



WHIRLWIND
A V I A T I O N

Manufacturer of Composite Constant Speed Propellers

Model:	400C-M14
Serial Number:	
Manufacture Date:	

Owner's Manual

400C-M14 Series

(Rev 2014-2)

WHIRL WIND AVIATION

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Congratulations on your propeller purchase from Whirl Wind Aviation!

Section 1: Introduction

To ensure many hours of trouble free operation of your new Whirl Wind propeller please read and follow the operation and maintenance recommendations in this manual.

The Whirl Wind 400C-M14 Series propeller is a composite constant speed hydraulically controlled aerobatic propeller. This fully constant speed propeller will automatically adjust blade pitch angle to maintain the selected engine RPM setting. A single acting piston (inside the hub) powered by engine oil changes the blade pitch. Oil pressure is adjusted and regulated by the engine driven governor. Once an engine RPM is selected it will be held constant at all flight airspeeds and power settings by the governor automatically.

The propeller control lever is used to set the desired engine RPM. Once the engine RPM is set, it is held constant by the governor, which maintains this preset RPM by varying the propeller oil pressure automatically. Mechanical stops for high and low pitch limit the pitch change travel of the propeller.

Whirl Wind propellers are experimental class and are not subject to any Federal Aviation Administration regulations. The operator acknowledges that these are experimental propellers and agrees to assume all risk in operating them on an experimental aircraft or any other machine. Any and all information in the owner's manual, service letters and other documentation are suggestions only and may not apply to an operator's specific application.

Section 2: Overview

2.1 Description

Whirl Wind Aviation developed the 400C-M14 Propeller System specifically for the Vedeneyev M14P and M14PF radial aircraft engines formerly used in Yakolev "Yak" airplanes.

The 400C-M14 is a 3-blade, 102" diameter counter-weighted aerobatic propeller system. It incorporates our state-of-the-art carbon fiber blades with nickel leading edge erosion shields, machined aluminum hub and 19" diameter composite spinner assembly.

Performance and Quality: The 400C-M14 propeller has been designed to maximize the aerobatic performance of your airplane. The exceptional performance is derived from advanced engineering developments including the use of our latest airfoils and tapered tip design. The 400C-M14 is a very hearty propeller system that can tolerate being flown in inclement weather and off unimproved airstrips.

Whirl Wind has made significant developments in the construction of the carbon composite propeller blades ensuring a strong, light and durable propeller system. The lightweight blades reduce the gyroscopic load on the crankshaft and assists in slow aerobatic maneuvers. The blade twist has been optimized for aerobatic performance and the wide cord provides more low-speed thrust and braking on long down lines.

The 400C-M14 Series propeller is hydraulically controlled constant speed propeller, counter-weighted for aerobatic aircraft. The propeller is designed to go to coarse pitch in event of oil pressure loss decreasing the possibility of engine overspeed. **Oil pressure is required to decrease propeller blade pitch (increase RPM).**

2.1 Construction

The 400C-M14 Series propeller blades are constructed from advanced thermoset composite materials. Each blade is equipped with a nickel leading edge erosion shield to protect the blade leading edge from debris damage. The 400C-M14 Series System includes: propeller, spinner, and all hardware needed for installation.

The 400C-M14 Series hub is CNC machined from certified aerospace aluminum alloy, which is then shot peened and anodized. The hub blade sockets are equipped with ball bearings to ensure smooth pitch change of the blades throughout the life of the propeller system. This propeller is counter-weighted to prevent engine overspeed in the event of the loss of engine oil pressure. This propeller can be flown in rain and off unimproved airstrips.

2.2 Standard Configuration For Counterweighted Propellers:

The 400C-M14 Series propeller is a fully aerobatic hydraulically controlled propeller system. In the aerobatic configuration the propeller is counter-weighted and oil pressure is required for low pitch (high RPM). The counter weights are located at the root of each propeller blade. In the event of engine oil pressure loss or governor failure the counter-weights will act on the propeller to return to high pitch (low RPM) to prevent engine overspeed.

Because of this built in safety mechanism full engine RPM will not be available and power available for climb or go-around will be limited.

Section 3

Section 3: Propeller Identification

Each Whirl Wind propeller system has a factory designated model number and serial number, which will identify the hub and propeller serial number. The propeller system blades will have individual serial numbers etched on the ferrule of each blade near the root end. All Serial numbers can be found on the owner's data sheet.

Example: 400C-M14-108

Series and Hub Style	400C-M14
Propeller Serial Number	108
Blade Serial Numbers	112, 113, 114

Section 4: Instructions For Installation

** For safety reasons always turn the propeller opposite of the usual direction of rotation.*

4.1 Propeller and Spinner Installation

WARNING! DO NOT OPERATE THE ENGINE / PROPELLER WITH ONLY THE SPINNER FILL-IN PIECES INSTALLED!

IF THE ENGINE AND PROPELLER ARE TO BE RUN WITHOUT THE SPINNER DOME INSTALLED IT IS IMPARATIVE THAT THE FILL-IN PIECES ALSO BE REMOVED. The centrifugal force will damage or destroy the fill-in pieces without the support of the spinner dome. (The engine and propeller can be operated with only the spinner rear bulkhead installed.)

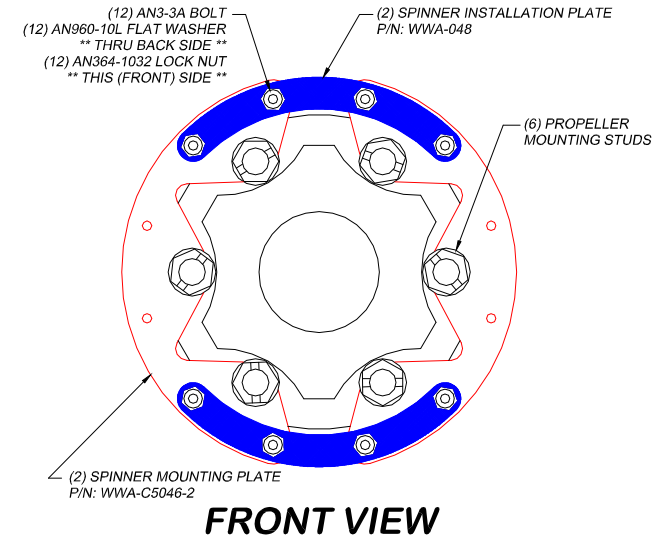
The Whirl Wind 400C-M14 Series propeller comes equipped with a composite spinner and rear bulkhead.

Note: The 400C-M14 requires the use of a splined prop flange adapter to mate to the Vedeneyev M14 engines. This adapter must be installed before the propeller can be installed. All propeller adapter and hub bolts must be tightened to 65 ft-lbs.

Step 1: Before beginning installation of the 400C-M14 Series propeller system inspect the O-Ring located in the propeller hub flange and make sure the O-Ring is in good condition.

For Two Piece Rear Spinner Bulkhead Installation:

Step 2: Using the supplied AN3 bolts and nuts, install the (2) temporary spinner installation plates as detailed below. The installation plates are provided to maintain the proper spacing of the (2) spinner mounting plates when the propeller mounting studs are tightened.



For One Piece Rear Spinner Bulkhead Installation:

Step 2: Note the factory position of the spinner rear bulkhead in the spinner dome in relation to the blade cutouts to determine its required position on the propeller hub. The spinner and spinner rear bulkhead have been number coordinated to match the blade cutout openings. Using the supplied AN3 bolts and nuts install the spinner rear bulkhead to the spinner mounting plates. The supplied flat washers are to be installed on the fiberglass side. The bulkhead is to be installed on the aft side of the mounting plates. (The standard 200C 14" rear bulkhead is an exception; it is to be installed on the forward side of the mounting plates. A slot is provided in the bulkhead so it can be slipped over the mounting plates into its forward position.) Tighten the bulkhead mounting hardware.

Step 3: After lightly lubricating the O-Ring with clean oil or O-Ring lube, carefully install the propeller on the engine crankshaft by tightening the (6) propeller bolts.

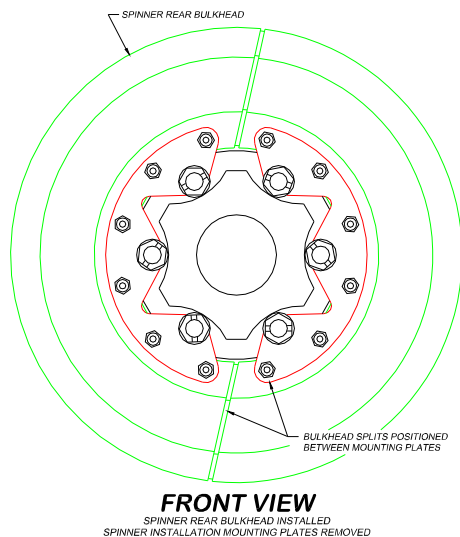
Step 4: Torque and safety wire the propeller hub bolts. Refer to data sheet for torque (dry, non-lubricated) values (65 ft-lbs for ½” hardware or 47 ft-lbs for 7/16” hardware). Safety wire the prop bolts in pairs with 0.32” stainless safety wire after installation.

*** Installation with a one piece rear bulkhead is complete. Proceed to Section 4.2 ***

For Two Piece Rear Bulkhead Installation:

Step 5: Remove the (2) spinner installation plates. Save them for future use.

Step 6: Note the factory position of the spinner rear bulkhead in the spinner dome in relation to the blade cutouts to determine its required position on the propeller hub. The spinner and spinner rear bulkhead have been number coordinated to match the blade cutout openings. Using the supplied AN3 bolts and nuts install the spinner rear bulkhead to the spinner mounting plates. The supplied flat washers are to be installed on the fiberglass side. The bulkhead is to be installed on the aft side of the mounting plates. Tighten the bulkhead mounting hardware.



4.2 Spinner Dome Installation

Install the spinner dome onto the propeller hub and rear bulkhead. The spinner and spinner rear bulkhead have been number coordinated to match the blade cutout openings.

The spinner dome has a forward bulkhead with a flanged hole that must engage the cylinder (cap) on the front of the propeller hub. The fit of the forward bulkhead to the cylinder is to be snug BUT NOT SO TIGHT that excessive force is required to push it on. If the fit is too tight, sand the inside of the forward bulkhead flange. If the fit is too loose, apply the provided Teflon tape to the cylinder. In some cases a combination of these processes will be required to obtain the proper fit.

Fasten the spinner dome and blade cutouts to the rear bulkhead using the supplied screws and nylon washers.

IMPORTANT: Periodically verify that the spinner screws are tight during the first few hours of operation.

4.3 Governor Installation

- Clean governor and engine governor mating surfaces.
- Place gasket on governor side.
- Align governor spline to engine drive and push governor up to seat against engine drive pad.
- Install governor mounting hardware and torque to 150 in-lbs.
- Attach control cable to the governor control arm with the appropriate hardware.

Note: The control arm is spring loaded to high RPM. Make sure control arm moves freely through 45 degrees of travel.

Section 5: Propeller System Operation

Throughout this manual the RPM limitations of the propeller are noted and must be strictly observed. The Vedeneyev M14 has 0.658 of internal gear reduction to drive the propeller. As such, 2,200 propeller RPM equals 3,343 engine RPM ($2,200 \times 0.658 = 3,343$ engine RPM). Please keep this distinction in mind when operating the engine/propeller system.

WARNING: Operation of this propeller over maximum RPM is strictly prohibited and may result in a catastrophic structural failure of the propeller system. Any type of structural failure may result in death or severe bodily injury. Refer to your propeller data sheet for Maximum RPM.

Be sure to limit engine power settings when performing ground run-up. Engine and propeller manufacturers do NOT recommend high engine power settings on the ground because it can result in excessive engine temperatures and propeller blade foreign object damage.

5.1 First Run-Up

To ensure proper first run-up of your new Whirl Wind 400C-M14 Series propeller system refer to your engine's operation manual for the proper run-up power setting. At the proper run-up power setting pull the propeller control lever back until the RPM drops by 300 - 400 RPM. Push the propeller control lever forward and observe RPM increase. Cycle the pitch three times to purge air out of the system. After first run-up refer to "Section 5.2" for inspection.

5.2 Inspection After First Run-Up

1. For all counter-weighted propellers verify counterweight 7/16" cap screws bolt torque to 450 in-lbs.
2. Inspect the propeller system blades and spinner for any nicks, cracks, or chips.
3. Inspect each aluminum blade ferrule and blade intersection (located at the root end of blade where the silicone sealant is visible) for movement and/or signs of chafing. There should be no movement between aluminum ferrule and blade. Notify Whirl Wind Aviation immediately if movement is detected.
4. Gently shake each propeller blade to feel for blade movement in the hub. Blade shake movement is allowed up to 1/8 inch, measured from the tip. Radial play of up to 2 degrees is acceptable. If the check shows values above these tolerances contact Whirl Wind Aviation immediately. Movement is only allowed between the aluminum blade ferrule and the propeller hub, not as described in item #3 above.
5. Inspect the nickel leading edge erosion shield. The nickel erosion shield should not be loose or have any cracks. Small paint cracks parallel to and along the edge of the shield where the nickel and paint meet are acceptable.
6. Check spinner dome and the aft and forward bulkheads for cracks of any kind or looseness.
7. No grease or oil leaks should be detected. NOTE: A small amount of grease leakage may occur in new propellers (first 2 to 5 hours) or in hot climates with high RPM conditions.
8. Before every flight the prop-control should be cycled at least twice to circulate the engine oil. In cruise flight any number of RPM settings are possible within the engine and propeller limitations. The RPM restrictions from the engine and propeller manufacturers must be strictly observed.

5.3 Dynamic Balance of the Propeller

Your Whirl Wind Propeller System has been statically balanced at the factory. However, it is recommended to have the engine/propeller dynamically balanced before the first flight.

Repeat the same inspection after balancing as for first run-up. All engine RPM and power settings limitations must be followed when operating the Whirl Wind 400C-M14 Series propeller. Refer to your Whirl Wind propeller data sheet for propeller operation limitations.

5.4 Inspection after First 2 Hours of Flight

Repeat entire inspection done in section 5.2 "Inspection after first run-up" after the first two hours of flight.

All engine RPM and power settings limitations must be followed when operating the Whirl Wind 400C-M14 Series propeller. Refer to your Whirl Wind propeller data sheet for propeller operation limitations.

Throughout this manual the RPM limitations of the propeller are noted and must be strictly observed. The Vedeneyev M14 has 0.658 of internal gear reduction to drive the propeller. As such, 2,200 propeller RPM equals 3,343 engine RPM ($2,200 \times 0.658 = 3,343$ engine RPM).

5.5 Overspeed Warning

It is possible to overspeed the propeller by rapid throttle advancement. Therefore, always adjust the power and RPM lever slowly and smoothly to avoid the possibility of overspeed.

If an overspeed occurs:

Overspeed Occurrence	Required Action
up to 110 % of the max RPM	A 50 hours inspection must be performed immediately by a certified A&P mechanic
111% to 120% of the max RPM	A mandatory teardown inspection at the factory is required
above 121% of the max RPM	<u>No further use of the propeller is permitted!</u> The propeller must be returned to the factory for inspection.

WARNING: Failure to adhere to these guidelines may lead to a catastrophic propeller structural failure. Any type of structural failure may result in death or severe bodily injury.

Section 6: Propeller System Inspection

6.1 Preflight Check

1. Inspect the propeller system blades and spinner for any nicks, cracks, or chips.
2. Inspect each aluminum blade ferrule and blade intersection (located at the root end of blade where the silicone sealant is visible) for movement and/or signs of chafing. There should be no movement between aluminum ferrule and blade. Notify Whirl Wind Aviation immediately if movement is detected.
3. Gently shake each propeller blade to feel for blade movement in the hub. Blade shake movement is allowed up to 1/8 inch, measured from the tip. Radial play of up to 2 degrees is acceptable. If the check shows values above these tolerances contact Whirl Wind Aviation immediately. Movement is only allowed between the aluminum blade ferrule and the propeller hub, not as described in item #2 above.
4. Inspect the nickel leading edge erosion shield. The nickel erosion shield should not be loose or have any cracks. Small paint cracks parallel to and along the edge of the shield where the nickel and paint meet are acceptable.
5. Check spinner dome and the aft and forward bulkheads for cracks of any kind or looseness.
6. No grease or oil leaks should be detected. **NOTE:** A small amount of grease leakage may occur in new propellers (first 2 to 5 hours) or in hot climates with high RPM conditions.
7. Before every flight the prop-control should be cycled at least twice to circulate the engine oil. In cruise flight any number of RPM settings are possible within engine and propeller limitations. The RPM restrictions from the engine and propeller manufacturers must be strictly observed.

6.2 50 Hour Inspection

1. COUNTERWEIGHTS: For all counter-weighted propellers verify counterweight 7/16" cap screws bolt torque to 450 in-lbs.
2. BLADES: Inspect the propeller system blades for any nicks, cracks, or chips. Inspect blades for cracks in the composite skins and nickel leading edges. No cracks are allowed in either. If cracks are present return propeller for repair to a Whirl Wind Aviation service center.
 - Inspect the cambered side of each blade for chord-wise cracks and the entire blade for any delamination of the composite skin or obvious discoloration.
 - Small cracks parallel along the nickel edge are allowed as long as the leading edge is not loose. Scratches or chips should be sealed up as soon as practicable.
 - In case of any questionable conditions, please contact the service department of Whirl Wind Aviation.
3. BLADE FERRULES: Inspect each aluminum blade ferrule and blade intersection (located at the root end of blade where the silicone sealant is visible) for movement and/or signs of chafing. Gently flex the blade at the tip to check for any movement between the aluminum ferrule and blade root – no movement is allowed. There should be no movement between aluminum ferrule and blade. Notify Whirl Wind Aviation immediately if movement is detected.
4. BLADE MOVEMENT: Gently shake each propeller blade to feel for blade movement in the hub. Blade shake movement is allowed up to 1/8 inch, measured from the tip. Radial play of up to 2 degrees is acceptable. If the check shows values above these tolerances, contact Whirl Wind Aviation immediately. Movement is only allowed between the aluminum blade ferrule and the propeller hub, not as described in item #3 above.
5. LEADING EDGE: Inspect the nickel leading edge erosion shield. The nickel erosion shield should not be loose or have any cracks. Small paint cracks parallel to and along the edge of the shield where the nickel and paint meet are acceptable.

6. SPINNER: Remove spinner and check for nicks, cracks or chips. Check spinner dome and the aft and forward bulkheads for cracks of any kind or looseness. Also inspect for any signs of chafing.
 - Ensure secure attachment to the hub.
 - Check AN3 bolt on aft bulkhead for tightness.
7. GREASE: No grease or oil leaks should be detected. NOTE: A small amount of grease leakage may occur in new propellers (first 2 to 5 hours) or in hot climates with high RPM conditions.
8. FLANGE BOLTS: Check propeller flange bolts for tightness (65 ft lbs).
9. Before every flight the prop-control should be cycled at least twice to circulate the engine oil. In cruise flight any number of RPM settings are possible within engine and propeller limitations. The RPM restrictions from the engine and propeller manufacturers must be strictly observed.

Section 7

Section 7: Propeller System Maintenance

There is no special maintenance schedule for the Whirl Wind 400C-M14 propeller system beyond the usual inspections listed in Section 6 and the teardown inspection schedule listed below. It is recommended that the operator apply a high quality paste wax on the blades at least once a month to aide in protection from the elements - it is important that the blades are always sealed from outside moisture. Automotive materials such as Acryluathane paint and Epoxy resin can be used to repair most small scratches and chips.

7.1 Teardown Inspection Schedule

Refer to the original propeller data sheet for recommended teardown inspection schedule. If the original data sheet cannot be found, please contact Whirl Wind Aviation directly to confirm the recommended schedule for your propeller.

7.2 Use of Propeller Log Book

1. Proper maintenance of this logbook is the owner's responsibility. It is an important record designed for the owner's information and protection.
2. If the propeller is sold or installed on another aircraft the logbook should be transferred with the propeller. New owner information should be registered with Whirl Wind Aviation by calling 440-275-1540.
3. It is recommended that maintenance release tags and work orders be attached inside the back cover of this book. If a copy of the work order is not available, the repair station and work order numbers should be referenced in the logbook entry.

Section

8

Section 8: Propeller Log Book

8.1 Maintenance & Service History

Date:	Total Propeller Time	Total Time Since Overhaul
Description of Work		Repairman & Repair Station Certificate Numbers

Date:	Total Propeller Time	Total Time Since Overhaul
Description of Work		Repairman & Repair Station Certificate Numbers

Date:	Total Propeller Time	Total Time Since Overhaul
Description of Work		Repairman & Repair Station Certificate Numbers

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Description of Work		Repairman & Repair Station Certificate Numbers

Date:	Total Propeller Time	Total Time Since Overhaul
Description of Work		Repairman & Repair Station Certificate Numbers

8.2 Transfer of Ownership

Please complete this form upon transfer of ownership and return to Whirl Wind Aviation, PO Box 190, Austinburg, OH 44010 U.S.A.

Propeller Model: **400C-M14**

Propeller Serial No: _____

Date Transferred: _____

Original Owner

Name: _____

Address: _____

City, State, Zip: _____

Phone No: _____

Notes:

New Owner

Name: _____

Address: _____

City, State, Zip: _____

Phone No: _____

Notes:
