



Razor X Mini Propeller (with Circle S Mini-Hub)

Installation and Operation Instructions



Introduction

Razor X Mini Propellers

WhirlWind Razor X blades offer excellent performance and unsurpassed durability. Every blade is equipped with a strong carbon spar for strength, has an electro-formed Nickel leading edge shield for abrasion protection, and is constructed using our new **X-Core Composite™** technology.

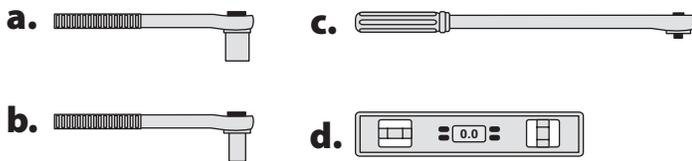
Razor X blades have been designed to fit Warp Drive Style hub systems, including hubs made by Circle S Manufacturing. The WhirlWind Mini Hub allows for a smaller diameter with a 75mm bolt pattern.

Follow the attached installation and maintenance instructions for years of trouble free operation.

Required Tools

You will need the following tools to assemble your propeller:

- a. 8mm ratchet and socket
- b. 5/16" ratchet and socket
- c. Torque Wrench
- d. Digital Level



! **NOTE:** WD-40 is recommended to clean the prop flange before installation and anti-seize compound should be used on all hardware.

X-Core Composite™ Technology

Unlike most airboat propellers on the market, Razor X blades are constructed with a structural solid foam core and carbon composite skins to create an incredibly strong, stiff and lightweight blade.

Benefits of X-Core Composite™:

- Structural foam core provides unequaled strength and durability.
- Entire outer skin is stabilized by the foam core, eliminating vibrations and flexing during operation.
- Instant push on start up as the blades do not flex or bend.
- Resonance issues from the engine and gear box noise are greatly reduced.
- Blades have a high damage tolerance due to the foam core, making them easier to repair than standard hollow blades.

Safety Information

⚡ WARNING: Read and follow all instructions before operating the propeller!

⚡ WARNING: Use extreme caution anytime you are near the propeller whether the propeller is turning or not, as severe bodily harm or death may result.

⚡ WARNING: Keep hands, feet, and body away from the propeller at all times. Failure to do so will result in severe bodily harm or death.

⚡ WARNING: Never allow anyone to stand in the same plane as the propeller.

Installation

These instructions show installation using a Circle S Manufacturing Hub.

1 Unpack Parts

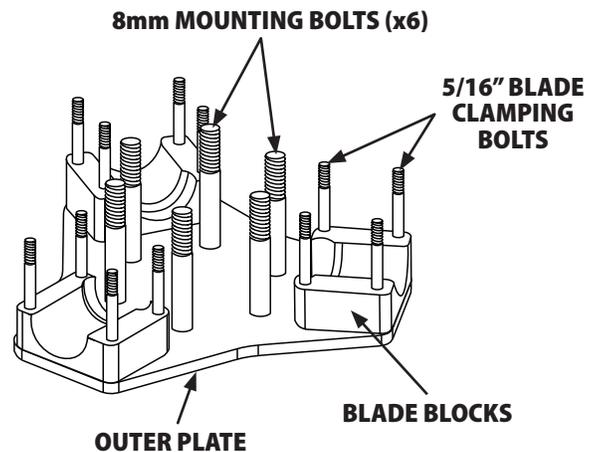
- a. Refer to the Packing List, unpack all propeller parts and verify no parts are missing.

Packing List

Part	Qty.
Blades	3
Front Hub Plate (outer half)	1
Rear Hub Plate (engine-side half)	1
Hub Spacers	6
8mm Mounting Bolts & Washers	6
Blade Blocks (2 per blade)	6
5/16" Blade Clamping Bolts	

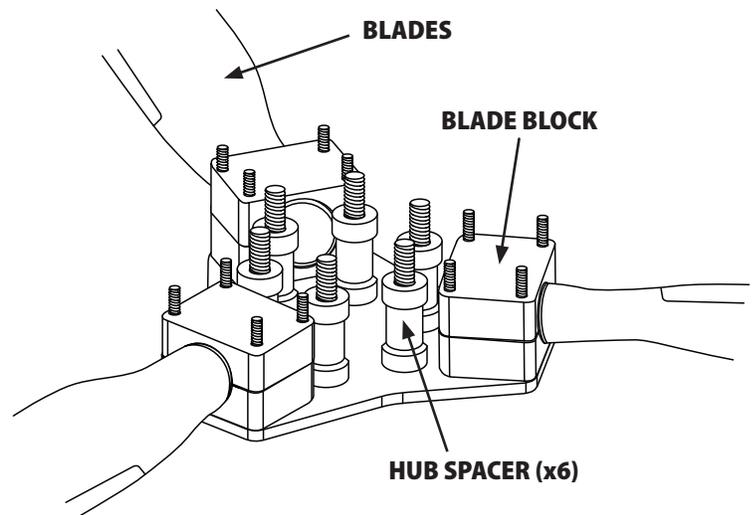
2 Prepare Outer Plate

- a. Insert all six 8mm Mounting Bolts with Washers through the six holes in the center of the Outer Plate.
- b. Insert 5/16" Blade Clamping Bolts (4 per blade) with Washers through the Outer Plate where shown.
- c. Slide Blade Blocks over each set of 5/16" Blade Clamping Bolts.



3 Install Blades

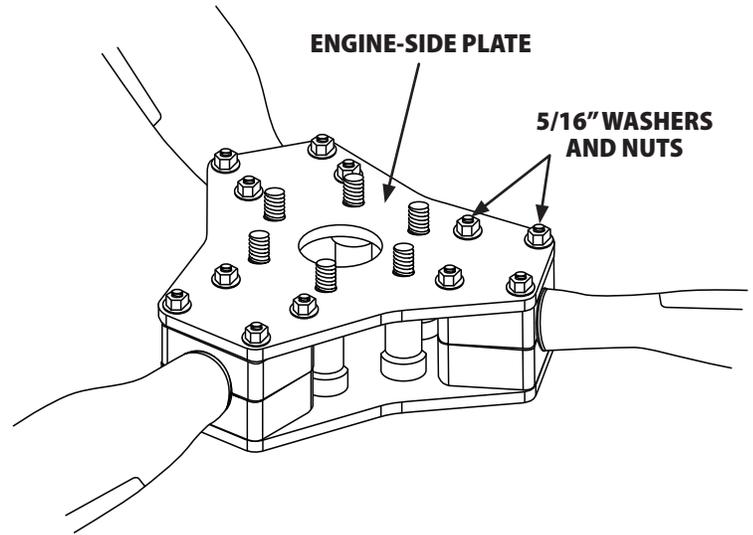
- a. Set the Razor X blades into the Blade Blocks.
- b. Slide Blade Blocks over each set of 5/16" Blade Clamping Bolts and ensure each blade is seated securely between the Blade Blocks.
- c. Set six Hub Spacers over the 8mm Mounting Bolts.



Installation

4 Install Engine-Side Plate

- Slide the Engine-Side Plate over the Mounting and Blade Clamping Bolts.
- Re-check the Blade Blocks and ensure each blade is still seated properly.
- Install the 5/16" Washers and Nuts on each Blade Clamping Bolt and hand tighten. Do not torque to specifications yet.



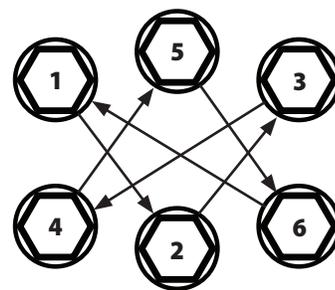
! **NOTE:** Do NOT force or hammer any propeller parts together.

5 Install the Propeller on the Airboat

- Make sure your prop-shaft is clean and free of rust and corrosion. **This cannot be stressed enough.** A clean and rust free flange will ensure proper installation and will prevent the hub from permanently bonding to your flange with rust.

! **NOTE:** It is recommended to spray your flange with a rust inhibitor (such as LPS or WD40) prior to propeller installation.

- Mate the propeller to the prop-shaft and install the six 8mm Mounting Bolts and Washers. Tighten the bolts using a hexagonal star pattern as shown below. Make sure the propeller is securely pulled up onto the prop-shaft - no gaps allowed.
- Torque 8mm Mounting Bolts to **170 in-lbs.**

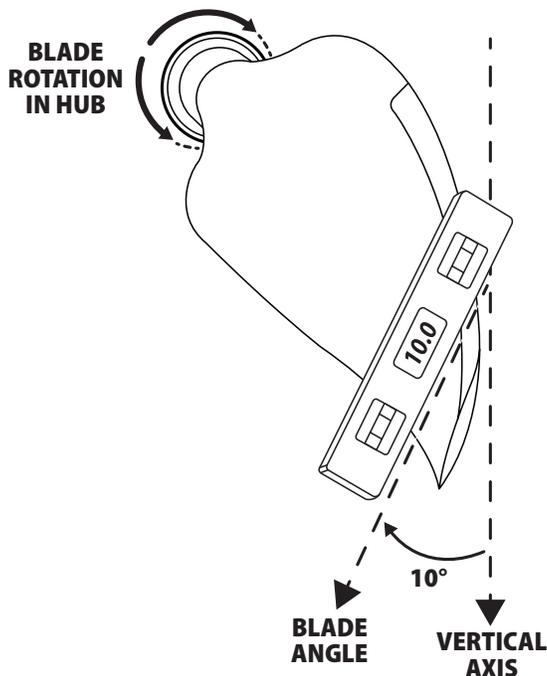


HEXAGONAL STAR PATTERN FOR MOUNTING BOLTS

Installation

6 Initial Pitch Setting

- Loosen the 5/16" Blade Clamping Bolts until the blade can be easily rotated by hand.
- To set the initial pitch, rotate the propeller so the blade is horizontal. Place a digital level flat on the blade, 2" to 3" from the tip.
- For the initial pitch setting, start with a pitch (or blade angle) of about 10° from the vertical axis. Remember that the greater the pitch, the lower RPM the engine will run. A lesser pitch will allow the engine to run at higher RPM's.



- Torque the 5/16" Blade Clamping Bolts to **16 ft-lbs.** before operating propeller.

FINAL CHECK:

Any blade movement in the hub is unacceptable. Ensure the hub has been installed flat against mounting flange, and that each blade is well seated in the hub (not misaligned or crooked).

7 Initial Engine Run

After the propeller is installed, refer to the following table for maximum recommended RPM to avoid damage during operation.

MAXIMUM PROPELLER RPM

Diameter	Max. RPM	RPM Range	Starting Blade Angle @Tip
63" to 69"	2500	2000 to 2500	10°

WARNING: DO NOT EXCEED MAX PROPELLER RPM! Propeller blade failure may occur if max. propeller RPM is exceeded - resulting in severe bodily injury or death!

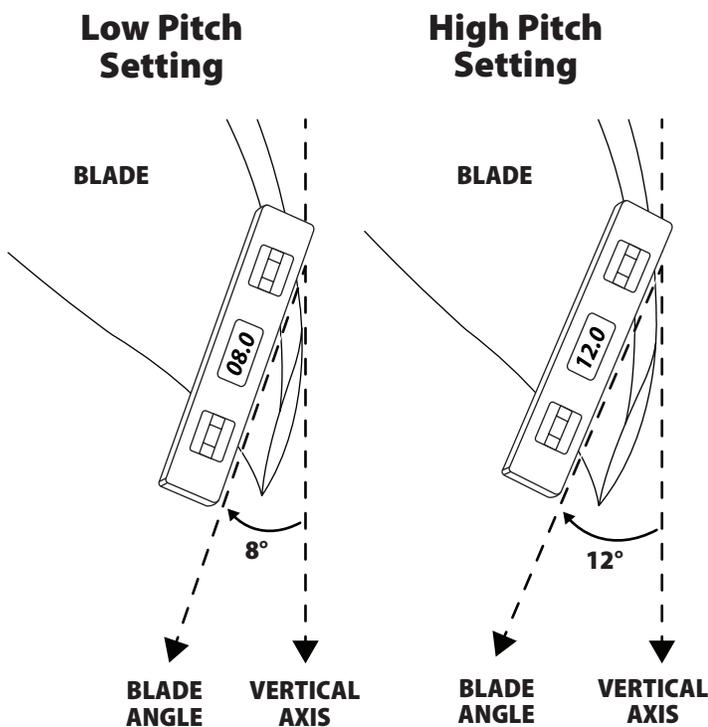
NOTE: Before starting your engine and new propeller for the first time, ensure the propeller blades clear all engine parts (suggested minimum clearance of at least 2"). Repeat this step each time you change the pitch setting of your propeller.

- Run the engine up to 2000 propeller RPM. Shut the engine down.
- Inspect the overall condition of the blades, leading edge and hub. Firmly grab each blade tip and apply a forward and aft force to ensure each blade is tight in the hub. Do not operate the propeller if the blades have any movement in the hub.
- Check for proper torque on all bolts (5/16" bolts to 16 ft-lbs and 8mm bolts to 170 in-lbs).

Installation

8 Maximum RPM Setting

- a. After you have completed the Initial Engine Run in Step 6, you can now perform a full Max. engine RPM (full throttle) run while the boat is safely secured, but **DO NOT EXCEED MAX. PROPELLER RPM!** (See Step 6)
- b. Adjust the pitch (blade angle) until target Max. engine RPM (full throttle) is achieved.
 - If the engine RPM is too low, **decrease** the pitch setting to increase RPM.
 - If the engine RPM is too high, **increase** the pitch setting to decrease RPM.



WARNING: Never use a mallet or other object to tap the blade during pitch setting.

- c. Check the bolt torque and perform visual inspection as described in “Propeller Care and Maintenance” after every 20 to 25 hours of operation. Enjoy your new propeller and have fun!



Performance Tip: Static Max. RPM (full throttle) should be 200 RPM less than the target Wide Open Throttle (WOT) RPM. Engine will increase 200 RPM when the boat is traveling at top speed.



Performance Tip: Lower Cruise RPM and better Fuel Economy can be achieved with a lower Max. RPM (full throttle) and higher pitch setting (blade angle). You may not want or need to turn your engine to its maximum RPM if you are interested in reducing noise or increasing fuel economy.



Tech Tip: If vibration is detected during propeller operation, do the following:

- First check the blade pitch setting on each blade and ensure they are within 0.5 deg of each other.
- Next ensure the hub is properly seated on the propeller flange (no gaps).
- Finally, check the blade track- each blade should track within 1/8” at the tip.

Propeller Care and Maintenance

Proper care and maintenance of your Whirl Wind propeller will ensure a long life with many hours of trouble free operation.

A complete inspection of your propeller should be performed periodically, at least after every 25 hours of operation. Before each use, carefully examine the propeller blades and hub for looseness, any signs of damage, excessive wear or any other condition that would make the propeller unsafe to operate.

In particular, before operating check: hub bolt torque, propeller hub for any signs of cracking, blade shanks for roughness or raised fibers, blades for impact damage or cracks, and the metal erosion shield for tightness.

Blades

- Wash & Clean all blades with a mild detergent (such as Simple Green).
- Optional: Polish blades with clear liquid automotive polish for an additional layer of UV protection (such as Turtle Wax Ice).
- Inspect the overall condition of blades, looking for chips, cracks, and any leading edge damage. If the leading edge is damaged, this can be repaired by returning to Whirl Wind with the full set of blades. If damage is neglected, it may worsen, making repair impossible.

Hub

- Wash & clean the hub with a mild detergent (such as Simple Green).
- Inspect the overall condition of the hub. Inspect the interior and exterior thoroughly for any signs of hair-line cracking. If any cracks are detected, contact Whirl Wind for assessment.

Bolts

Check the bolt torque on all bolts.

- 5/16" bolts to 16 ft-lbs
- 8mm bolts to 170 ft-lbs



NOTE: Every Razor X blade is manufactured using a state-of-the-art production process that yields a smooth surface finish on each blade.

Any slight marks on the surface of the blades, such as small bubbles and/or pinholes, are common to this production process and do not affect the structural integrity of the blade.

30 Day Satisfaction Guarantee

Whirl Wind Propellers Corporation guarantees your satisfaction for a period of 30 days from date of purchase to the Original Purchaser. If during this time you are not satisfied with our product you may send the propeller back for an exchange or for a full or partial refund. Any shipping and handling charges are non-refundable. If you have tested the propeller on your boat, the propeller may be subject to a restocking fee if the propeller shows excessive signs of wear or abuse.

Simply return the propeller to the address below. Returned items must be within 30 days of purchase to qualify. Return shipping must be prepaid and insured for the full value of the propeller or parts. The cost of returning the propeller is incurred by the customer. Whirl Wind Propellers reserves the right to refuse any return found to be the result of a suspicious origin or untrustworthy nature.

Return Address: Whirl Wind Propellers
 1800 Joe Crosson Drive, Ste C
 El Cajon, CA 92020

Whirl Wind Propellers Corporation

Whirl Wind Propellers
1800 Joe Crosson Drive, Ste C
El Cajon, CA 92020
(619) 562-3725
www.whirlwindpropellers.com

Limited Warranty

Whirl Wind Propellers Corporation expressly warrants its products to be free from defects in material and workmanship under normal use and service for a period of twelve (12) months after delivery to the original retail purchaser.

 **WARNING:** Whirl Wind airboat propellers are not suitable for installation on the following engines without the use of a harmonic damper. Installation on these engines shall void all warranty claims.

- 8 Cyl Continental GPU Engines
- Direct Drive Cadillac Auto Engines

 **WARNING:** Whirl Wind airboat propellers are not suitable for installation on the aircraft engines that have removed the crankshaft counterweights. Installation on these engines shall void all warranty claims.

 **WARNING:** Whirl Wind airboat propellers are not covered by warranty when used for racing of any kind due to the infinite variety of racing modifications and set-ups. The racer assumes all risks and accepts personal responsibility for any and all loss, liability, damages, or costs following such injury, permanent disability, or death.

 **WARNING:** Any Blade Style with a diameter of 76" or greater may ONLY be installed on engine applications using reduction systems. Direct drive installations are not permitted and are not safe to operate. Direct Drive installations of these blade styles shall void all warranty claims.

 **WARNING:** For Aircraft engine installations, timing advance must not be greater than 25 degrees Top Dead Center or warranty shall be void.

Whirl Wind Propellers Corporation's obligation under this limited warranty is limited to repairing or replacing, at its option, any propeller or propeller hub, determined by Whirl Wind to have been defective and which is properly returned by the owner, with a written statement describing the alleged defect, to its place of business at El Cajon, California USA. Any replacement of a unit or a part of a unit during the warranty period will not extend the warranty beyond the original duration.

Procedure For Obtaining Warranty Service: All warranty returns are to be shipped prepaid and insured for the full value of the item being returned to Whirl Wind Propellers Corporation at the address listed below. Upon receipt of the unit, Whirl Wind Propellers Corporation will decide which remedy, repair, or replacement it will provide. The unit must be accompanied by a copy of the original (Distributor or Dealer) invoice and a brief description of the defect. The remedy of repair or replacement is exclusive and does not include the cost of shipping, removal, or installation, all of which are the customer's responsibility.

Whirl Wind Propellers – Warranty Returns
1800 Joe Crosson Drive, Ste C
El Cajon, CA 92020

Conditions, Exclusions, and Disclaimers: This limited warranty applies to units that have been used and maintained properly. It does not cover units that show abuse, alterations, improper installation, or improper packaging for shipment; and it does not pertain to damage due to object strike or excessive blade wear due to operation.

To the extent allowed by applicable law, THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED IN FACT OR BY LAW, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THE REMEDIES OF REPAIR OR REPLACEMENT SET FORTH HEREIN ARE THE ONLY REMEDIES UNDER THIS WARRANTY. Whirl Wind DISCLAIMS ANY OBLIGATION OR LIABILITY, WHETHER IN CONTRACT OR IN TORT, INCLUDING LOSS OF USE OF THE PRODUCT WARRANTED, LOSS OF TIME, INCONVENIENCE, LOSS OF PROFITS, COMMERCIAL LOSS OR ANY OTHER DIRECT, CONSEQUENTIAL, SPECIAL OR INCIDENTAL DAMAGES. THIS WARRANTY IS IN LIEU OF ANY OBLIGATION OR LIABILITY ON THE PART OF Whirl Wind TO ANYONE OF ANY NATURE WHATSOEVER by reason of the manufacture, sale, lease or use of the warranted products and Whirl Wind neither assumes nor authorizes anyone to assume for it any other obligation or liability in connection with such warranted products.

Repair or replacement of a nonconforming unit or part is the exclusive remedy for breach of this limited warranty, and shall constitute fulfillment of all liabilities of Whirl Wind Propellers Corporation to a customer or user, whether based on contract, negligence or otherwise. IN NO EVENT SHALL WHIRL WIND PROPELLERS CORPORATION BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.