

What's Proper for Props

Some answers to common questions about overhauls, danger signals, and day-to-day care

by PAGE SHAMBURGER / AOPA 22129

■ Nervousness about the possibility of losing part of a prop often is the cause of a wider yellow stripe on the backs of airplane drivers.

Think about it. If that prop doesn't stay on, you're not going to stay up there for long, even if you carry spares on other engines. Doesn't it make good sense to treat that metal or wood blade with kindness?

I went to the new Sugar Valley Propeller Service—a certificated prop shop at Sugar Valley Airport near Mocksville, N.C.—to find out how.

First off, all props have a life span the same as your plane's—if nothing goes wrong. Most of them have a built-in, look-see necessity called "overhaul," and your own TBO depends on your prop, the model, the type, and what the book says. Don't try to cheat on that; it's your neck.

As an example, my own prop is a Model 278 Beechcraft (on a "K" Bonanza), and the experts say that one will

go 1,500 hours. I got nervous about it when it reached 1,340, mostly because Beech kept sending reminders about a possible pitch-bolt failure in that model. Successive bulletins said to replace that pitch bolt within five years, then at overhaul, then *soon*.

I called Sugar Valley. You see, for years work on props—both overhauls and unbending—has been in the exclusive few, big, certificated shops. This is understandable when you think of the many thousands of dollars required to set up such shops and the few (comparatively speaking) propellers going

around in this country. Those big shops, of necessity, lean more towards big props, i.e., those on corporate and airline multi-engine, flown-many-hour planes.

You can't blame those big shops, but we little airplane drivers have been faced with paying a lot of dough, suffering from lengthy down-time, and shipping our prop sometimes a great distance each time we zap a blade into terra firma, or the time runs out between overhauls, or something in there just doesn't turn right.

The era of the few big shops is ending, and that's why I called Sugar Valley. It's new, certificated for all props, up to and including those used on twins, and it's not far away from my home. The two owners, Gary Herman (with 12 years of experience working on props in Piedmont Aviation's shop) and Tim Henderson (a copter and prop mechanic), do all the work themselves. They have no intentions of outgrowing us little fellows.

So they gave me an estimate for my controllable-pitch prop: \$225. The Beech fix-kit for the pitch-bolt AD note is \$131.50, and they said they could do that at the same time. They didn't mention any extra labor needed for that installation (and, naturally, I didn't!), and to add a little gravy, they were delivering a prop near my home airport and would pick mine up that same afternoon, free.

They're both pilots—Gary is an instructor and an ATP—and they own a Comanche for prop pickup and delivery at a reasonable mileage charge, if you choose.

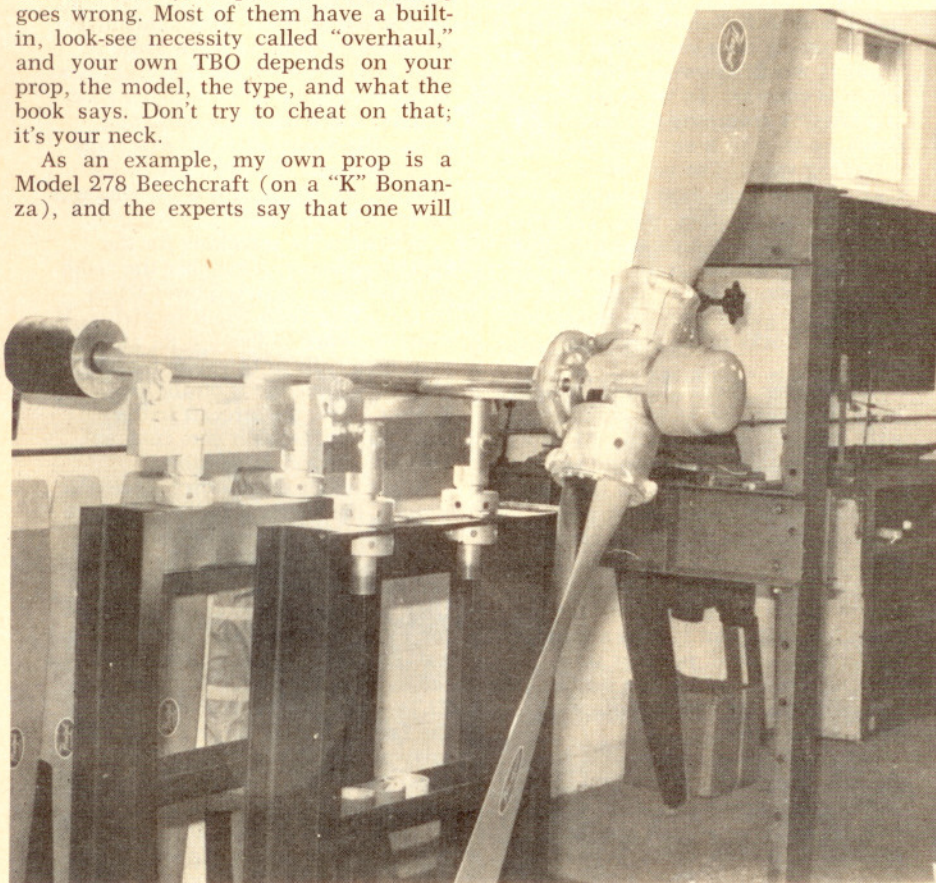
A day and a half later, my prop was finished as promised. The bill comprised the \$225 of the estimate, \$131.50 for the Beech kit (no extra labor on that), and \$7.60 for parts carefully itemized as seals, placards, and decals. Cheap? No, but certainly less expensive in dollars and down-time than I had expected.

So just what does a prop shop do to a prop in overhaul? You're asked first how you want that prop finished—mirror-finished, anodized, or painted. You've probably never thought about that, so let's look at them in order.

Mirror-finish is beautiful to look at, like well-polished silver. You've seen it gleam from the front end of some proudly owned homebuilts, even some corporate planes. But to keep that shine, you must either love to rub or have a copilot you can order around and don't like. It takes almost daily labor with Never-Dull or some similar polishing agent. Without that, the lovely finish becomes dull, and you can bet that the outside world's horrors of pollution and corrosion already have started eating into naked metal.

Anodizing is coating metal either by chemical or electrolytic means. An anodized finish shows up as pale gray film on the prop's face. This one is okay, but the shield between bad agents and metal props is very thin, so thin that a scratch from, say, another piece

continued on page 73



With a balancing rod like this one, a prop shop can detect even the smallest deviations in propeller balance. Photos by the author.

of metal, even a dime, can start opening the door for corrosion.

Sugar Valley's experts recommend painting, though it costs them more in dollars and time. Now this isn't ordinary paint, but a tough gray coat (seen mostly on Hartzells right out of the factory) made up of five components—an expensive mix made especially for the job. That's the longest lasting and best armor your prop can have.

After you've decided on the finish, what next? The blades are hand-ground smooth. Out go the nicks; off goes the corrosion with rough, then medium, finally finest sandpaper. To be doubly sure, good prop shops use both dye-penetrant and Magnaflux to look for hidden cracks. The newest system is an x-ray box with delicate probes to scout out potential danger beneath the metal surface. This box is called "Eddy Current 520" and is much used at Sugar Valley to make sure there is no damage at the bottom of nicks and on the insides of hubs.

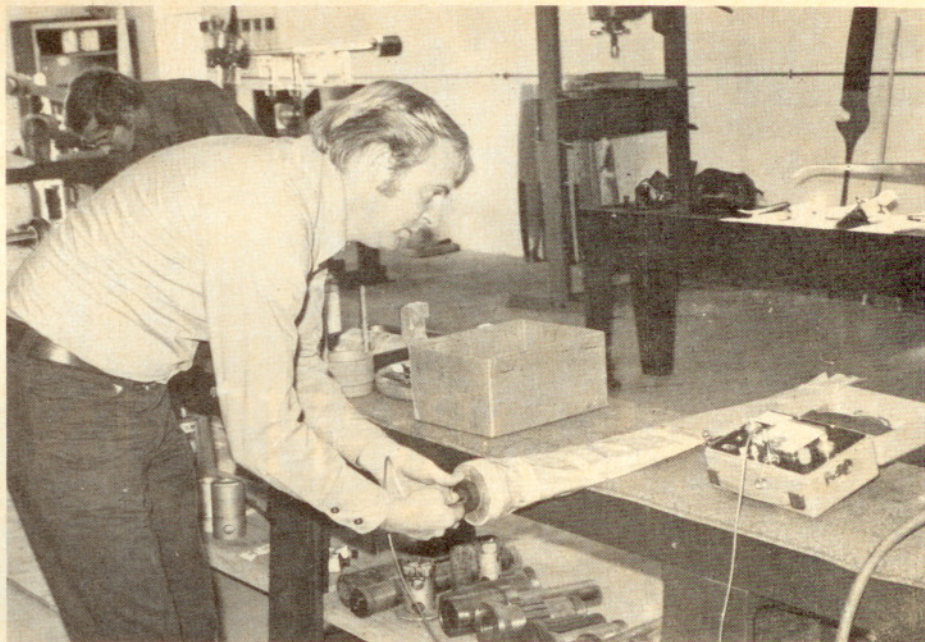
Next, the prop is carefully checked for trueness and correct pitch, then balanced. Machines do an important job in these chores, but the pitch is checked or set by hand at some of the smaller shops like Sugar Valley.

"Yes, there's a machine for that, too," explains Gary, "but it's very expensive. We'd rather spend our money for equipment to do a job we can't do equally well by hand. Maybe hand-set pitch does take longer, but it's just as good." Gary and Tim have already invested \$28,000 in equipment, and that doesn't even count the variety of stands, etc., they've built themselves. No wonder prop repair has always been the domain of the big shops!

Then your prop is painted or finished to your order, greased (preservative added where possible), and wrapped to await pickup.

Another point you'll need to consider in deciding whether to go to a small or a large shop: If it's a prop shop *only*, and it's fighting to establish itself, the men will go the extra distance of cleaning corrosion from parts rather than automatically going the quicker and more expensive route of replacement. If a part—for instance, a clamp I saw at Sugar Valley—can be recovered by grinding, it will be. Providing, that is, that the fix is as good as new. You save—well, in this instance, \$104—for new clamps.

I wish I could give you the exact cost for your prop if it needs overhaul. I can't. A listing of the hundreds of different fixed-pitch and constant-speed props and their prices would fill this space. You simply have too many variables. Using this one small shop as an example, Gary and Tim base their flat-rate costs on a combination of the Blue Book's figures (sure, there's a book for that, too) and their own work/time study. The estimate they give customers is based on a rate of \$10 per hour for



Using an Eddy Current 520 gray box with a special probe, Gary Herman checks a prop hub for cracks inside.

the time they think will be required; thus, if problems with a particular prop take them longer than they'd figured, they lose money.

Let's back up and talk about bent prop tips. They can be straightened by a *good*, certificated shop probably three times—that is, if the bend is within tolerances. The tighter the bend, the more doubtful the recovery. Measuring the bend is part of the law.

Some prop shops are certificated for tip bends; a lot of the big shops aren't and don't want to bother. Not only to be legal, but to assure the safety of the only neck you've got, do not, repeat *do not*, just stomp on that bend and eyeball it for straightness. Take it or send it to a properly certificated prop-repair station. It doesn't cost that much (one I saw had a \$30 bill attached), and losing part of a prop can be lethal.

Many of the props now flying have AD notes. If yours does, do check it out immediately.

Here are the answers Sugar Valley gave me about warning signs of a prop going bad. Gary and Tim stress first that you must keep the prop clean so you can *see* nicks, corrosion, or cracks.

Nicks, particularly those five inches to one foot from the tip, are dangerous. Check those out and be sure that when they're filed smooth, the filing goes all the way to the bottom of the nick. The top, or widest part of the nick, is not what causes the trouble; it's the part deepest into the blade.

With a constant-speed prop, if the rpm's hang up during the runup, watch out. If the problem isn't caused by the governor (check that first), then you know you've got prop troubles. Excessive looseness of the blades in the hub can be dangerous. Some props are built to give a little at the hub; others are not. If you can move yours back and forth, ask a mechanic who knows those specs.

Look for any signs of grease coming down the prop blades, and don't automatically blame them on an engine leak. (Remember that engines use *oil*, not grease.) Grease in a prop hub is important, and it should stay there, not run down the blades. Watch for those warning stains; some seal or some vital hub part may be going.

Run your hand down the propeller blades. If you can feel waves in the blade on a newly acquired bird, the last straightening job may have been performed under the stomp-and-eyeball system, and that could be deadly.

Of course, do not fly with a prop with obvious bends or any deep nicks. Keep your eyes open for missing nuts or bolts, and never, never ignore unusual roughness in the way a prop runs. That could be a sign of a blade ready to part company with you.

As to hints on keeping props happy, the Sugar Valley chaps said to keep those blades clean, even lightly waxed, and greased as the specs call for.

Do not push or pull on any prop tips when moving the airplane. Don't let linemen do it either, even if it makes you unpopular. If a prop must be used as a handle for moving the plane, push or pull *only* near the hub. Not only is tip-pushing dangerous (the prop could kick over), but muscle versus airplane weight, with that much leverage, is sure to bend thin tips—and even large blades can bend fairly easily. (The smaller-type trainers, such as 150s and Yankees, have very thin prop tips. Back and forth a few times and that tip can sling off from metal fatigue.)

So there you have it. Be gentle with your Hartzells, McCauleys, Hamilton-Standards, and Sensenichs. Don't run them up over loose gravel or sand if you want their lives to be long and smooth. It simply boils down to doing unto them as you'd have them do unto you. □