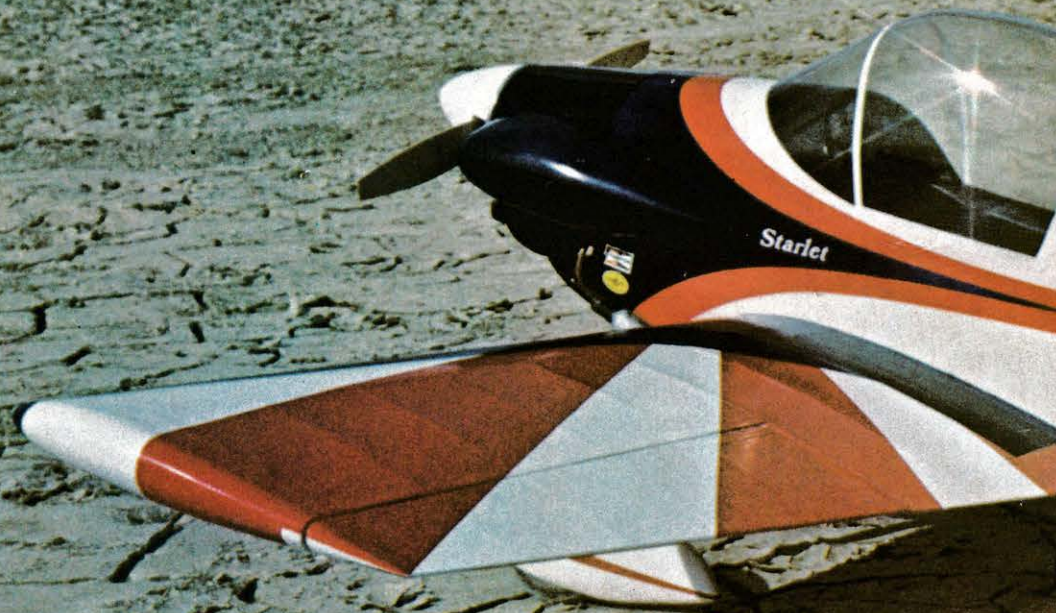


# STAR~STRUCK STARLET

If you ever wanted to fall in love with a starlet, here's one that will make a fan of you.



## By Jerry Nelson

**T**he Corby CJ-1 Starlet is an Australian designed, Volkswagen-powered homebuilt. The all-wood structure is designed and stressed for advanced aerobatics. The wingspan is 18 feet 6 inches, with an overall length of 149.9 inches and a gross weight of only 630 pounds. That's a very small airplane, by anyone's standards. (Additional information on the full-size Starlet can be obtained from: *Hapi Engines, Inc., Eloy Municipal Airport, RR #1, Box 1000, Eloy, AZ 85231. Phone (602) 466-9244.* An information package is available for \$7.00.)

My reasons for selecting the Starlet as a model subject were threefold:

1. It would be an aerobatic model, capable of all FAI maneuvers.

2. It would be 100 percent accurate in scale outline.

3. The plane would be giant-scale ( $\frac{1}{4}$ -Scale) and still be a practical size to transport.

All of these objectives were achieved with the Starlet. The model has done all of the FAI aerobatic maneuvers, plus quite a few full-scale aerobatic stunts not normally done

with models. This is not intended to suggest that the Starlet could steal the world championship title from Hanno Prettner, but the model can do all of the maneuvers with a reasonable degree of proficiency, and it certainly can be considered a true contest model. The model, as shown here, is rendered in exact scale. Admittedly, some changes could be made which would improve the aerobatic qualities, but this would mean deviating from the scale outline. More on this subject later.

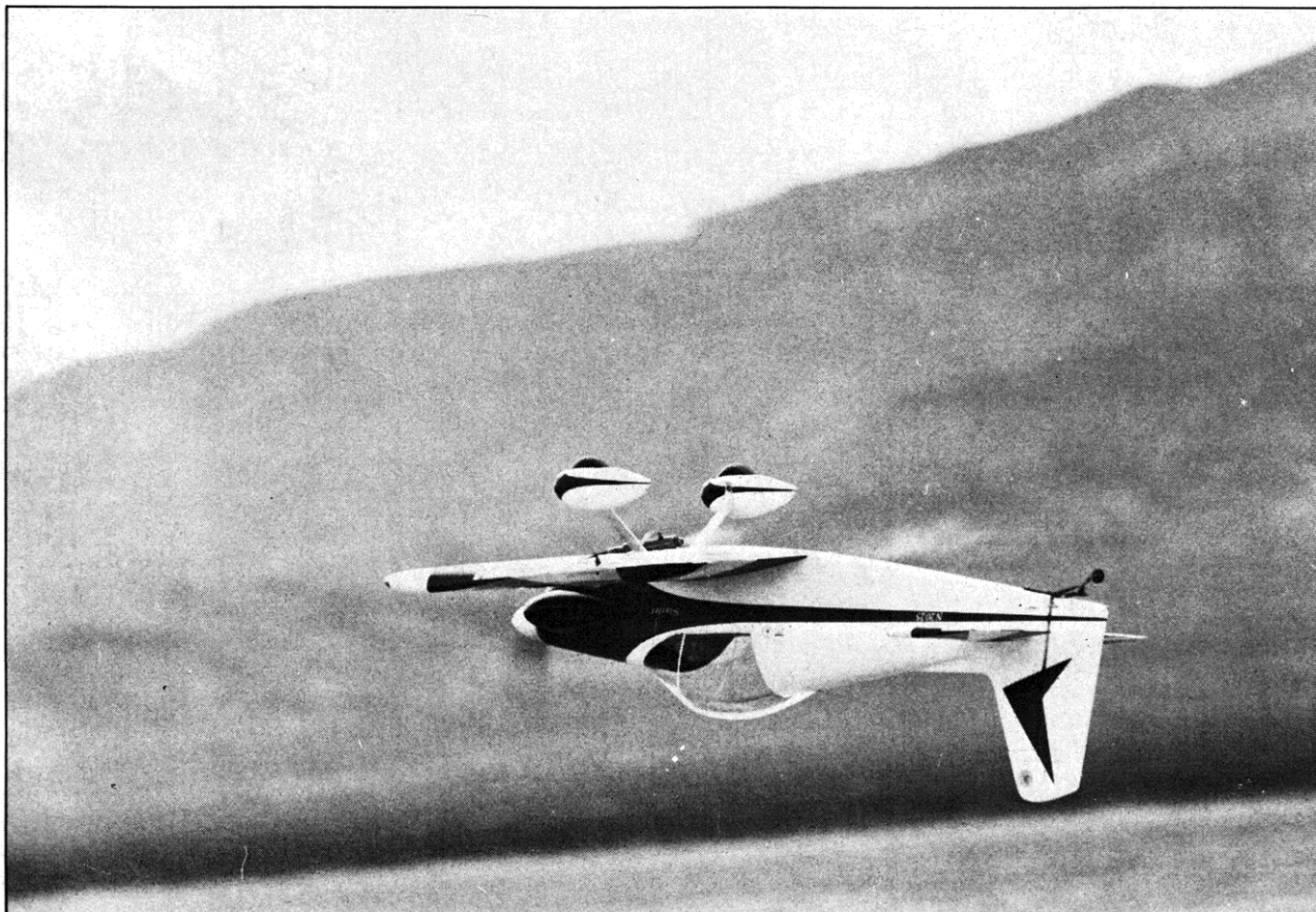
Don't let the short-coupled look of the Starlet frighten you. While the C.G. is critical, as is the amount of elevator travel, the model has no serious longitudinal stability problems. If you put in too much elevator travel, the snap rolls are truly spectacular. Three, and sometimes four, simultaneous horizontal snap rolls can be performed, yet the stall characteristics are quite gentle, and the Starlet has no tendencies to drop a wing. Four point rolls are easily done . . . maybe not perfect, but quite respectable.

The Starlet is exact scale, as referred to the factory 3-view drawings. The outlines of the structure

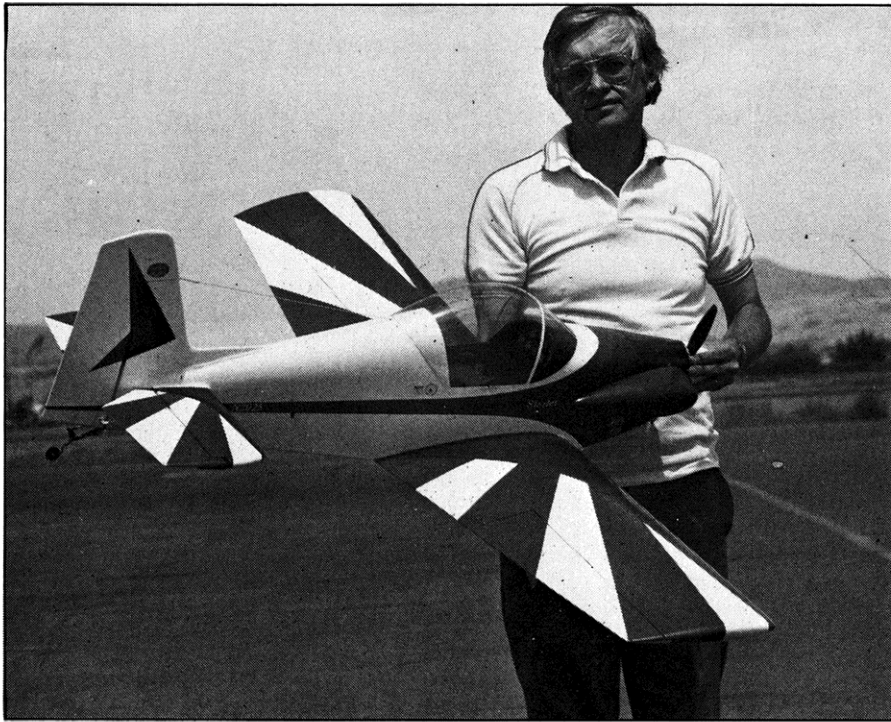
are also duplicated, such as the rudder and elevator rib locations. The airfoil is a NACA 2415 as the model plans are drawn, which is a deviation from the scale airfoil. The semi-symmetrical 2415 is a stable section, with good aerobatic qualities. As built from the plans, the model is very competitive in Sport Scale, and it could easily be made into a very fine Precision Scale entry. A full-blown cockpit interior could be installed, since there's so much room beneath that big bubble canopy.

The model is designed to a scale between  $\frac{1}{4}$  and  $\frac{1}{3}$ -scale. The model is based on a  $3\frac{1}{2}$ -inch C.B. Associates spinner. The scale came out to 3.46 inches-per-foot, thereby qualifying it as Giant Scale (or  $\frac{1}{4}$ -Scale), even though its wingspan is less than 65 inches! Don't forget that the full-size aircraft had a span of only a little over 18 feet.

The powerplant for the model can be any engine between a .60 glow, to an O.S. 1.20 twin four-cycle. I feel that the O.S. 1.20 twin would be the perfect engine for this aircraft. I selected the Webra .90 four-cycle, with the throttle mounted directly into the cylinder head. The reason



*On a low inverted fly-by, the Starlet struts her stuff. An amazingly docile airplane, yet with so much aerobatic performance.*



*The author holds his bird. A very small machine for giant-scale.*

for this selection was to allow the model to be qualified for FAI aerobatics, as well as AMA aerobatics (a .90 four-cycle counts as a .60 in glow). I also wanted that fantastic sound that can only be had from a four-cycle.

The Webra .90 four-cycle has sufficient power to do the required maneuvers. Using a 14-6 prop and 15 percent Nitro fuel, over 9,200 rpm are obtained. Even at my home field in Reno, with density altitudes over 6,000 feet, there is ample power to do maneuvers. A noticeable increase in performance is found when the plane is flown at flying sites at lower altitudes.

The realistic low sound levels produced by the Webra four-cycle, coupled with the very scale appearance of that big fuselage, makes the model seem much larger in the air than it actually is. The relatively small size of the assembled model is very desirable, since you can put the fully assembled Starlet in a small station wagon.

The original prototype weighed in at 10 $\frac{3}{4}$  pounds. That was more than expected, but that's because no special effort was made to keep the model light. Mostly hard balsa was used, to ensure strength, but this was not necessary. I would estimate that at least a half pound could be saved

by the careful selection of wood and the choice of R/C equipment. That 10 $\frac{3}{4}$  pounds is perhaps about two pounds too much for any serious aerobatic work.

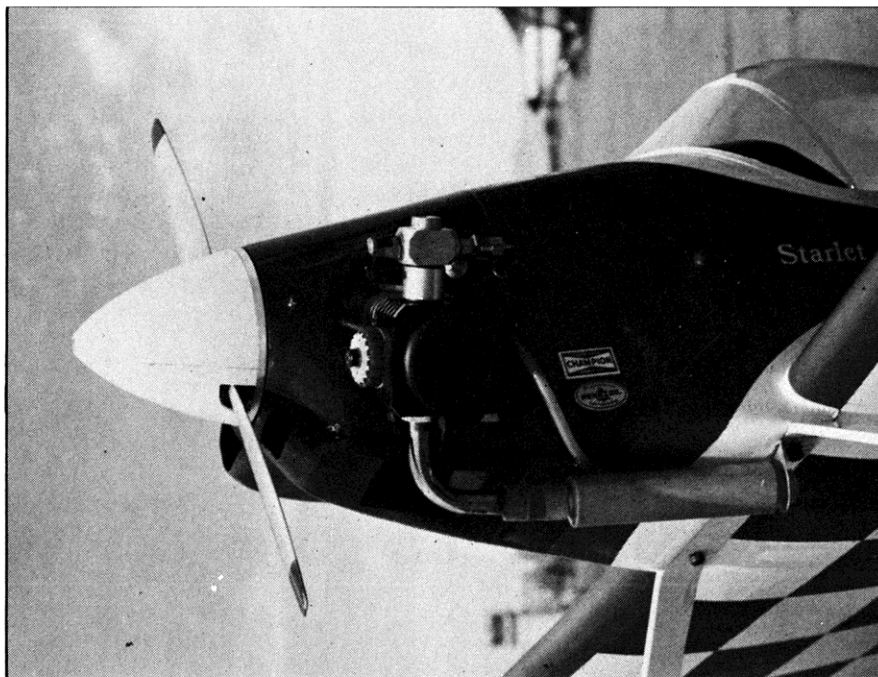
If the aerobatics are more important than the scale appearance, then some changes could be made. The fuselage should be lengthened about two inches, between the wing and stab. This alteration would hardly be noticed in most Sport Scale events (I hope no judges are reading this!), and the model will have improved roll characteristics and the elevators will be less sensitive. If desired, the fuselage can be lightened by using 3/32-inch balsa, instead of the 1/8-inch called for on the plans.

To further improve the maneuverability of the Starlet, the wing dihedral should be only half of that shown on the plans. This will improve the rolling maneuvers, especially the four-point rolls and knife-edge flight. A significant weight savings could be made if the landing gear were changed to a wing-mounted system, using 5/32-inch wire located between ribs #4 and #5. The heavy plywood mounting block system currently used on the fuselage would be eliminated. About a half pound of weight can be saved by this change. The revised landing gear would not be scale, but it sure would be a lot lighter. The wing sheeting can be reduced to 1/16-inch balsa, but make sure that only high-quality wood is used to maintain strength. The 1/4 x 14-inch spruce main spar could also be rock-hard balsa, but such changes aren't going to make much of a dent in the overall weight.

A good alternate powerplant would be the Webra geared .61 engine. This would give a savings in the total power package weight in the nose, plus the added increase in horsepower would make a dramatic change in the vertical performance of the Starlet. With such an installation, an external silencer would have to be fitted, however, it would be possible to redesign the fuselage layout to have a concealed tuned pipe.

With the changes outlined above, and the Webra geared .61, an eight pound aircraft is possible. At this weight, aerobatic performance would be fantastic, especially when performing Aresti-type maneuvers in a limited aerobatic frame.

*The Webra .90 four-stroker makes for a nice installation. Cheek cowl totally hides the engine. (Nelson photo)*



The Aresti-style maneuvers bring up another reason for selecting the Starlet. I believe that the future of R/C aerobatics on an international level, including the World Championships, will be to do maneuvers in a limited aerobatic zone or "box." This emulates the full-scale Aresti system of maneuvers and scoring. The models would be required to be scale versions of the actual aircraft designed (or capable of) advanced aerobatics. The Starlet is perfect for this type of event, which is a happy marriage of the best of the scale rules, and the excitement of true stunt flying.

It seems almost ridiculous to have to say that the Starlet is definitely not a beginner's airplane. Some stick time is necessary to handle this type of performance. Going into step-by-step details on how to build the model won't be necessary, but here are a few helpful pointers.

The wing is a simple, all-wood structure. Since the airfoil is a tapered semi-symmetrical type, it will be necessary to block up the spars. We prefer to build this type of wing in a good jig.

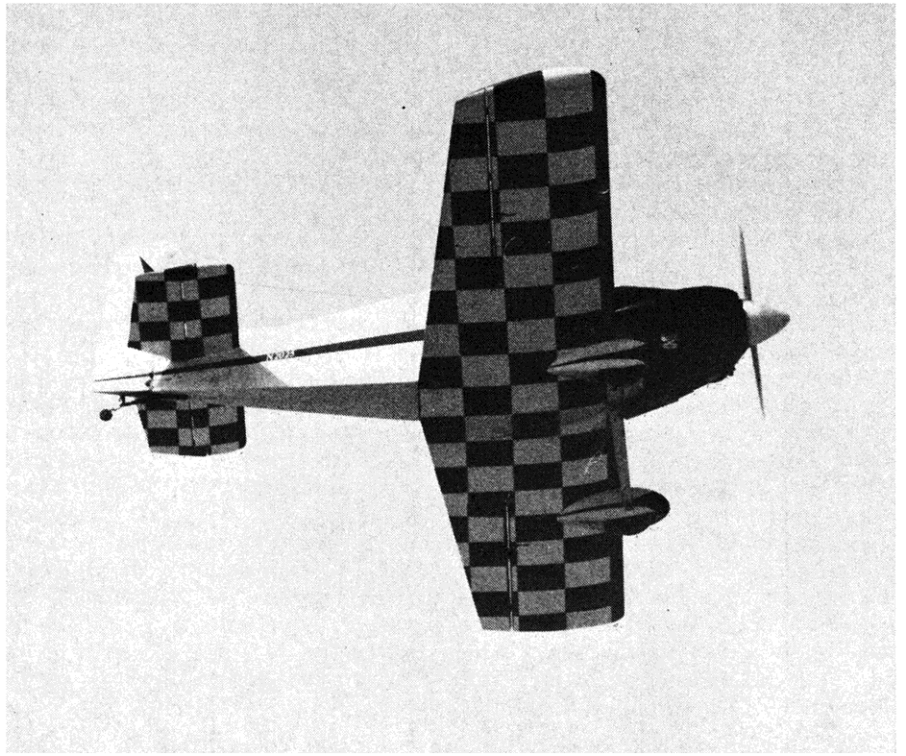
The flat sides of the fuselage are very easy to build. There is quite a bend in the forward portion of the sides at the area of the leading edge of the wing. It may be necessary to steam the wood in this area to help form the curvature. The bulkheads and formers are from laminated balsa. The extra time to do this is worth the effort, since these pieces are very light, yet strong and rigid.

In the tail group, I suggest that the rudder and elevator ribs be made flat, instead of the slightly curved shape of the true airfoil. Making the ribs flat makes building the empennage a lot simpler.

The model is covered with aircraft-quality Ceconite R/C fabric. This material is adhered with dope, then tautened with heat. The advantage of Ceconite is that it stops shrinking at 400 degrees. This eliminates any concern for warps or structural damage by over shrinking, especially on the Starlet's lightweight aileron, rudder and elevator structures. The fabric will give an exact-scale appearance, is very durable, lightweight, and the covering job can be done at a low cost.

The prototype model was given one coat of Ceconite R/C Filler Coat, applied with a foam brush directly over the raw (undoped) fabric. Five coats of butyrate dope were sprayed on, plus three coats of butyrate dope trim.

A J.R. 8-channel system, with 2001 servos, was used. Two tandem

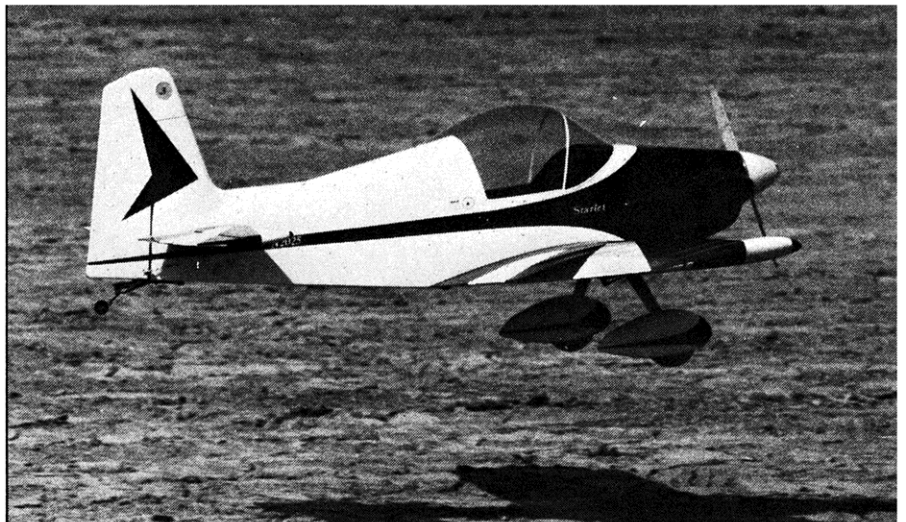


*The full aerobatic paint scheme, right down to the checkerboard. As shown here, model is to exact scale outlines. (Nelson photo)*

servos were used on the elevator, joined by a C.B. Associates Servo Doubler assembly. The unit was not used because the additional power of an added servo was needed, but to improve the reliability of the R/C system. If one servo should ever fail, partial elevator control is still available. The extra weight of one more servo is a small price to pay for a major improvement in safety and reliability.

To simplify scratchbuilding the model, I can supply not only a set of building plans, but I also have a molded canopy, ABS cheek cowls,

*Touching down on a deadstick landing, the Starlet proves itself stable. A very honest airplane.*



wheel pants, the 3/16-inch aluminum landing gear, and even the Ceconite covering materials. Write or call for complete prices and details: Jerry Nelson & Co., 3510 San Mateo Ave., Reno, NV 89509. Phone (702) 322-0664.

The Starlet may not exactly grab you the first time you look at it. It looks big and clumsy . . . not at all what you'd expect of a refined aerobatic model. Yet, turn it loose in the sky and you'll immediately fall in love with its smooth and precise response. That bulky little putt-putt is a real handful of airplane. It almost turns itself inside out, doing the hairiest snap rolls you'll ever see. If you ever wanted to fall in love with a Starlet, don't make it one from the silver screen, but make it a Corby CJ-1 instead!

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