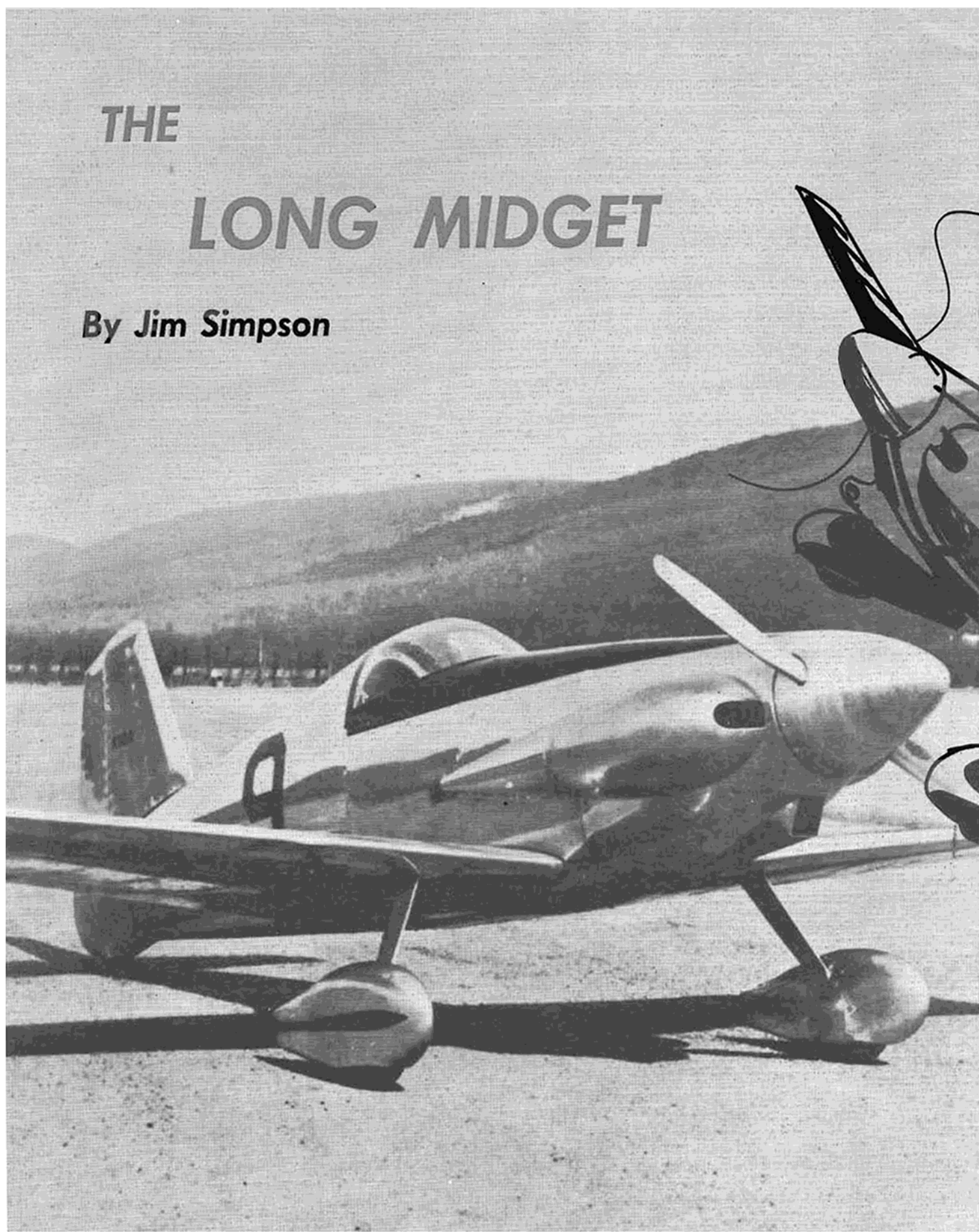


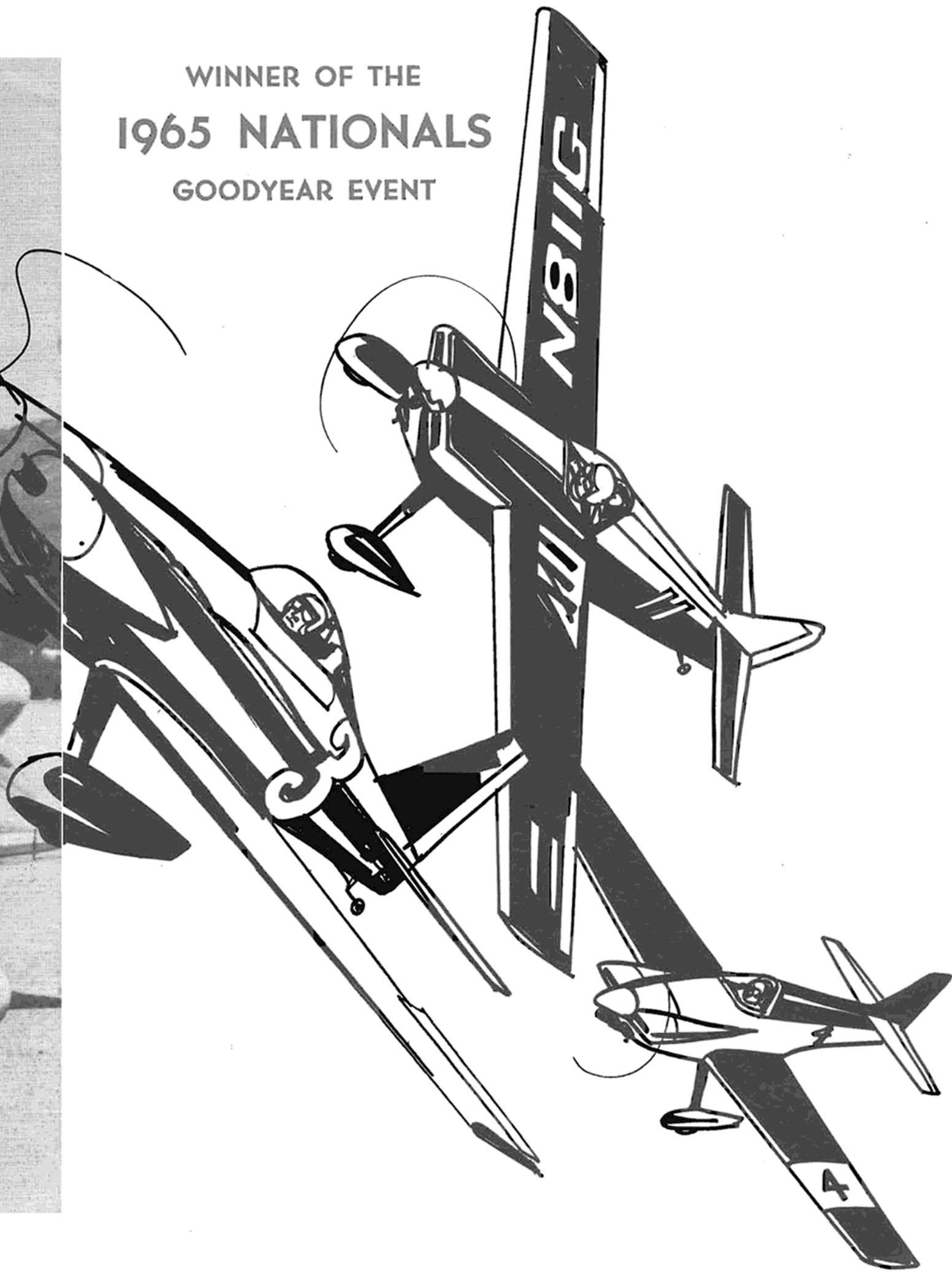
THE

# LONG MIDGET

By Jim Simpson



WINNER OF THE  
1965 NATIONALS  
GOODYEAR EVENT





Long Midget photographed in 1940's by Jerry Kleinburg at Opa Locka, Florida.

**Designed by Jim Simpson, built by Maurice Woods, and flown to victory by Cliff Weirick. . . . RCM presents the N.M.P.R.A. Goodyear event winner at the 1965 Nationals.**

Bushby Aircraft Midget Mustang fitted with 125 H.P. engine. Bushby Aircraft photo.



**T**HE "Long Midget," or "Midget Mustang," (they are the same basic design), has always appealed to me, and is of course, a natural for the NMPRA Goodyear event. But, before we continue with the text concerning the model, a short story of the real bird is in order.

The late Dave Long of Loch Haven, Pennsylvania, a professional airplane designer and chief engineer for Piper Aircraft, was the designer of the high-performance, all metal "Long Midget." Dave established a reputation for safe, stable, and "forgiving" airplanes. In addition, he built five of the hottest low-wing home-builts ever entered in the Goodyear and Continental Air Races. With the decline in Goodyear racing, the Long Midget became the only one of the diminutive racers to capture the heart and eye of airplane buffs everywhere.

The Midget Mustang has been updated from the original Long Midget design, and is offered in Kit form by Bushby Aircraft Company, P.O. Box 209, Glenwood, Illinois. The construction changes from the original racing version include standardization of materials to make use of the new alloys readily available, plus construction simplification and cockpit and canopy changes for increased pilot comfort. It is one of the simplest to build proven designs available to the home builder today.

The Midget Mustang's 9-G structural strength and low power loading give a true high performance, fully aerobic sport plane, as well as a fast cruise speed for cross country flying. Construction is of the all metal stressed skin type. The fuselage is assembled with six formed aluminum bulkheads and a stainless steel firewall. The firewall is reinforced with aluminum angles to which are attached the engine mount brackets, and brackets for attachment of four fuselage stringers. The center section bulkhead incorporates four heavy aluminum angles to which are attached the steel wing fittings. The fuselage is constructed by first attaching the three tail cone skin sheets to the four tail cone bulkheads. This tail cone assembly is then attached to the center section by means of one wrap-around sheet. Three smaller sheets complete the fuselage to the firewall.

The wing of the full-scale Midget Mustang consists of the front spar, which is cut from aluminum sheet and bent to "C" shape, then reinforced with twelve aluminum strips to form an "I" beam. The rear spar is composed only of the "C" aluminum section with reinforcement for wing attach fittings. The wing ribs consist of nine nose sections, nine main sections, and one tip rib. The ribs are formed of sheet aluminum, and as is the with the bulkheads,

do not require heat treating. After the ribs are attached to the spars, the leading edge skin is attached, followed by the top and bottom main section skins.

All of the control surfaces are of similar construction. They consist of one spar, hinges, control receptacle, two ribs, several skin stiffener members, and skins. Total construction cost of the full-scale ship is approximately \$1,000, less engine.

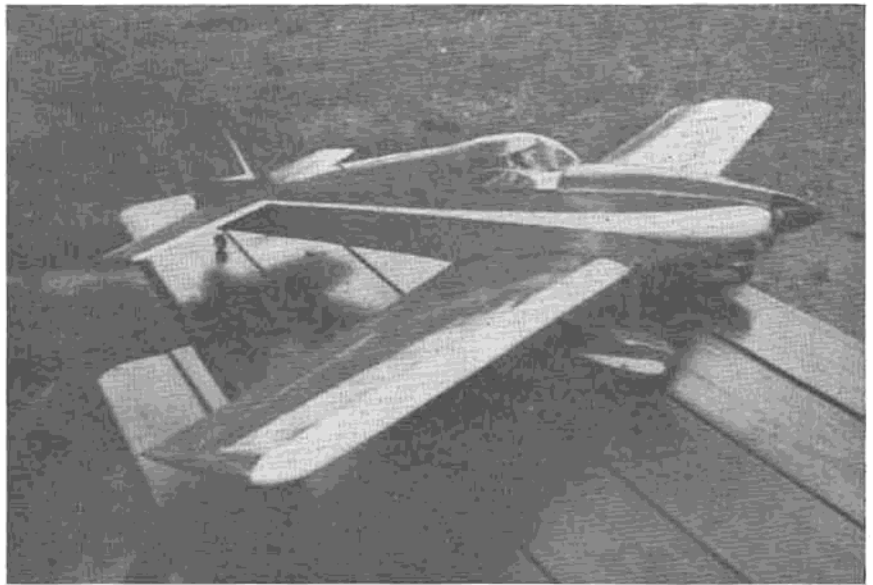
Specifications for the Midget Mustang are as follows: Span: 18'-6"; Length 16'-5"; Height (level): 6'-5"; Root Chord: 60"; Tip Chord: 30"; Aspect Ratio: 5.0; Wing Area: 68 sq. ft.; Aileron Area: 4.80 sq. ft.; Stabilizer Area: 8.78 sq. ft.; Elevator Area: 5.12 sq. ft.; Fin Area: 3.50 sq. ft.; Rudder Area: 3.36 sq. ft.; Empty Weight: 540 lbs.; Gross Weight: 850 lbs.; Wing Loading: 12.5 lb/sq. ft.; Power Loading: 10.0 lb/sq. ft. Top speed with a Continental 85 is 185 MPH with a cruise speed of 170 MPH and a stall speed of 57 MPH. Rate of climb is 1500 ft./min. Takeoff distance is 500 feet. Cruising range is 450 miles. With the larger and optional Lycoming 125, top speed increases to 210 MPH with a cruise of 185 MPH. Stall speed is now 60 MPH with a 2200 ft./min. rate of climb. Take off distance is further reduced to only 400 feet. Cruising range drops to 375 miles. Service ceiling is approximately 16,000 feet.

The model, presented here, is patterned around the Long-Johnson "Mammy" #N9N, as evidenced by the landing gear configuration. There are many different versions of the same basic Long design, so you pay your money and take your choice — we've got building to do!

The following, I hope, will be a "new" and time-saving building technique for you. If *you* know of a better way to do it, please write me, because these methods have been borrowed from my buddies!

Start with the tail because it's easy, and when you're finished, you have the illusion of being one-third done! You may build the "sandwich" version with white glue or "contact cement." I prefer the former. Or, you may cut the horizontal stab of  $\frac{1}{4}$ " balsa and add the last 1" toward each tip of  $\frac{1}{2}$ " x 1" stock, grain crosswise to prevent warps. Cut the elevator and sand to cross-section, and connect with favorite Taurus type horn or U-shaped  $\frac{3}{32}$ " piano wire. Make the vertical stab and rudder of  $\frac{3}{16}$ " sheet and don't forget to notch the vertical stab into the horizontal stab. Drill the hole for the tailwheel strut and after installation, reinforce with Celastic — cover and sand to suit. I personally prefer light silkspan covering as it "hides" the grain and is very light.

Cut the fuselage sides from  $\frac{3}{32}$ " x 4" x



Author's original R/C prototype is also an excellent stunt aircraft.

**Dave Long's full scale "Long Midget" was one of the hottest low-wing designs ever entered in the Goodyear races. Today, the "Midget Mustang" version is a top favorite among homebuilt enthusiasts.**

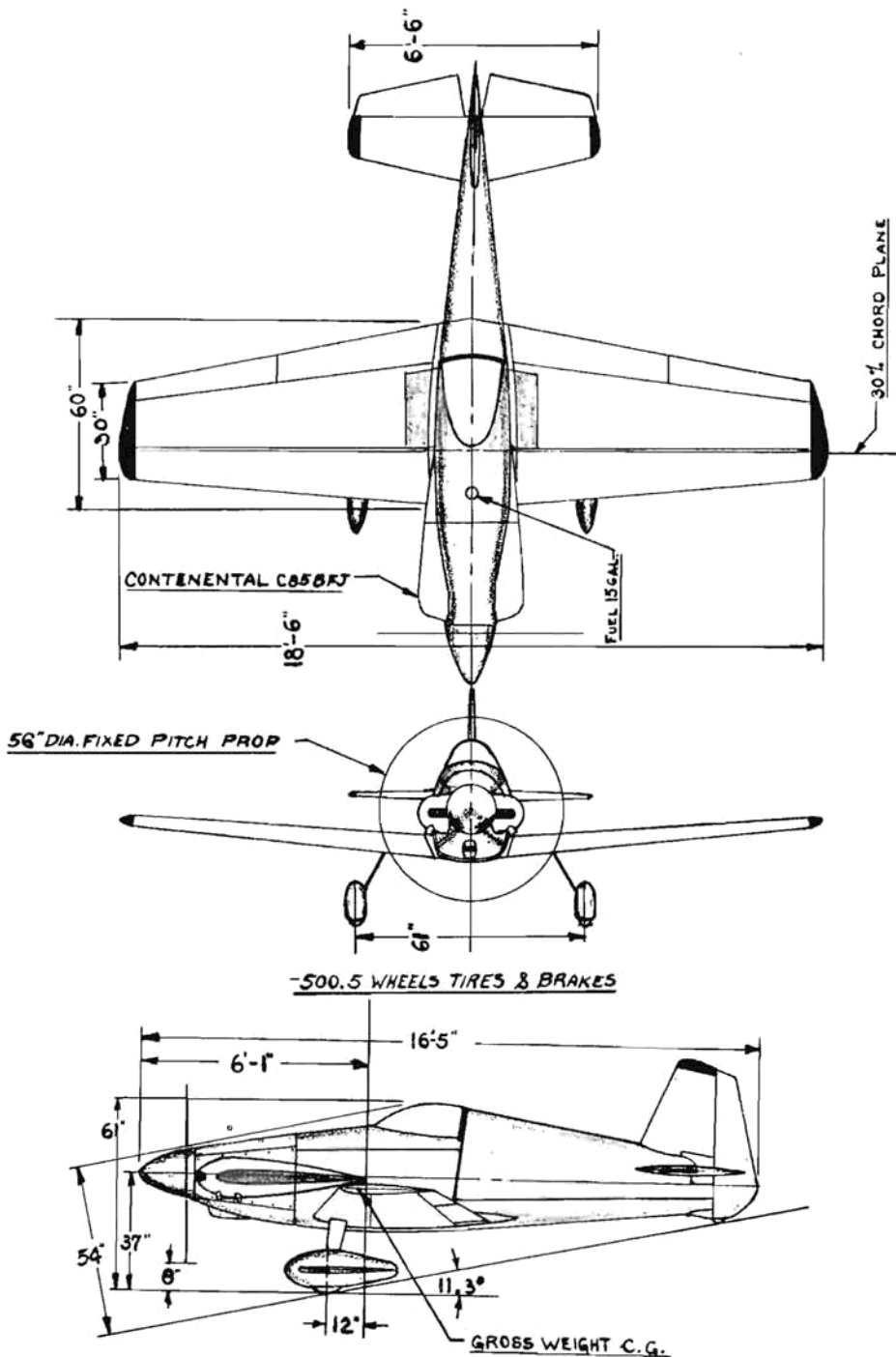
Cockpit photo of Midget Mustang built from Bushby Aircraft plans and kit. Bushby Aircraft photo.



3/8" (isn't that nice?) and add 1/8" sheet doubler from firewall forward, and between the firewall and landing gear bulkhead - Grain vertical! Next, add the 1/4" sheet wing doubler. Cut the firewall from 1/4" ply. The landing gear bulkhead is made from 3/8" ply with holes drilled for the landing gear clips (I use nylon thread and sew the 3/8" wire gear to the bulkhead). Be sure to cut the hole for the battery cable. Next cut the remaining formers and install to sides, taking great pains to align (I haven't managed a straight fuselage yet, so will make no further comment). When this has dried (straight, of course), add the bottom planking and sides of turtledeck. Spot glue the top and bottom Cowl blocks in place. Now add the turtledeck back plate, and when dry, carve and sand to shape. Drill holes for dowels, add tail assembly, and check fairing blocks.

Cover and paint to suit. (I prefer silkspan here, too, and still use fiberglass resin fuel proofer in the engine compartment and fuel tank area!) Glue a balsa strut fairing to the landing gear, then shape Celastic around this for finished landing gear wing strut. The wheel pants can be made of 1" sheet stock sandwiched between 3/16" sheet. I find that epoxy holds the pant to the wheel retainer real well. Don't forget to "depants" your plane on rough fields!

The wing ribs are all 1/16" sheet and can be cut using the center rib as a pattern. Measure the length of each rib and mark it on a straight line on the balsa to be cut - now place the pattern on the line and *pivot* the pattern rib at the centerline mark. On the leading edge use its form to cut camber, first top, then bottom of each succeeding rib until the total of 9 are done. Mark the spar location 3" back from leading edge - stack ribs and cut all notches simultaneously. With the main spar in place, erect ribs perpendicular on the rear of the leading edge planking and be careful to insure that the centerline of each rib is parallel to the bench top. Now add the TE top planking. Next, gently raise leading edge planking and slide, "sticky side up," a 2" strip of masking tape under it at every rib location. Now, glue on top LE planking, pin at the spar, and tape at the LE at each rib! (EASY!) Now add cap strips, and if on a jig - dihedral brace - 3-4 1/2" under one tip (1 1/2-2 1/4" each tip) also center section planking. When dry, add bottom TE planking, cap strips, and center section planking. Level up the leading edge planking and ribs to accept leading edge strip. Add tip blocks! Install linkage and cut out ailerons. Plank the aileron leading edge,



Three views of Midget Mustang furnished by Bushby Aircraft Co., manufacturer and supplier of full-size Midget Mustang kits, plans and accessories. An excellent choice for an NMPRA Goodyear ship.

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## LONG MIDGET

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add horns and tailor to fit the wing cut-out. (I use TE stock on wing TE and aileron LE, with the wide part up on both, hinging the ailerons at the top with sig nylon hinge material.) Now sand, cover, and paint to suit. On the original models (four of them) double layer silkspan was used and the heaviest one weighed 4 lbs. 11 oz. flying! That's why I like silkspan and dope on balsa.

It's easy for me to sit here and tell you how to build these because I designed it to be built this way. The balance point should not be more than 33% aft of M.A.C. (mean-aerodynamic chord). Elevator movement — very little — ailerons, half of that! Rudder, throw-lots on digital or reds, little or none on analog (if rudder channel neutral drifts!). Adding stall strips 4" long made from  $\frac{3}{4}$ " sq. cut diagonally sure helps stability! Put them 2" from the fuselage on each wing leading edge. (Wash out in the wing tips will do the same thing.)

This airplane is intended as an all-around airplane; thus it can be entered in scale and pattern events as well. It will do the complete AMA stunt pattern as well as many free-style maneuvers.