OV-10 BRONCO

by Rich Uravitch

An easy-to-fly, giant-scale twin for everyone

SPECIFICATIONS

Model: OV-10 Bronco
Type: giant scale
Span: 81 in.
Length: 79.5 in.
Wing area: 1,215 sq. in.
Weight RTF: 13 to 15 lb.
Wing loading: 24 to 28 oz./sq. ft.
Engine range: .46 to .60 2-stroke; .70 4-stroke
Engine used: O.S. .46FX
Channels req'd: minimum of 4; 6 with flaps and retracts

Comments: absolutely the easiest, the most economical to build, the most fun to fly twin-engine, flap- and retract-equipped, giant-scale warbird that I have designed.

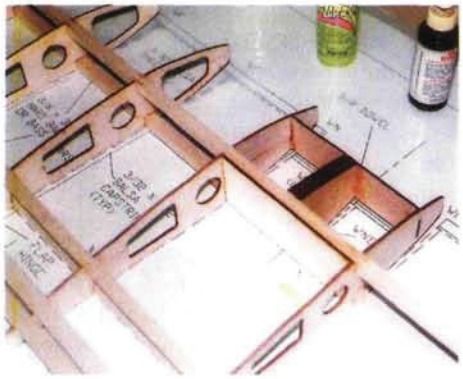
PHOTOS BY RICH URAVITCH

It's hard to believe that five years have passed since I designed the OV-10 in its original 52-inch-span version (*Model Airplane News* plan FSP11951). I designed it as a "first twin" for sport-scale fliers who might want to grab some "multi-engine" points without committing to a lifelong project or breaking the bank. It used a pair of "sport" .25s—O.S.* 25FPs—and flew very well, even with one engine out. A lot of them have been built by modelers who took the time to drop me a note to say how much they enjoyed it. Some even sent pictures; believe me, there are some very talented modelers out there! More often than not, they suggested that I should make a larger version, perhaps a .40 to .60—made sense to me; after all, it's generally accepted that "Bigger flies better" and that a lot of modelers have joined the giant-scale ranks. The question was just how big should I make it? Well, the magic number for the wingspan seems to be 80 inches. That's the monoplane span criteria established by the IMAA. I decided to take a look at a larger version that would, I hoped, fill the same bill as the original, i.e., it would be simple and affordable and designed for sport engines and inexpensive, off-the-shelf retracts.

Enlarging my original plan by about 50 percent made the wingspan what I wanted, but an 80-inch Bronco turns out to be very large because the real airplane has a relatively short span to begin with; its length is nearly the same as its span. So, could I make this 80-incher meet the same general criteria as its smaller predecessor? Some structural changes to beef up the wing, the incorporation of retracts and flaps, and a control-system modification were all it really took. I had a model that looked as if it would work! So if you've been considering trying a twin–one that satisfies a lot of requirements–you might want to take a close look at this project.

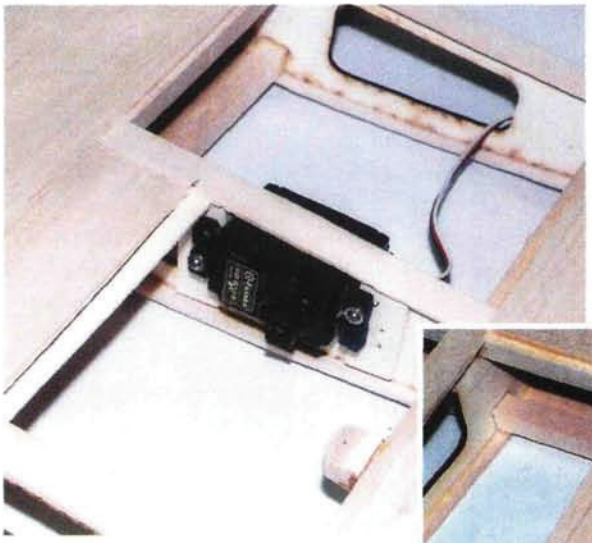
IT'S A LOT EASIER THAN IT LOOKS ...

I can't give you a blow-by-blow description of each construction step, but I will touch on the unique or important issues. If you've built any of the box-style trainers so prevalent these days, then you already have most of the building skills required to frame up a Bronco. It basically consists of building three box-shaped fuselages and a constant-chord wing with no dihedral. This allows you to build the wing directly over the plan on a flat surface; just make certain the surface is flat. I drew the wing in two panels so that I could build them separately and then join them. To begin construction, I usually pin all the lower sheeting into place over the plan and then add the lower capstrips and the lower spars, followed by the ribs. In addition to providing a slightly more rigid structure, this method reduces the lower-surface sanding required to blend the sheeting with the capstrips.



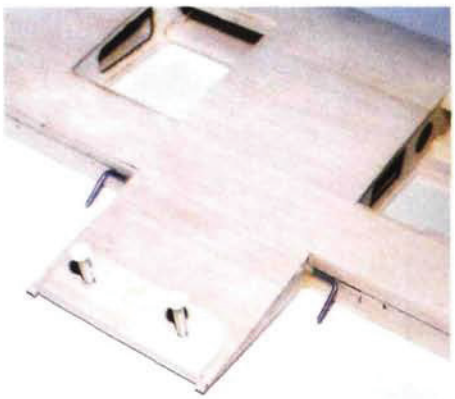
Pin the spars to the protected plan, add the ribs and start the sheeting. Assembly proceeds rapidly with the constant-chord, no-dihedral wing. Here's the wing at the nacelle attachment area; note the lite-ply spar web and laminated dowel receptacle.

Prepare all the required laminated ribs, and install them along with scrap filler blocks, flap linkages and other items before proceeding with all the upper sheeting and capstrips. This is also a good time to fit the aileron and flap servos in their appropriate rib locations. You will need to tailor the openings in the ribs to suit your servo choices. These servos are mounted directly through the rib, and access is gained through removable panels in the lower sheeting. When mounting the servos, be certain to add a scrap of additional lite-ply to the rib to accept the servo-mounting screws. I also suggest that you fabricate some light paper tubes through which you'll run the servo-extension leads. Although there are holes in each rib for the wiring, it is a lot easier with a conduit installed. Add the upper sheeting, capstrips and sub-LE, and you've almost finished. Attach and shape the balsa LE; choose either balsa blocks or the vacuum-formed wingtips for installation; sand everything to a fairly smooth finish. Now it's time to cut away the flaps and ailerons. Cap their LEs and the openings created in the wing, then temporarily fit and install your favorite hinge system. Install the flap-interconnect linkage securely, and final-sand the wing.



The aileron and flap servos are mounted directly on the ribs, as shown here. Cut the hole in the rib to fit your servo, and make sure to add scrap lite-ply under the servo-mount points.

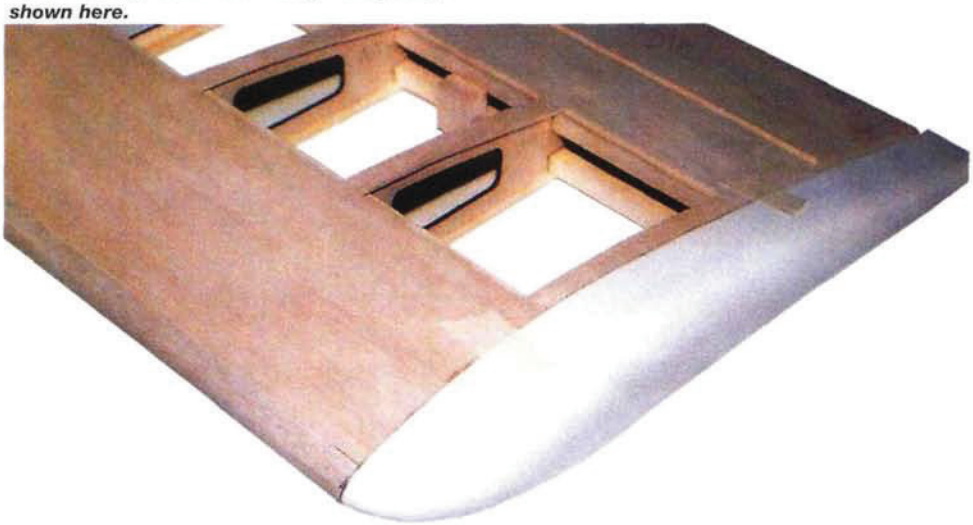
The removable covers on the lower wing surface allow easy access to the aileron and flap servos.



The flap-interconnect linkage consists of a length of ⅛-inch music wire inside a brass tube bearing. Here you see the wing's right nacelle attachment point that uses a pair of ¼-20 nylon bolts. Don't forget the lite-ply reinforcing plate for the bolts.

The sheeting has been applied to the wing along with the LE and capstrips.

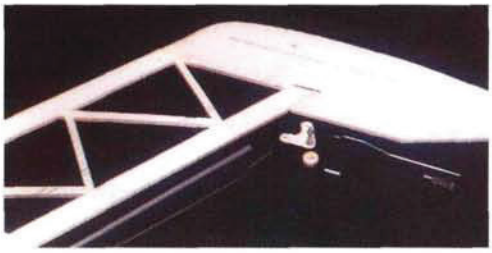
You can carve the wingtips and hollow them out or use my vacuum-formed plastic parts, as shown here.



FUSELAGE AND NACELLES

The fuselage and nacelles are about as easy to assemble as they come; they consist of lite-ply sides and bulkheads plus some longerons for strength and to allow you to round the sharp edges somewhat. Note that the fuselage formers (bulkheads) F4 through F7 are actually assembled from ¼x¾-inch lite-ply or basswood strips. The remaining bulkheads are cut from ⅛-inch lite-ply. When you install the bulkheads, make certain that they are square and that you haven't built any twist into the assemblies. The only bulkhead that should not be square is the right-hand nacelle firewall. It should be installed to provide 3 degrees of right thrust to help with those rare engine-outs.

Before you add the upper and lower 3/32-inch balsa sheeting to the nacelles, install the internal portion of the elevator and rudder pushrod linkages, which may be

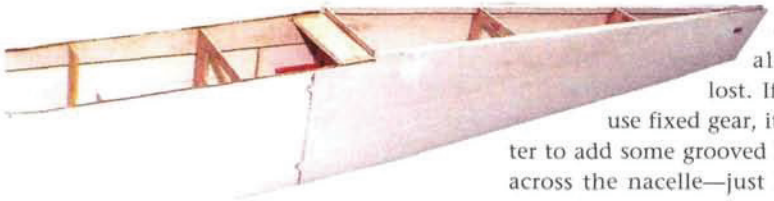


Elevator-actuation-linkage parts. The nylon tube and vertical pushrod will be built into the fin before it is sheeted.

face. The elevator linkage, housed in the nacelle, is equally direct but is connected to a bellcrank mounted on the outer inboard surface of the nacelles at the location shown on the plan. The other end of the bellcrank is connected to a wire that runs inside a tube in the vertical fin.

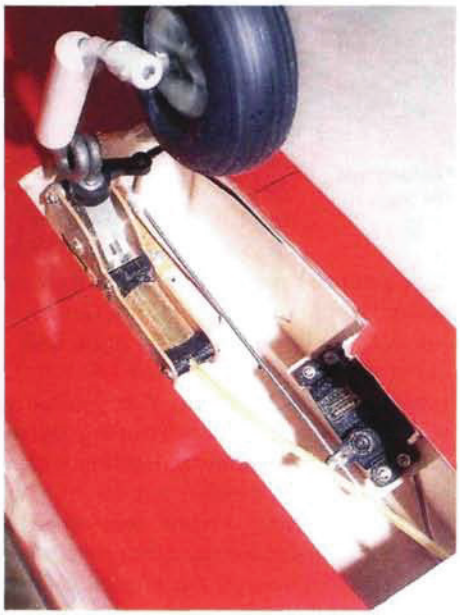
I assumed that you would want your Bronco to have retracts, so the plan doesn't show any fixed-gear installation. The three Broncos completed from this plan all use the Spring Air* units with custom struts, and they continue to perform well. They are rugged and simple and will automatically extend if allsystem air is lost. If you do wish to use fixed gear, it is a simple matter to add some grooved hardwood blocks across the nacelle—just like the installation that's typical of most of the sport models with which you are probably already familiar. The nose-gear unit—retract or fixed—is simply bolted to the 3/16-inch birch ply F3 bulkhead.

Built-up nacelle prior to the addition of the top rear sheeting and equipment installation. Like the fuselage, the structure is simple and rugged, and it's easy to build.



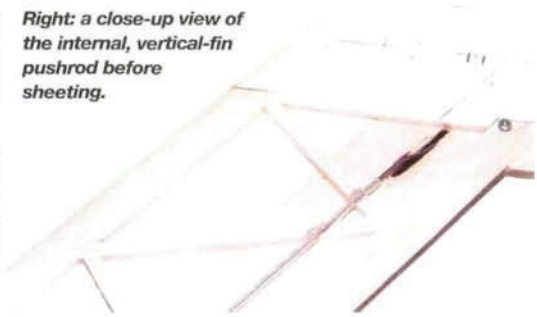
Internal layout of the nacelle showing foam-wrapped tank (top of photo), throttle servo and rudder and elevator servos. The Spring Air retracts are just visible near the center of the photo.

Nyrods or the solid pushrod type. The rudder linkage is straightforward; it uses a simple pushrod directly from the servo to the rudder horn on the rudder's inside

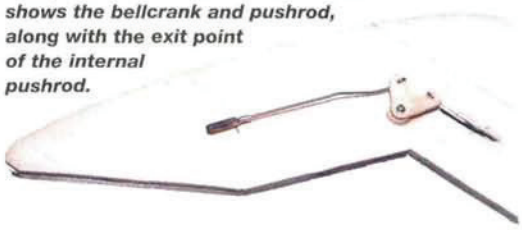


The Spring Air retractable nose-gear installation. This view shows the strut and steering servo—a simple setup.

Right: a close-up view of the internal, vertical-fin pushrod before sheeting.



Here, the left vertical fin's inner face shows the bellcrank and pushrod, along with the exit point of the internal pushrod.



SIMPLE TAIL GROUP

The empennage consists of the horizontal stabilizer and elevator and a pair of vertical fin and rudder assemblies. These are built up from balsa framework and ribs that are then sheeted on both sides. The stabilizer framework incorporates four alignment dowels that ensure the proper

The stab attachment locks have been glued to the inside face of the vertical fin; this allows the stabilizer to be bolted into place rather than glued.

incidence when the model is assembled. If you plan to make the stabilizer removable for transportation, it would be a good idea to install aluminum bushings in the framework through which the 6-32 assembly bolts will pass. Since the vertical fins also house the tube and pushrod wire that connect the actuation bellcranks, I suggest you prepare the basic framework, sheet one side, cut carefully through the framework to install the wire/conduit and then sheet the other side. Since, for appearance, you want the pushrod to exit through the fin's inside face, mark the fin appropriately before you apply the sheeting. Don't forget to install a small, birch-ply hard-point to which you'll attach the externally mounted upper bellcrank. This system is simple, it works extremely well, and it has

The fuselage's forward end. A balsa block has been used for the nose piece, but the vacuum-formed plastic part is also available.

been virtually trouble-free on all three prototypes. Just remember to make all the wire-to-bellcrank connections slop-free.

All that remains of the building end of this adventure is the application of all the sheeting and planking where necessary, the fabrication and attachment of all the other parts—nose cap, rear fuselage cap, engine cowls and wingtips, etc. Unless you really love carving block balsa, consider purchasing these components in a convenient, ready-to-use form. I just happened to have these vacuum-formed parts, since I had to do the carving. If you use the plastic parts, permanently attach everything except the cowls. The fit should be very close, requiring just a touch of filler to blend with the surrounding wooden structure. Add some basic cockpit goodies such as instrument panels, glare shields and whatever other things you choose to dress things up with (nothing looks emptier than a flat cockpit floor). A final sanding and ding-filling session should have you near the point of covering. Install the engines, tanks and throttle linkage and fit the cowls. If you tilt the engines on the firewalls to approximately the 10-o'clock position, the muffler can be tucked neatly underneath the wing, close to the nacelle. Having your spinners on hand when you fit the engines on their mounts will make things much easier.

I used two O.S. .46FX 2-strokes in the prototype. The engines have been tilted to the 10-o'clock position to provide better muffler clearance.

ASSEMBLY TIME!

Bolt all the airframe components together for the first time and step back. Looking at the result of your efforts in its ready-to-cover state for the first time is gonna get you goin'; if it doesn't, check your pulse! It would also be a good time to check everything else you've done along the way: wing-to-nacelle/fuselage fit, stabilizer-to-fin alignment and general surface preparation, etc., because we're closing in on the fun stuff—finishing!

If you're like many of us scale guys, long before you ever ordered the plan for this baby, you already had a paint scheme in mind. And that's the way it should be; always have your documentation on hand before you start a project. It minimizes problems later on, and more important, it gives you something to think about while you wait for the plans to arrive.

My original Big Bronco was finished in the same Navy scheme as I used on the smaller version years ago. I thought it was attractive and visible then; it seems even more so now. Flying buddies Ted Rufo and Gene Davis were the guinea-pig "plan provers" on this project, and Ted chose a Marine Desert Storm-type scheme for his Bronco (tan over light blue MonoKote* with dark green Cheveron* flat paint sprayed on for the camo). As I write this, Gene has his ready for finishing, but he is still undecided on a finish; I think a USAF FAC scheme would be great! You probably won't have a problem finding paint schemes for your Bronco; deciding which one to use might be quite a different matter! If you decide to paint, remember to save a little paint for the canopy framing. Add a pair of your favorite pilot figures, secure the canopy, and you should be ready to go!

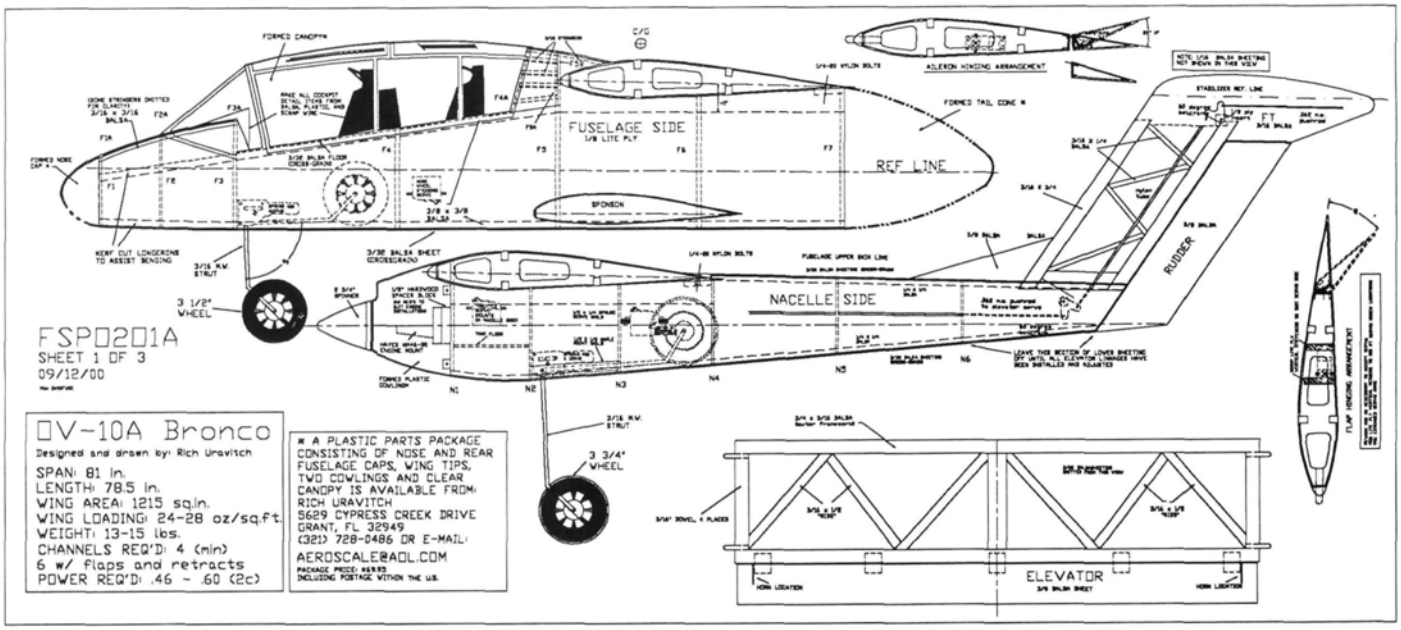
PROPER PREFLIGHT!

When it's time to test-fly your new Bronco, do yourself a huge favor: do all your homework at home! Check the CG with the gear retracted, as there is a slight rearward shift of weight (the struts and tires) when it's retracted. Homework assignments also include running the engines, cycling the gear, checking for leaks and working the controls to make certain they follow your command. Look away from the model, move the sticks, and have someone else tell you which control is moving which way. You'd be amazed at how many test-flight crashes are caused by control throws being reversed, even after they've been checked on the ground.

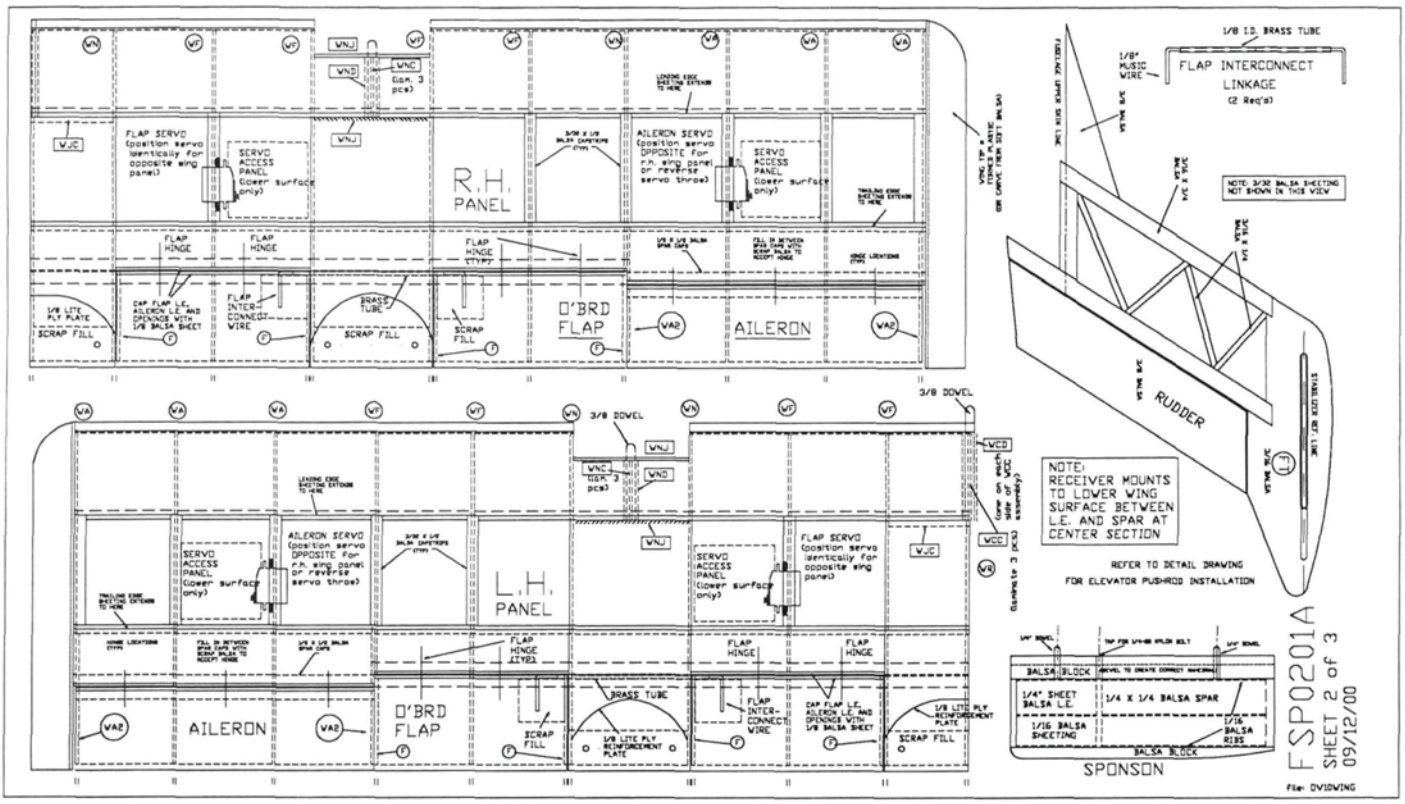
Here's a little tip about multi-engine throttle settings. It is not necessary, on any twin, to get every last rev out of the engines. If you feel it is, install larger engines. As a rule, I adjust the weaker of the two engines to a couple of hundred rpm off peak and then adjust the other one to match. It's a safe setting—one that is far less susceptible to quitting because of going to an over-lean condition as a result of fuel draw or related problems. I've reached the point at which I use a tach only to verify what I hear, and believe me, there is nothing like the sound of a twin when the engines are on song and talking to each other! Doing all this prep work has some real advantages. If any problem arises, you'll be able to remedy it in the comfort of your workshop with tools and materials readily available. The result is that when you do eventually head off to the field, you'll be able to field the many questions that always come with the appearance of an exciting new model, nonchalantly set up your model, fire up the engines and have them settle into a beautiful idle. It doesn't get much better than this!

BRONCO PARTS

To speed your building process, I have a plastic parts set that consists of the nose and rear fuselage caps, two wingtips, a pair of cowls and a huge, clear canopy with the framing molded in. I also have available Spring Air retracts with the 3/16-inch music-wire struts bent specifically for the Bronco. The plastic parts set costs $69.95, including postage; the retract set, with all air accessories, costs $200. They may be ordered directly from me at: Rich Uravitch, 5629 Cypress Creek Dr., Grant, FL 32949; Aeroscale@aol.com.



To order the full-size plan, turn to "RC Store" on page 200.



The test flight of your Bronco, if it's anything like the two I've done, will almost qualify as a non-event. The tricycle gear keeps it heading where you want it on the takeoff roll, rotation is clean, and climb-out is crisp. All the flight controls are responsive but not sensitive. You'll be absolutely amazed at how effective the flaps are when they're extended for landing. The model slows down dramatically, and you can almost point the nose at a spot on the runway and fly it there with throttle. It is very aerobatic—not TOC aerobatic, but scale aerobatic. The rolls require a little pitch correction if you want to keep them axial, loops are big and round, and stall turns, eye-watering!

This Bronco has more than achieved the objectives I had for it when I started the project. It's a multi-engine, giant-scale warbird that uses sport .46 to .70 engines, off-the-shelf retracts and non-exotic building materials; it's also quick to build and flies easily. I hope you've decided to enter the RC multi-engine fraternity by building your own OV-10. It is unique, exciting and as about as non-intimidating a way to get into flying a giant-scale twin as there is. I hope you enjoy yours as much as I do mine. As always, if I can be of help, drop me a note. In the meantime, order the plan and get started! This is your year to get your multi-engine rating!

**Addresses are listed alphabetically in "Featured Manufacturers" on page 158.* ✈