GA-RW3B/RZ3B Propellers

Installation and Operation Instructions

(GA-RW3B, GA-RZ3B, and GA-RW3B-STOL75)

For Rotax 912 / 914 Engines

ATTENTION: Failure to follow these instructions will void all warranties, expressed and implied. Mounting difficulties, vibration, and or failure can result from improper assembly of the propeller blades and hub components.

CAUTION: Rotating propellers are particularly dangerous· Extreme caution must be exercised to prevent severe bodily injury or death·

Checklist

Read through all instructions first, then use this checklist to check off items as you read through a second time and perform the installation.

Checklist

- ❒ Read through this entire instructions manual
- ❒ Verify Drive Lugs/Bushings (p. 2)
- ❒ Ignition off; wheels chocked; parts inventoried; engine flange cleaned (WD-40)
- ❒ Blades:
  - ❒ Leading edges should face clockwise when viewed from behind aircraft
  - ❒ Lightly secure hub over blades with clamping bolts--do not torque
- ❒ Spinner Back Plate:
  - ❒ Sand protruding lug holes if lugs don't fit through them
  - ❒ Mark where blade cutouts line up from spinner dome
- ❒ Hub:
  - ❒ Orient blades with cutout marks
  - ❒ Line up counter-bores with protruding lugs and ensure flush fit against mounting surface
  - ❒ Lightly install mounting bolts--do not torque
- ❒ Blade Pitch:
  - ❒ Set approximate blade pitch (Table 6) and SLOWLY tighten and torque clamping bolts in star pattern
  - ❒ Re-check blade angles (should be within about 0.2° of each other)
  - ❒ Tighten and torque mounting bolts in star pattern
- ❒ Check static RPM (page 10) and adjust pitch as necessary. Wedge-Lock washers click loudly when loosened and can be reused about 10 times
- ❒ Run engine for 5 min at 50% RPM and re-check all mounting and clamping bolt torques
- ❒ Install Spinner Dome and Fairings with #8 screws
- ❒ Fly Aircraft and note max rpm in level flight, wide open throttle (DO NOT EXCEED MAX ENGINE RPM!), re-pitch propeller as necessary (see Pitch and Propeller Performance pg 18)
- ❒ 5 Hr Inspection
- ❒ Dynamically Balance Propeller (Recommended)
- ❒ Follow all inspections (page 11)

Quick Reference Sheet

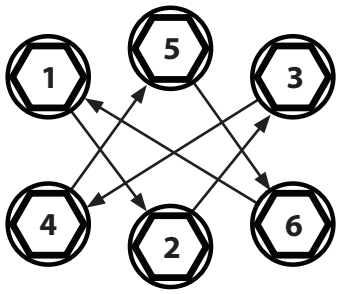
Overall Installation Procedure

- Install Propeller (Do not install spinner dome yet)
- Perform Static RPM Check (pg 10)
- Re-Pitch Propeller as necessary (200 RPM/1°)
- Run 50% of Max RPM for 5 min.
- Check Bolt Torques
- Install Spinner Dome
- Fly aircraft and note max rpm in level flight, wide open throttle (DO NOT EXCEED MAX ENGINE RPM!).
- Re-Pitch Propeller as necessary (see Pitch and Propeller Performance pg 17).
- Perform all inspections and recommended dynamic balancing (pg 11)

Inspection Intervals	Inspection Type
Any Pitch Change	Check Bolt Torque (Mounting Bolts may be different than Clamping Botls)
First 5 Hours	
First 25 Hours	
Every 50 Hours	50 Hr Per Page 12
Repeat intervals every 25 and 50 Hr until 2000 hours is reached and a major periodic inspection is necessary	

Flange	Bolt Type	Size	Socket	Torque
Threaded	Clamping	**1/4”**	**1/4” (12-pt)**	**8 ft-lb (96 in-lbs)**
	Nut	**1/4”**	**5/16”**	**--**
	Mounting	**8 mm**	**6 mm (allen)**	**15 ft-lb (180 in-lbs)**
Non-Threaded	Clamping	**1/4”**	**1/4” (12-pt)**	**8 ft-lbs (96 in-lbs)**
	Clamping Nut	**1/4”**	**5/16”**	**--**
	Mounting Bolt	**5/16”**	**1/4” (allen)**	**15 ft-lb (180 in-lbs)**
	Mounting Nut	**5/16”**	**1/2”**	**--**

To torque bolts, follow tightening pattern below and tighten in the following increments: 50%, 75%, then Full Torque.



Propeller	Example Aircraft	Engine	Blade Pitch	Static RPM
70”	**Rans**	**100HP**	**17°**	**5100 to 5300**
STOL 75”	**Kitfox**	**100HP**	**15°**	

CAUTION: Drive Lugs are required for this propeller installation. Verify that your hardware kit is compatible with your drive lugs (p. 2)

NOTE: Blade pitch angles will typically need to be adjusted until the target static RPM is achieved. **See Pitch and Propeller Performance** on page 18 for more info on selecting pitch.

Propeller Models

These instructions apply to the following propellers:

Model	Diameter(s)	Weight (lb)
GA-RW3B	68", 70"	10.1
GA-RZ3B	68", 70"	10.1
GA-RW3B-STOL	75"	10.7

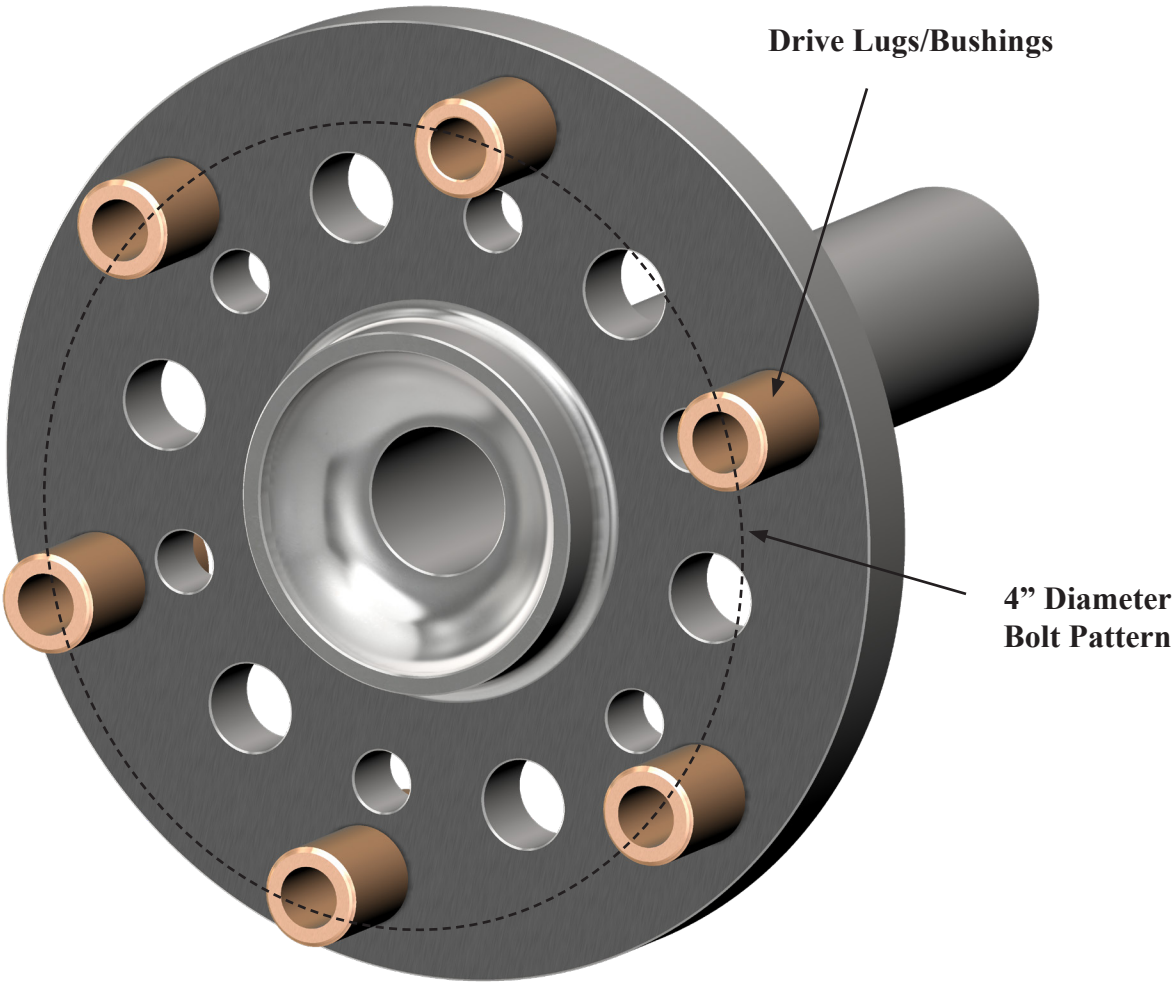
Contents

CAUTION – Experimental and LSA Installations Only.

This GA-RW3B propeller is an Experimental and LSA propeller system. WWPC has designed and engineered this propeller for specific series engines with general known characteristics. However, it is impossible to know and test all possible modifications and combinations of modifications for these type engines in the Experimental and LSA category. The owner and operator of this propeller acknowledges this nature of the Experimental and LSA category and understands that Experimental and LSA engine modifications can severely limit the life and reliability of this propeller. INSTALLATIONS ON MODIFIED ENGINES MAY CREATE AN UNSAFE CONDITION THAT MAY RESULT IN DEATH, SERIOUS BODILY INJURY, AND/OR SUBSTANTIAL PROPERTY DAMAGE.

FOR THREADED DRIVE LUGS, MINIMUM THREAD ENGAGEMENT OF 0.3125" INTO DRIVE LUG THREADS

NOTE: THE BOLT MIGHT NOT EXTEND COMPLETELY THROUGH THE DRIVE LUG



Drive Lugs are required for this propeller installation. Verify that your hardware kit is compatible with your drive lugs

WhirlWind Hardware Kit	Rotax Part Number	Drive Lug	Drive Lug Notes
8 mm	842 634	M8	
5/16"	842 638	5/16"-24	$$ Special order from Rotax
5/16"	Other distributors	5/16" non-threaded	Not from Rotax, but very common
Not Compatible	842 639	5/16"-20	
Not Compatible	842 630	M8	For older engines only; SN specific!

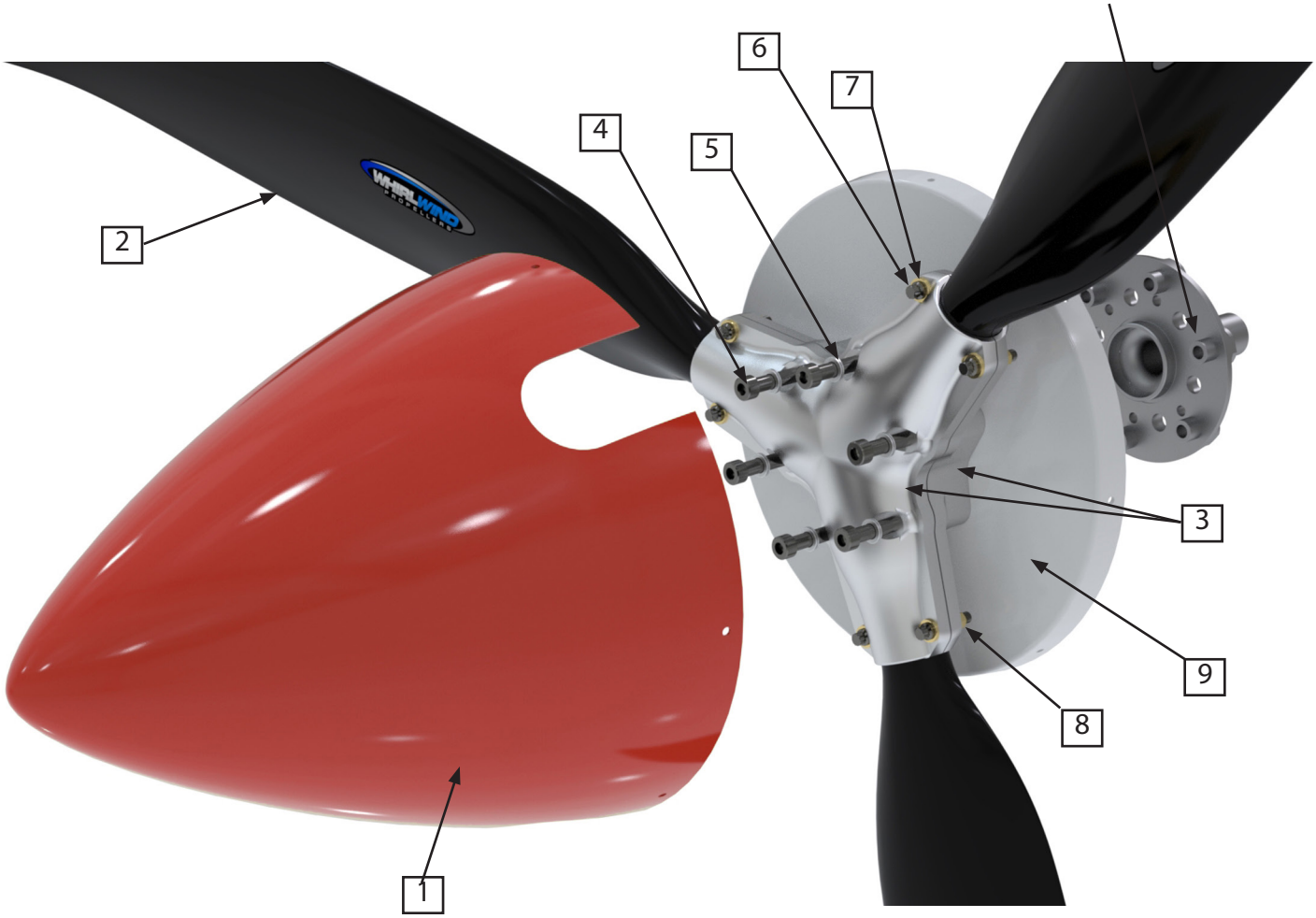
Installation Threaded Flange (with Optional Spinner)

Item	Part	Qty.
1	Spinner Dome	1
2	Blades	3
3	Hub (forward & aft halves)	1
4	Mounting Bolts (8mm x 70mm) (Larger Sizes Available on Request)	6
5	Mounting Wedge-Lock Washers (8mm)	6
6	Clamping Bolts (12-pt, ¼"-28 x 1 ½")	6
7	Clamping Flat Washers (AN960-416)	12
8	Clamping Lock Nuts (¼")	6
9	Spinner Back Plate	1

IMPORTANT: See Table 2 on page 6 for torque values and interval checks

One wedge-lock washer (2 Pieces with ramped sides facing each other)

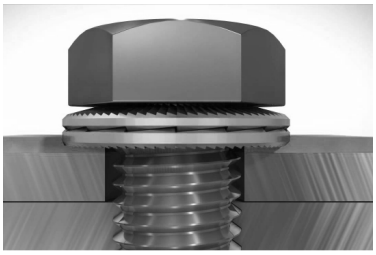
CAUTION: Drive Lugs are required for this propeller installation. Verify that your hardware kit is compatible with your drive lugs (p. 2)



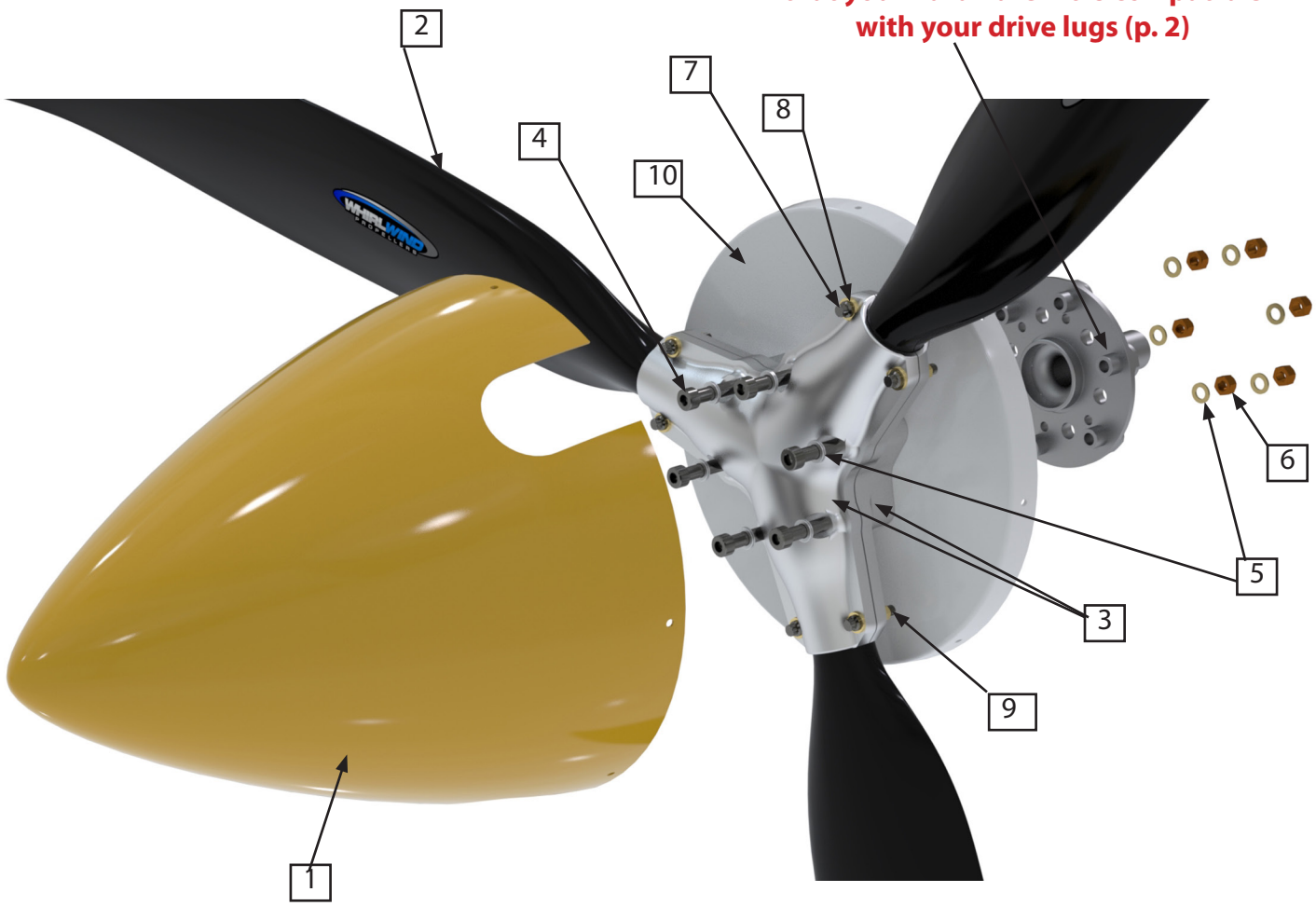
Installation Non-threaded Flange (with Optional Spinner)

Item	Part	Qty.
1	Spinner Dome	1
2	Blades	3
3	Hub (forward & aft halves)	1
4	Mounting Bolts (5/16")	6
5	Mounting Flat Washers (AN960-516)	6
6	Mounting Lock Nuts (5/16)	6
7	Clamping Bolts (12-pt, ¼"-28 x 1 ½")	6
8	Clamping Flat Washers (AN960-416)	12
9	Clamping Lock Nuts (¼")	6
10	Spinner Back Plate	1

IMPORTANT: See Table 2 on page 6 for torque values and interval checks



CAUTION: Drive Lugs are required for this propeller installation. Verify that your hardware kit is compatible with your drive lugs (p. 2)



Overview & Installation Guidelines

Overview

The GA-RW3B propeller by Whirl Wind Propellers Corp is a composite ground-adjustable propeller system. Each GA-RW3B propeller is manufactured to meet or exceed ASTM quality standards and is proudly made in USA.

Composite Blades

The composite blades of the GA-RW3B are manufactured from advanced proprietary thermoset epoxy/graphite composite matrix. This advanced composite structure ensures high-strength and blade accuracy in all flight environments. The blades are finished with a high quality gloss finish and are equipped with an electroformed Nickel leading-edge shield.

Electro-formed Nickel Leading Edge Shield

Each GA-RW3B blade is equipped with a superior electro-formed Nickel leading edge shield for abrasion and wear protection. The electro-formed Nickel leading edge shield is superior to any other material available for blade edge protection. The shield is made to the exact shape of the blade and offers unsurpassed durability.

Aluminum Hub

The GA-RW3B hub is CNC machined from aerospace Aluminum to exacting tolerances, dimensionally certified and anodized.

WARNING!:Exceeding the noted RPM limitation for an extended period of time may lead to **CATASTROPHIC FAILURE**.

Guidelines

Read and follow these guidelines to ensure a safe, successful propeller installation.

CAUTION: Failure to follow these instructions will void all warranties, expressed and implied and may cause mounting difficulties. Improper assembly of the propeller blades and hub parts will lead to Vibration Issues and Bodily Injury or Death.

1. Verify the magneto (ignition) switch is "OFF" and that both magnetos are grounded.
2. Chock the aircraft wheels to prevent movement.
3. Clean all dirt and oil residue from the engine flange.

NOTE: WD-40 (or equivalent) is recommended to clean the prop flange before installation.

4. Always use a calibrated torque wrench when tightening mounting or clamping bolts, and torque to the listed value for your propeller.
5. Take inventory of hardware and tools. Ensure that you have the correct number of pieces with the appropriate sizes and lengths.
6. Slide washers onto their corresponding bolts so they are ready for installation.
7. Never modify the propeller hub.
8. Always spin propeller in the opposite direction that the engine spins it.

Limitations

1. MAX RPM Rotax Engine 912/914: 5800 (do not exceed by more than 10% for 2 minutes) MAX RPM propeller 2450.
2. Min / Max Pitch : +10° / +45° at 11 inches from blade tip.
3. Recommended Major Periodic Inspection : 2000 hours (see p. 5 for inspection requirements).
4. Mass Moment of Inertia : RW3B = 4150 kg.cm^2
   RW3B-STOL = 4250 kg.cm^2

Required Tools

You will need the following tools to assemble your propeller:

a. Hex Key Allen Wrench/Socket (See Table 2)

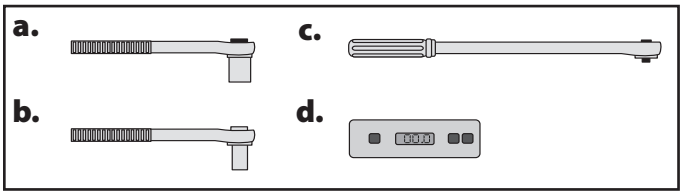
b. Wrench and Ratchet (See Table 2)

c. Torque Wrench

d. Digital Protractor

e. WD-40 (or equivalent)

f. Sand paper



NOTE: WD-40 (or similar) is recommended to clean the prop flange before installation.

Recommended Inspection Intervals

IMPORTANT: After first installation run the propeller for 5 min at 50% RPM. Then check all mounting and clamping bolt torque values with Table 2 below..

IMPORTANT: After the first 5 hours of operation, or any blade angle (pitch) change, re-check all hub mounting bolts and blade clamping bolts torque values from Table 2 below..

Inspection Intervals	Inspection Type
Any Pitch Change	Check Bolt Torque (Mounting Bolts may be different than Clamping Bolts)
First 5 Hours	
First 25 Hours	
Every 50 Hours	50 Hr Per Page 12
Repeat intervals first 25 and every 50 Hr until 2000 hours is reached and a major periodic inspection is necessary	

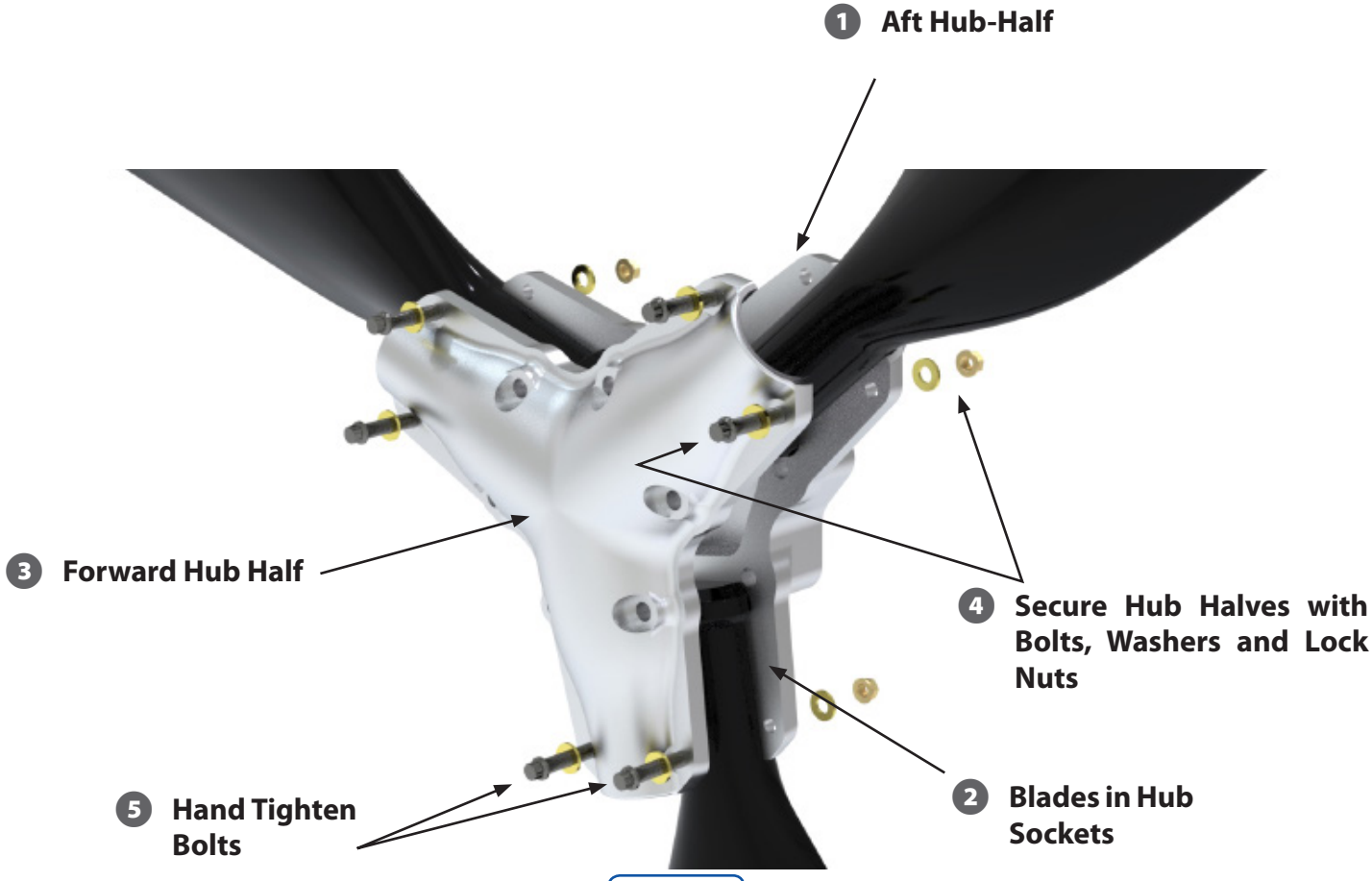
Table 1

Flange	Bolt Type	Size	Socket	Torque
Threaded	Clamping	**1/4”**	**1/4” (12-pt)**	**8 ft-lb (96 in-lbs)**
	Nut	**1/4”**	**5/16”**	**--**
	Mounting	**8 mm**	**6 mm (allen)**	**15 ft-lb (180 in-lbs)**
Non-Threaded	Clamping	**1/4”**	**1/4” (12-pt)**	**8 ft-lbs (96 in-lbs)**
	Clamping Nut	**1/4”**	**5/16”**	**--**
	Mounting Bolt	**5/16”**	**1/4” (allen)**	**15 ft-lb (180 in-lbs)**
	Mounting Nut	**5/16”**	**1/2”**	**--**

Table 2

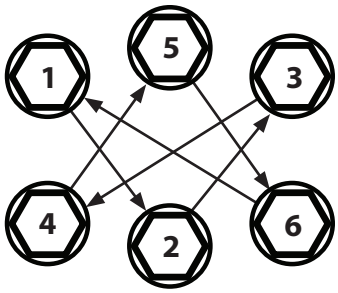
Blade and Hub Assembly

1. Set the Aft Hub-Half on a flat surface.
2. Place all three blades into hub blade sockets. Remember, the metal leading edges will face clockwise when viewed from behind the aircraft.
3. Place the Forward Hub-Half over the blades and Aft Hub-Half. Gently lift the blade tips and seat the hub halves.
4. Secure the Hub Halves together using the Clamping Bolts, Washers and Lock Nuts as shown.
5. Hand tighten the 6 Clamping 1/4" Bolts so the blades are held in the hub, but can still be smoothly rotated. These bolts will be torqued after pitch angle has been set.



Install Propeller

1. Spinner Back-Plate: Use sandpaper to bore the holes wider if needed to fit over protruding drive lugs. Place on engine flange/spacer.
2. The Spinner Dome may only fit on the back plate in one orientation, so mark where the blade cutouts will be before installing the hub.
3. Install the Hub (with blades) on engine flange by hand-tightening Mounting Bolts and washers (wedge-lock washers for threaded propeller flange or flat washers for non-threaded flange).
4. Set the blade pitch angles (refer to the **Set Blade Pitch Angle** section on Page 9) .
5. Ensure all 1/4" Clamping Bolts are torqued to 96 in-lbs and mounting bolts are torqued 8mm mounting bolts to 180 in-lbs.



NOTE: Follow a symmetrical (star) pattern when tightening bolts is important to avoid changing blade pitch angle.

6. Install and secure Spinner Dome using the supplied #8 screws. Ensure there is a minimum of 3/16" clearance between the spinner dome cutouts and the propeller blades and hub. Inadequate clearance may result in the spinner dome wearing into the blades or hub.
7. Before operation, verify the Static RPM for your engine (refer to the **Verify Static RPM** section on Page 12).

Inspection Intervals	Inspection Type
First 5 Hours	Check Bolt Torque After Pitch Change
First 25 Hours	Check Bolt Torque
Every 50 Hours	50 Hr Per Page 12

Table 1

Torque Values	
8mm(Allen) **Bolts**	**180 in-lbs**
5/16" (Allen)	**180 in-lbs**
1/4" (12-pt)**Bolts**	**96 in-lbs**

Table 2

IMPORTANT: After first installation run the propeller for 5 min at 50% RPM. Then check all mounting and clamping bolt torque values with Table 2 above.

IMPORTANT: After the first 5 hours of operation, or any blade angle (pitch) change, re-check all hub mounting bolts and blade clamping bolts torque values from Table 2 above.

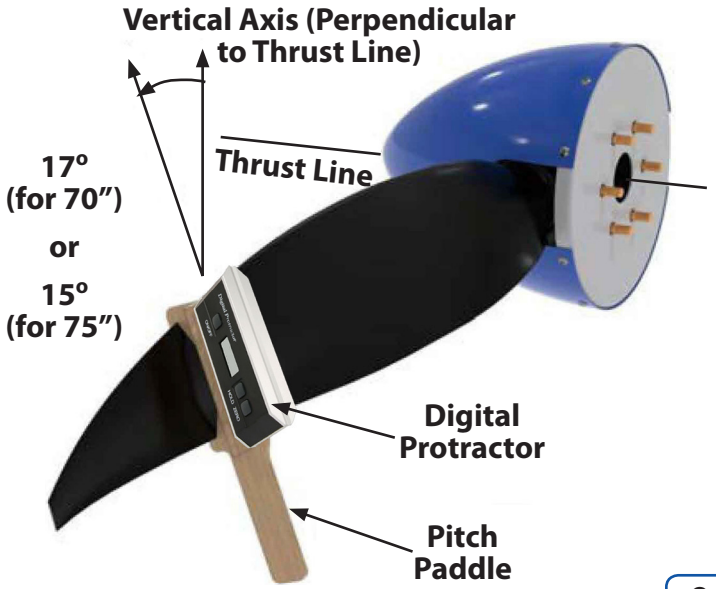
Set Blade Pitch Angle

Once the propeller is mounted on the prop flange, you are ready to set the initial blade pitch.

NOTE: Certain aircraft manufacturers limit the total pitch range to comply with aircraft design regulations.

NOTE: If the Clamping Bolts have already been torqued, loosen the bolts so the blades can rotate smoothly in the hub. The Wedge-lock washers will click loudly when loosened.

1. Spin the propeller so one of the blades is horizontal (or level with the ground) on the left side of the aircraft.
2. Calibrate protractor by placing it on an exposed flat portion of engine flange (or spinner back-plate) and zeroing read out.
3. Slide the pitch paddle and protractor on the blade as shown. Make sure the paddle is parallel with the Blade's cord line.
4. Rotate the blade to a recommended starting angle of 17° from vertical for a 70" blade, or 15° from vertical for a 75" blade. Both blade/angle combinations generate a static engine RPM of 5100 to 5300.
5. Rotate propeller to next blade and Repeat Steps 1-3 for each blade.



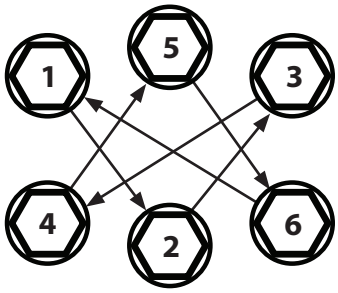
6. After the blade pitch is set on all three blades, **torque the Clamping Bolts to 96 in-lbs**. Follow the symmetrical star pattern tightening each bolt 1/8 to 1/4 turn at a time. It is important to maintain an even gap between the hub half to prevent a change in pitch angle.
7. **Torque mounting bolts to 180 in-lbs**

IMPORTANT: After the first 5 hours of operation, or any blade angle (pitch) change, re-check all hub mounting bolt and blade clamping bolt torque values.

NOTE: To lower RPM, increase the blade pitch. To increase RPM, decrease the blade pitch. NEVER MASK AN ENGINE PROBLEM WITH A PITCH CHANGE. If you are unsure, please contact the factory

NOTE: All pitch angles should be within 0.20 degrees of each other.

WARNING: Exceeding a Limitation for an extended period of time may lead to a **CATASTROPHIC FAILURE, BODILY INJURY OR DEATH**.



NOTE: Follow a symmetrical (star) pattern when tightening bolts is important to avoid changing blade pitch angle.

NOTE: It is important to maintain an even gap between the hub half to prevent a change in pitch angle.

NOTE: After all mounting and clamping bolts have been properly tightened, check the blade angles again to make sure they have not changed.

Inspection Intervals	Inspection Type
First 5 Hours	Check Bolt Torque After Pitch Change
First 25 Hours	Check Bolt Torque
Every 50 Hours	50 Hr Per Page 12

Table 1

Torque Values	
8mm(Allen) **Bolts**	**180 in-lbs**
5/16" (Allen)	**180 in-lbs**
1/4" (12-pt)**Bolts**	**96 in-lbs**

Table 2

IMPORTANT: After first installation run the propeller for 5 min at 50% RPM. Then check all mounting and clamping bolt torque values with Table 2 above.

IMPORTANT: After the first 5 hours of operation, or any blade angle (pitch) change, re-check all hub mounting bolts and blade clamping bolts torque values from Table 2 above.

1. Install and secure Spinner Dome using the supplied #8 screws. Ensure there is a minimum of 3/16" clearance between the spinner dome cutouts and the propeller blades and hub. Inadequate clearance may result in the spinner dome wearing into the blades or hub.

❶ Before operation, **Verify Static RPM**

WARNING: Exceeding a Limitation for an extended period of time may lead to a **CATASTROPHIC FAILURE and BODILY INJURY OR DEATH**.

NOTE: Have your tachometer calibrated by a professional before performing this next operation.

1. With the brakes on, run the engine at full throttle and note the static RPM on the tachometer.

   The static RPM for a High Speed propeller should be between 5100 to 5200 engine RPM.

   The Static RPM for a STOL propeller should be between 5200-5300 engine RPM.

   If your measured RPM does not fall within the appropriate range, use the following guide lines to repitch the blades.

   - Typically 1 degree of pitch changes the static engine RPM by about 200 RPM
   - If the static engine RPM is too low, decrease the blade pitch angle to increase RPM.
   - If the static engine RPM is too high, increase the blade pitch angle to reduce RPM.

WARNING: **NEVER EXCEED THE MAXIMUM RPM RATING FOR YOUR ENGINE**. If you are not seeing your correct static RPM, be certain the tachometer was properly calibrated and verify blade pitch angles.

2. After the desired static RPM is achieved, re-check all bolt torque values (The ideal pitch setting will allow the propeller to reach (with out exceeding) maximum RPM at full throttle in level flight.

WARNING: Do not operate your propeller above the recommended propeller RPM. If your propeller has been subjected to an over speed condition of 10% over the maximum engine RPM (example 5800 X 1.1 = 6380) for more than 2 minutes, you must land and perform a 100 hour inspection. **After a Suspected impact or an overspeed condition of *20% or higher, the propeller must be removed from service and returned to the manufacturer for inspection***.1

Dynamic Balance Inspection

Any time an engine is paired with a different propeller or different propeller orientation relative to the flywheel (such as rotating a spacer for hand-proping) it should be dynamically balanced. It is not necessary to balance the propeller after re-pitching as long as blade angles are within 0.5° of each other. Dynamic balancing is not always necessary, but is always recommended.

Tachometer Inspection

An improperly operating tachometer can lead to propeller failure, excessive vibration or cause an engine to exceed maximum RPM limits established by manufacturers.

Proper tachometer operation and accuracy should always be checked (using the manufacturer's procedure, if available) during normal maintenance intervals.

Inspection Intervals	Inspection Type
First 5 Hours	Check Bolt Torque After Pitch Change
First 25 Hours	Check Bolt Torque
Every 50 Hours	50 Hr Per Page 12

Table 1

Torque Values	
8mm(Allen) **Bolts**	**180 in-lbs**
5/16" (Allen)	**180 in-lbs**
1/4" (12-pt)**Bolts**	**96 in-lbs**

Table 2

Pre-Flight Inspection

Perform this inspection before every flight.

IMPORTANT: After first installation run the propeller for 5 min at 50% RPM. Then check all mounting and clamping bolt torque values with Table 10.

IMPORTANT: After the first 5 hours of operation, or any blade angle (pitch) change, re-check all hub mounting bolts and blade clamping bolts torque values from Table 10.

Before each flight, 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.

The pre-flight walk-around is an important element of the process of airworthiness maintenance. It should not be merely a superficial look, but a studied review of the condition of everything that might give trouble during the forthcoming flight.

1. Carefully examine the propeller assembly for looseness, any signs of damage, excessive wear or any other condition that would make the propeller unsafe to operate.
2. Check the leading edge of blades for cracks and debonding.
3. Check the spinner and bulkhead for security, missing screws, damage and cracks. Cracks typically originate from the attachment screws.
4. Check for looseness of the bulkhead. This could be an indication that the mounting bolts are loose and need to be retightened. **After the first 25 hours of operation, all bolt torques must be checked, then every 50 hour interval.**
5. Note any indications in the logbook for future reference to determine whether an acceptable condition is getting worse.

50-Hour/Annual Inspection

In addition to the recommendations for the Pre-Flight Inspection, the propeller and spinner should be visually examined in detail after every 50 hours or 12 calender months. This will require the removal of the spinner for a detailed examination.

50-Hour or 12 calendar months inspection:

1. Remove spinner dome and examine it for damage and cracks. If necessary, replace the spinner dome. Visually inspect the blades and hub for damage, corrosion and nicks. If found, further disassembly will be required as described in steps 3-11.
2. Check torque on all accessible fasteners. If fasteners have not loosened and lost torque, and no issues are suspected of the propeller and hub, continue to step 10.
3. Write down blade angle and mark each blade with its respective orientation to the hub/ engine to maintain dynamic balance when re-assembling. Remove forward hub-half fasteners and uninstall the forward hub-half.
4. Remove each blade and inspect blade shanks for any wear. A thorough visual inspection is recommended together with a coin tap inspection of each composite blade, including the nickel erosion shield on the leading edge (see AC 43-5).
   - No dents in the metal erosion shield should be deeper than 1/8".
   - No dents should puncture the metal erosion shield.
   - No excessive wear on the leading edge.

   (If further inspection is required, return the blades to the factory or an approved propeller shop for further examination.)
5. Conditions requiring blade replacement:
   - Any hole in hollow blade shell (doesn't apply if a replacement metal erosion shield will cover hole).
   - Any crack deeper than .025".
   - Any solid tip damage that can't be trimmed off completely
6. Remove Mounting Bolts and dimensionally check against one another. Any bolts that exhibit stretching, corrosion or damage such as cracks or nicks are to be replaced.
7. Remove the Hub Mount Half . Inspect both hub-halves for corrosion.
8. Check or remove the rear spinner bulkhead to examine for missing fasteners, damage, and cracks. If damaged, replace the spinner bulkhead.
9. Check torque on optional spacer, if you remove the spacer, keep track of orientation so as not to change propeller orientation (affects dynamic balancing).
10. It is recommended to replace the Hub hardware during the 12 month condition inspection. Because the initial installation typically involves re-pitching the propeller several times, it is HIGHLY recommended the special wedge-lock washers be replaced during the 12 month condition inspection.
11. Reinstall the assembly per the above installation instructions.

2000-Hour Major Periodic Inspection

Must be accomplished by an A&P or IA.

1. Remove Spinner Dome and examine it for damage, and cracks. If necessary, replace the Spinner Dome.
2. Remove Clamping Bolts and washers, Retire both sets from service.
3. Remove the Hub Clamp Half and set aside.
4. Remove Mounting Bolts and washers and Retire both sets from service.
5. Remove the Hub Mount Half .
6. Remove the rear spinner bulkhead and examine for missing fasteners, damage, and cracks. If damaged, replace the spinner bulkhead. Check torque on optional spacer.
7. Send both hub halves and both blades to an **Approved Propeller Repair Center** for the remaining 2000 hour inspection.

NOTE: These blades do not have life limitation. There is no specified overhaul time. The propeller parts are removed from service when they can no longer meet the Continued Airworthiness Requirements.

Propeller Removal

1. Before working on the propeller disconnect the battery and make sure the ignition switch is turned off.
2. Perform installation procedure in reverse order of operation.

Suspected Impact

Propellers that have been involved in a known or suspected static or rotating impact with relatively solid objects (e.g., ground, maintenance stands, runway lights, birds, etc.) or relatively yielding objects (e.g., snow banks, puddles of water, heavy accumulation of slush, etc.) should be inspected for damage before further flight.

If the inspection reveals one or more of the following listed indications, the propeller should be removed and sent to Whirl Wind Propellers for evaluation.

- A blade that tracks out of limits or out of edge alignment.
- Loose blades in the hub.
- Any diameter reduction (tip damage).
- Visible major damage to the hub that cannot meet the Minor Hub Repairs criteria.
- Visible major damage to a blade that cannot meet the Minor Blade Repairs criteria.
- Operating changes, such as vibration or abnormal RPM.

IMPORTANT: After any propeller strike the bolts should be replaced.

Lightning Strike

Any Whirl Wind composite blade suspected of lightning strike should be inspected and may require repair or replacement.

Lightning strikes usually enter a composite blade through the metal erosion shield. If a lightning strike is present, a darkened area and possible pitting, usually in the proximity of the tip, will be noticeable.

If a lightning strike is suspected or detected, consider the blade unairworthy. Return the blade to the factory or an approved propeller repair center for further examination.

Normal Wear and Tear

The following picture shows various size paint chips on the aft (high pressure) side of a propeller blade. This is normal wear and tear, no action is needed, and there are no delaminations here. For asthetics you can use primer to fill chips, sand flush with a sanding block, and touch up with paint. Another option is to paint over with a clear coat.

Wear is inevitable on the metal erosion shield. The wear rate depends on several factors, including high operating RPM's in rain or sandy areas, FOD on taxiways and runways, etc.

Continued Airworthiness Requirements

The following recommendations will help you operate your propeller safely, keep it looking good and help it to last.

NOTE: There is no specified overhaul time. The propeller parts are removed from service when they can no longer meet the Continued Airworthiness Requirements.

- Never install a propeller unless it is a model approved for the aircraft/engine. The service history must be properly documented, and the propeller must pass a pre-installation inspection.
- A thorough visual inspection should catch a dangerous flight condition. Use touch and hearing as well as visual clues. Changes in surface roughness, unusual free play, and odd sounds indicate conditions that may affect airworthiness. Feel for roughness and look for texture changes, waviness, and changes in reflection that may signal the removal of protective coatings. Some areas may require the use of a 10x magnifying glass to identify small features or find cracking.
- The pre-flight walk-around is very important, and should be a studied review of any condition that might give trouble during flight. Refer to the **Pre-Flight Inspection** section for details.
- Do not paint over areas of corrosion on hub parts.
- Do not operate any aircraft after a propeller has been subjected to an impact without a thorough inspection. Refer to the **Inspection After Suspected Impact** section for details.
- Do not use the propeller as a tow-bar to move your aircraft.
- Apply a good quality automotive paste wax to the blades at least once a year.
- Avoid running-up in areas containing loose stones, sand, and gravel, to reduce erosion and/or damage to the leading edges and blades.
- Finish loss off the leading edge is a normal wear item and is dependent on the amount of operation in rain and grit.
- Whenever there is evidence of engine roughness, check bolt torque on both the clamping and mounting bolts, and check the propeller blades for track. The blades should track within 1/4" of each other at the tip. Rotating the propeller and reinstalling may help.
- If the bolts are inadvertently over-torqued, they should be replaced immediately.
- If your propeller blade(s) or hub assemblies begin to show any of the following conditions, it must be repaired by an approved propeller shop or retired from service:
  a. Cracks in the metal hub or bolts,
  b. Loose metal leading edge,
  c. Any crack across the blade,
  d. Any crack along the blade length,
  e. Blade impact damage with missing composite material larger than 0.5 square inches and/or deeper than 0.025"
  f. Obvious damage or wear beyond economical repair.

Example Propeller Combinations

Model	Diameter(s)	Moments of inertia	Weight	Engines	Limits
GA-RW3B-70	68", 70"	4350 kg⁄cm²	12 lbs	Rotax 912, 912s, 912is, 914 series engines	2450 RPM MAX (Propeller) 115 HP Max
GA-RW3B-STOL	75"	4350 kg⁄cm²	12 lbs	Rotax 912,912s, 912is,914 series engines	2450 RPM MAX (Propeller) 115 HP Max
RZ70	68",70"	4350 kg⁄cm²	12 lbs	Rotax 912,912s, 912is,914 series engines	2450 RPM MAX (Propeller) 115 HP Max

CAUTION – Experimental and LSA Installations Only.

This GA200L propeller is an Experimental and LSA propeller system. WWPC has designed and engineered this propeller for specific series engines with general known characteristics. However, it is impossible to know and test all possible modifications and combinations of modifications for these type engines in the Experimental and LSA category. The owner and operator of this propeller acknowledges this nature of the Experimental and LSA category and understands that Experimental and LSA engine modifications can severely limit the life and reliability of this propeller. INSTALLATIONS ON MODIFIED ENGINES MAY CREATE AN UNSAFE CONDITION THAT MAY RESULT IN DEATH, SERIOUS BODILY INJURY, AND/OR SUBSTANTIAL PROPERTY DAMAGE.

PROPELLER PERFORMANCE

In selecting a propeller, keep in mind that both aircraft and engines of the same model may vary in performance, and that operators may want different performance characteristics. For instance, one person may require a high climb rate while another seeks maximum cruising efficiency.

STANDARD PITCH / NORMAL FLYING

For normal or cross country flying, a propeller that turns up to maximum continuous engine RPM at full throttle level flight will give best all-around performance. To achieve this configuration, aim for the lowest static rpm within the recommended range.

CRUISE PITCH

A cruise propeller will turn 150 to 250 static RPM less than a standard pitch propeller. While cruise pitches will provide 4-6 mph higher airspeeds at low-altitude cruise power rpm's, maximum level flight speeds are no better than climb or standard pitches, and the take-off and climb performance will noticeably suffer. Additionally, at higher altitude the cruise-power rpm increases to max engine rpm anyway, so the standard pitch configuration then becomes a better cruise pitch configuration for altitudes above about 8,000'.

CLIMB PITCH / HIGH ALTITUDE OPERATION

For improved take-off and climb performance, use a climb pitch that will turn 100 to 200 static rpm more than a standard pitch propeller (Refer to your particular aircraft operating manual for propeller limitations). Climb pitches will typically reduce flight speeds by 4-6 mph at cruise power RPM's. A climb pitch is also recommended for aircraft operating from high density altitude runways. To achieve this configuration, aim for the highest static rpm within the recommended range. Be careful not to exceed max engine rpm when flying a climb pitch configuration.

PITCH NOTES AND LIMITATIONS

The faster the airplane, the higher the pitch setting that will be required to keep the engine from overspeeding at Wide Open Throttle (WOT). While the propeller may be structurally operated at any pitch setting from +14° through +26°, the take off RPM at WOT must meet the aircraft manufacturer's recommended limits to ensure safe flight. The propeller RPM should never exceed the engine manufacturers recommended maximum RPM.

NOTE: Certain aircraft manufacturers limit the available propeller pitch range to comply with aircraft design regulations.

Limited Warranty

We hope you enjoy your new composite propeller. We have worked hard to ensure that your propeller will meet or exceed your expectations for years to come. We offer a one year limited warranty on any defect in materials and workmanship.

In the event a unit does not conform to this express warranty, Whirl Wind Propellers Corporation will repair or replace the defective material at its place of business in El Cajon, CA, USA. Whirl Wind Propellers Corporation will decide which remedy, repair, or replacement it will provide. Any replacement of a unit or a part of a unit during the warranty period will not extend the warranty beyond the original duration. 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.

Procedure For Obtaining Warranty Service

Units or parts that are defective must be shipped prepaid to Whirl Wind Propellers Corporation at the address listed below:

Whirl Wind Propellers
1800-C Joe Crosson Dr
El Cajon, CA 92020

The unit must be accompanied by a copy of the original (Distributor or Dealer) invoice, a Return Authorization Number (which can be obtained by phoning or emailing wwpc@whirlwindpropellers.com), and a brief description of the defect.

Conditions, Exclusions, and Disclaimers

This limited warranty applies only to units that have been installed, used, and maintained properly in strict accordance with our specifications, instructions, and recommendations. It does not cover units that show abuse, alterations, improper installation, improper maintenance or repair, or improper packaging for shipment; and it does not pertain to damage due to object strike, or excessive blade wear due to operation. Overspeed of any kind or use on or with engines or equipment not approved by Whirl Wind Propellers Corporation automatically voids this warranty. This limited warranty is the only warranty provided with respect to covered units, and THERE ARE NO OTHER WARRANTIES, REPRESENTATIONS, CONDITIONS OR GUARANTEES, EXPRESS OR IMPLIED, WITH RESPECT TO THE COVERED UNITS OR THE MANUFACTURE THEREOF, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

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 to a customer or user, whether based on contract, negligence or otherwise. IN NO EVENT SHALL WHIRL WIND PROPELLERS CORPORATION BE LIABLE FOR ANY OTHER EXPENSES, CLAIMS OR DAMAMGES OF ANY KIND HOWSOEVER CAUSED, INCLUDING (WITHOUT LIMITATION) ANY OTHER PRODUCT REPLACEMENT OR INSTALLATION COSTS AND/OR ANY DIRECT, INDIRECT, CONSEQUENTIAL, INCIDENTAL OR SPECIAL DAMAGES.

The purchaser of the covered units has read, understood and, by purchasing the units, agrees to be bound by the above terms and conditions. Some states do not allow the exclusion of incidental or consequential damages, so the above limitations may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

Whirl Wind Propellers Corporation

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