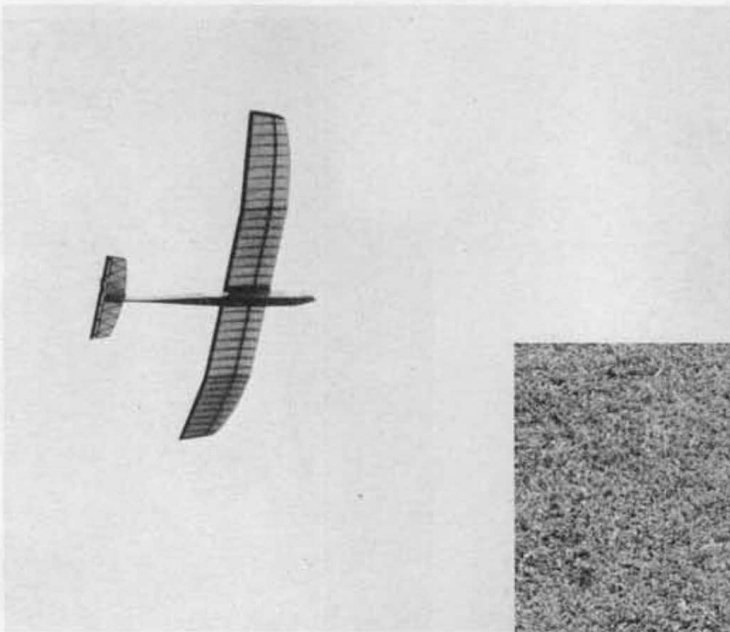
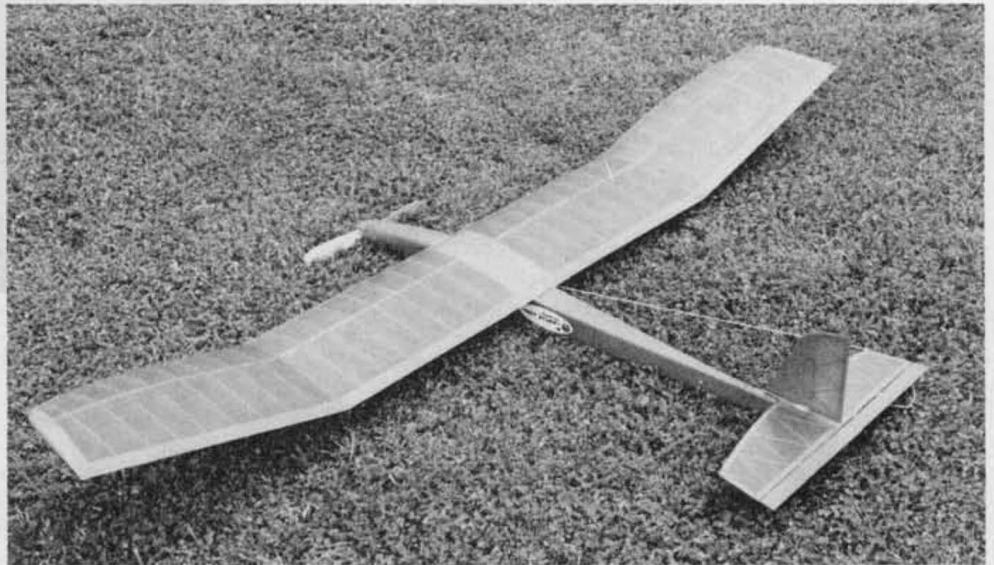


Astro Challenger



By **BOB BENJAMIN**. . . Our cover artist put down his palette long enough to review a fine new electric R/C model with a folding propeller to aid its efficiency.

• During the last few years I often found myself on the scene when one of the local R/C fliers was trying to get an electric job going. Too many times the results were far from satisfying. Although I got to fly electric airplanes on several occasions by being asked to do test flight honors, I wasn't convinced that I wanted to get involved. Then last summer I had the chance to meet Mitch Poling and watch him and several other experienced Seattle area modelers make their electric airplanes perform the way they were supposed to. I was impressed! As the year progressed, other local fliers kept coming to me for help with their electrics because they saw me having success with other types of models, and I began to see that a lot of the bad experiences resulted from a poor choice of equipment. I had



read enough to know that Astro Flight has earned a solid reputation as a pioneer in electric flight and as a producer of consistently high quality equipment, so I got in touch with Bob Boucher, explained my situation as a modeler with lots of experience in other areas who wanted to get started right in electric, and asked him what he would recommend. The result was my highly rewarding relationship with the Astro Challenger and the Astro Cobalt 05 system.

Although I have done a fair bit of flying of slope and thermal sailplanes and was quite active a few years ago in SAM R/C Oldtimer competition, this is the first electric sail-

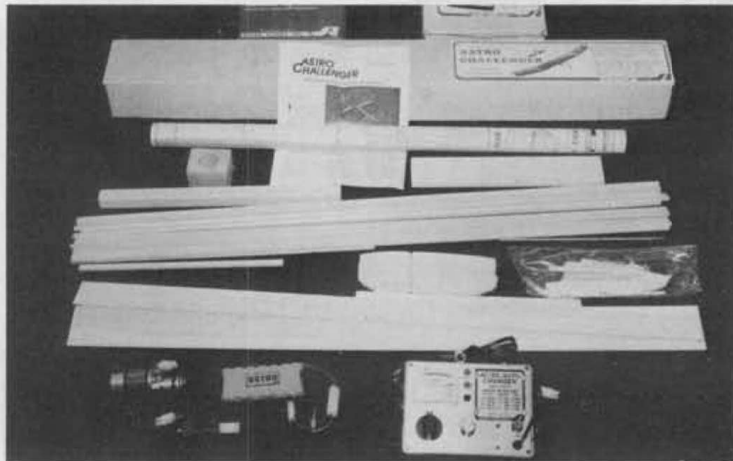
plane of any type that I have built. I suspect that it is one of the very best electric-powered sailplanes currently on the market. I can report without reservation that the Challenger met or exceeded every expectation that I had and confirmed my suspicion that the lack of success a lot of my friends experienced was due to a bad choice of equipment. There is a lot of low-priced stuff on the market that looks tempting to a modeler just getting into electric. Unfortunately, that low-priced gear leads to a lot of the marginal performance that turns people off.

The airplane and power system I brought home consists of an all-balsa, 72-inch span sailplane of deceptively simple appearance and very sophisticated design; the Astro Cobalt 05-g geared motor system, which includes a wiring harness with an on-off toggle switch and an on-off micro switch (an alternative to an electronic on-off control); a seven-cell, 800 mAh power pack made up using the new Sanyo red cells; and the Astro AC/DC Auto Charger (model 4005B). The overwhelming impression I got on my first inspection of the Cobalt system was of well engineered precision. This is the good stuff! At Bob Boucher's suggestion I ordered the Midway Model Company's folding propeller, designed especially for electric systems, from Hobby Horn. I also special-ordered three yards of Sig's Silray (silk-rayon covering); unfortunately, this superior covering material isn't as common in hobby shops as it used to be.

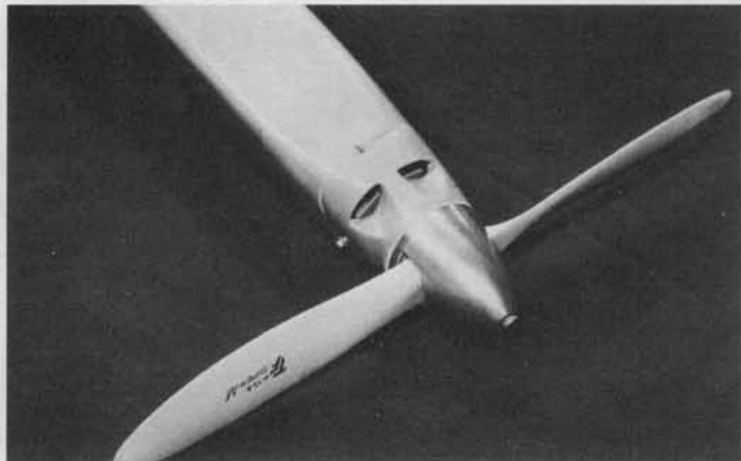
The Challenger is not a difficult airplane to build if you pay attention to the plans and to what you are doing. The material selection and attention to quality are outstanding. The instructions are minimal, and there



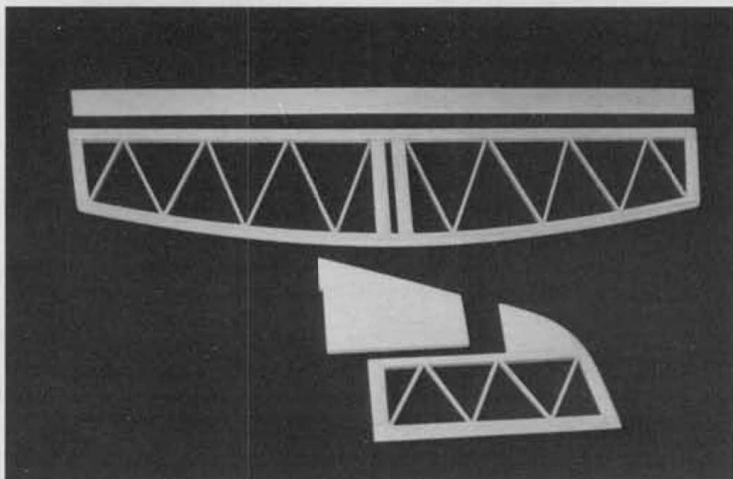
Author tosses the Astro Challenger on its initial flight. Actual climb angle that the Challenger will maintain is significantly greater than what you see here.



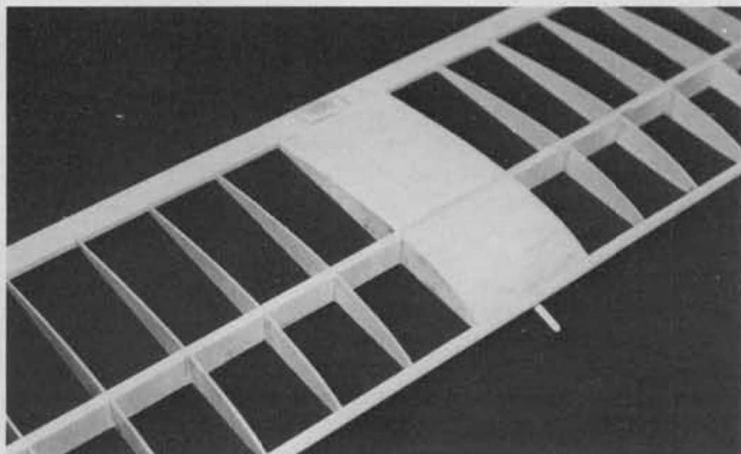
All the components necessary, including the AC/DC charger and geared cobalt 05 system wiring harness.



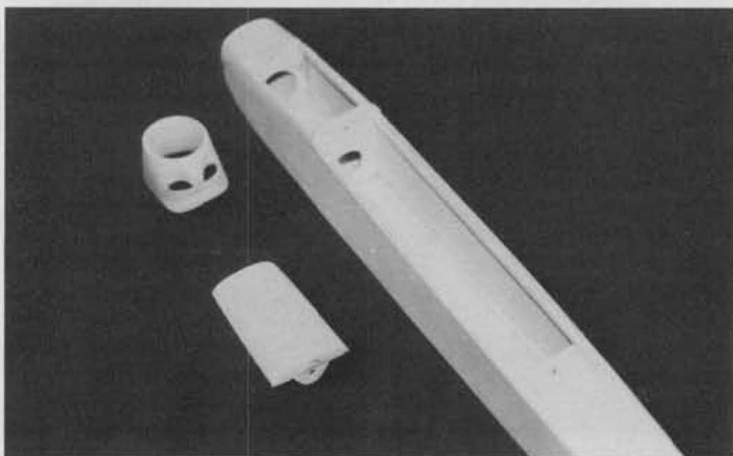
Underside of the nose on the completed model, showing flush intakes. Bump on left is cowl attachment screw.



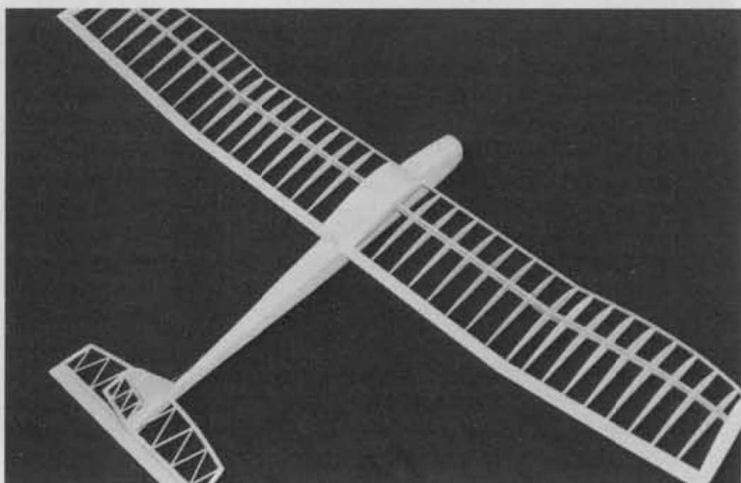
Tail surfaces built up, sanded, and ready to cover.



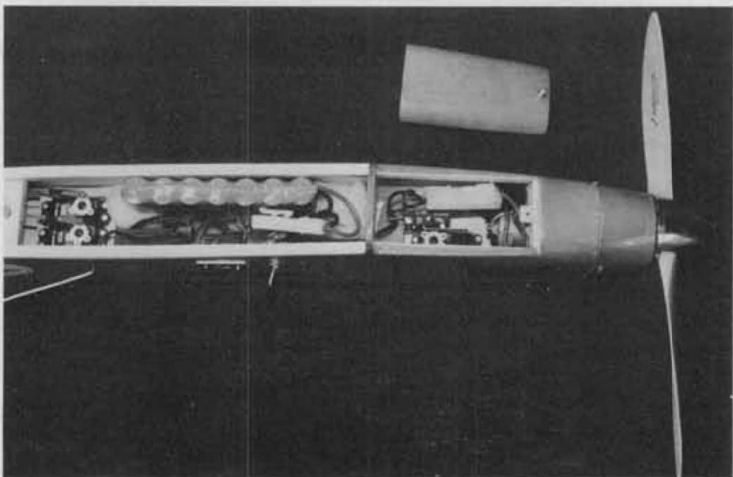
Wing center section ready to cover. There is no dihedral break at the fuselage.



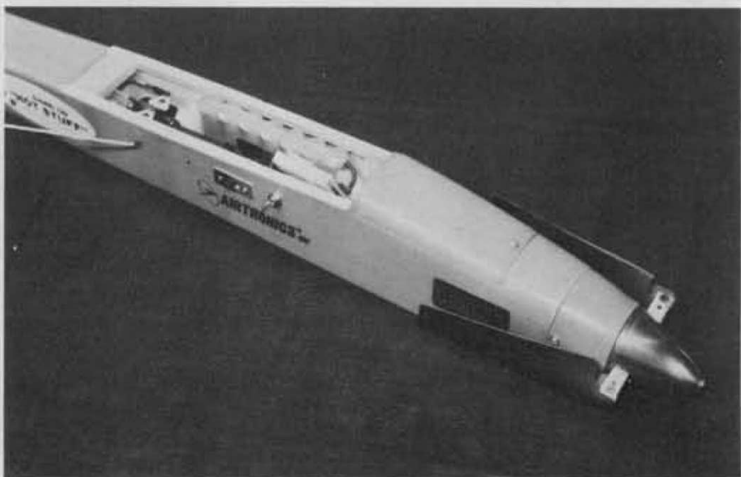
Fuselage and removable cowl components ready to cover. The front cowl is an option necessary only with the geared motor.



All framed up and assembled for a test fit.



The on-off microswitch provided is ahead of the leading edge former mounted on a plate with the throttle servo.



Side shot of the nose with the Hobby Horn folder.

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are a few areas where the plans don't provide as much detail as they might. An experienced builder familiar with electric power would have no trouble, but a newcomer might find himself wondering what to do. Astro Flight reports that they are working on a new set of instructions to ease the workload for future builders. In the meantime, I hope I can help you over what might otherwise be a few tough spots.

Keep in mind while working that weight control is important. This would not be a good airplane on which to use epoxy glue. I used Hot Stuff products. Keep the sanding block handy and don't be afraid to use it.

The tail surfaces are straightforward. Don't be scared by the curved, laminated leading edge on the horizontal stab. The kit instructions mention that you might want to

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bend it wet. This is okay if you are more comfortable doing it that way.

As the wood in the Challenger kit is of excellent quality, I wasn't concerned with doing a dry bend; I cut several "pinning blocks" from scrap balsa, pinning through them and using them to hold the two laminations in place while building the rest of the structure in place against them. I had no problem with distortion after removing the completed structure from the board. Be aware of one possible source of error: the stab trailing edge and tips are 3/16- x 3/8-inch balsa. This looks very similar to the 1/4- x 3/8-inch wing leading edge. Make sure you pick up the right piece of wood. The rudder holds no surprises. I sanded mine to a semi-feather at the trailing edge. This isn't necessary but results in a nice appearance and a slight weight saving. I cut slots as appropriate for the hinges provided in the kit; these are one-piece plastic hinges with a "waffle" pattern in the tabs for secure attachment.

You should have no problem with the wing. I had no trouble bending the spars and the leading edgestock for the outboard panels without wetting, using pinning blocks as with the horizontal tail. You will have to notch the trailing edge to accept the ribs before beginning assembly. Do be aware that the wing is built entirely flat on the board; there is no washout (twist) built into this design. Leave the top center section sheet ahead of the spar off until after the wing center panel has been removed

from the plan so you can install the tie-down dowel properly, with scrap filler between the two center ribs. The sheeting is completed after the dowel is added.

The fuselage is based on two 3/32-inch sheet balsa sides with 3/16-inch square balsa corner reinforcements added as indicated. These are necessary for you to be able to sand the corners of the fuselage round after assembly. There are no formers aft of the wing trailing edge. Don't worry; if you sheet the top and bottom cross-grain, as the plans indicate, you won't need any. The structure is plenty rigid as designed. Assemble the sides at F-1 and F-2 using a square to insure alignment. Install the 3/32-inch sheet crutch, which is really a cabin area floor. Be careful when adding the nose block that the pre-cut hole, which forms the motor mount, is set at the angle shown on the plan, as this determines motor downthrust.

To insure proper alignment of the rear portion of the fuselage, pin the assembly over the top view of the plan, bottom down, and join the sides at the tail, being sure that you line up on the centerline. Pin as necessary to line up the sides with the outline on the plan and sheet the top with 1/16-inch balsa cross-grain. This will lock up the assembly so you can finish the bottom off the plan. Notice that there are two alternative nose drawings shown; if you are using a direct drive motor, you simply slide it into the pre-cut hole in the nose block. If you have a geared motor, remove the gearbox, slip the

motor into the noseblock from the rear, and reattach the gearbox. You might want to add a keying block or two to prevent the motor from rotating in the mount and moving the prop shaft off center. I found that after a few dozen flights, my gearbox (and prop centerline) had been moved about five degrees off center by motor torque.

Cowling the geared motor will require you to do a little carving and hollowing of the nose block material provided. I matched my nose cowl to a spinner and attached it with small screws to two thin plywood plates Hot Stuffed (Special T) to the front of the fixed nose block. Although this added a fraction of an ounce, this made for a readily removable cowl. If you don't use a spinner, you'll get plenty of cooling air through the front of the cowl. I added two flush intakes under the nose; check the photos for a look at these. Keep in mind when planning locations for your motor and radio switches that you may need to be able to shift the motor battery around somewhat to balance the airplane. Make sure you leave yourself room enough to move!

The wing attachment is pretty much self-explanatory. You will need to tap the 1/8-inch ply wing mount and the 3/16-inch balsa filler that lies over it to accept the 1/4 x 20 wing bolt. It's a good idea to flow thin CA into the area after cutting a thread, then run the tap through again, in order to get a really strong installation.

I suspect that most Challengers will be covered with plastic film products and the

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airplane is designed to have acceptable structural strength using these materials. Since I prefer a little more rigidity in an airframe and like the total freedom from worry about slipping or sagging, I used Sig's Silray (silk-rayon fabric) applied and finished with butyrate clear dope. At the expense of somewhat more time and effort being required to complete a covering and finish, this approach results in superior strength, including resistance to surface flutter at high speeds, an absence of seams that might slip, and an avoidance of that "plastic" look. Silray is available only in white, but I dyed mine with ordinary Rit dye for a really neat deep orange see-through finish. You've no doubt heard that "silk-and-dope" is too heavy. Published figures indicate that silk and an appropriate amount of clear dope is equal to or lighter than an equivalent plastic covering. Here's the facts: I used a 300 mAh battery, rather than the lighter 250 mAh pack shown on the plan. My servos are a fraction of an ounce heavier than the S-33s indicated, and I added an aluminum spinner. The advertised weight of the Challenger is shown variously as either 39 or 40 ounces. My airplane weighed in on a commercially certified digital scale at 39 ounces! If your local hobby shop doesn't carry it, you can order Silray directly from Sig.

With the building and finishing done, I installed a lightweight radio system that I had been saving for an appropriate project. My Airtronics 92245 mini-receiver and three 94401 servos fit with no problem. (I used a third servo and micro switch furnished with my 05 system in place of the

Astro electronic on-off control shown on the plan.) I elected to use a slightly larger radio battery, as mentioned earlier, and installed a 300 mAh pack from SR Batteries. Though I haven't pushed it to the limit yet, I have already determined that I have over an hour's flying time in this pack, and my ESV tells me that I can do this with a safe margin of reserve charge left. This system operates with one of my "old reliable" Airtronics Championship 7 transmitters, and has proven to be a super match for this airplane. With the radio system and motor battery in the position shown in the photos, I found the airplane to be in perfect balance.

I had done several "run-ups" in the shop before the airplane was finished, and so had become familiar with the Astro AC/DC Auto Charger before it was time to fly. This is one neat unit and completely eliminated my concern about having to learn exotic battery charging procedures in order to be able to fly electric. It consists of a timer-controlled charger, operating off either household line current or an automotive battery, with a current adjustment that allows you to charge 4- to 7-cell packs of from 250 to 1200 mAh capacity in 15 minutes. A meter allows you to monitor and adjust current during the charge period. An adjustable trickle-charge circuit takes over at the end of the timed fast-charge automatically. Provision is also made for voltage monitoring with a separate meter to allow peak charging. As this was my first "fast charge" system, I was initially a little apprehensive about getting everything right. A few minutes spent studying the instructions eliminated the anxiety—everything worked per-

fectly on the first try.

With everything ready to go, Mother Nature cooperated for once by providing us with a beautiful Saturday evening; warm, gentle breezes dying away to a flat calm, and everyone else in the club unaccountably gone home early, leaving the field empty for my wife (and good flying buddy) Teryl and me to check out the new goodie. This is when all the "will it really work like they say?" gremlins jump out and bite you, but I told myself that Astro Flight didn't get that good reputation for nothing, and did a range check, final inspection of the Challenger, and that final walk out onto the runway. Wiggle the controls, flip the throttle stick forward (Love the sound of the Cobalt!), moderate toss, and . . . WOW! Hot dog! I love it! Up went the Challenger at a consistent 30- to 40-degree angle of climb until I had her near the limit of visibility. Since the air had cooled to the point where there wasn't much more than a few patches of "zero sink" lift remaining, eventually I had the airplane back down at a hundred feet or so. Turning on again, I found that I had sufficient charge to make two more max climbs, with a little left to play around in the landing pattern. At about that time, one of my friends showed up and I treated him to a repeat performance. Was he impressed? You betcha!

The Challenger turned out to be easy and straightforward to fly under power and with the motor off seemed willing to ride even the light lift available in the still evening air. Subsequent practice reveals that the airplane does a fine job of spotting her own thermals.

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The excellent rudder authority of the Challenger allows an immediate turn into the thermal, and you're on your way. The trick is to let her do the hunting for you.

The first flights were made with a 12-6 Super M prop. When I felt I had enough time on the airplane to be able to make a comparison, I switched to the Hobby Horn folding propeller. This is a 12-7, with black glass-filled nylon blades attached to a machined aluminum hub. It is designed to work with the Astro Cobalt 05, and no modification was necessary to mount it. As I suspected, the greater pitch resulted in a somewhat better climb with an attendant increase in current drain, which showed up as a decreased amount of "extra" charge after three climbouts. The glide, needless to say, was markedly improved. As I can't find a "standard thermal" to use for calibrating performance, I can't give you quantitative figures, but there is no doubt that the folder will give you a competitive edge. The most dramatic evidence of the cleanup that resulted

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from using the folder was the first few landings I made after having used the "fixed" prop; I had to rethink my entire approach pattern, as the Challenger acted as though she had been greased.

To say that I'm pleased with the Astro Challenger-Cobalt 05 system would be an understatement. Any reservations I had held about getting into electric for keeps disappeared with that first flight. If you are on the fence yourself about electric and have any interest in sailplane flying, this is the combo that will make a believer out of you. There are a lot of electric sailplane kits and motor systems around that will fly. This is the one that will really perform the way you hoped it would.

A few weeks after my first flight I took the Challenger to the Puget Sound Electric Model Flyers Sixth Annual electric fly-in in Seattle. This is a two-day affair that always draws some of the top electric fliers in the Northwest. On the first day I made a few flights but spent most of my time looking

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and listening. On Sunday, I decided to get serious! The day was mostly overcast, with light, spotty lift, but the Challenger and I got together and won the high-time trophy! As if that weren't enough, I had decided to put on a little demonstration of the aerobatics that can be done with an airplane like the Challenger; I took home the aerobatic trophy "for showing how much can be done with a plane not often thought of as aerobatic at all." Remember my comment about the extra strength inherent in a doped silk covering? I put the Challenger through consecutive loops, stall turns, lazy eights, rolls, short stretches of inverted flight, precision high speed low passes with breakaway pullups, and a split S, and she loved it. It just goes to show what a versatile airplane Bob Boucher designed. Build it right and you can stop worrying about getting out of those "hat sucker" thermals!