helps reduce ventilation and propeller slippage, allowing for higher mounting heights and greater bow lift. Too much cup, however, will cause excessive steering torque and bow lift and limit the engine's ability to develop and maintain proper RPM at a certain pitch.

### BLADE GEOMETRY



Blade geometry refers to the actual shape of the blade (or "ear"). By manipulating the blade's shape, diameter and pitch progression, different performance characteristics are created for each different type and style of propeller.

### BLADE SURFACE AREA

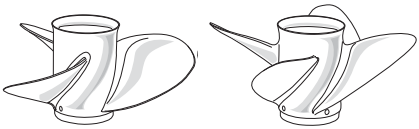


Blade surface area refers to the total surface of the blades. The more blade surface area a prop has the more water it pushes, for better hole shot and increased planing efficiency. Too much can create significantly more drag, however, potentially restricting engine RPM and causing negative boat-handling issues.

## YAMAHA PROPELLER TERMINOLOGY (CONTINUED)

### NUMBER OF BLADES

Three-bladed propellers are the most common, offering good overall performance and efficiency for most applications. Four blades characteristically provide increased acceleration and bow-lifting characteristics with better performance in rough water conditions. However, they typically mean more drag on the engine, resulting in lower top speeds and different handling characteristics.



**Three-blade** **Four-blade**

### CAVITATION

Cavitation occurs when pressure on the water across the blade's surface is reduced to the point of becoming water vapor, forming bubbles. If these bubbles burst, they can cause a "cavitation burn" which can deteriorate the propeller's surface and cause negative performance issues. As this condition can cause an increase in engine RPM, it's often confused with ventilation.

### VENTILATION

Ventilation is when air is drawn in around the propeller blades. Normally, this causes a gain in RPM, but a loss of speed, since the propeller blades are not biting "clean" water. Controlled ventilation can be beneficial, though, in helping the engine gain RPM during hard acceleration.

## YAMAHA PROPELLER TERMINOLOGY

### SLIP

Slip is the amount of "wasted" energy a particular prop generates, meaning that the actual distance traveled in one full propeller revolution is less than its pitch measurement. It is normally expressed as a "percentage of inefficiency". A certain amount of slip is engineered into each line of propellers to create different performance characteristics.

### HOLE SHOT

"Hole shot" refers to rapid acceleration of the boat, from a standing rest or very slow speed until just on-plane. This is when the engine and the propeller work their hardest.

### GEAR RATIO

Gear ratio on a marine engine refers to the gears used in the lower unit, much like an automobile's transmission. The higher the ratio, the more pushing power the engine will produce. The lower the ratio, the more top speed the engine can generate. It's important to choose a propeller that allows the engine to operate within the manufacturer's recommended wide-open throttle (WOT) RPM under normal loads and conditions.