MODEL AIRPLANE CONSTRUCTION NEWS MAGAZINE

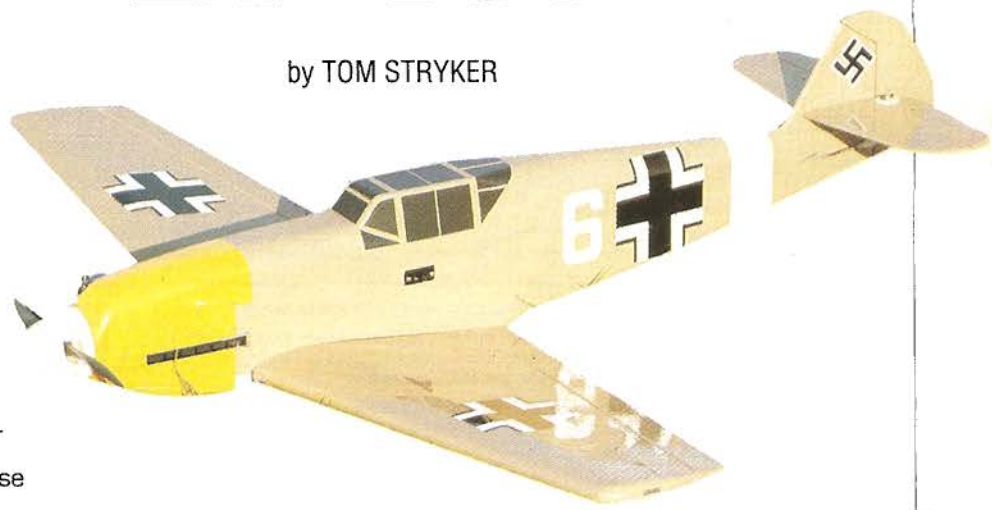
1/12-SCALE

P-51 MUSTANG AND Bf-109

by TOM STRYKER

ADDING TO SOME of the classic confrontations of all times (Ali and Frazier, Roadrunner and Coyote, Donald and Ivana), here are two of the most famous aerial adversaries of WW II: the North American P-51 and the Messerschmitt Bf-109.

Modeled to 1 inch equals 1 foot, these aircraft were designed to compete in the new AMA-sanctioned combat event—1/12-Scale WW II Combat (see sidebar). Though the P-51 is almost exactly 1/12 scale (37 1/4-inch span), the Bf-109 in 1/12 scale came out ridiculously small (32 1/2-inch span), so the 5-percent-deviation rule was followed to increase its span to a more reasonable 34 inches, and the stab and fin to a size

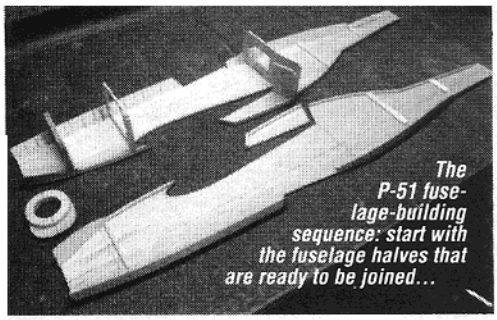


PHOTOS BY TOM STRYKER

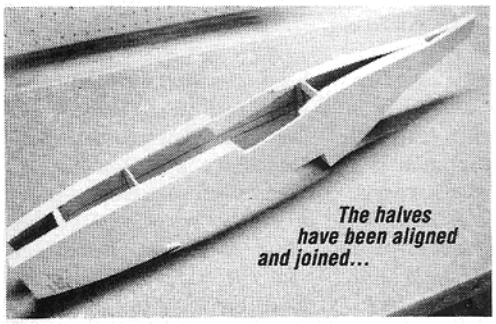
P-51 MUSTANG AND Bf-109

large enough to avoid them being mistaken for scrap balsa! Since the planes are designed for combat, their design and finish are as simple as possible. Murphy's law says "He who spends the most time building will be the first to midair!" (or something like that!).

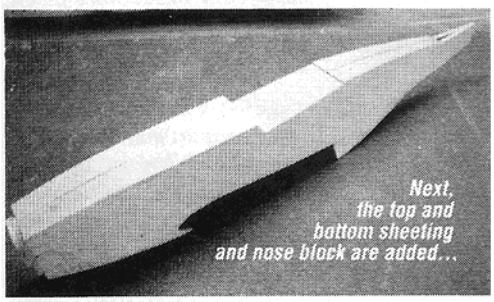
Almost identical building techniques are used for both models, so putting them together in one article was a cinch. The wings are fully symmetrical and build up very light. The fuselages use simple "box-type" construction with a little triangle stock for shaping the tops. There's no landing gear, so hand-launching is used. The radio required is 3-channel (no rudder) with mini-servos and battery.



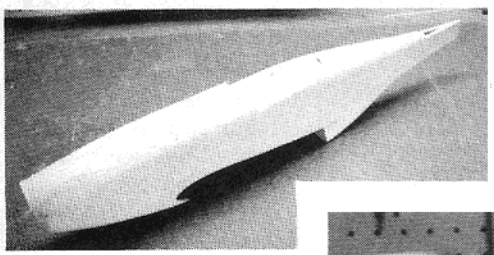
The P-51 fuselage-building sequence: start with the fuselage halves that are ready to be joined...

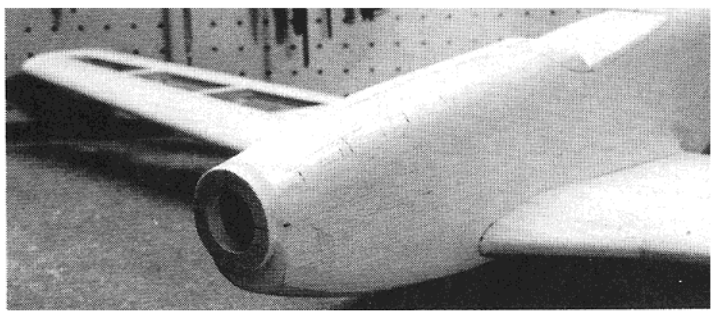


The halves have been aligned and joined...



Next, the top and bottom sheeting and nose block are added...





Above: after a little carving and sanding, the shape is nicely rounded.

Right: a view of the P-51's nose area after the shaping has been completed.

SPECIFICATIONS

	P-51	Bf-109
Scale	1/12	1/12 (plus 5 percent)
Wingspan	37 1/4 inches	34 inches
Length	32 3/8 inches	30 inches
Wing area	240 sq.ins.	205 sq.ins.
Weight	1.75 to 2.2 pounds	1.6 to 2.2 pounds
Wing loading (oz/sq. ft.)	17 to 21	18 to 24
Engine	10 to .15 (no tuned pipe)	
No. of channels	3 (aileron, elevator, throttle)	

(Miniservos and battery required)

CONSTRUCTION

Because of the size and limited wing area of these models, careful selection of balsa is a *must*. Use very light wood for the wing and fuselage and just slightly heavier wood for the tail.

Since the two models are built so similarly, all instructions, except where noted, apply to both aircraft.

• **Wing.** The wing is easy to build since, although it's fully symmetrical, it's built on a flat surface. The plans only show one wing half, so two identical wing halves are built over one drawing.

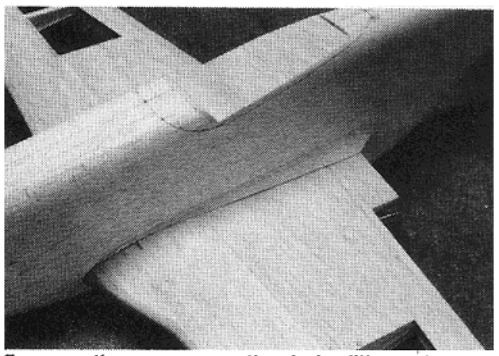
Begin by cutting the 22-degree angles into the 3/16x3/8-inch leading-edge stock. Pin the leading edge (cut slightly oversize), trailing edge, 1 1/4-inch aileron stock, capstrips and center-section sheeting to the plans. Do *not* cut out the 1-inch-wide ailerons yet. Secure the bottom spar and all the ribs. Attach the top spar and leading edge to the ribs. (Note: since the inner two ribs on the P-51 are longer, cut the leading edge where it meets R-3, sand the appropriate angle, and reattach.)

Put 1/16-inch shear webs between all the ribs, securing them to the two spars. Secure the top trailing edge and leading edge and the top center sheeting. Then add the top capstrips to the ribs.

Remove the wing from the building board, and secure the bottom sheeting to the ribs and leading edge. Trim and round off the leading edge. Build the other wing half, making it identical to the first. Note that the ailerons haven't yet been cut out.

Block-sand both ends of the wing half. Roughly carve and attach the wing tips. Do *not* allow the glue to come into contact with the rear 1 inch of the aileron stock (since it will be cut out next). Round off and final-sand the tips.

With a long straightedge and an X-Acto blade, cut out the 1-inch-wide ailerons from the wing center section to the wing tip. Saw the ailerons away from the center-section trailing edge. Hollow out the center sections as necessary, and insert the 1/16-inch aileron torque rods; then reattach the



For cosmetic reasons, an optional wing fillet made out of scrap 1/2-inch triangle stock was added.

the leading edge. Wrap the center section with 2 1/2-inch nylon reinforcing cloth and secure it with thin CA. Insert the 3/16-inch dowel.

• **Fuselage.** Cut out the fuselage sides and bulkheads. Drill holes in the firewall for the engine-mounting bolts, the fuel line and the throttle linkage; their positions will depend on how you want to position the engine.

Attach all stringers, rear doublers, braces and triangle stock (with relief cuts, as appropriate) to both fuselage sides. Do *not* add the 1/16-inch wing-saddle doubler yet, because that would make it difficult to bend the fuselage sides together. Block-sand the inside rear of the fuselage sides so that they'll fit flush together when the fuselage is joined.

Cut out the 3/16-inch nose-block pieces (two for the P-51; three for the Bf-109), and glue them together.

Tack-glue the firewall and bulkheads to one fuselage side so that you can reposition them when you join the fuselage halves. Join the fuselage halves at the rear, then work forward, tack-gluing each bulkhead. Use a jig to ensure alignment, make corrections as necessary, then apply CA to secure the bulkheads firmly.

Wet the top surface of the 3/16-inch top sheeting as necessary to bend it around the fuselage, then attach both pieces to the top of the fuselage. Trim and attach the 1/8-inch cockpit floor pieces. Invert the fuselage and add the 1/16-inch cross-grain bottom sheeting. Block-sand the nose area and attach the nose block. Attach the 1/16-inch fuselage doublers to the inside walls of the fuselage, and trim them flush with the wing saddle.

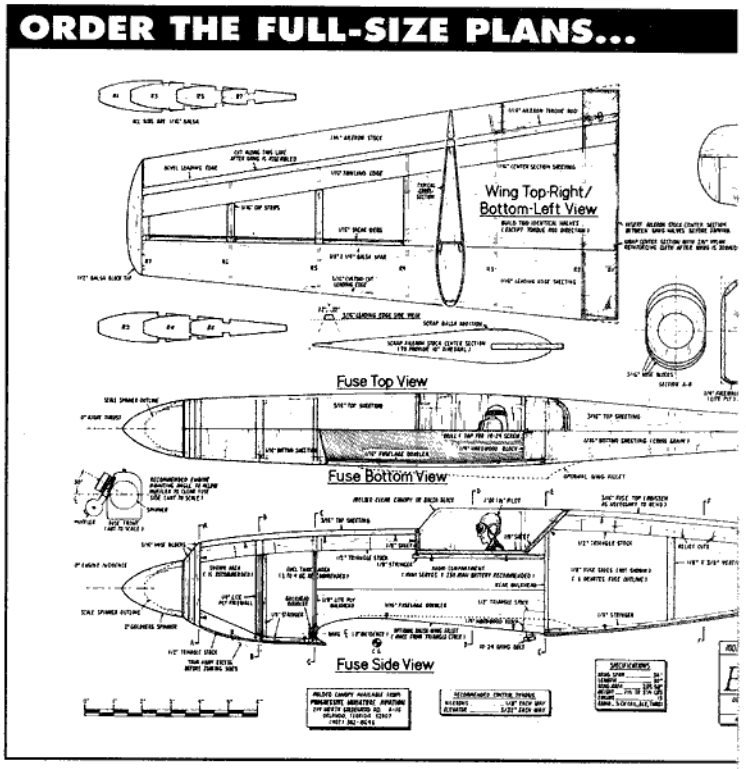
Carve and round off the entire fuselage and nose section, referring to the cross-sections on the plans. A typical sequence would be to carve the entire fuselage roughly with an X-Acto blade, sand the corners with 80- to 100-grit sandpaper, then smooth the surface with 240- to 320-grit sandpaper.

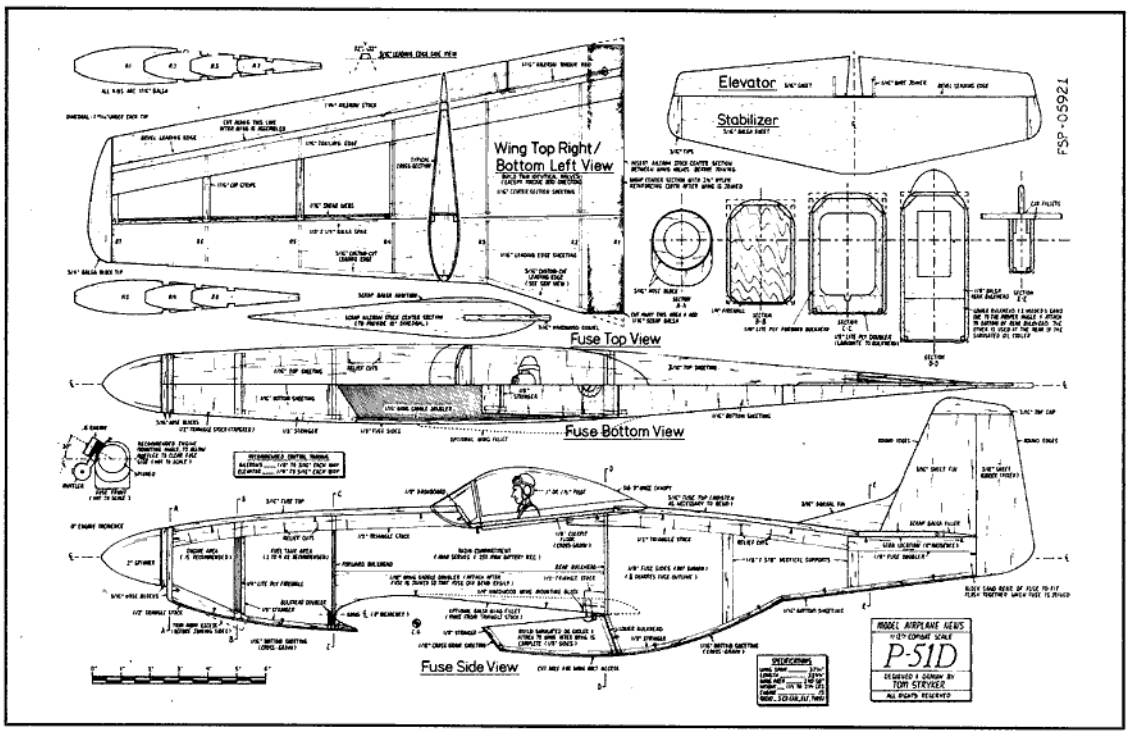
• **Tail assembly.** After cutting out the 3/16-inch fin and stabilizer parts, glue them together and round off the edges slightly. Bevel a vee-shape into the leading edge of the elevators, and taper the trailing edges slightly. Bend the 1/16-inch connecting wire, and drill appropriate holes in the elevators. Groove out the trailing edge of the stabilizer enough to accept the wire.

• **Wing mounting.** Mount

center-section trailing edges. Bevel a vee-shape into the leading edge of each aileron.

Prepare the wing dihedral guide by cutting it out of scrap 1 1/4-inch aileron stock and scrap 1/16-inch sheet. Cut a 3/16-inch slot in the front. Attach the dihedral brace to one wing half, then attach the other wing half, being very careful to ensure that the wings are aligned. The dihedral brace should provide the required 10 degrees of dihedral, but double-check with about 3 3/4 inches under one tip. Cut and/or sand straight across the center leading and trailing edges as depicted on the plans. Add scrap 1/16-inch balsa as necessary to





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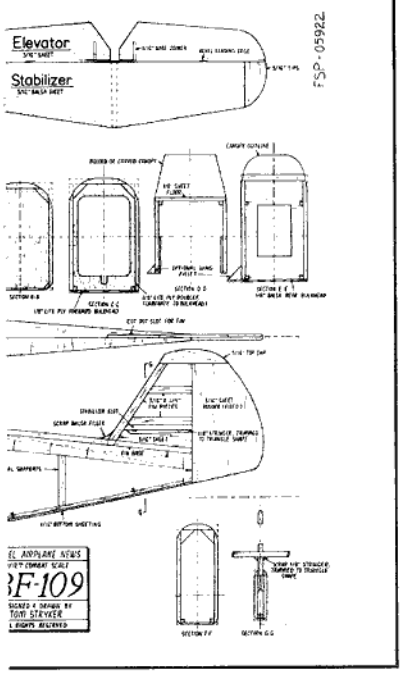

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the 1/4-inch hardwood wing-bolt block, and affix the 1/2-inch triangle-stock pieces securely in the corners. Trial-fit the wing, and open up the slot in the bulkhead as necessary until the wing fits snugly in the saddle. Align the wing then drill a 5/32-inch hole through the wing rear and follow it with a 10-24 tap. Remove the wing, and enlarge the hole in it just enough for a 10-24 nylon bolt to fit easily.

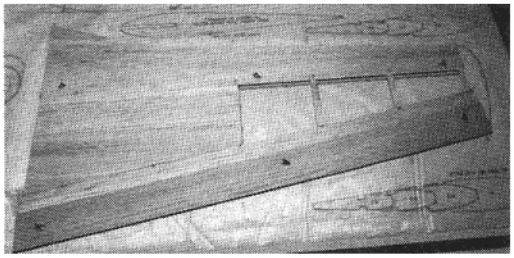
- **Oil-cooler assembly (P-51 only).** With the wing mounted, trim and assemble the pieces for the simulated oil cooler and glue them to the wing. Mount a scrap piece of 1/8-inch stringer across the front corner, then sheet the front and top with 1/16-inch cross-grain balsa. Round off the edges to match the bottom of the fuselage, and make a 1/2-inch-diameter hole above the wing bolt to allow access.
- **Tail mounting (P-51 only).** Align the stabilizer with the wing, then secure the stab to the fuselage with plenty of medium CA. Mount the fin assembly to the top of the stab and the rear of the fuselage. Add a small scrap of balsa to the junction behind the stab where the fin meets the fuselage top, and sand to shape.
- **Tail mounting (Bf-109 only).** Slide the stab through the slot in the fin, and secure it with thin CA. Carve two pieces of scrap 1/8-inch stringer into a triangular shape, and glue them securely to the junction on the bottom of the stab where it meets the fin. Secure the fin to the top of the fuselage (fit it into the slot in the top sheeting; see plans) and to the rear of the fuselage.
- **Canopy.** The P-51 has a standard Sig* 9-inch WW II canopy, which should now be cut out and trimmed. For the Bf-109, carve one out of balsa, vacu-form one, or order one from Progressive Miniature Aviation*.
- **Wing fillet (optional).** For a little cosmetic improvement, a fillet may be added to the joint between the wing and fuselage. Trim scrap 1/2-inch triangle stock to the approximate shape of the wing saddle. Make relief cuts as necessary to bend the triangle stock around the fuselage, and secure the fillet to the fuselage. The exact shape of the fillet isn't critical, so you may sand until you like the way it looks.

COVERING

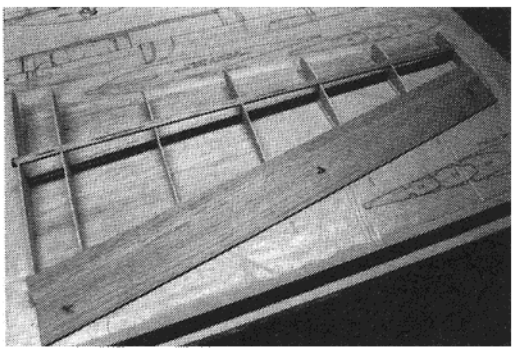
Cut the cowl opening for your engine in the appropriate position. Cover the aircraft with your favorite iron-on film. Pick a scheme that will show up well in the air and that has sufficient contrast between the top and bottom. Fuelproof all the exposed areas after you've completed the covering. Insert a pilot figure, if you want one, and attach the canopy.

EQUIPMENT INSTALLATION

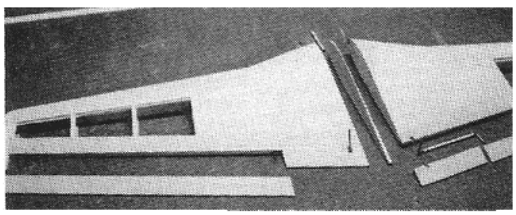
Begin by installing the engine and fuel tank (2- to 4-ounce tank) so that the radio may be positioned to adjust the CG. The radio will probably have to be positioned as far rearward as possible to offset the long nose moment. Stick with the recommended control



Although fully symmetrical, the wing is built on a flat surface. Here, the bottom sheeting has been pinned to the plans over wax paper.

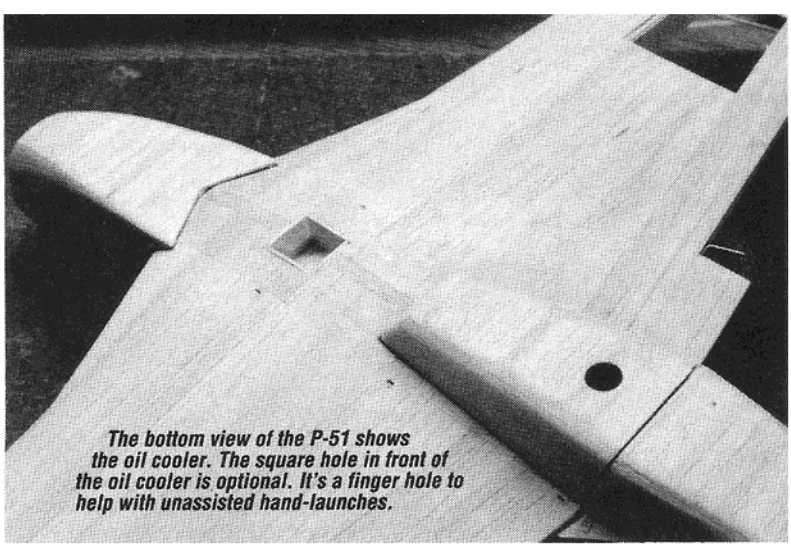


The wing has a minimum number of ribs to minimize weight and building time.

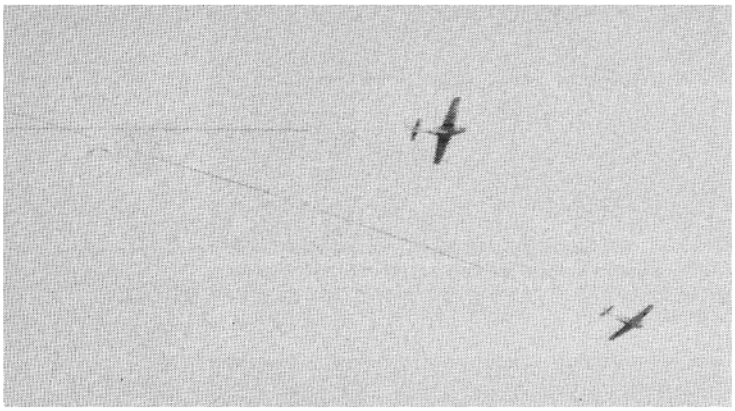


The nearly completed wing, showing the torque rod and center-section detail.

The P-51's 1 1/2-inch pilot is a trimmed down Williams Bros. figure, and the canopy is a 9-inch WW II canopy from Sig Mfg.



The bottom view of the P-51 shows the oil cooler. The square hole in front of the oil cooler is optional. It's a finger hole to help with unassisted hand-launches.



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throws (see plans), because too much can make for a real handful! Check and adjust the CG, both fore and aft, and side to side.

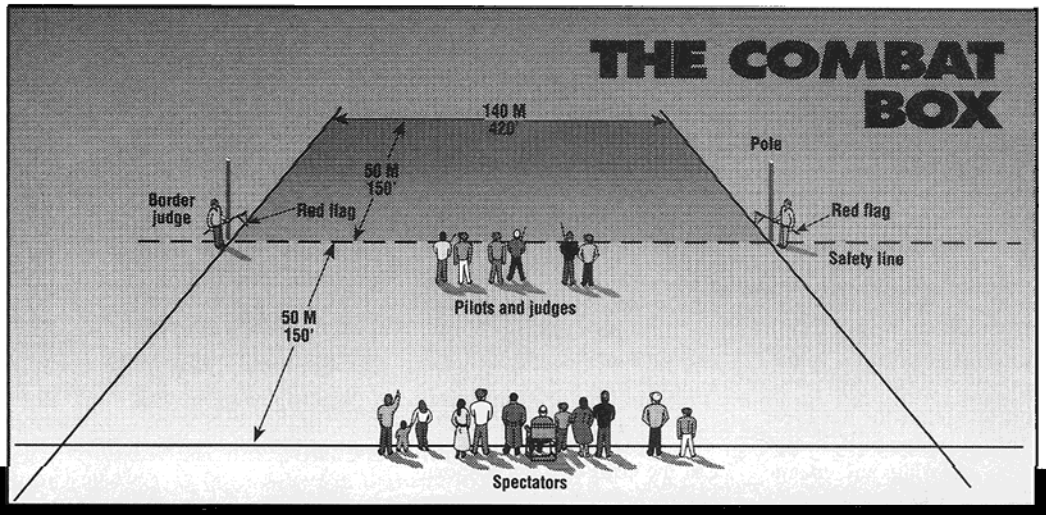
FLYING

A moderate toss into the wind (by someone other than the pilot, if possible) will easily get these fighters airborne. With the recommended control throws, flight is very smooth and stable. If too much throw is used, especially elevator, they'll "snap out" of a hard pull-up. Recovery, though, is immediate when the elevator is released. Flying combat, it's tempting to put lots of control throw in to turn more tightly, but remember that we're trying to emulate WW II fighters and their large, graceful maneuvers.

Landing is easy if the throttle is set up to cut off when the trim is pulled back and the prop is aligned to stop horizontally. The glide is relatively shallow, unless a streamer is still attached (meaning you haven't been shot down!), in which case your plane will descend much quicker. Just remember to aim for grass, *not concrete (ouch!)*.

After a successful combat mission, we'll see you at the officers' club for some "hand-flying" and swapping tales about how many bad guys you flamed! You're buying!

**Here are the addresses of the companies that are mentioned in this article:*
***Sig Mfg. Co.**, 401 S. Front St., Montezuma, IA 50171.*
***Progressive Miniature Aviation,** 214 N. Goldenrod Rd. A-16 Orlando, FL 32807; (407) 382-8646.* ■



FIGHT TO THE FINISH

New for '92 is a provisional AMA event called "WW II Combat," the objective of which is to "recreate the excitement of WW II combat in an enjoyable, safe, scale competition."

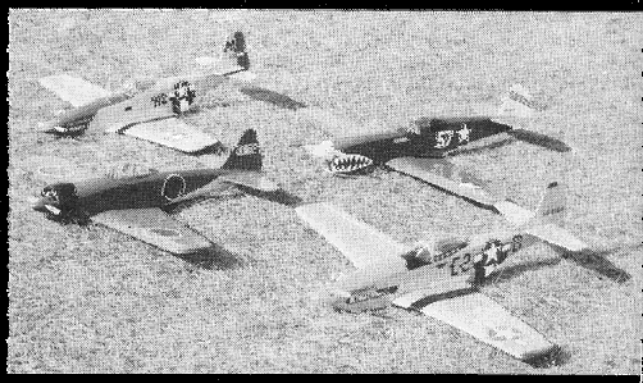
Basically, this event involves 1/12-scale sport-scale replicas of fighters that operated from 1935 to 1955. The 1/12-scale (1 inch to 1 foot) requirement must be met to within 5 percent for wingspan, length, tail span, rudder height and fuselage cross section. The maximum weight allowed is 2.2 pounds for a single-engine model and 2.5 pounds for a twin.

The engine limitations specify: .15 for a single-engine design in which the full-scale plane was powered by an in-line engine (P-51, Bf-109, P-40, etc.) and .20 for single-engine designs where the full-scale plane was powered by a radial engine (P-47, FW-190, A6M Zero, etc.). Any engine within these limitations is allowed, but tuned pipes are forbidden. In a twin-engine aircraft, the total displacement must not exceed .20 (two .10s).

The aircraft may be launched by hand, dolly, catapult, or wheels (if installed). Each aircraft will pull a streamer that's 30 feet long and approximately 1/2 inch wide; it will be secured to the aircraft with 5 feet of cotton string.

The provisional scoring system is fairly complicated and uses a system that awards points for being the first airborne, flying the longest, surviving a midair and, obviously, cutting an opponent's streamer. Points will be lost for failure to become airborne in time, crossing safety lines, crash-landing after midairs, etc. Consult the 1992/1993 Competition Rules guide for full details of the rules.

To my knowledge, very few kits fit these requirements. Some could be modified to meet the 5-percent rule, but the 2.2-pound rule really encourages scratch-building. As well as the P-51 and Bf-109 presented in this article (they were designed specifically *for* this event), other designs in *Model Airplane News's* vast inventory of plans could be used.



Rich Uravitch's 40-inch-span P-47 Thunderbolt (plan no. FSP06843) is just under 1/12 scale. J.P. Neate's stick-and-tissue F4F-3 Wildcat (plan no. FSP09791) is almost exactly 1/12 scale and would certainly come in well below 2.2 pounds. And if you stretch the term "fighter" a little, Rich Uravitch's AT-6 Texan (plan no. FSP04821) will also qualify.

Greg Rose wrote the rules for the new AMA 704 WW II (combat) event and is forming a national combat organization. For information on dogfighting and additional sources of plans, contact *Greg Rose, 3429 Elmy, Orion, MI 48359.*