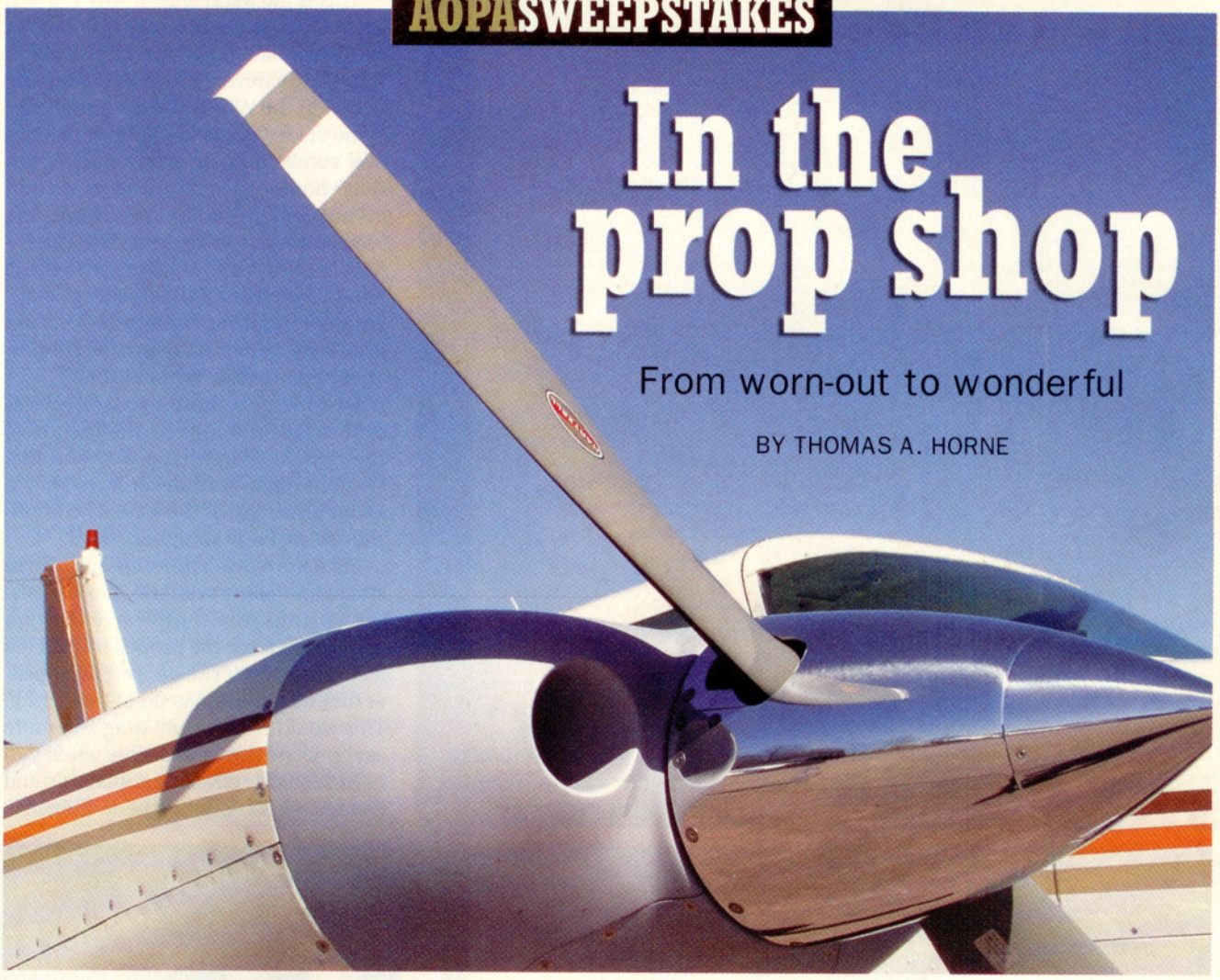


In the prop shop

From worn-out to wonderful

BY THOMAS A. HORNE

For the most part, propellers do their work without complaint. We count on them to work flawlessly each and every time we fly, and don't give them much of a thought—except perhaps during the preflight inspection. Maybe it's because propellers whirl away invisibly as we fly.

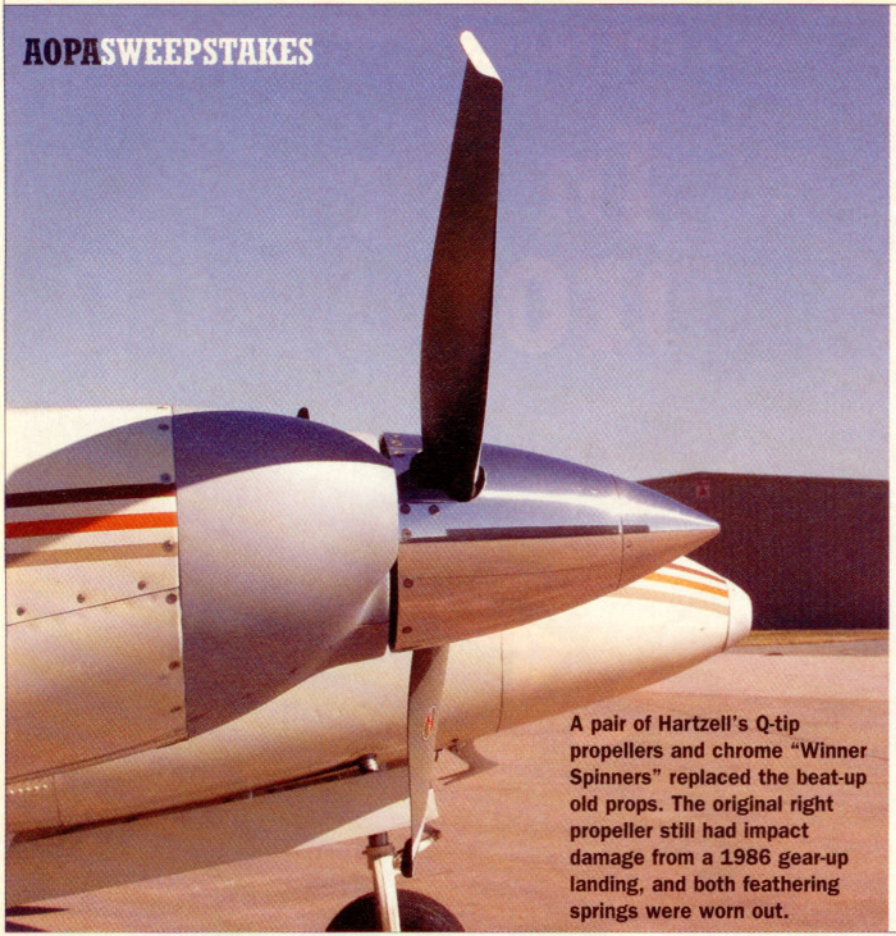
So it comes as no surprise to learn that most propellers—be they fixed pitch or constant speed—receive little or no routine maintenance, attention, or overhaul. This in spite of manufacturer recommendations that propellers be inspected and overhauled at prescribed intervals.

The AOPA Win-A-Twin Sweepstakes gave us a somewhat shocking affirmation of propeller neglect when it came time to have our 1965 Piper Twin Comanche's Hartzell propellers inspected as part of the restoration process. The props were sent to Tiffin Aire Inc., of Tiffin, Ohio. There they were completely disassembled and checked. Our hope was that they could be reconditioned and returned to service.

But no! Tiffin Aire found so much wear, corrosion, damage, and other anomalies that it would have cost us nearly $11,000 per propeller to have them repaired. With a pair of brand-new Hartzell Q-tip propellers costing $17,200, we opted to junk the old props and buy new.

Tiffin Aire's report on the right propeller tells of the toll that 39 years' worth of wear and tear have taken. Corroded and worn parts ranked high on the report, but outright damage was also in evidence. Perhaps most alarming was the impact damage to the propeller hub, and the bent pitch-change rod. Obviously, this damage occurred back in 1986, when the airplane had a gear-up landing. Were inspections and repairs documented in the airframe logbooks? Not explicitly.

You hear colloquial knowledge to the effect that manufacturers set extremely conservative wear standards, and that it's possible to safely fly with moderately worn components. But according to Steve Reindel, a customer service representative for Hartzell, "We have to be conservative. A rotating propeller has 10 to 20 tons of centrifugal force exerted on it. A small area of corrosion or pitting may be OK at one point in time, but the danger is that pitting and corrosion can become cracks."



A pair of Hartzell's Q-tip propellers and chrome "Winner Spinners" replaced the beat-up old props. The original right propeller still had impact damage from a 1986 gear-up landing, and both feathering springs were worn out.

This is the main reason why Hartzell has established recommended time between overhauls (TBO) for its propellers. With some newer propellers, like the Q-tips in the Win-A-Twin, those times come at six-year or 2,400-hour (whichever comes first) intervals. A five-year, 2,000-hour TBO is the standard recommendation for most other propellers used on aircraft flown under FAR Part 91.

Which brings up an important point: Under Part 91, propeller and engine overhaul recommendations are just that. There is no regulatory imperative to perform overhauls.

Of course, common sense dictates otherwise. Just look at the results of the Win-A-Twin's prop inspections. Without them, we'd never have known about the extent of the wear. The implications are fairly straightforward.

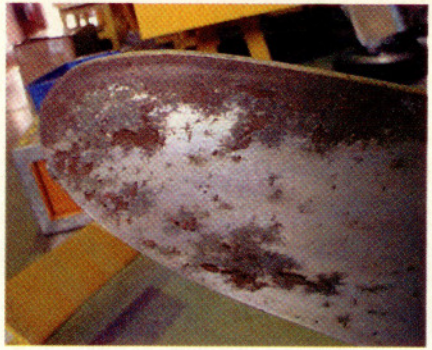
Take the worn feathering springs. In an engine-failure scenario, those worn-out springs might not have enough strength to force the propellers into the feather position. The danger? A propeller that windmills instead of feathering. This would create more drag and more asymmetric thrust at a time when you need to quickly clean the airplane up and configure it for optimum performance.

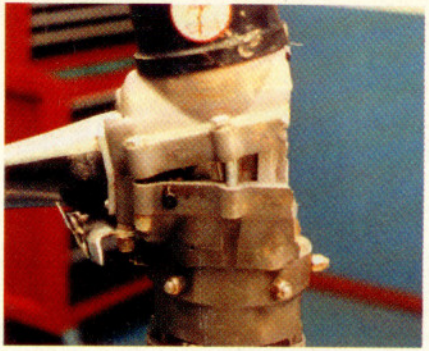
Or the corroded preload plate. Cracks or corrosion in the plates' set screws could cause them to break off and lodge in the hub, freezing the propeller at a fixed pitch.

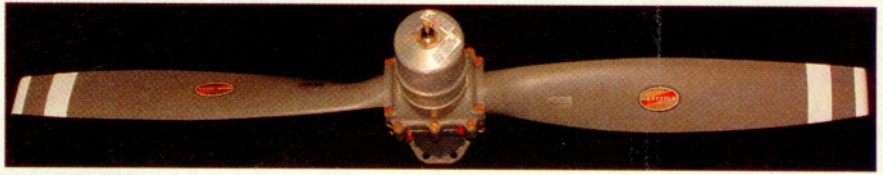
Hartzell says that propeller governors should be overhauled at the same time the propellers are. The main concern here is to make sure the overspeed governor properly does its job. As you can imagine, a propeller overspeed can have disastrous consequences. Stresses in the prop hub can build to the breaking point, causing the blade retention clamps to fail and the propeller blades to separate. A propeller flying off is bad enough, but what's worse is the subsequent vibrations. They can be bad enough to tear an engine off its mounts and render the airplane unstable and uncontrollable.

While fixed-pitch propellers don't have the complexity of constant-speed versions, both require careful examination of the blades during the preflight inspection. Small nicks in the leading edges or blade faces can set up stresses that can lead to cracks and blade failures. Any doubts about the propeller's integrity? Better ask a mechanic.

Buying new propellers certainly gave us peace of mind. Thanks to the new overhaul limits (made possible in part by a new style of hub with painted internal surfaces to prevent corrosion) we—and the Win-A-Twin's next owner—have a new lease on life.

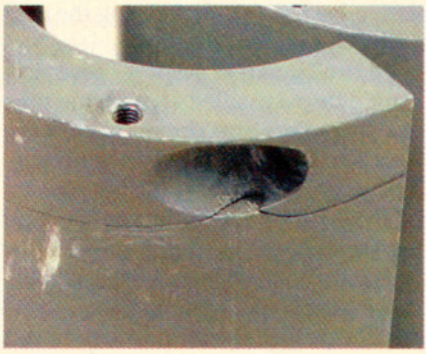


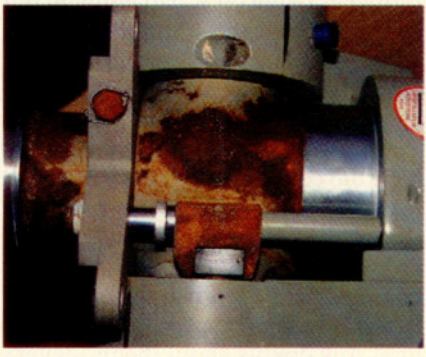




This parade of defects shows why props should receive more attention. Corrosion (top, left and right) on a blade face can lead to cracks; each area of corrosion produces multiple points for crack initiation. A hub's undetected fatigue crack (above) propagated to the point of complete hub failure.

What about those Q-tips, you ask? Are they purely cosmetic? Hartzell says there are two advantages. One is that the propellers' normal diameters are reduced by one inch. This keeps dirt and small stones farther from the blade tips, and keeps tip erosion during ground operations to a minimum. Noise reduction is another plus. The curl of the Q-tip acts much like a winglet, smoothing out the vortices—and therefore the noise—





Corrosion on a blade clamp's inboard surface (top) caused it to fail. Corrosion on the hub, pitch change fork, and clamps (above) sent this prop to the junkyard.

caused by low-pressure air moving to high as the propeller tips reach the supersonic speeds of high power settings.

But the Q-tips do have an undeniable ramp appeal. They get the looks, get the comments, and it's difficult to resist touching them. And how many times do we hear the wisecracks about landing gear-up? Always. They invoke the story about a hapless flight standards district office official who, upon spotting his first Q-tip propeller, began writing up its pilot for a violation. "Honest, they're supposed to be that way!" came the defense. The report was allegedly filed, and the case was heard. In the hearing, the propeller manufacturer gave a presentation about its line of Q-tip props, and the ticket-happy official received his comeuppance. AOPA

i Links to additional information about the AOPA Win-A-Twin Sweepstakes may be found on AOPA Online (www.aopa.org/pilot/links.shtml). Keyword search: Win-A-Twin.

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