

PLASTIC PROPS AND FREEWHEELERS

by Wally Ferrell

Wally Farrell, recently retired occupational therapist, is a longtime member of the Flying Aces Club (FAC) and the D.C. Maxcutters. He is one of the top aces in the FAC with more than 350 competition victories.

My primary interest in Free Flight has been FAC rubber scale ships. Many fliers use plastic props to power them up and I have a few thoughts on some modifications that you might find helpful. There are also some ideas about front ends in general. Much of this material has been presented in various newsletters or taught to me by other fliers. Let me express my thanks to them for writing and showing me the ropes. Here we go:

1. **Prop Diameter** - The rule of thumb I started out with was that the prop should be about 30% of the wingspan. However I've moved toward 40%. So for example, a 16" dimer would get a prop of 4.8" diameter at the 30% mark and 6.4" diameter at the 40% mark. (As a side note, I fly most of my dimers on 6" props). This is a big difference in diameters but it gives a good range from which to work.

Prop diameter is one of the very interesting variables in Free Flight. You might be able to go beyond these guidelines depending on the wing area, decalage, dihedral and fin size of your ship. Why do you want a larger diameter prop? Well, larger diameter props will spin more slowly, giving an extended cruise. The downside of larger props is that you will have more torque effect under power. All freewheeling props will pull your airplane to the right in the glide, and a bigger prop will have a much bigger effect on the right hand glide.

2. **Balancing** - Most of the plastic props need balancing. This can be done quite simply by scraping (preferred) the heavy tip, or by adding CA glue (or paint) to the lighter tip. Here's a method: Put a piece of 1/32" wire in the prop shaft, hold it horizontally and give the prop a light spin. The heavy blade will come to rest at the bottom. That is the one to scrape. You want the prop to come to rest in a neutral position when you are done. Balancing the prop will improve efficiency by decreasing wobble caused by unbalanced blades.

3. **Scraping props** - I believe (and this is not based on science), that lighter props turn better. After reading online a little bit, there are apparently some strong opinions on this. I figure it is better for the rubber to spend its energy turning a lighter prop. On smaller planes, like peanuts or Phantom Flashes, scraped props are nearly a necessity, just in terms of keeping the nose light. I usually support the blade on something like a random spray bottle or can I have around and use a larger X-acto blade or stiff Single edge razor blade to do the scraping. Be careful. If I am serious about it I will first do some of the "major" removal with a sanding drum on my drill press. A light touch is needed on the drill press to avoid burning through, but it really speeds things up and I'm always in a hurry. Every now and then when I scrape a prop, it will distort. I throw them away and start over.

4. **Getting more pitch by decreasing prop diameter** - Okay, here's the deal. Let's say you need a sassy new 7" prop for your latest ship. You can just pull one out of your stash, sure. But you might want to consider cutting down an 8" prop. Why? Well, you will wind up with a better P/D. Let's assume that your 7" prop has a pitch of say, 7.7" for a P/D of 1.1. Your 8" prop has a pitch of 8.8", which is still 1.1 for that 8" prop. If you cut down the 8" prop, you now have a 7" with a 8.8" pitch .. and a P/D of 1.25.

5. **Re-shaping props** - this is something I do on a regular basis. I am a fan of using more of a Larrabee-shaped prop, with the chord of the prop being widest at the 40-50% mark. To learn more about the Larrabee props, there is an excellent article written by Sergio Montes from 2007, which is available through the PFFT archives found at the Volare website. Maybe what I

am actually doing is pseudo- Larrabee but I trim off some of the leading and trailing edge of the standard prop. I believe this is improving efficiency some.

6.Re-pitching props - This is again something I am inclined to do but it is a little fussier. You will need to have a pitch gauge or jig. I think you can bend in to 1.3 P/D without too much difficulty. You can use pliers. There may be some stress marks. The caution here is that you do not want to twist in any forward or backward sweep of the prop blade so take your time. If you really want more pitch, consider adding a small amount of heat judiciously applied. Don Srull has been urging me toward increasing the pitch to 1.5 P/D. There are some big benefits to this. The cruise is longer, and the glide is improved in that there is not as strong a tendency for the freewheeling prop to pull the plane to the right. The "cost" of increased P/D is that you may need more cross-section of rubber.



Front Ends In General

1. **Keep it tight** - One of the mistakes I see fairly often is that noseblocks are executed in such a way that they are loose. Maybe they didn't start loose but they have been shimmed out so far that they become so. The single most frequent cause for an airplane that will not repeat its flight path with any consistency is that the noseblock is loose. Noseblocks should be constructed so that if you hold your ship nose down, the prop does not fall out. There should be enough friction that you have to gently push it into place. There are several methods you can employ, including those nice small "Moses" magnets to hold it on. You need to do a very careful inspection and make sure the matching surfaces of the prop block and fuselage front end are dead flat. Any opportunity for rocking will occur. I've had several fliers tell me the tension of the rubber band will hold the noseblock in. Don't believe it. That rubber motor is following the path of scientific chaos inside the fuselage and could care less about steadying your noseblock. Trust me on this.

One of the major boons for noseblocks (and trimming in general) is using the Gizmo Geezer nosebutton. It allows you to add down/side thrust without shimming your noseblock out of position. I wrote a more detailed article on using the Gizmo Geezer nosebutton for the FAC newsletter about 2-3 years ago.

2. **Freewheelers** - I use .047" wire for the prop shaft on 95% of my ships. I routinely take a plastic prop and drill it out with a #52 drill bit, just the tiniest bit larger than the hole that is already there. I then take a piece of 1/16" O.D. brass tube, (with the thin wall that accepts .047" wire) and insert it into the prop. You want to be sure that the prop spins quite freely but is not a sloppy fit. Ream it just a little with the piece of brass tubing if you need to. I then cut the brass

shaft so that it is longer than the prop shaft. How much longer will depend a bit on which of the three freewheelers I am going to use. This in turn will allow the brass shaft to take the tension of the braided motor while the prop is able to spin freely. I always use those small brass washers between the nosebutton and prop (or brass prop bushing). I don't usually use beads unless I am trying to clear a cowl.

There are three types of freewheelers I use with plastic props: the Struck Freewheeler, the Bail and the Nason freewheeler.

The Struck is very easy to make and I always back it up with thread as shown. This has been a very reliable system. The Bail system requires soldering with silver solder but has the strong advantage of allowing on-the field switching of the prop, a real boon when trimming a new ship.

The Nason clutch (also described in the PFFT archives) is great for hiding inside a spinner and is the freewheeler most likely to re-engage if there is a "hiccup".

3. **Shop around** - There are some really nice plastic props out there. In addition to the ubiquitous Peck props, there is a nice 6" Ikara prop, and the white Easy Built props are also very good. Try stuff out!

I hope that this information will be helpful. [have been incredibly fortunate to have found the FAC, and have benefitted from the generous advice of so many fliers over the years. Thanks to you all! I am eager to pass along information; it's part of the fun!



