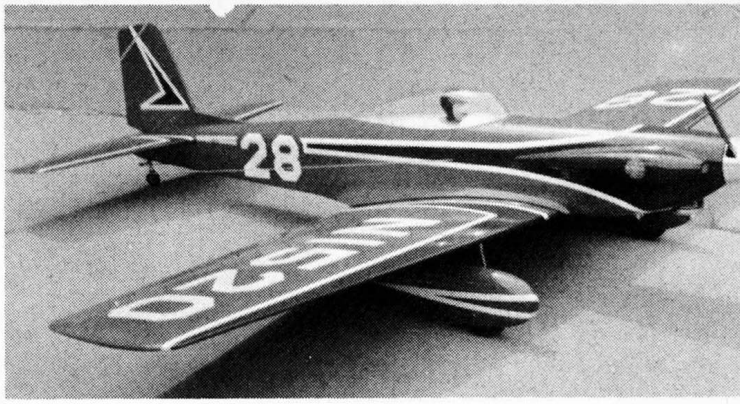
deBolt Special



This K&B .40 powered Goodyear is the one that impressed the experts. Fast as greased lightning—for Prototype class.

By HAROLD deBOLT

In the fall of 1965, I made up my mind that I was going to have a Goodyear racer no matter what. On studying the rules I noted that if you have a scale version, you wind up at a race with some handy handicap points. However, in observing several races, it was soon noted that the true scale racers were not the fast ones—in fact, most of them did not seem to fly well. Sure, it was true that most of the winners were of the semi-scale variety and did have excellent performances. However, who can say where non-scale ends and true scale begins? According to the rules, only the true scale variety were eligible for maximum handicap points, hence the best you could do with semi-scale was to get a small portion of these points.

My search quickly narrowed to three aircraft, Shoestring, Midget Mustang, and Stardust. Shoestring is a good basic design, but has been worked over so many times you tend to leave it as a last resort. Stardust looks very good also, but it is so obscure in racing circles that you would have difficulty proving it ever existed. Another problem arises. If yours is to be a scale model, you *must* have authentic drawings of the original airplane. Many magazine three-views were available but none of these, except the Midget Mustang, had been authenticated. How can you build a scale model without plans for the original?

The Midget Mustang looked as good as any in three-views found and, with authentic plans available it seemed a good choice. Lines soon appeared on paper outlining a Midget to the minimum allowed by the rules. Once the outline is there you start analyzing. You begin to understand the reason for all of the semi-scale types; it is obvious that, if you held true scale, you would not have a good looking version in model form. Also, when the size fitted the rules wing-wise the fuselage bulk was far above minimum, and much more than needed for model use. The choice is whether to build a scale entrant or a racer and, obviously, if you held true scale, you would never have a contender! Judicious doodling would provide a good racer and still be original. I got to thinking, what are we trying to prove? Either it is scale, or it is not. Why try to call a modified design a scale *version* of the original. It doesn't make much sense!

I decided to go all out with a really fast Goodyear.

When I thought about the event and watched some of the races, my impression of the causes of its lack of popularity, the country over, was simply that the models were just too "hot" for the average flyer and grass flying fields. It appears to me that if we want to see this event grow we must have models which are suitable to the average flyer and grass flying fields. Greater wing area will not slow the top speed down greatly, but it will allow the model to be slowed down to the point where a decent landing can be made on any type of surface. If the power is held in line through the

1966 FAI RC team selection finals, where ship was considered fastest. Author finds it stable enough for spectacular aerobatics.

deBolt Special

use of stock engines and fuels, the speed should not get above the average flyer's ability. Also, the combination should make the event much more interesting to all. I would want to say now, that the model presented here, comes far from filling the bill outlined above!

Instead, it appears to be an excellent example of what has become accepted by the experts for the present Goodyear event. It is as fast as any seen yet and, except for the very high speed which makes things happen almost too quickly, it handles well. You can put on a high speed air show that even the Blue Angels would admire! Would you believe vertical rolling continuously until it is out of sight? Or 500 ft. diameter loops at 100 mph? Cuban-eights 500 ft. high and 1000 ft. wide at 100 mph? But for performance like this you must pay the piper when it comes to landings. Given enough space to slow down, and a decent surface to land on, there is no problem. But don't expect to drop it into a handkerchief-size field like you would a stunt job!

It is possible, under the rules, to forego scale and have an original by designing to fit the so called "prototype" class. In this class you have a free-hand, except for wing size, fuselage cross-section, etc. These parameters are called out in the general rules. I started off with the wing and tail plan forms which I had laid out for the Mustang and, with very little alteration, they are scale.

Realizing that the greatest drag comes from the wing, much thought was given to its airfoil. For a model to be really fast it must also be stable; obviously, if it bounces like a cork, it can hardly show its potential speed. The NACA 65000 series of foils is hard to beat for low drag and high speed. Being fully symmetrical, these sections have minimum drag with excellent lift curves, plus ample stability. With them, the drag does not decrease very rapidly, going from the 12% to the 10% range, yet lift and stability does decrease. My choice was a 65A012 at the root, progressing to a 65010 at the tips. With such a high speed model, wing strength is hard to come by if the wing does not have enough thickness.

Because ailerons can contribute greatly to the drag of a wing, I gave them more attention. I like the strip type for light weight and simplicity, but suspect that the portion adjacent to the fuselage does little more than add drag. Therefore, I ended them about 25% of the way out on the wing hoping to get rid of this drag. They are every bit as effective as any I have used before.

To reduce the parasitic drag, only leading and trailing edge, plus a web spar, were used, depending upon the sheet covering for strength. With a good finish, this presents an unbroken surface, and obviously, minimum drag. About the same general ideas were used for the tail surfaces except for the airfoil; in this case none at all was used, building them flat for simplicity—you have to give up somewhere!

The Special is a low-wing airplane for more reasons than good looks. This wing location helps out with the required fuselage cross-section. By placing the wing at the bottom of the cross-section, the actual height of the body itself can be reduced by the thickness of the wing. Considerable drag is created wherever a surface joins the fuselage. Any wing location other than a cabin type or low-wing has two points of interference, the upper and lower sides of the airfoil. With the low-wing you obviously only have the upper side and the interference there can be helped considerably by the use of a wing fillet. I also find that the engine cowling can be faired into the remainder of the fuselage much more smoothly, if you do not have a wing to contend with.

A low-wing model also allows the use of a high-thrust line, which suits the force arrangement which I prefer. The combination keeps a model completely free from all trim changes over its complete speed range, very handy at high speeds around a tight course. The low-wing, high-thrust-line arrangement has another marked advantage; the very minimum of landing gear. Another strike against the old devil drag.

Most other points about the design are details. For example, the cowl hides the engine, but is not complex, The cross-section of the fuselage fairs everything in cleanly, yet provides usuable space for equipment. The "Camloc" wing fastening gives utility and, further, cuts drag by eliminating dowels and rubberbands. The radial engine mount and plywood forward fuselage probably do not add to the speed, but they reduce the construction time.

Choice of Equipment: All of these models just about meet the minimum in weight when using full-house proportional. Rudder is absolutely necessary to control torque on takeoff and, with the high speed obtained, it would not seem advisable to use anything less than a completely independent control system; coupled controls are not recommended. The original models have used front-rotor Super Tigre .40 and K&B .40 engines. It seems foolish to fly with less power, and most other engines will not fit the cowl without major engine mount changes. To balance correctly, it is important to keep all RC gear as far forward as possible, even though it seems a waste of usable space.

Five of these models have been flown so far. All but one used the normal unpressurized fuel system—with excellent results. I built two; my second model is the only one of the five using pressure at the time of writing. K&B recommends the use of pressure with their engine and I had excellent luck with it when I developed it for CL speed. It has performed far better than I ever dreamed! After 50 flights or so, I suspect that much of the success may be due to the particular design of the model and fuel system rather than a generally better way of operating an RC engine. For example, I don't have any serious idling problems with it in this airplane, yet in others this apparently is a problem.

I have never seen pressure add speed to a model, CL or this one; in fact, that is not the purpose of pressure. What pressure does, is assure you of a good engine run every time under all atmospheric conditions when using a highly tuned racing engine. Believe me, these new .40 engines are the ultimate in engine tuning!

You will be interested in the "quick and easy" finish used. First cover the model with Silron or a substitute like Silray, using clear dope. Sand down the seams and edges using #400 paper. Mix 25% Mennen talc with the clear, thin enough to be sprayable and spray on a coat as heavy as practical. Let dry thoroughly, then sand out with #400 paper. Spray entire model white with colored dope and trim as desired. Let dry 24 hours and spray overall with Hobbypoxy clear. This cuts finishing time by at least 50% and gives a job good enough to draw "oohs and ahs!"

Flying: There is no mystery about flying this bird, but the first time up you would do well to double check all controls for neutrals. It might be a bit 'hairy" to trim out at full bore! One thing, it is not smart to take your eyes off it! A couple of times, when I looked back, it was not where I expected it to be—it was over in the next county! If you try to make a landing approach by simply throttling back from full bore and flying in as per usual, you may find it flying by your anticipated touch-down spot like greased lightning. The trick is to throttle back at the beginning of the approach while a bit high, then doing a series of 360-degree turns while killing off speed, by gradually raising the nose. When the speed is dissipated, break out of the circle into the landing path at a much

deBolt Special

more reasonable speed. A word of caution—do your buzzing, and practice *away from people.*

History of the Special: Unfortunately, due to equipment failure, my first ship never got into a race. Ed Keck also built one about the same time, powered with the K&B .40. He first flew it in competition at the Detroit Invitational in September 1966, entering Open Pylon. He placed 2nd behind my .61 powered P-Shooter and appeared to be faster in the straight-aways, losing out for lack of pylon practice. Tony Bonnetti also built one with the K&B .40. Then I built a second one for use in Oklahoma at the FAI finals. This one had the K&B .40 with pressure and was finished just in time for Okie. The three of us had a ball at Okie. We had many fast flights, but only Tony was able to make the finals. He crossed the finish line first but, unfortunately, was called for cutting a pylon. One of the Specials posted the highest qualifying time of the meet with a 2:01. The same model also posted the fastest heat time with a 2:11.

If you are interested in Goodyear as it stands now, and feel you are capable of handling a model which may be at least 50 percent faster than anything which you have had, you probably can't find anything better than this one—as far as I know.