

Northwest Sport Race — there are no secrets!

By John Thompson

Revised from *Flying Lines*, Issue No. 203

Can you build a simple Brodak profile CL model kit?

Of course you can!

That means you also can build a competitive Northwest Sport Race airplane. Order the kit now, and a Fox .35 Stunt engine, and you could be flying your first race in a couple of months.

The rules of NWSR are simple:

Kit airplanes of profile design (which meet certain minimum specifications) are powered by stock Fox .35 or O.S. .25 LA engines. The rules allow certain simple modifications that make the plane more suitable for racing; these are not difficult nor do they enhance performance.

Races are similar to standard AMA-type contests: Participants fly preliminary heats of 70 laps (5 miles), with one required pit stop. The top planes from the prelims go to a 140-lap (10 mile) feature race requiring two pit stops. There can be from two to four planes aloft in each heat.

There are details, and all are listed in the Northwest Sport Race Rules available from *Flying Lines*. However, the entire rules fit on one page and they're not difficult to understand. The things you need to know can be explained as answers to a few questions:

What airplane can I build?

The airplane must be a design that has been manufactured as a kit. You can build it from the kit, or you can build it from scratch. *Your finished airplane must be an accurate representation of the kit design!* Right now, one choice for a NWSR plane available in kit form is the **Brodak Super Fly**. This airplane was designed for NCLRA (National Control Line Association) Fox Racing, which is similar to NWSR.

Other choices include the Brodak Super Clown, Brodak Tomahawk, Brodak Buster, old-style Sterling (S-1) Ringmaster or similar. Have fun making your own choice, but follow these basic guidelines for best results: Use a kit design that has a mid-wing (not high- or low-wing), and that has a fairly thin airfoil (rules allow a minimum 1-inch-thick wing). Do not choose an airplane with a thick, aerobatic airfoil, such as a Flite Streak. These are not suitable for racing, because

they are difficult to handle in multi-plane circumstances, under windy conditions and hard to land in racing style.

What engine can I use?

The stock Fox .35 Stunt engine is the only engine allowed.

Can I modify the airplane?

You may make internal changes which strengthen or lighten the airplane. You may change the landing gear configuration from the kit design. *You may not make changes to the external dimensions or shapes of the airplane.*

Can I modify the engine?

You can change the needle valve and spray bar assembly. *No other modifications are allowed, and the performance-enhancing Fox hemi/stuffer kits are prohibited.* You may take the engine apart and flush it out, and reassemble, making sure that everything is properly tightened down and that there are no leaks or binds. Careful break-in per Fox instructions will result in a good-running racing engine.

How should I build and set up my NWSR airplane?

Generally speaking, you can build the plane just as it comes in the kit (or plans). Most commercially manufactured kits don't need any particular lightening or strengthening. There are a couple of things that you should do to make your plane a true racing plane, and a couple of other allowed modifications that can be considered optional.

Essential setup guidelines:

Controls: You are going to set this plane up for level flight, not for aerobatics. Therefore, you want a detuned control system.

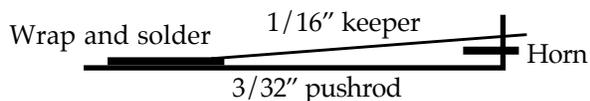
Use a full-size (3-inch) bellcrank, and put the leadouts in the outer holes of the arms. Put the pushrod in the inner hole, nearest the bellcrank hub. At the tail, use a tall elevator horn, and put the pushrod in the hole farthest from the elevator. This will result in a plane that has very little elevator travel, and it will take a lot of arm movement to get control response. This makes for a plane that will have enough control to climb and dive as necessary in racing traffic but will fly level smoothly and land predictably.

You will also balance the plane slightly nose-heavy, for the same reasons. You do not want an airplane that will do stunts!

Do not use threaded quick links, ball links or other such hardware on your pushrod; they will

fail under racing conditions. Use only music wire with L-bends or Z-bends for your pushrod ends.

Tail end pushrod connector assembly



See the diagram above for a bulletproof tail-end connection.

Landing gear: Use a one-wheel gear, positioned just slightly ahead of the center of gravity. At this position, the plane will land without bouncing and roll well along the ground. Note that a 2-inch wheel is required.

The best landing gear is an aluminum sheet gear, bolted into the fuselage on the inboard side. During construction, it would be a good idea to bury some hardwood between the doublers at the landing gear mount location, so that the gear will be securely mounted. You can also use a wire gear; if you choose to do so, make a main leg of 1/8" music wire and a 3/32" supporting strut — and again, bury hardwood where the landing gear will mount. Remember, racing planes take a lot of pounding; a flimsy landing gear will not last long. Both a sheet aluminum gear and a wire gear can optionally be buried inside the fuselage. However, I recommend bolt-on (use clips for the wire style) so that the gear can be replaced if necessary.

Optional allowed enhancements:

There are a few things you are allowed by the rules to do which are not essential but might make your plane last longer and possibly even perform a little better:

Fox stunt engines vibrate quite a bit; anything you can do to stiffen and strengthen the front of the airplane could help assure that your horsepower goes into forward motion rather than into shaking the airplane. I've been told that the Brodak Super Fly, mentioned above, is particularly susceptible to vibration; if you are building one of these, consider strengthening the fuselage to prevent vibration as suggested below.

Some kit designs have short maple engine bearers. Substituting longer bearers — running them back past the leading edge of the wing — will result in a stiffer, stronger fuselage, less prone to vibration and fatigue.

The outboard plywood doubler can be replaced with an aluminum doubler. This will strengthen

the front end and help prevent vibration. A thicker inboard doubler also reinforces the nose.

If you use an aluminum doubler or an aluminum plate of any kind under the engine, bear in mind that Fox .35 engines' motor mount lugs are not parallel, so mounting on aluminum directly would tend to twist the crankcase. One way to prevent this is to use thin plywood "crush plates" between the engine lugs and the aluminum it's mounted on.

What not to do: Remember, you are not allowed to do anything that changes the airplane's external configuration: Don't clip the wings, leave off the canopy, shorten the rudder, etc.

Finishing:

Your sport racer will lead a hard life. It will be landing at high speed and being caught by your pitman, for example.

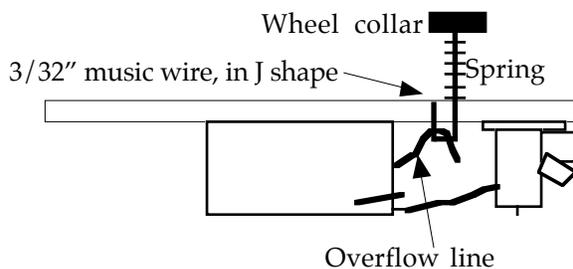
I recommend covering all fuselage and tail section areas with lightweight fiberglass cloth, using dope or, better yet if you can find it, epoxy finish to apply the cloth.

Decorating your plane to make it look nice is always fun, but make sure the finish is sturdy. Use Monokote or similar easily repairable plastic finish on the wings and an epoxy or dope finish on the fuselage.

How should I set up my engine?

There is no real setup necessary. A clean, well-broken-in stock engine is all you need. You may substitute an after-market needle valve and spraybar assembly if you want to get finer needle valve response.

Uniflow fuel cap-off device shown oversize for clarity



How do I set up the fuel system?

You need a fuel tank that will run about 50 laps, and less than 70 laps. Fifty laps will give you the mileage you need for the required number

of pit stops in the heat and feature races. A tank of about 2 ounces should give you this mileage. Be sure to buy or build a *uniflow* tank. This is a tank with the fuel pickup tube and the filler tube going to the same location at the back outboard side of the tank. This will give you a consistent engine setting throughout the flight.

Now, here is the one tiny bit of technology you will have to build into your sport racer to go along with the above advice about tanks:

A uniflow tank requires that the overflow tube be capped when the airplane is in flight. Because you will be rapidly refueling the tank on your pit stops, you will want to build a simple spring-loaded pinchoff gizmo so that you don't need to waste time uncapping and recapping the overflow. You just squeeze the pinchoff device when fueling and let go when the tank is full. See the diagram above for how to make very simple pinchoff, using a piece of music wire bent into a "J," a small spring and a wheel collar. Two holes drilled through the fuselage and bushed with brass tubing complete the job.

What accessories and support equipment do I need?

- Propeller: You should try various different props to see what works best on your plane. A good starting place is the ZZ NWSR prop, available from Mike Hazel. Make a trip to the hobby shop and get several props to test, starting with 9x6 or 9x7 props, and variations on that theme.
- Handle: Use a sturdy, narrow-spaced handle, preferably one with a front crossbar so you can hold it with both hands.
- Racing accessory basket: Assemble a small mechanic's basket containing your battery, fueler bottle, prop/plug wrench, spare prop and spare plug. Do not take a lot of extra tools and repair gear to the circle; it will only get in your way.

What else do I need to know?

Study the rules as published in *Flying Lines* Issue 198 for details not covered in this article. A copy of the rules is available from John Thompson if you don't have Issue 198.

Pitting and piloting techniques

This subject is dealt with in greater detail in the "Racing Tip Sheet" available from me. This will be included in the "Racing Made Easy" packet mentioned above, and may be the subject of a future *FL* article.

But here are a few pointers:

Piloting:

Like any competitive event, you will need to take your airplane out and practice. If you can find a regular teammate, this will really help.

First, the pilot should learn to fly with more than one plane in the air at the time. It will not take long to get the hang of this.

Secondly, the pilot and pit man should work together on making quick pit stops.

First, a few tips for the pilot.

Your takeoffs should be smooth — not skyrocketing straight up—but you need to get the plane off the ground and begin stepping back into the pilots' circle immediately. Sport racers are slow accelerating, so you will need to make sure you have good tension from the launch — don't be shy about hauling on the lines to keep good tension.

Once in the pilots' circle, keep up with your plane (remember, you are flying it; it's not flying you!). Do not let the plane get ahead of you; always keep the lines going out straight, not angled forward. Walk as small a circle as possible; try to keep your handle in the center of the circle and going around as small a circle as possible. Don't be afraid to rub shoulders with the other pilots — they expect it. You are not allowed to whip or "walk the backside" of the circle, but you can tighten your circle up as much as possible. This is better for you — and makes flying easier for everyone.

You pass above and others pass your plane above. Fly smoothly — no wild ups and downs.

When your engine quits, tow the plane around to the pit man — don't make him chase it. Land after the plane passes the last pit ahead of yours and just before you get to your pit. Your pitman will catch your plane as you come in.

Pitting:

Practice until you can fuel the plane and start it quickly every time.

On the initial start there will be a warmup sequence; for example, you may warm the engine at 2 minutes, 1 minute and 30 seconds in the countdown. When the starter says "go," you should be able to flip the prop once, remove the battery and launch the plane.

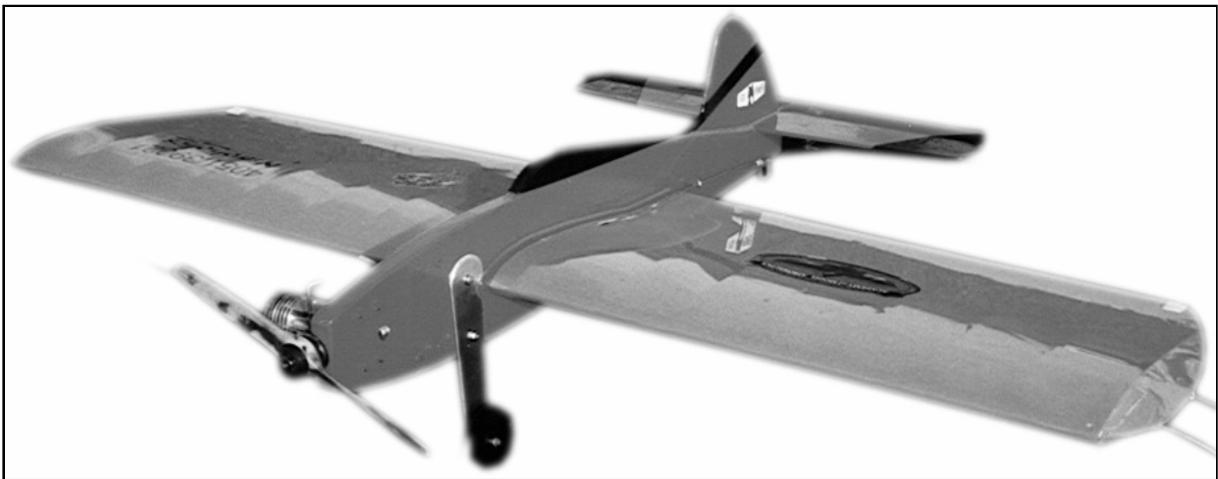
On pit stops, you are going to douse the engine head with fuel for cooling, connect the fueler bottle, squeeze the overflow pinchoff, add fuel, connect the battery and flip the prop. There's a sequence to all this, and every plane likes things done a little differently. Practice will tell you

just what order to do things in. For example, your setup may require you to squeeze fuel for an instant after you release the pinchoff — or to stop squeezing before you release. Practice and find out what works.

The key to pitting is not to do things right the first time. Do not hurry! Just carefully do everything you are supposed to do — catch, cool with fuel, squeeze overflow, fill tank, connect battery, flip prop, remove battery launch — and do it right the first time. Calm pit stops are quick pit stops!

Racing is one of the most fun — and most easily learned — competitive events. It doesn't take much investment to get a lot of enjoyment from your NWSR plane. If you get started now, we'll see you on the field next season!

Questions? Contact John Thompson at johnt4051@aol.com or via Flying Lines.



Above is a typical Northwest Sport Race airplane, a Brodak Super Clown, as raced by the Nitroholics Racing Team. *Flying Lines photo.*