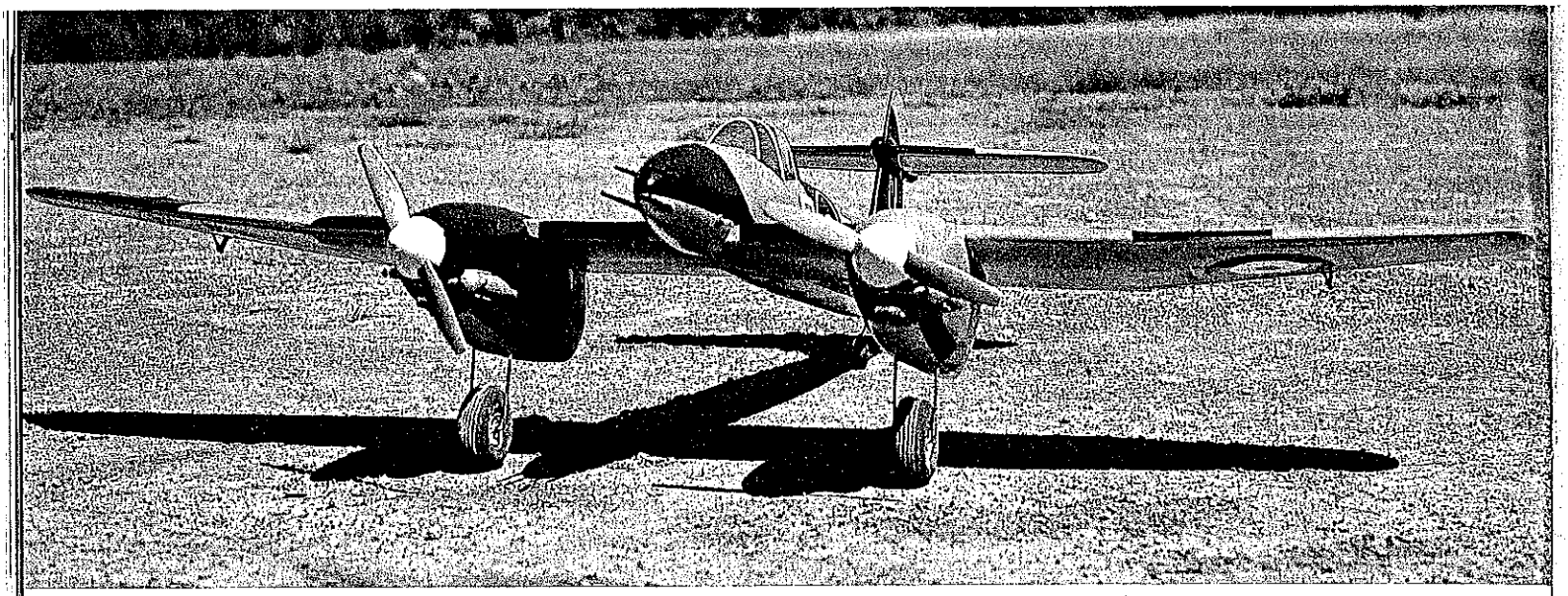
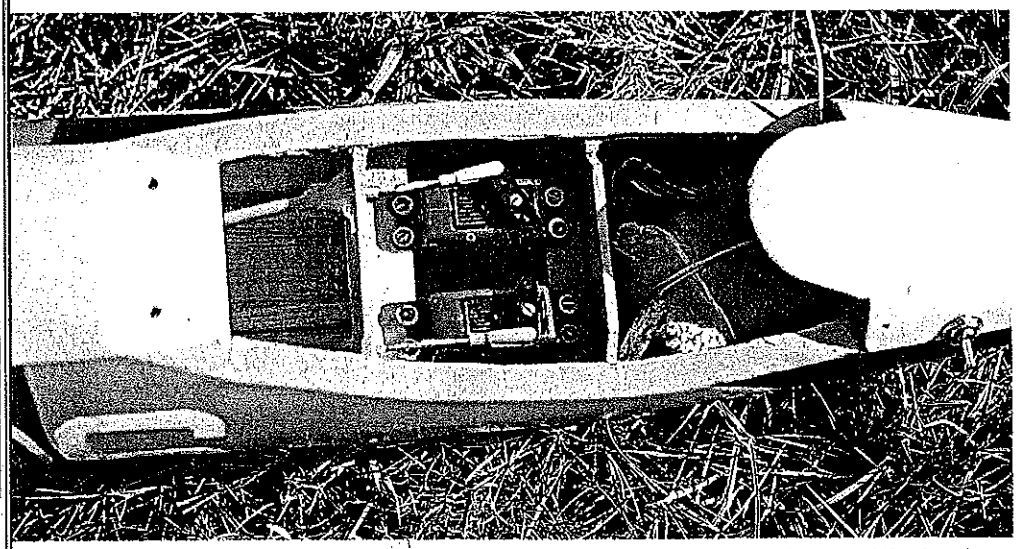
The Whirlwind was the first British fighter designed to be armed with 20mm cannons. Although the model appears to have a short nose moment, the center of gravity on our author's model was as per the plans.

Westland Whirlwind



The model is happiest taking off and landing in the same three-point attitude shown as it rests. Full-size plane was small for a twin engine.



Use sufficient foam packing to keep the receiver wedged against the top of the fuselage, and route the antenna wire away from the servos in the wing to avoid any potential tangles.

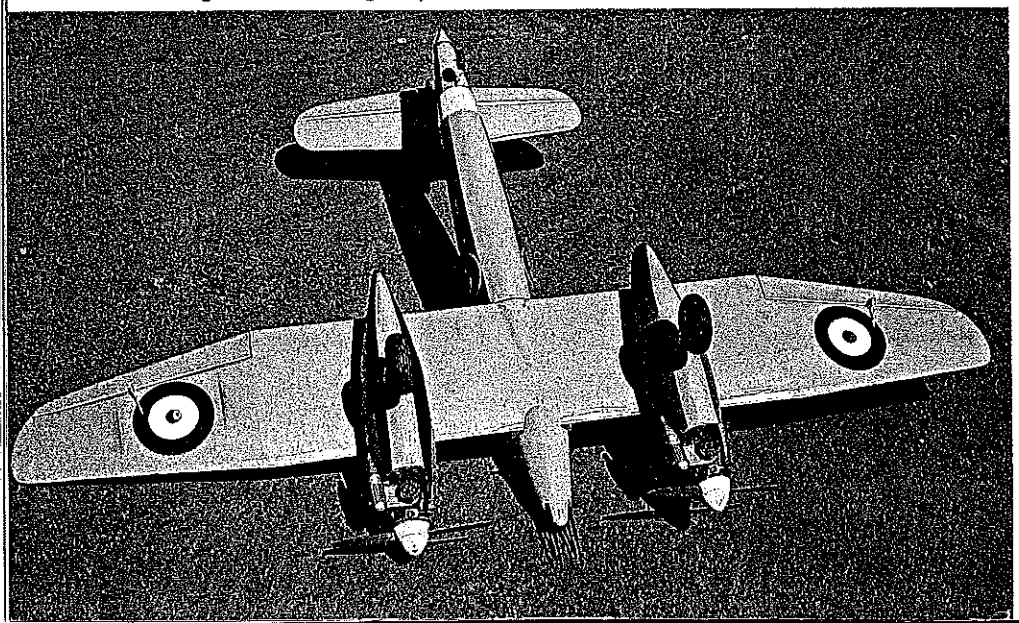
The sleek appearance of this rarely-modeled WW II fighter makes it an outstanding project in its own right. Add to that easy transportability and inexpensive .10-size engines for power, and you've got an irresistible twin. A four-channel radio is required.

■ Frank B. Baker

THE PROTOTYPE is one of the unheralded aircraft of World War II. It was designed in 1938 to meet the need for a cannon-equipped fighter. In many ways it was very innovative for its time.

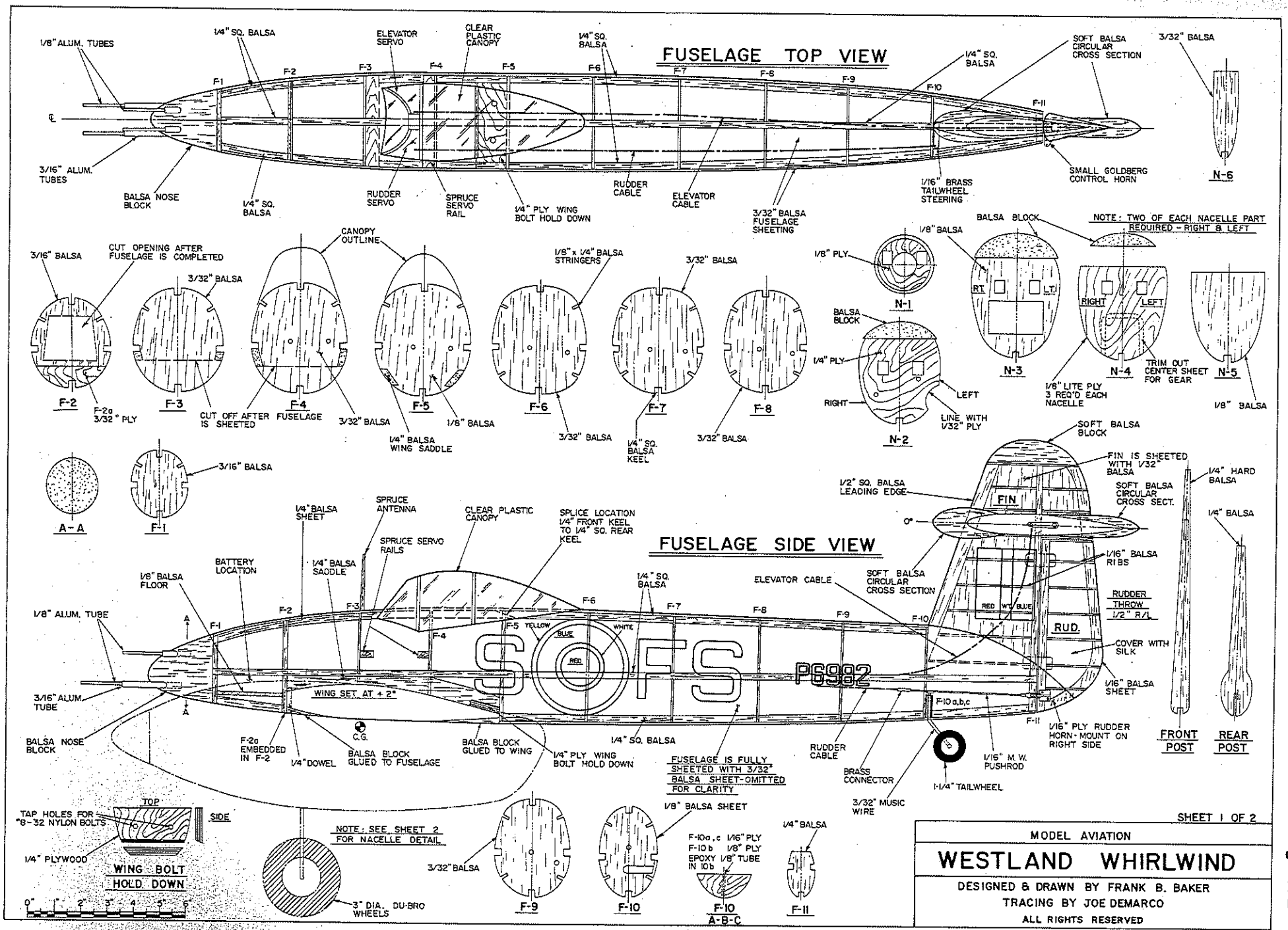
Although it was not a very large aircraft, having a wingspan of only 45 feet and an overall length of 32 feet, 9 inches, it was fast (360 mph) and very maneuverable. Outfitted with 885-hp engines that had no growth potential, its performance could not keep up with wartime demands. Consequently, only 112 were actually built. Engine limitations confined the Whirlwind to low-altitude work where it was used primarily as a fighter bomber.

The wing has a rather high aspect ratio for a fighter. Dihedral is in the outer panels only.

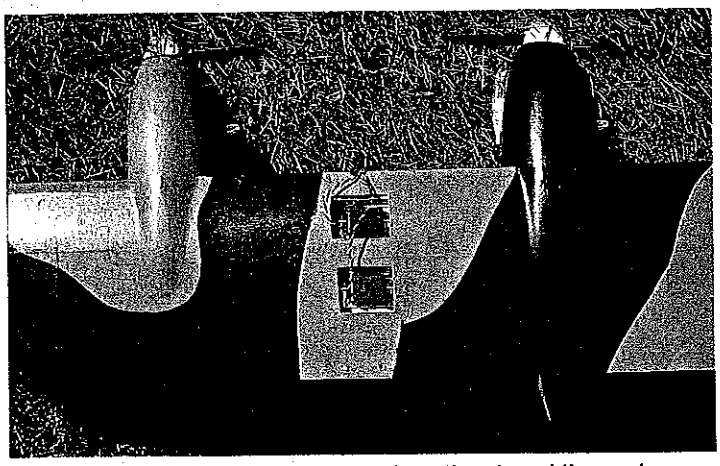


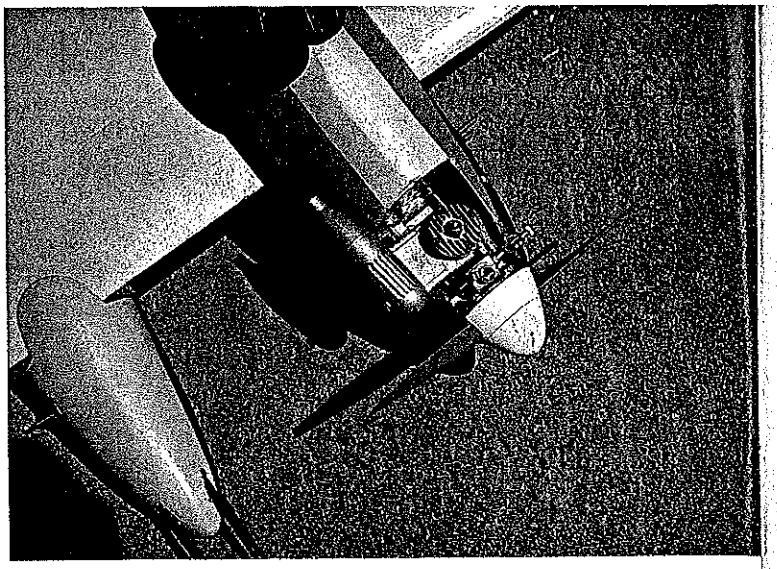
The few Whirlwinds that were built saw extensive combat action and were not withdrawn from service until 1943. Only one Whirlwind survived the war, and it was used as a company "hack" until 1947, but it does not appear to exist today.

Due to its sleek appearance and unusual (for 1938) T-tail, the Whirlwind has considerable appeal as a model. However, it has rarely been modeled. Upon searching through my old magazines, I only found a Control Line model done by the late Paul Plecan in 1943 and a small photograph of an .02-powered Free Flight. The plans presented here were enlarged from a set of three-view drawings published in *Model Airplane News*, February 1969, that showed both the markings and camouflage



Full-Size Plans Available . . . See Page 172





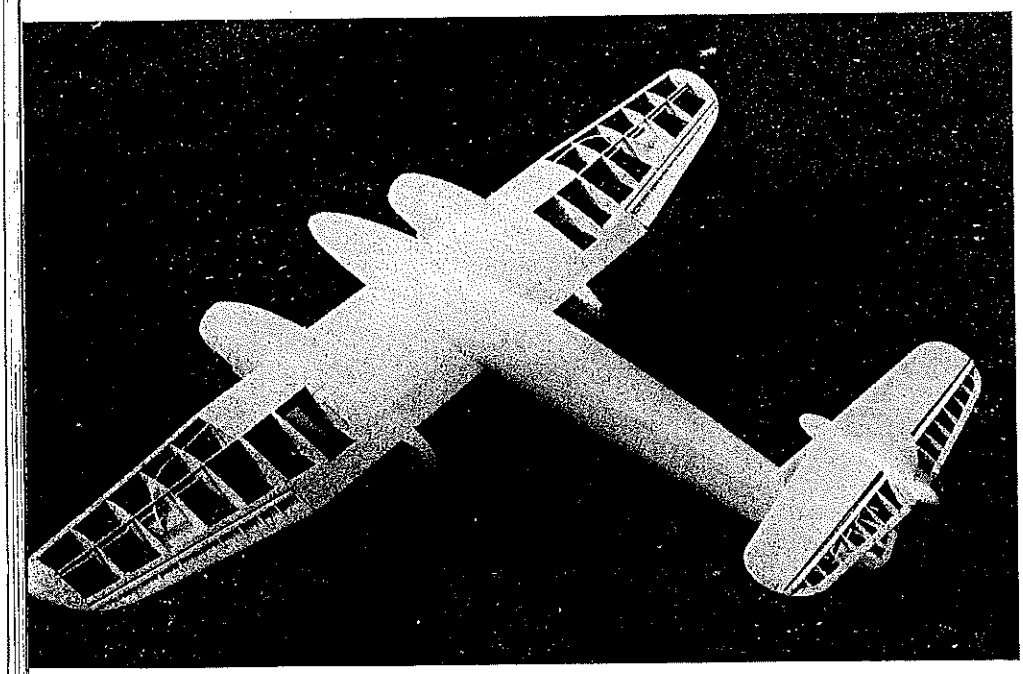
Above: The nacelles have 1½° of out thrust, and the engines are mounted another 1½° out for good single-engine performance. Right: Well-hidden O.S. .10-FSR engines have plenty of cooling.

patterns.

Good documentation for the Whirlwind was very hard to find. The best I came across (even though only a two-page description with one photograph) was in the book, *Planemakers #2 Westland.* It's available from Jane's Publishing Co. for $15.95 by writing to them at the following address: 4th floor, 115 5th Ave., New York, NY 10003. Despite the lack of printed reference material, the Whirlwind is still recognized by many modelers due to the small perspective sketches by the late Hank Clark that often appeared as fillers in modeling magazines.

For a number of years, my wife has been needling me about having so many multi-engine models when I only fly one or two of them each season. The obvious solution was to build yet another twin that I could use as an everyday "go flying" model. I had been eyeing the Whirlwind for a number of years but had been concerned about a potential center-of-gravity (CG) problem with the typical short-nosed, twin-engine British aircraft. The success of my DeHavilland Mosquito convinced me, though, that this problem was probably more visual than real. As usual, I designed the model for two O.S. Max .10 FSR engines, resulting in a wingspan of 54 in. The relatively large size compared to the small engines means that it must be built lightly. I also made the wing detachable on this model so it can easily fit into the trunk of today's smaller cars.

Construction. Due to the T-tail configuration, I departed from my usual construction sequence of building the wings first. The initial step, then, is to build the basic fuselage framework consisting of formers with ¼-sq. and ⅛ x ¼-in. stringers. Be sure to notice that Former 2 had a 1/16 plywood section embedded into it. The curved stringer sections from Former 4 forward are cut from ¼-in. sheet and spliced to the ¼-in. sq. before installation. Be sure to glue in place the ¼-in. sheet wing saddle between Formers 2 and 5 at this point. Also install the steerable tail wheel mechanism.



All-balsa construction is both light (a necessity for the small engines being used) and strong. Slender fuselage was completely covered using only four sheets of 3/32-in. balsa.

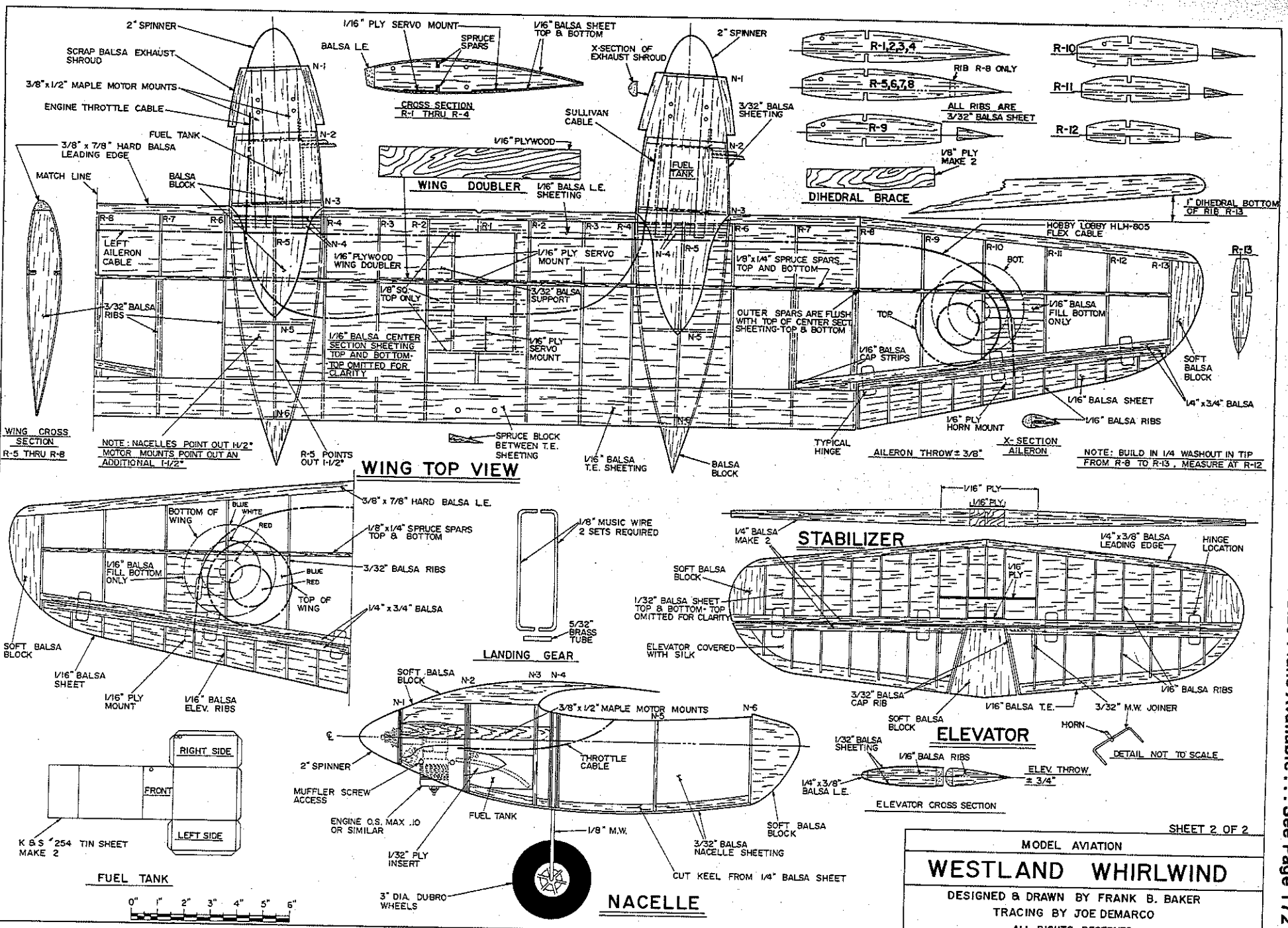
Next, the side sheeting will be glued on. Use a medium sheet of 3/32 balsa, and soak it in hot water to which a bit of ammonia has been added. Position the sheet so that the bottom edge is about ⅜ in. above the trailing edge of the wing and parallel to the side stringer. Use liberal amounts of white glue. I personally prefer Pica Gluit because it is sandable, but most any brand you like will work. Use lots of pins and masking tape to hold the sheeting in place, and check to make sure that the fuselage is straight after the sheeting is attached.

Set the fuselage aside, and build the tail assembly. Use very lightweight balsa for everything except the fin post, which should be hard balsa. The elevator is constructed like a T-tail Sailplane with the horn buried within the vertical fin. Once the stabilizer and the elevator are completed, install the hinges, and connect the elevator. Glue the stab to the vertical fin, checking for vertical and horizontal alignment. Note that the brass horn goes through the fin post. Install the rudder and its hinges.

Once the tail surfaces are assembled, run the rudder and elevator nylon tubing and control cables through the fuselage and the elevator tubing up the fin. I used the Hobby Lobby bulk-pack nylon tube with braided cable (HLH 805). Insert a 1/16 music wire "Z" into the end of the elevator horn, and solder it to the elevator cable. Likewise, attach 1/16 music wire to the rudder cable and a "Z" piece to drive the tail wheel arm.

Cut out Former 11 to fit the fin post. Slip the whole T-tail assembly onto the fuselage; pin it into place, making sure that the rudder is vertical and that the elevator spar is perpendicular to the center line. Also make sure that both the rudder and elevator can be moved by the cables from the servo area.

Sheet the vertical fin and stabilizer with 3/32 balsa, and then glue the whole assembly to the fuselage. Trim the fuselage side sheeting where it meets the vertical fin along the line shown on the plan. Select two sheets of soft 3/32 balsa, and cover the top and bottom of the fuselage. I was able to completely cover the fuselage with only four 3-in. sheets of 3/32 balsa. You will have



SHEET 2 OF 2

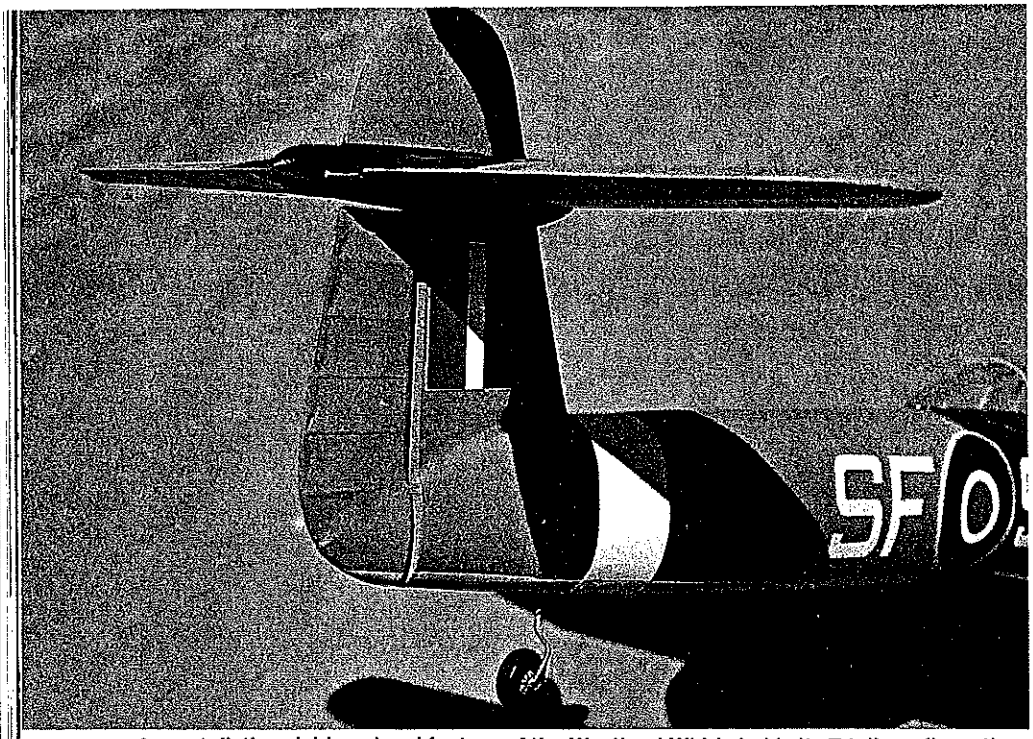
MODEL AVIATION

WESTLAND WHIRLWIND

DESIGNED & DRAWN BY FRANK B. BAKER

TRACING BY JOE DEMARCO

Full-Size Plans Available . . . See Page 172



A most distinguishing visual feature of the Westland Whirlwind is its T-tail configuration. Though innovative at the time, this setup was virtually unheard of on aircraft of the period.

to make a few V-shaped cuts to make the sheeting go around the compound curves, but getting the sheeting to fit is not difficult.

Rough-cut and trim the nose block, and glue it onto Former 1. Carve it to the approximate shape, and then sand the whole fuselage until all the joints and high spots have been smoothed. This completes the fuselage work for now.

The wing is of conventional D-tube construction, and the center section is built as one unit. Be sure to notice that the leading edge shape between the nacelles is different than that outboard of the nacelles. This is due to the oil coolers being in the wing. Build the outer panels as separate units, and then use the dihedral braces to join them to the center panel. Note that the rear wing spar of the outer panel goes through the outboard rib of the center section. This provides a much stronger junction than is typically used at this point.

Sheet the bottom of the wing center section in the areas shown on the plan with 1/16 sheet balsa. Install the aileron nylon tubes and control cables as well as the engine control tubes and cables (Sullivan 507 GRC-3) which exit at the bottom of the wing. Mount the plywood servo plates in the wing, putting them as low as possible. Sheet the top of the center section.

I use built-up ailerons consisting of a central 1/16 sheet with ribs top and bottom and a leading edge spar. This method is quick and light.

Shape the leading edges, being careful to transition from the oil cooler shape to the normal leading edge at the nacelle. After gluing on the soft balsa wing tip blocks, give the whole wing a sanding to smooth out the surfaces. Build the fuel tanks out of K&S easy solder tin plate (#254), and use brass tubing long enough so that it can be trimmed after installation.

Cut out the Lite Ply nacelle formers, and bend the 1/8-in. music wire landing gear legs. Solder the 3/32 brass tube to one side of the landing gear, mount the wheel, and then solder the other landing gear side to the brass tube. Epoxy the three plywood #4 formers and the landing gear unit (with wheel) together. When this is set, build the engine mount assembly consisting of nacelle Formers 1-4, the maple engine mounts, and the fuel tank.

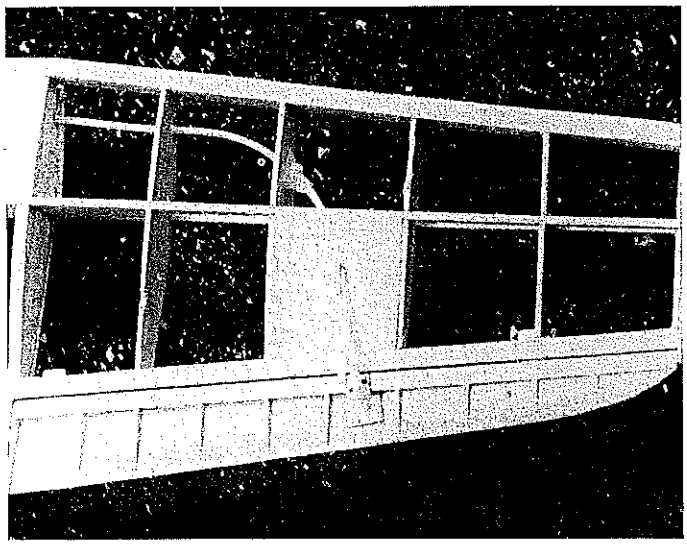
These nacelles are a bit sneaky, as they are banana-shaped. Their centerlines have 1½° of out-thrust while the engine beams have an addition 1½° of out thrust. Pay close attention to the top view of the nacelle on the wing plan, as the whole unit is slanted outboard.

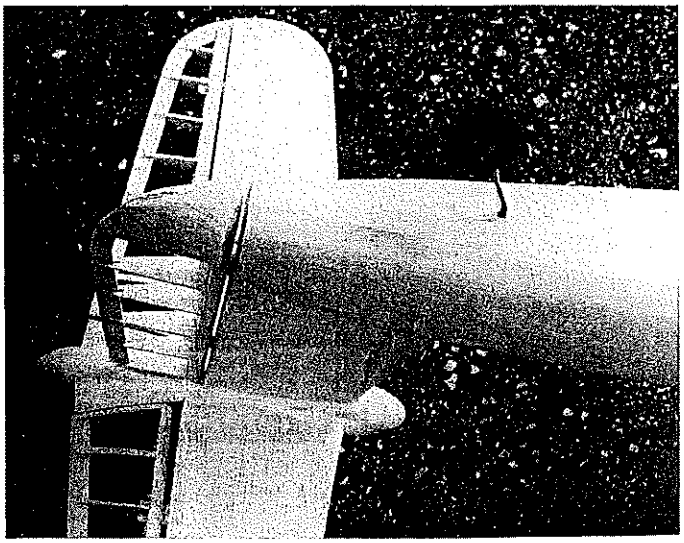
I cheated on the spinners for two reasons. First, the O.S. Max .10s don't like to run with big spinners. Hence, I used some old Williams Bros. 2-in. spinners that approximated the forward part of the to-scale spinners. Second, the British used a very blunt, well-rounded spinner that is not available from any of the current manufactures of spinners for models. You may want to build your own for a more true-to-scale appearance.

Next, cut the bottom ¼ keel from sheet material, and glue it to the engine mount unit. Glue Formers 5 and 6 to the keel. Make two nacelles, one left and one right. Mount the nacelles on the bottom of the wing; block the wing upside down on the table, and use a Robart incidence meter to get a -2° setting. Then position the nacelles on the wing, and trim the formers until the engine bearers are at 0° up or downthrust and 3° out thrust. Once the proper alignment is achieved, the nacelles can be glued to the bottom of the wing. When doing this you will have to thread the engine control tubing through Formers 2, 3, and 4. If you forget to do this, you'll have a real problem on your hands. However, the tubes hang down from the bottom of the wing, and they are hard to ignore. Be sure to check final alignment before the glue sets.

Once the nacelle framework is attached

Continued on page 170





Left: The ailerons consist of a forward spar, a 1/16-in. sheet center, and scrap filler pieces top and bottom for the ribs. This is both quick and lightweight. Right: The vertical fin and the stabilizer are sheeted with 1/32-in. balsa which results in a desired lightweight tail assembly.

ing.

Flying. Your model should balance at the wing spar location. Add ballast as needed to get it to balance there. Hand-glide the model, adjusting the tail or wing incidence to get a long, smooth glide with no gallop or dive. (This is one reason for lightly tack-gluing the wing during assembly; in this way it can be cut loose easily for adding slivers of balsa in the wing bed—sanding them away as necessary—for incidence adjustment.)

Try a few flights with a small number of turns in the motor. If the balance point is correct and the glide is okay, you should only have to worry about thrust line adjustments. Add down and side thrust as needed; observe each flight, and increase the motor turns in stages when the model is flying well at each stage.

This may seem like a slow process, but by the time you are up to max-turn flights, you not only will have your Thorp Tiger properly adjusted, you'll know its flight characteristics. For flying indoors, a lot depends on the room you have. Usually a steady climb of about 5° to 10° while turning in 70 to 80-ft. circles is about right.

I hope you enjoy your Peanut Scale Thorp Tiger as much as I do mine. If you've never built a low-wing Peanut Scale model before, this is one you should give a try.

Reno Air Races/Wallace

Continued from page 84

the North American P-51 Mustang, British Hawker Sea Fury, Grumman F8F Bearcat, and the Chance-Vought F4U Corsair. Several of these planes have been equipped with monstrous engines and props in combination with lightened airframes, clipped wings, streamlining, and other modifications.

The course for Unlimiteds is 9.2 miles per lap with eight pylons, and it is entirely within view from the specator seating area. Similar to the AT-6 class, Unlimiteds start each race airborne with the planes abreast. They enter the race course via what is referred to as the "chute." The sight and sound of seven to nine Unlimiteds thundering onto the course from a full-power descent is spectacular, to say the least.

The Reno Radio Control Club was highly visible at the race site with its display and raffle booth. In addition to the club's main booth, they had three satellite booths which offered raffle tickets on three ready-to-fly RC model packages.

Reno Stead Airport, the site of the air races and show (incidentally, also the main flying site for the 1984 AMA National Contest), is located approximately 11 miles north of downtown Reno via Interstate Highway I395. Some hotels and casinos even provide a free shuttle bus service to and from the race site.

The dates for the 1986 Reno Air Races and Air Show have been established as September 11-14. Any model flier who attends won't be disappointed.

Tips for first-time attendees:

1) Make your travel and hotel accommodation arrangements early. There are many fine hotels to select from, but their busiest time of the year is the week of the air races and show. Rates are reasonable. Circus Circus, for example, offers a double-bed room at $24.00 per day plus tax (Monday through Thursday) and $32.00 per day plus tax (Friday through Sunday).

2) Order your air race tickets early if you want reserved seating. The address: Reno Air Racing Association, P.O. Box 1429, Reno, NV 89505. Telephone: (702) 826-7500.

3) Food in Reno is excellent and inexpensive. Most hotels and casinos offer top-rated dinners at less than half the price of restaurants elsewhere. There are varied buffets at very low prices.

4) Rental cars are readily available, and many companies offer bargain rates of $70 to $90 per week with unlimited mileage for a compact or sub-compact model. Shop around via the WATTS line number provided by most car rental companies, but do reserve your car in advance.

5) Bring your camera and lots of film (or tape). There is a 24-hour film processing service at the race site.

6) Take some warm clothing. While the normal daytime temperatures at the race site are in the upper 70s and low 80s, colder temperatures sometimes occur.

7) If you have a radio receiver equipped with the aircraft band, take it with you. You'll be able to listen to the race pilots talking to the air traffic controller and to the pace plane. These conversations are fascinating, and you'll know if an emergency develops even before it is announced. The air traffic radio frequency is 118.5.

If you can avoid (or indulge in only moderately) the other temptations that Reno has to offer, it is certainly one of the least-expensive vacation spots in this country.

Whether your modeling interest is in Pylon Racing, Aerobatics, or Scale—or if you have a general interest in aviation—Reno has it all, and you should try to attend.

Whirlwind/Baker

Continued from page 94

to the wing, the sheeting, top block, and rear blocks can be shaped and attached. The top block will have to be close to its final shape before being attached, as it is hard to shape once in place. Install the engines and spinners, and glue in the blocks at the side of the engine. Carve these to shape, and sand the nacelles. Cut out the triangular areas in the nacelle sheeting, and glue in the 1/32 plywood half-round that goes under the muffler. When completed, there should be about 3/32-in. clearance between the muffler and the plywood.

Cut away the fuselage sheeting that extends below the wing saddle, and trim it until the fuselage can be placed on the wing. Use the Robart incidence meter to set the wing at +2° incidence while the stabilizer is at 0°. Also check to make sure that the wings and stabilizer are parallel and perpendicular to the centerline.

Once the wing fits, glue in the ¼-in. ply wing screw-down plate, the front and back bottom of the wing blocks, and the ¼-in. birch dowel on Former 2. Use a round file to cut a notch in the center of the leading edge of the wing to match the dowel. Remount the wings, and align the spars

FULL SIZE PLANS

No. 514 Henry T **$4.75**
RC sportster for ½A, 2-3 channel RC spans 52 in., has adjustable flaps.

No. 515 Westland Whirlwind **$11.50**
RC Sport Scale WW II twin-engine British fighter for .10 engines spans 55 in. Two plan sheets.

No. 516 Envoy **$6.75**
CL Stunter for .40/.46 power spans 58 in.

No. 193	**Stiletto:** CL Stunt model (McDonald) winner 1976, 1980, 1982 FAI World Champs	$ 3.75
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No. 262	**Crashmaster:** CL Crash-proof trainer, two sizes—.15-.30- and .35-.40-power	$ 1.25
No. 302	**Mini F-16:** RC Sarpolus' .049 ducted fan sport flier for 2-channel. Balsa wings, tail, fuse structure	$ 2.75
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No. 326	**Taylor Cub:** RC Don Srull's Schoolyard-Scale for .049s, 2-3 channel. Spans 50 in.	$ 3.50
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No. 479	**Four-Stroke Rooster:** RC Sport/Aerobatics ship has 1920s styling, uses .90 4-stroke engine, spans 85 in. 2 sheets	$11.00
No. 482	**Golden-Ager:** RC Sport/Aerobatic model looks like a Golden Age sportster. For .60 engines, spans 62 in.	$ 7.50
No. 483	**CGS Hawk Ultralight:** FF Outdoor "Gas" Scale plane uses CO-2 power, spans 29 in.	$ 3.00
No. 487	**Cap 21:** RC Scale Aerobatic plane for .40-size engine spans 62 in. Two sheets.	$10.00
No. 488	**MB-7:** FF Jumbo Rubber Scale of 1920-era Thomas Morse Scout biplane spans 37 in.	$ 5.00
No. 490	**Weekender:** RC Low-wing sport flier for .20-size 4-stroke engine spans 47½ in.	$ 5.75
No. 495	**FW-190:** RC Hand-launched, all-balsa scalelike sportster for .10-.15 engines and two RC channels. Spans 39 in.	$ 4.25
No. 496	**P-47 Thunderbolt:** RC Other half of Dogfight Duo has similar characteristics to FW-190	$ 4.25
No. 497	**Manhattan Pieces:** FF Indoor rubber cabin model is ideal for beginners. Spans 20½ in.	$ 2.00
No. 499	**4-60:** RC Doc Mathews' great sport flier for .60-size four-stroker engine spans 70 in. Two sheets	$12.75
No. 500	**Fokker D.VII:** RC Sport scale model of WW I monoplane uses .90 four-stroke engine, spans 83½ in. Two sheets	$16.00
No. 501	**Eindecker:** CL Sport scale model of early WW I monoplane for ½A power spans 23⅜ in.	$ 2.00
No. 502	**Bill Winter's Vagabond:** FF Sport flier is down-sized, .02-powered version of 1940s cabin plane. Spans 33½ in.	$ 2.25
No. 503	**Buzzbat:** RC Slope-soarer spans 60 in., uses 2 RC channels	$ 7.50
No. 504	**Turbo Lance II:** FF Rubber-powered scale model spans 19½ in.	$ 1.50
No. 505	**P-38 Lightning:** CL Sport Scale fighter spans 65½ in., weighs 10 lb., uses twin .35s. Two sheets	$11.75
No. 506	**Playmate:** RC Sport flier for 3 RC channels, .15-.25 engines spans 50 in.	$ 6.50
No. 507	**Hummin'bird:** FF Hot class A/B Gas competition plane won at the '85 Nats	$ 7.50
No. 508	**B-25B:** CL Profile scale WW II bomber for twin ½A engines spans 30½ in.	$ 4.00
No. 509	**Roscoe 18:** FF Hand-Launched Glider features curved, 18-in. wing, DT	$ 1.50
No. 510	**Stomper:** FF Hand-Launched Glider has angular, 18-in. wing, DT	$ 1.50
No. 511	**F-16:** CL ½A profile scale fighter spans 17 in., has tricycle landing gear	$ 2.00
No. 512	**Extra 230:** RC Giant Scale acrobatic plane spans 8 ft., uses Quadra engine. Two plan sheets	$16.50
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Full-size Plan List Available. A complete listing of all plans previously published in this magazine, through No. 489, may be obtained free of charge by writing (enclose stamped, pre-addressed envelope) *Model Aviation*, 1810 Samuel Morse Dr., Reston, VA 22090.

perpendicular to the fuselage centerline. Drill the pilot holes for the wing hold-down screws. Then tap the wing mount plate holes, and drill the wing holes to fit the tie-down bolts. Mount the servo rails inside the fuselage. Cut the cannons from 5/16 and ⅛-in. aluminum tubing; epoxy together. Mark the cannon holes on the nose block, and drill them. This is a a tough job, so plan to use some filler to hide your mistakes. However, do not glue the cannons into the nose block. Using the outlines given on the plans, carve a balsa block to the shape of the canopy. I used Sig 1/32-in. butyrate sheet to mold my own canopy, but a commercial unit could be trimmed to fit.

Finishing. One of the members of our club put me onto Red Devil "One Time" spackling compound. This is a super lightweight material that is a bit tough to put on (adding a bit of water or wetting the sheeting a bit seems to help), but it sands beautifully and produces a very smooth surface. Put this filler on all blocks and sheeted areas, and then sand until it is all gone. A few spots may need a bit more to fill in depressions. Once the wood is filled, give the whole plane a brush-on coat of primer, and then sand it down.

I chose to cover my Whirlwind with silk, and I applied enough brush coats of clear Aerogloss to fill in the pores. I then gave it one sprayed-on coat of aluminum to provide an opaque undercoat. One coat of Cessna gray was then sprayed on the whole plane. The bottom was then given a sprayed coat of Cessna gray lightened with white. Stinson green, with red and black added for darkening, was applied to the green areas.

The roundels and lettering were masked with contact shelf paper and spray-painted. (One of my pet peeves is that decal manufacturers do not give the dimensions of their insignias. They say they are ⅓-scale, which doesn't help those of us who build to odd scales. As a result, I end up painting them on rather than buying them.) When the paint dries, install the canopy and the cannons.

Flying. The Whirlwind turned out to be a bit different than my previous twins. On takeoff it rolls a relatively short distance and breaks ground in a three-point attitude. It just keeps on climbing in the same attitude as it broke ground. Once leveled out, it picks up speed and is a reasonably fast plane that does quick rolls and leisurely loops.

The first few times I landed the Whirlwind, it nosed over onto its back. It turns out that the Whirlwind likes to land in a three-point, tail-low attitude just like my full-size J-3 Cub. Once I discovered this, I could grease it on the runway every time.

I think you will thoroughly enjoy having the Whirlwind. It has an unusual appearance in the air and on the ground that sets it apart from the run-of-the-mill World War II fighter, yet is a very easy airplane to fly—and small enough to fit both your car and pocketbook.