

IN 1937, THE GERMAN air force was one of the most powerful and advanced in the world. While the flying machine arsenals of the United States, England, and other world powers were technically stagnating with outdated monoplanes and biplanes, Germany already had the superior BF-109 fighter in active service. This aircraft played a prominent role in the Spanish Civil War, and it went on to reign as the Luftwaffe's indisputable first-line fighter throughout most of World War II.

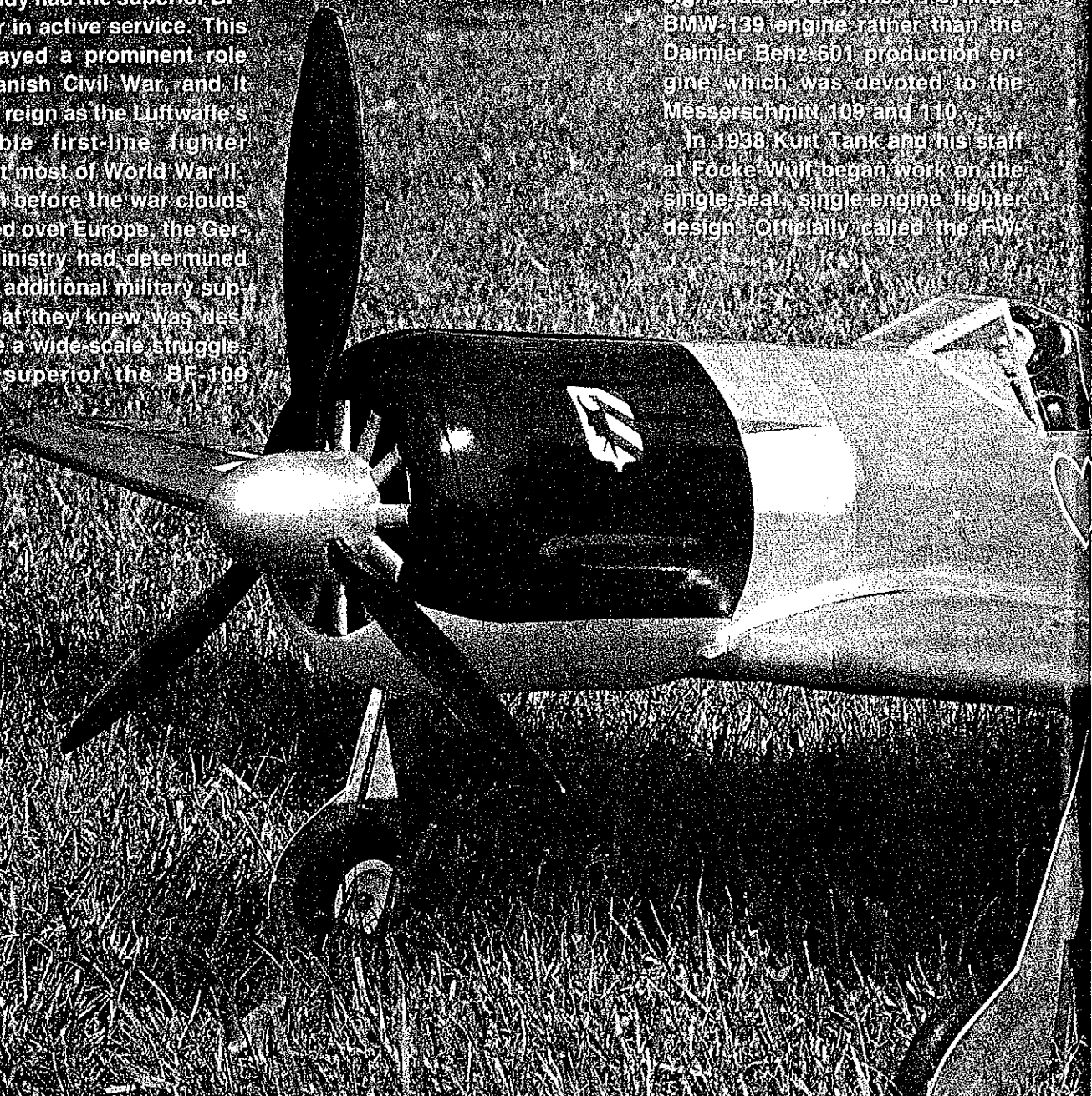
But even before the war clouds had erupted over Europe, the German air ministry had determined a need for additional military support in what they knew was destined to be a wide-scale struggle. However superior the BF-109

may have been, the aircraft did have recognized shortcomings and limitations. German military planners, though, convinced that the impending conflict would be a short one, argued that a secondary warplane was unnecessary. Despite this lack of support, the

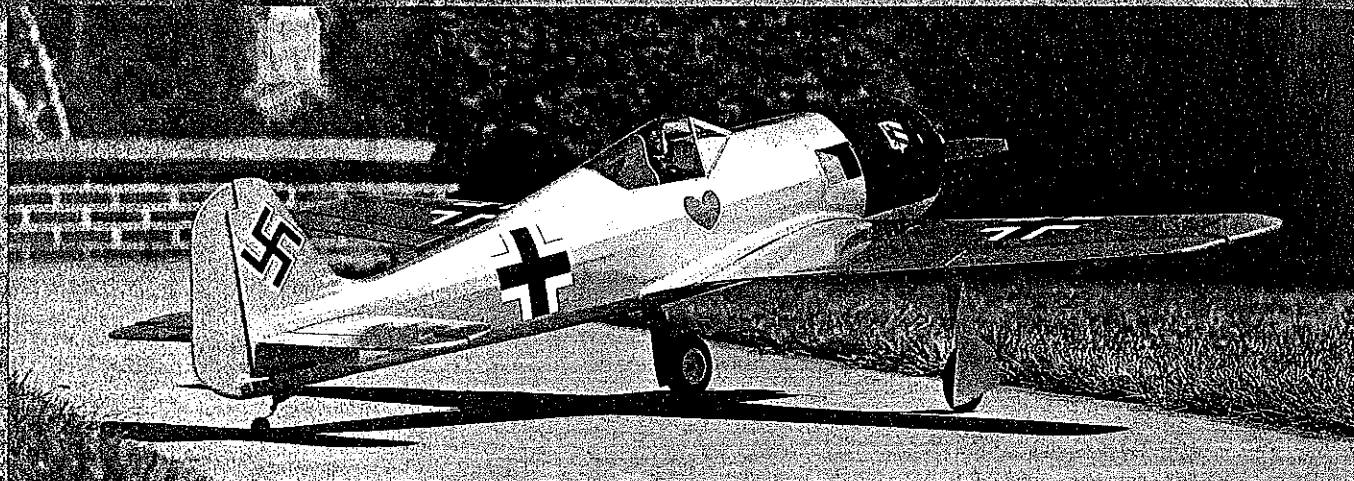
air ministry went ahead with the project, and a contract to develop a second-line fighter was issued to the Focke-Wulf company.

Focke-Wulf was selected partly because of its excess manufacturing and engineering capacity, and partly because the new design was to use the 14-cylinder BMW 139 engine rather than the Daimler-Benz 601 production engine which was devoted to the Messerschmitt 109 and 110.

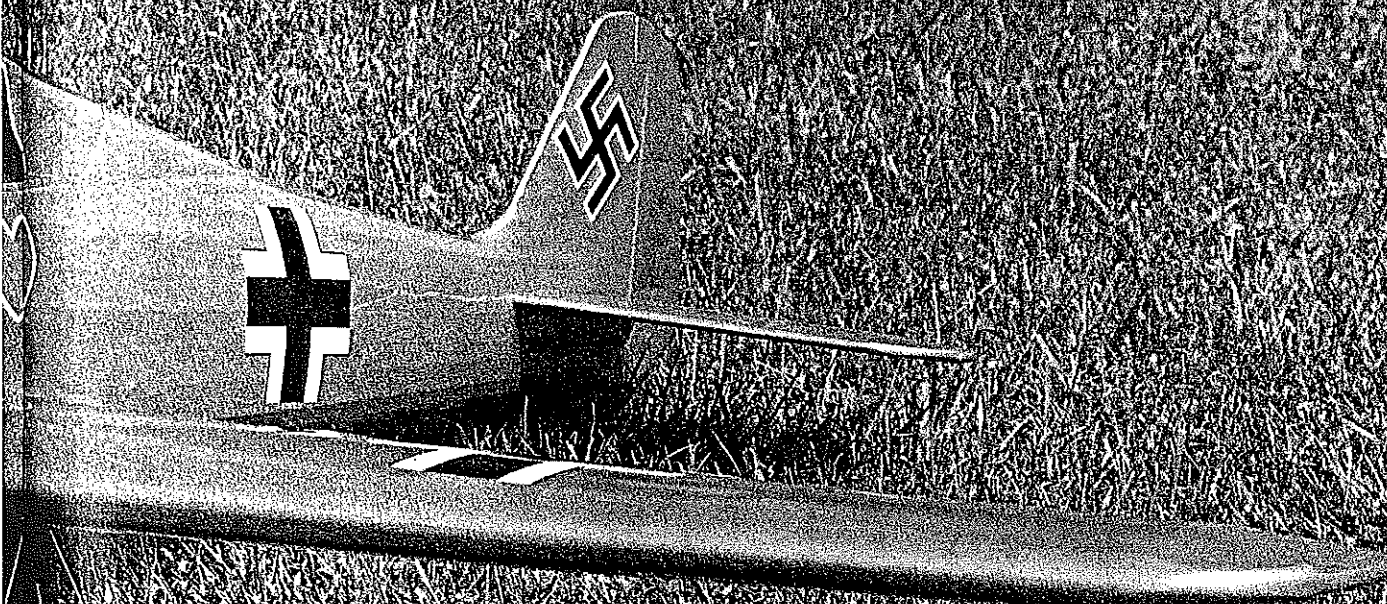
In 1938 Kurt Tank and his staff at Focke-Wulf began work on the single-seat, single-engine fighter design. Officially called the Fw



# Fw 190 A



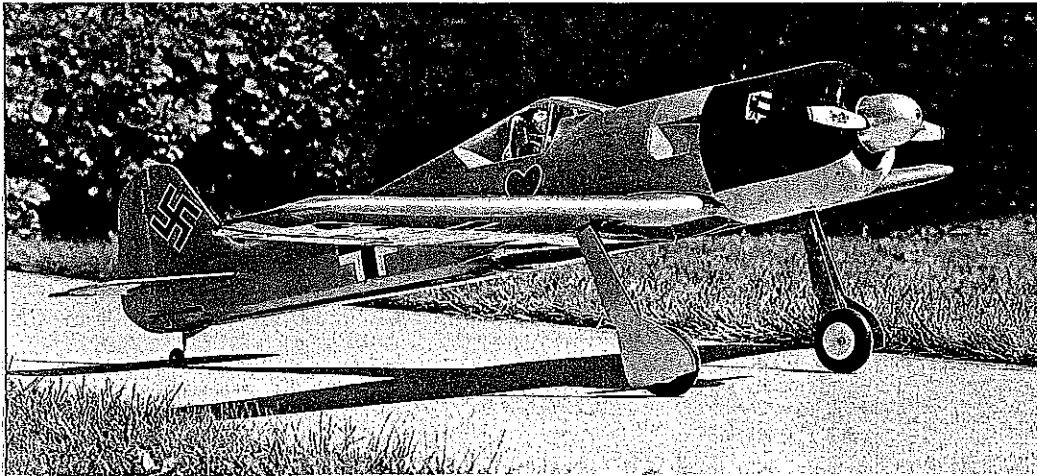
A look at the plans will show that this model has a completely built-up structure—not unlike a large rubber-powered ship. This method keeps the weight (and cost) down, says the author. Aluminum Super MonoKote covering provides easy visibility. Some full-size FW-190s weren't painted, but most of them had some kind of camouflage scheme with gray-blue undersides.



Small and lightweight, the highly maneuverable prototype aircraft served the Luftwaffe in a variety of ways, depending on how it was outfitted. This five-channel RC semiscale version provides fine performance on a .35 to .45 engine.

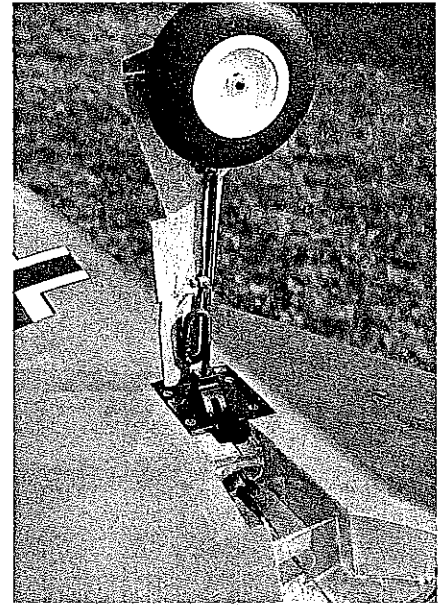
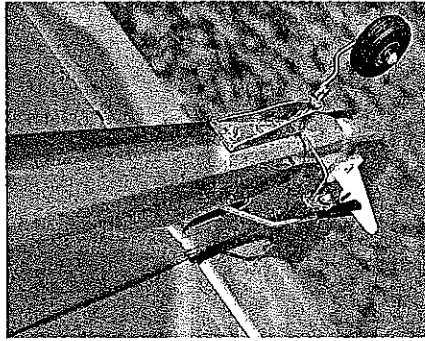
—Gary Brown

# Bf 109



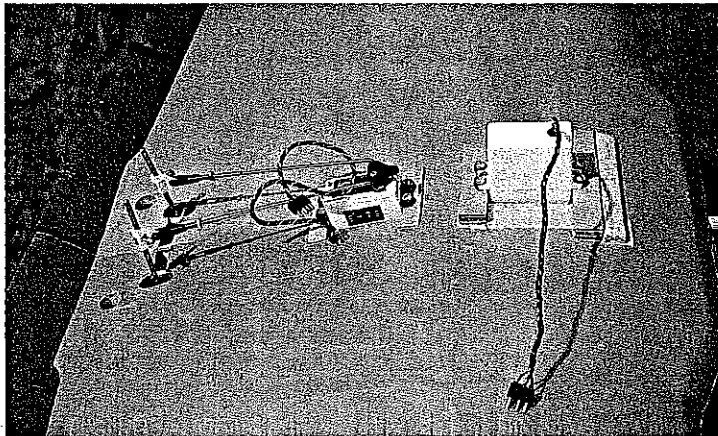
The model (and also the full-size FW-190) handles easily on the ground. Takeoffs exhibit no tendency to ground loop, and only a tad of right rudder is needed to keep it rolling straight.

190, the airplane was nicknamed Wurger, which is German for Butcher Bird. It was to be designed around the twin-row 14-cylinder BMW-139 air-cooled radial engine. The first prototype, FW-190 V1, had a large, ducted spinner the same diameter as the cowling. This system failed to provide adequate cooling and was just the beginning of overheating problems that were to plague the early Focke-Wulfs. By fitting subsequent versions with the more powerful BMW-801 twin-row radial, a more conventional spinner, 12-bladed cooling fan, and

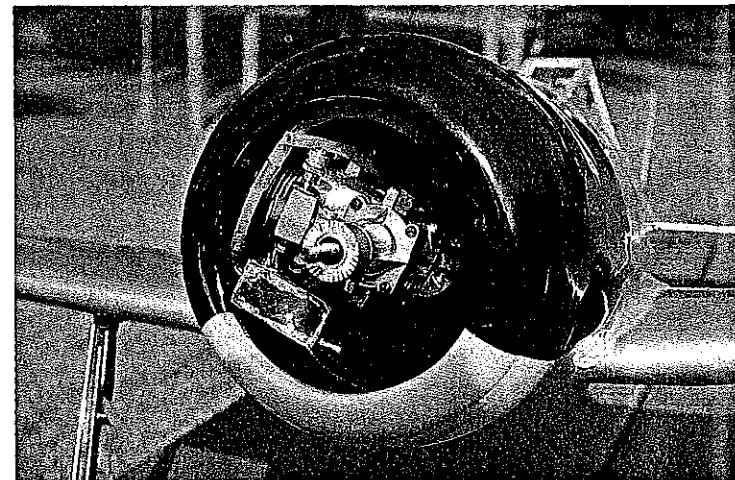
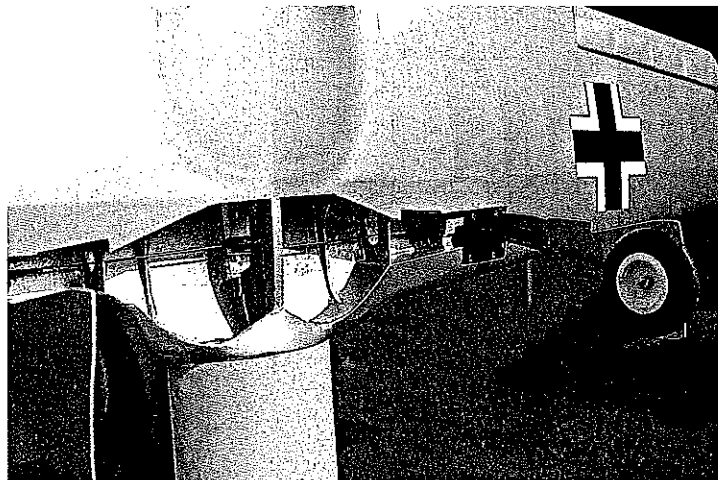
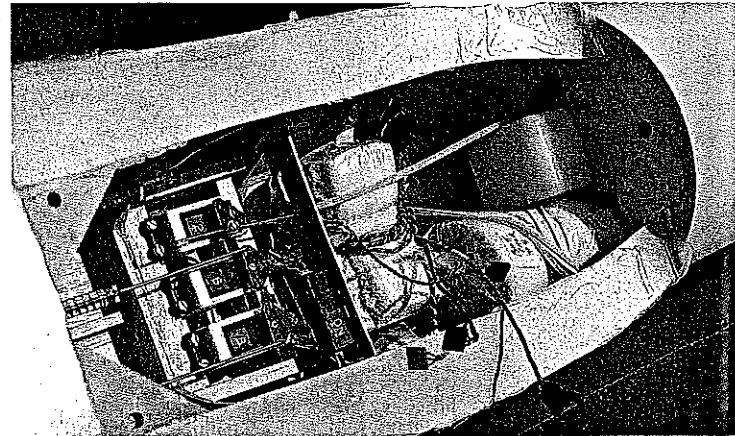


The right landing gear shown in the down-and-locked position. Pushrod of  $\frac{1}{16}$  music wire makes a straight run from the servo. The simple gear door fasteners have given no problem. Williams Bros.  $\frac{3}{4}$ -in. wheels are thin enough to fit easily into the wing.

Tail wheel mount is silver soldered sheet brass screwed to  $\frac{3}{16}$  ply glued into the fuselage structure. Steering via a link to the rudder horn was easier than using the rudder itself with this model—works just as well. Note single coil bent into the tail wheel strut.



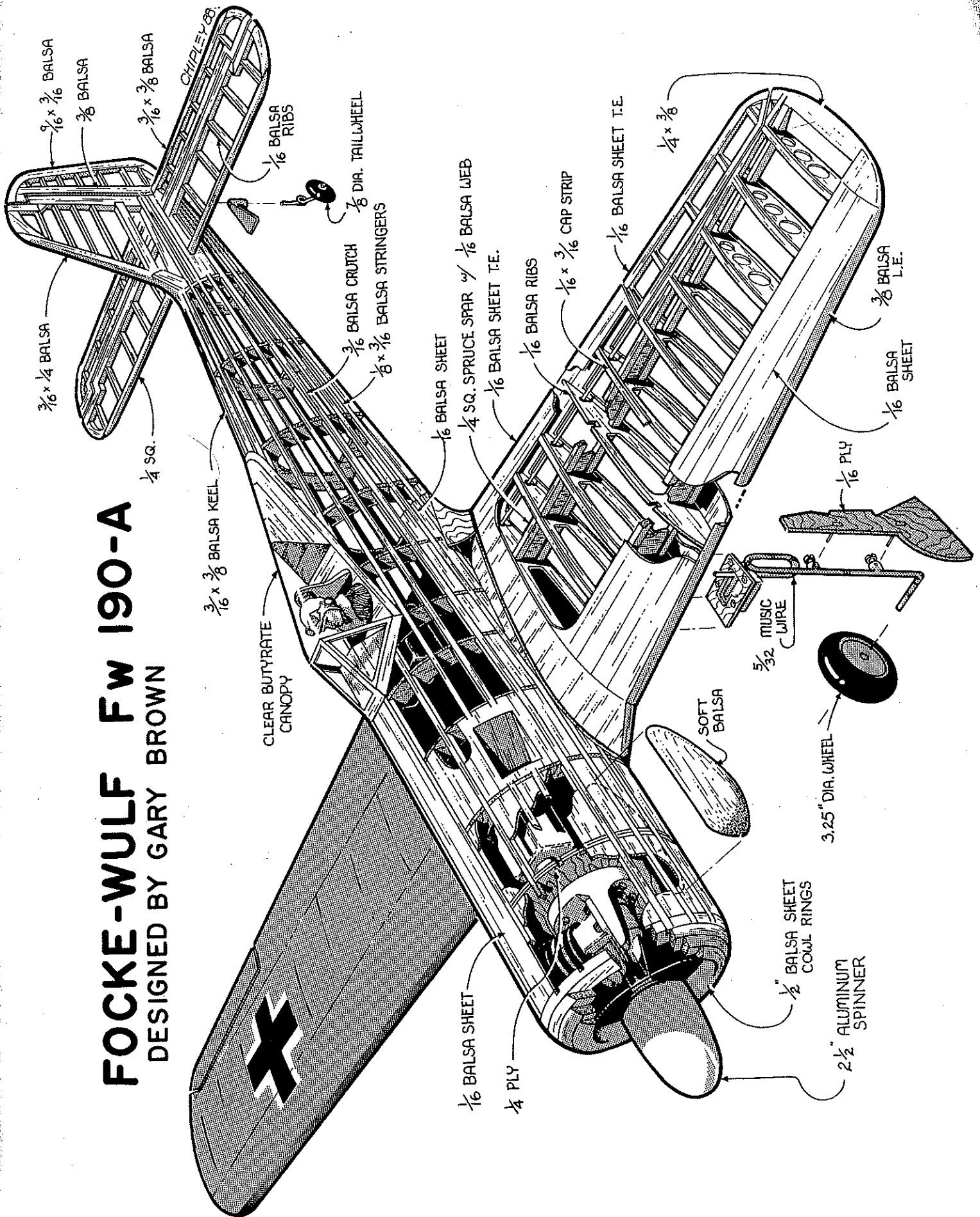
Left: Retract servo sits inverted ahead of the aileron servo. Ailerons are driven via brass and music wire torque rods. Right: Radio installation. Battery and receiver are between formers F7 and F9 and held in place with #64 rubberbands and music wire hooks. Rubberbands also are useful for keeping wire harnesses neat and in place. Antenna is routed through a plastic soda straw conduit glued to formers inside the fuselage.

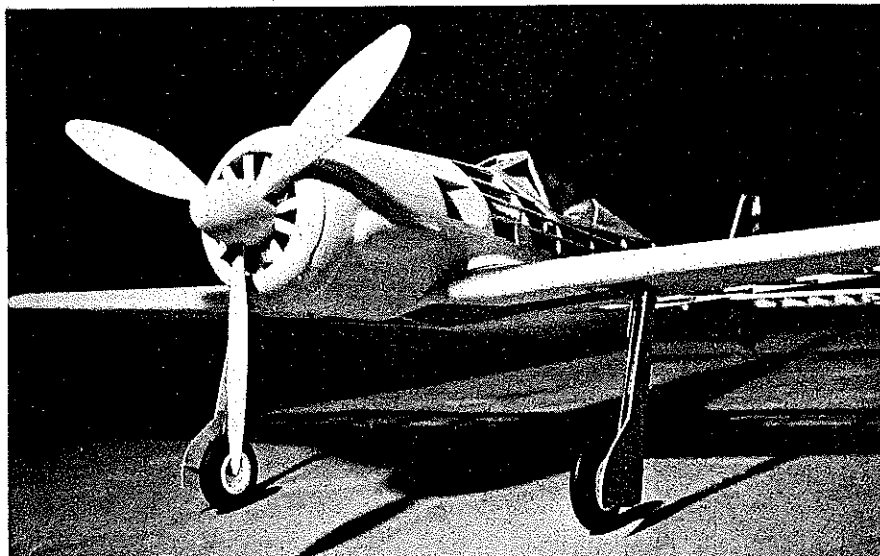


Left: B&D retracts as shown require pretty much of a straight push-pull arrangement from the servo. Appropriate ribs are cut out just enough to clear the wheels and landing gear in the retracted position. Wheel wells are lined with soft sheet balsa and fuel-proofed. Right: Original installation of a K&B .35 shows the homemade sheet brass muffler. A J-Tec in-cowl muffler should work just as well, as there is plenty of room.

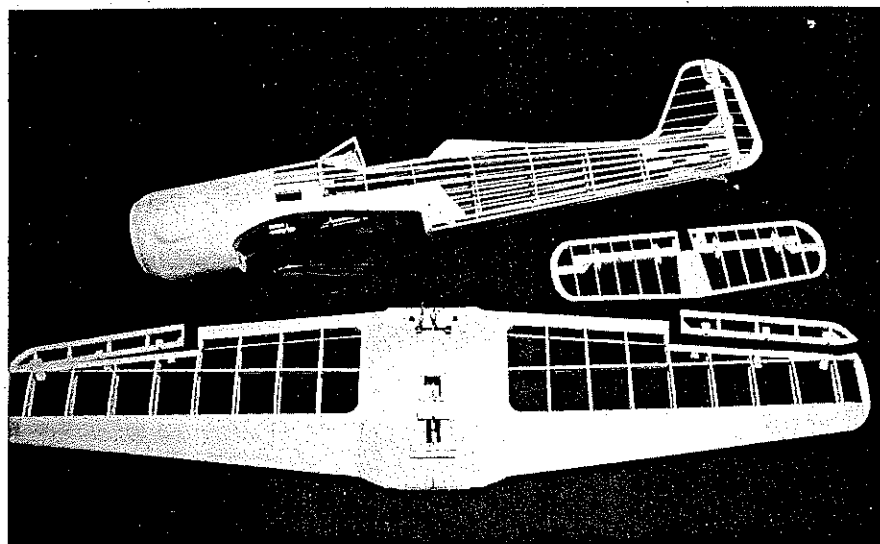
# FOCKE-WULF FW 190-A

DESIGNED BY GARY BROWN





With all the sticks and stringers, this plane could almost pass for a Comet rubber-powered kit. Here the landing gear and flying surfaces were being fitted before covering and painting.



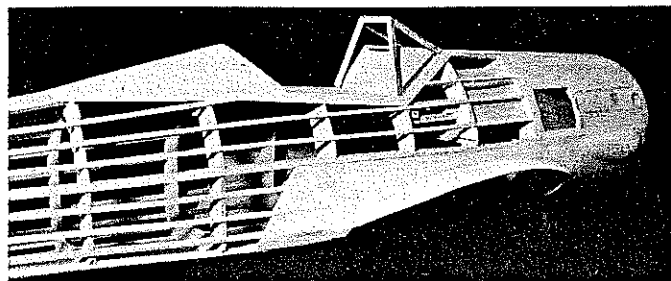
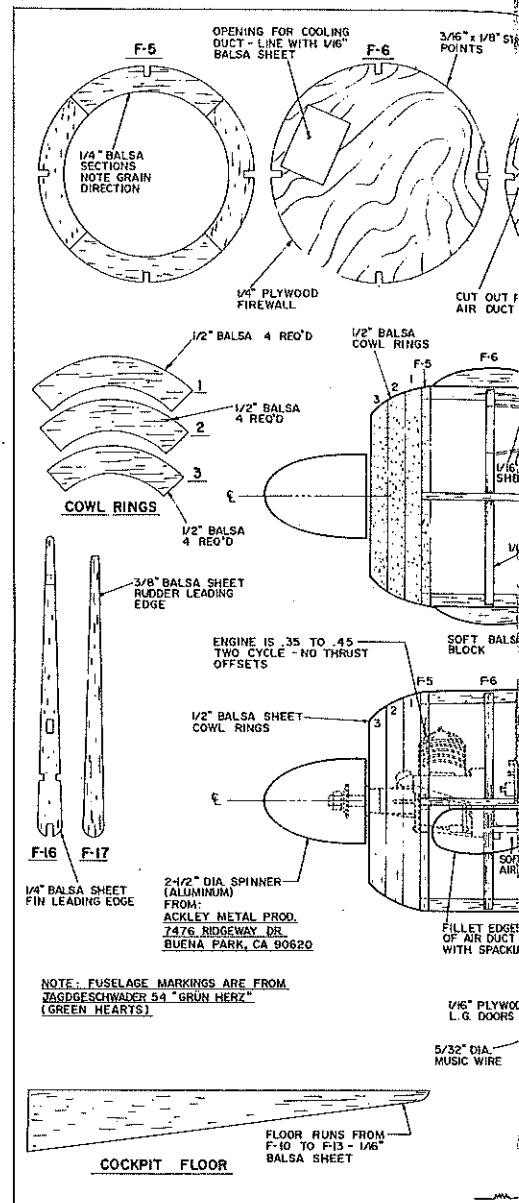
Basic sub-assemblies which have been completely sanded and made ready for covering: fuselage, wing, and stab. Note how the vertical fin is constructed directly on the fuselage.

better ducting, the overheating condition was eventually resolved.

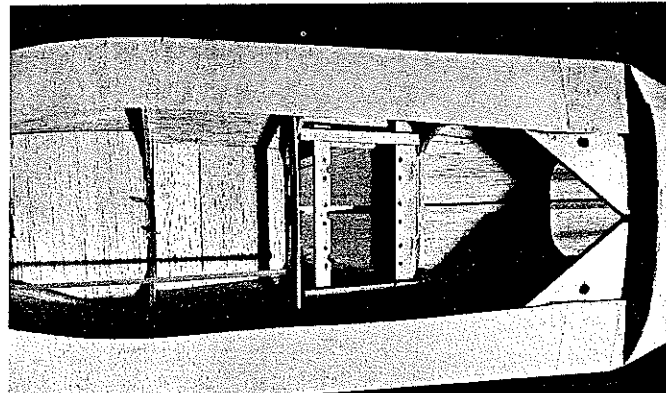
Although the BF-109 remained Germany's principal fighter throughout World War II, the FW-190 became an important auxiliary as the Luftwaffe's number one tactical, multirole attack aircraft. Over the course of the war the Wurger was equipped with a wide range of armament, from the 7.9mm MG-17 machine gun, to 30mm can-

nons, to 1,000-lb. bombs. Recognizing and exploiting the aircraft's versatility, the Nazis deployed it not only as a fighter but as a fighter bomber, torpedo bomber, reconnaissance plane, and ground support plane. It was used as both an all-weather and a night fighter.

With a wingspan of only 34 ft. 5 in. and a takeoff weight of 8,000 lb., the Wurger was lighter and smaller than most Allied air-

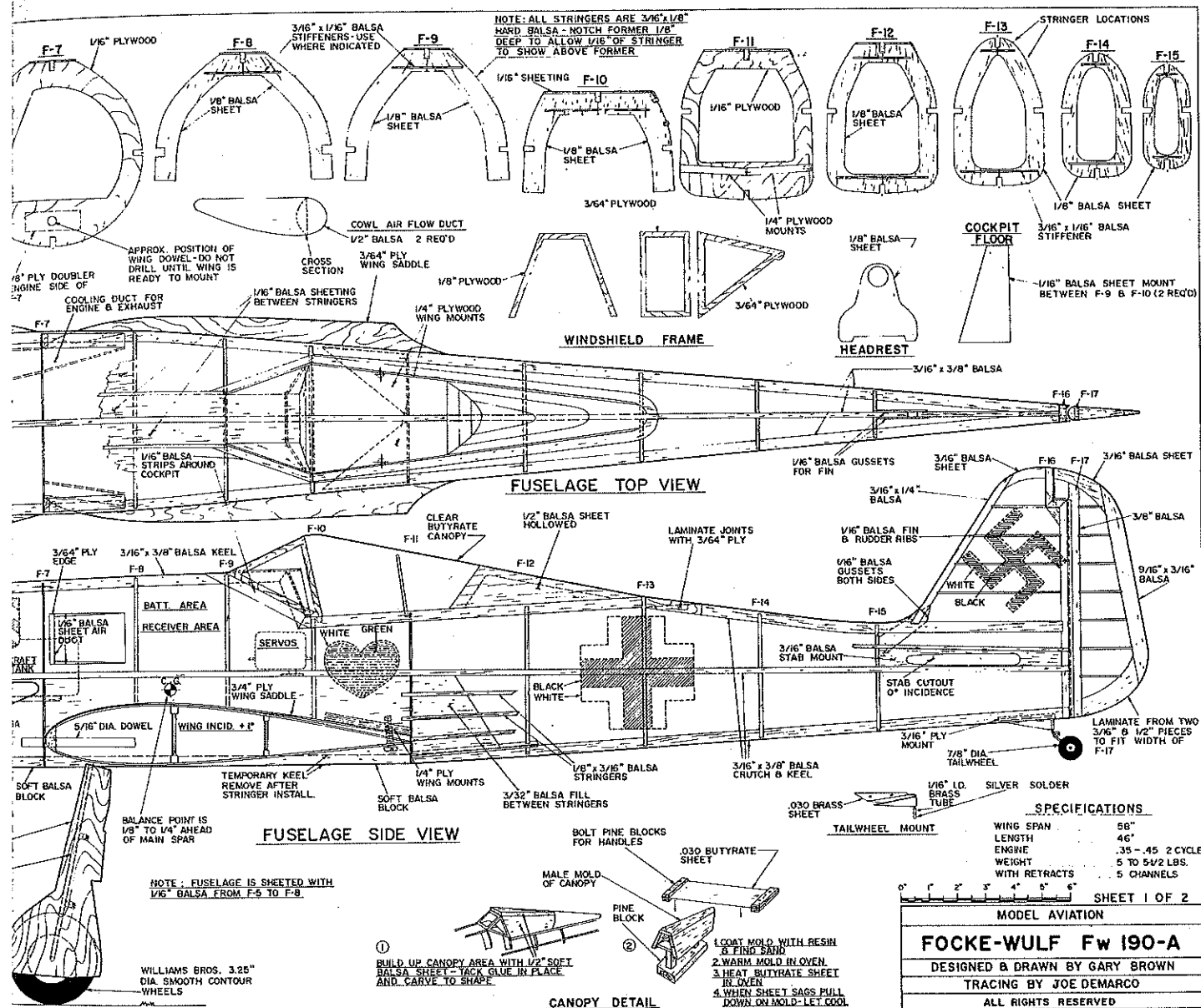


Above: Air exit duct in the cowling is functional. A 1/2-in.-dia. hole provides access to the glow plug. The wing fillet is rather small and made easily with microballoons and epoxy. Right: The radio compartment is big enough for just about any system. Wing saddles of 1/4 plywood and wing mounts of 1/2-in. plywood are clearly visible.



craft. In contrast, the P-47D had a wingspan of 40 ft. 9 in. and weighed 13,500 lb. at takeoff; while the wingspan and takeoff weight of the P-51D were 37 ft. and 10,000 lb., respectively. The FW-190 was obviously a diminutive but potent bird, capable of maneuvering with the best in the skies over Europe.

My interest in the Wurger dates from a trip to the Smithsonian's aircraft restoration

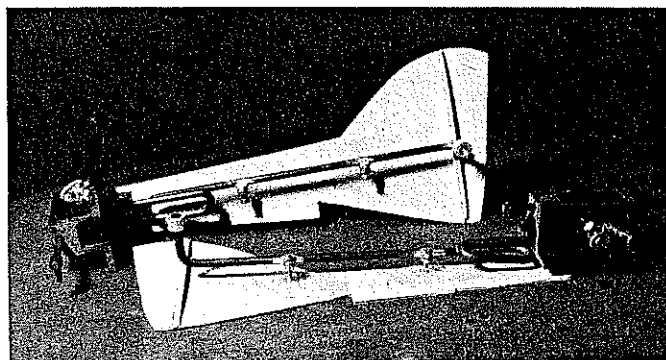
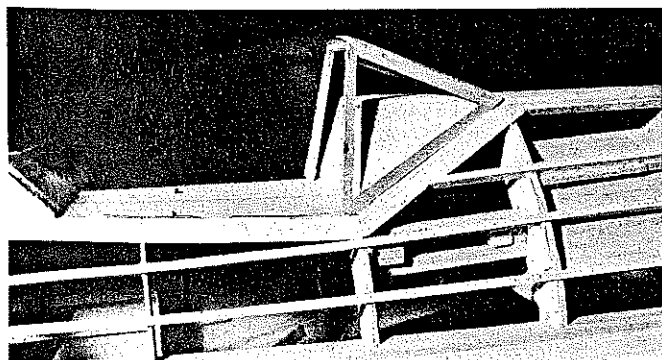


facilities at Silver Hill, MD. A friend, George Clapp, was in the process of finalizing a set of superb three-views of the DH-4, and I'd traveled with him to assist in taking measurements of a recently completed example of that aircraft. At the time, there were several planes undergoing restoration: a Japanese Nakajima Irving twin engine night fighter, an early Northrop flying

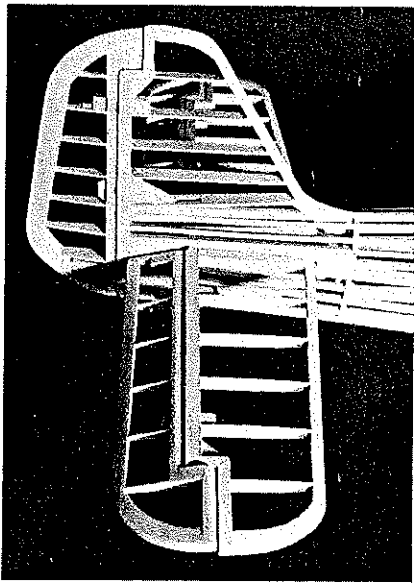
wing, and an FW-190. I was fascinated by the small and compact size of the Focke-Wulf design, which always looks so much larger in photographs. Taking the time to study the aircraft intimately, I began to appreciate its clean, functional lines and careful engineering. Then and there, I decided to begin a collection of material on the FW-190, both to satisfy my own interest and as

the basis for recreating it as an RC model.

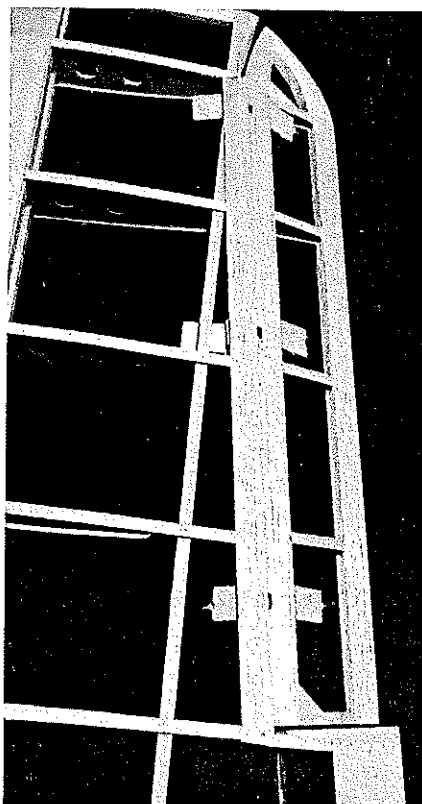
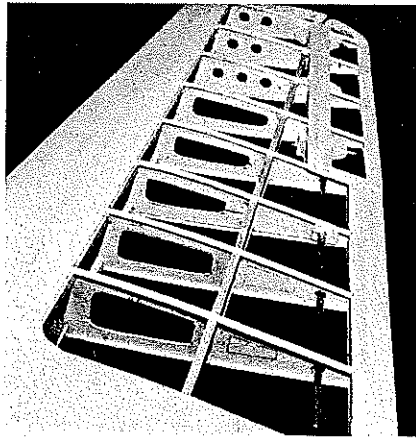
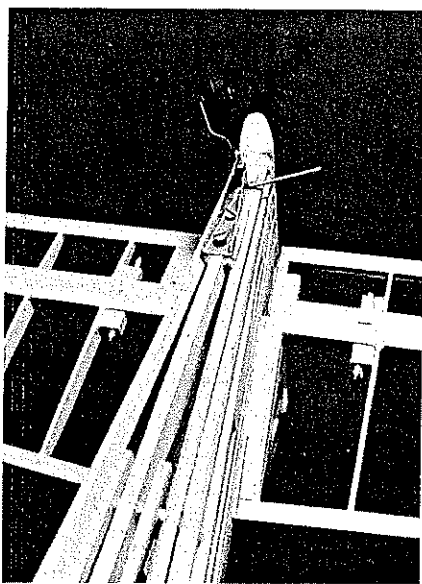
In doing so, my purpose was not to produce an exact Scale replica suitable for Nats competition, but a lightweight semiscale design with retract which would be capable of good performance on a .35 or .40 engine. I've flown the model, which weighs 5 lb., on an old K&B .35, but have since substituted an HP .40 for improved perform-



Left: Author's canopy was molded from .030 clear butyrate sheet, which he says works easily. Follow the directions on the plan, and practice with several sheets until you get a good one. Right: B&D 85° retract gear shown with gear doors and attachments. Thin 1/8-in. ply piece at the gear door bottom holds the door to a curved shape to match the airfoil section when the wheels are retracted. All photographs by the author.



Tail surface group. Note use of Robart Hinge Points. Balsa blocks are glued to the spars to give hinges more area for adhesion. Tail surface leading edges are rounded to give a sealed joint effect. Tail wheel bracket is cut from sheet brass, then silver soldered at the joints.

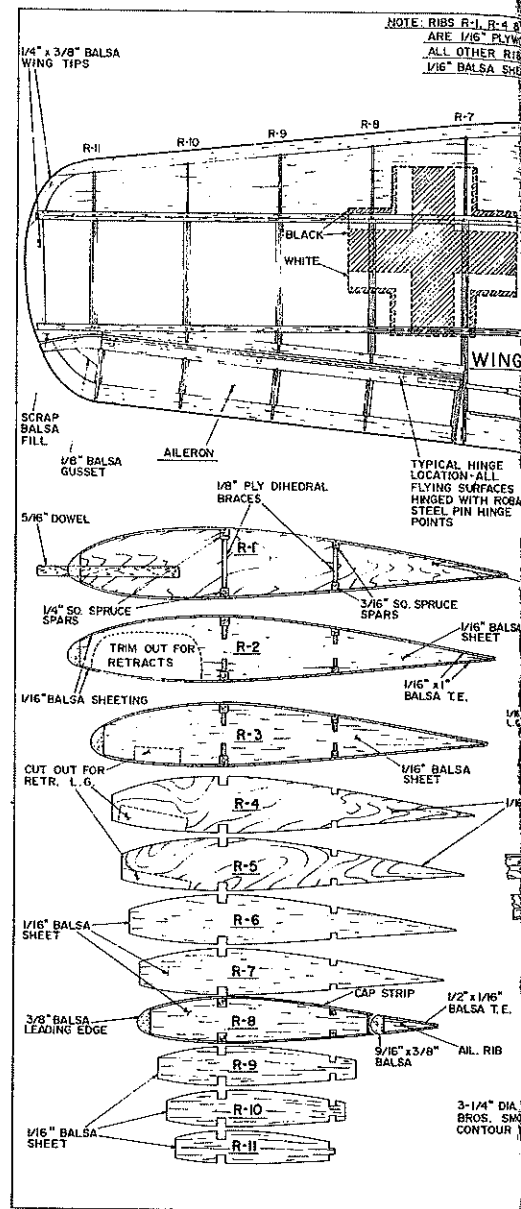
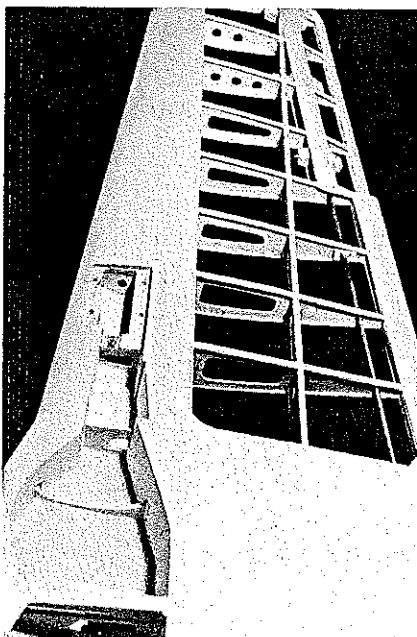


ance. Though not finished in the markings of any particular aircraft, it does carry the JAGDESCHWADER 54, GRUNHERZ insignia. The green heart (GRUNHERZ) was the GESCHWADER emblem, and the shield of the cowl was the Gruppen insignia. Photographs of these markings on both FW-190s and BF-109s are quite common in the aircraft history books.

If you've ever built an Old-Timer or stick-type model, constructing the Wurger shouldn't bring any unwelcome surprises. Before you begin, however, study the plans and thoroughly acquaint yourself with the design.

**Wing.** Build the left and right panels over the plans by gluing ribs R-4 through R-11 to the bottom front 1/4-in. spar and the rear

Wing structure is basically a semi-symmetrical airfoil with four spars and sheeted LE. A 3/32 brass torque tube actuates the ailerons.

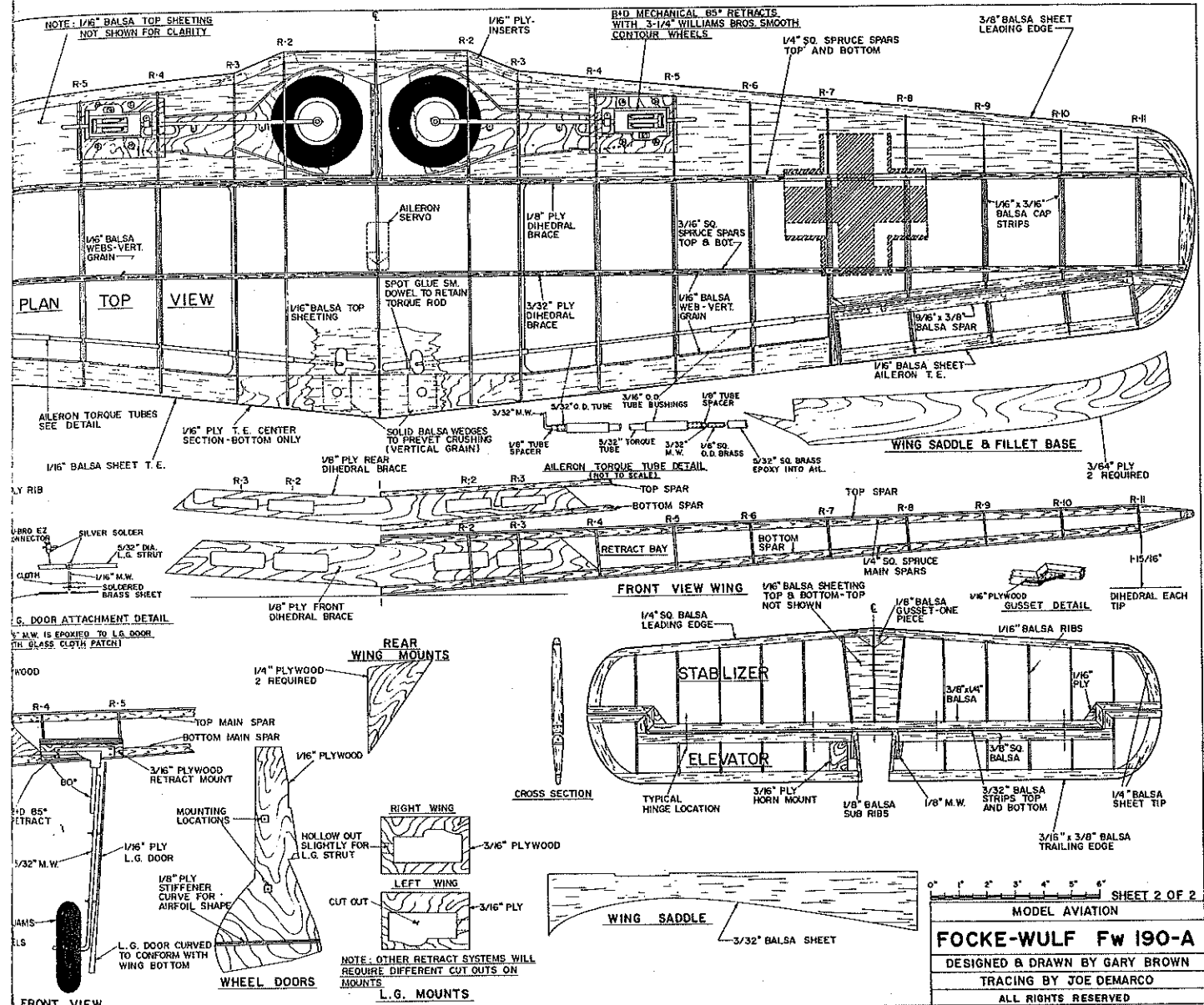


3/16-in. ones. Be sure your spar material is arrow straight. Plywood ribs R-4 and R-5 may need to be modified to accept retracts other than those I used (made by B&D). Glue on the top front and rear spars.

Glue the leading edge from ribs R-3 to R-11, and the trailing edge from R-1 to R-7. Add the trailing edge aileron spar and related pieces. For detail, refer to the cross section of rib R-8 shown on the plans.

Join the left and right wing panels with the front and rear plywood dihedral braces. Once the glue is dry, add the center rib (R-1) and ribs 2 and 3. Finish the general wing framing by adding the top center-section sheeting and the leading and trailing edge pieces as per the plans.

You're ready to install the retracts and servos. Work out the retract locations and operations, then establish the retract servo location and its linkage. Determine and set up the aileron servo location; do the same with the torque tube linkage and operation. When it all works satisfactorily, finish any undone sheeting such as the top and bottom leading edge. Line the wheel wells with soft



$\frac{1}{16}$  balsa to keep dirt and oil from the wing interior. Install the leading edge wing dowel after covering the wing.

**Fuselage.** Begin by assembling the  $\frac{3}{16}$  x  $\frac{3}{8}$ -in. horizontal crutch over the plans. Cut out all the formers (F-5 through F-16). Spot glue six or seven balsa scraps across the

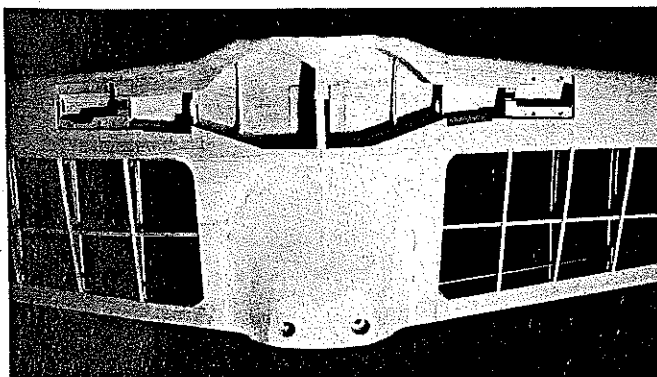
frame to hold its shape as you add the formers. Be sure to cut the notches in plywood formers F-6 and F-7 before gluing them into the crutch. Glue in the first and last former. When dry, glue in the remaining formers, removing the balsa scraps as you proceed.

Add the top and bottom  $\frac{3}{16}$  x  $\frac{3}{8}$ -in. balsa

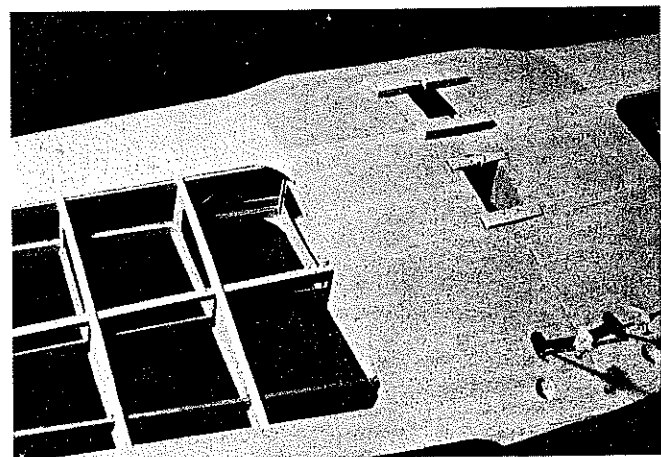
keels. Glue on the  $\frac{1}{16}$  cockpit sheeting from F-9 to F-10 and F-13 along with the wing saddles.

Determine the stringer locations by using pins or rubberbands to secure the left and right top or bottom stringer groups to the formers. Once they are arranged in a sym-

*Continued on page 126*



Bottom side (above) and top side (right) of the wing center section. A  $\frac{3}{16}$  ply frame mounts the retractable landing gear between two  $\frac{1}{16}$  ply ribs. Dihedral braces of  $\frac{1}{8}$ -in. ply support the center section.



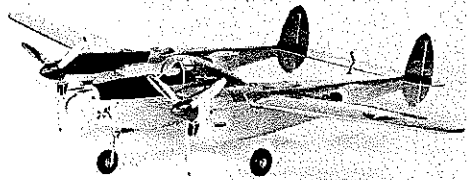


QUALITY PRODUCTS SINCE 1964

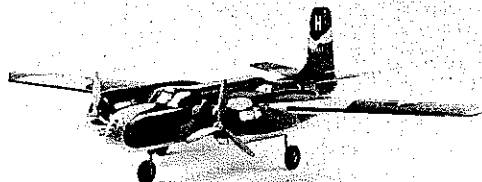
VISIT OUR OUTLET STORE AT 15 MORGAN STREET IN CRYSTAL LAKE, IL

THESE TWINS HAVE BEEN DESIGNED BY NATIONALS CHAMPION HAL PARENTI AND REFLECT A HIGH CALIBER OF MODEL ENGINEERING THAT IS HARD TO BEAT. AS WITH ALL OF OUR SHORT KITS THEY ARE BUILT AROUND A FOAM CORE WING AND BOX FRAME FUSELAGE FOR SIMPLE BUT STURDY CONSTRUCTION. THE SPECIALLY DESIGNED AIRFOILS AND GENEROUS TAIL AREAS GIVE THEM OUTSTANDING FLIGHT PERFORMANCE THROUGHOUT THE ENTIRE SPEED RANGE.

**NEW!** P-38 LIGHTNING (TWIN) 70" ..... 64.95



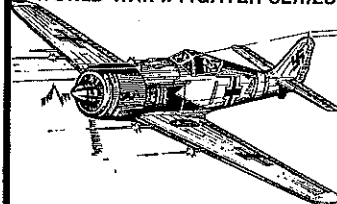
A-26 INVADER (TWIN) 68" ..... 54.95



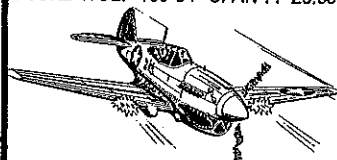
**SHORT KITS INCLUDE:** WING CORES, CANOPIES, COWLS, PLANS, ENGINE MOUNTS, FIREWALLS, MOLDED MISC. PARTS, SHORT HARDWARE PACKAGE AND MATERIALS LIST FOR ADDITIONAL Balsa AND HARDWARE NEEDED.

**ORDERING:** SEND CHECK OR MONEY ORDER FOR REQUIRED AMOUNT PLUS \$4.50 PER KIT (CANADIANS ADD \$6.50) TO WING MFG., P.O. BOX 33, CRYSTAL LAKE, IL 60014. ILLINOIS RESIDENTS ADD 6% SALES TAX. ALL ORDERS MUST BE IN U.S. FUNDS. SEND \$3.50 FOR PRODUCT CATALOG DESCRIBING OUR COMPLETE LINE OF FOAM WING CORES, ACCESSORIES, KITS, TOOLS AND MUCH MORE.

WORLD WAR II FIGHTER SERIES



AGM2 ZERO 54" SPAN ..... 29.95  
 P-40 TOMAHAWK 55" SPAN .. 29.95  
 P-39 AIRACOBRA 55" SPAN .. 29.95  
 P-51D MUSTANG 54" SPAN .. 29.95  
 C.202 FOLGORE 56" SPAN ... 29.95  
 FOCKE WULF 190 54" SPAN .. 29.95



PHONE: 815-459-0417

## Safety/Preston

Continued from page 22

mended, it was advisable to maintain a relative humidity of 55% in the working environment. Upon checking the relative humidity of the electronics assembly area of the plant, it was found to be low, between 30% and 40%. Installation of humidifiers enabled the operatives to continue work with the same materials, but without further skin complaints."

Reports of skin irritation resulting from the use of cyanoacrylate glue to build models appear to be fewer than reports of irritation to the respiratory tract. This could mean one of two things. Either the likelihood of experiencing skin irritation due to CyA vapors is small, or most modelers work in an environment that is over 55% relative humidity. I see two messages in the *Contact Dermatitis* article that you should be aware of. First, if you have experienced itching of the skin, try raising the relative humidity in your workshop. Second, if you are in the habit of tack gluing components with CyA prior to making a solder joint, avoid breathing the fumes that result when you apply the soldering iron.

I've seen a number of articles and received several letters that hinted that cyanide gas may be present in the vapor that results when CyA polymerizes. Some suggested that use of baking soda to "fill" a poorly made joint can cause the release of cyanide gas. All of these reports are false.

Similarly, allegations that CyA may be a carcinogen are also groundless. Studies have been conducted in which cyanoacrylate was orally administered to albino rats to establish its toxicity. These showed that it is not considered a toxic substance as defined by requirements of the Federal Hazardous Substances Act.

In other words, despite the fact that it may cause temporary irritation to the respiratory tract, cyanoacrylate appears to be less of a hazard to your health than a number of other materials that you use in the pursuit of your hobby. Use it with common sense, and you shouldn't experience any problems.

When responding to advertisers, mention that you read about them in *Model Aviation*

## FW-190/Brown

Continued from page 31

metrical and evenly spaced pattern, mark the stringer location on each former, removing the stringers as you notch the formers. When all the formers are notched, begin gluing on the stringers, alternating sides to prevent warping of the structure. Add the cowl-ing rings and forward fuselage sheeting. Be sure to include the cooling duct in the scale location on the right side of the fuselage. It not only exits hot air from the cowl, but also provides an outlet for the muffler exhaust.

The wing fillets on the FW-190 are rather modest, which makes for an easier job. I formed them from epoxy and microballoons. The rear wing bolt mounts are 1/4-in. plywood drilled and threaded to fit standard 1/4-in. nylon wing bolts. Epoxy them to the wing saddles and former F-11.

The final framework consists of the stabilizer, fin, and rudder. These are simple structures built over the plans, covered, and glued or hinged in place. The only exception is the fin, which is constructed right on the fuselage after former F-16 is attached.

When all of the woodworking is done and before covering, I like to trial fit the hardware, engine tank, radio, servos, landing gear, movable surfaces, etc. Once I know everything fits properly, the model is ready for covering.

Forming the canopy is very simply done by stretching heated .030 butyrate over a male mold of the canopy. Follow the directions on the plans, and buy four or five sheets of material to practice with. It is really not a difficult operation, and I'm sure you'll be pleased with the results.

Robart hinge points were used for all the hinging. They are easier to use than most, and they provide a scalelike hinge joint. In addition to being better looking, gapless hinges are said to be more effective. In comparison to some of my other models, this

does seem to be true. As for flying surface movements, start with the following dimensions:

Ailerons, 3/8 in. up and 1/6 in. down; elevator, 3/8 in. up and 1/6 in. down; rudder, 3/8 in. left and right. If you balance at the point shown on the plans, add 1/8 in. up trim to the elevator for your first flights in addition to the above movements.

To mount the engine, first screw it to a Kraft-type mount and attach the muffler, then bolt the entire assembly to the firewall with 4-40 bolts and blind nuts. The engine and mount will fit easily through the front of the cowl, eliminating the need for a hatch. My muffler is an in-cowl type which I fabricated from sheet brass, silver soldering the pieces together. If you don't care for home-brew mufflers, the J-Tec in-cowl mufflers should work very well, as there is plenty of room inside the cowling.

Don't forget to fuel proof all of the usual areas before covering. I did the cowling interior (engine compartment), the rear of the firewall (fuel tank area), and the engine cooling duct. Thinned epoxy glue or polyester resin works well.

If you prefer not to install landing gear retracts, standard off-the-shelf fixed-wire gear and grooved wood blocks can be substituted. Just remember to mount the blocks into 1/16 plywood ribs. As noted on the plans, I used B&D mechanical retracts in conjunction with a Futaba FPS-8 retract servo. The combination makes for a strong and reliable system. Smooth contour wheels of 3 1/4-in. dia. from Williams Bros. are narrow enough to fit inside the wing with the proper landing gear angle.

For covering the Wurger, the dictum is "Keep it light," and that goes for everything else on this model. As long as you do that, the choice of covering material is yours. I used Super MonoKote both for covering and for the markings. Epoxy paint was used on the nose.

Your model should weigh about five pounds, ready to fly. Don't be tempted to

**NEW! FREE!**  
**Catalog No 12**  
**from**  
**Hobby Lobby**  
**is READY NOW!**



**Over 100**  
**NEW ITEMS that YOU**  
**have never seen**  
**before!**

NEW! "Scimitar" Electric Flight Props!  
 NEW! FAST scale offshore Racing Cat!  
 New! 500-watt Electric Flight Motor!  
 NEW! 1-meter Racing Sailboat!  
 NEW! 3-meter Electric Soarer!  
 NEW! 4 ft. Steam Launch!  
 NEW! "Monster-Flex Race boat Drive!  
 NEW! Sperber RF-58 Motorsailer!  
 NEW! scale 1933 Rhonbussard!  
 NEW! Wood colored Oldtimer props  
 NEW! Electric Flight Propulsion Systems!  
 and about 1,000 NEW and old  
 items available ONLY from us  
 and pictured ONLY in Catalog 12

Call us at (615) 373-1444  
 or send the order form.  
**FREE IN THE USA Others send \$2.00**

Call for **FIRST CLASS** Mail.  
 \$2.00 — bill to your credit card.

ZMA

Name \_\_\_\_\_

Street Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

Zip \_\_\_\_\_

**HOBBY LOBBY**  
 INTERNATIONAL, INC.®

5614 Franklin Pike Circle  
 Brentwood, TN 37027  
 (615) 373-1444

**WANNA RACE!**  
 NORTH-EAST AREA  
**BEGINNER RACES**  
**Q-500 • FORM-1 • FAI**  
**FREE** Instructions  
**Club Programs**  
 for Information Contact:  
**NORTH EAST PYLON RACING ORGANIZATION**  
 119 DEAN AVE. FRANKLIN, MASS. 02038  
 Tel. (617) 528-4043 or (203) 673-2000

beef up the structure. That would only add excess weight and degrade performance.

**Setup and flying.** If you've kept the weight down, your FW-190 will fly very well with no bad habits. Takeoffs are quite straight with absolutely no ground looping and only a bit of corrective right rudder needed. I suspect the wide-spaced mains are largely responsible for its good manners on the ground.

The model will rise-off-ground (ROG) when it reaches flying speed without elevator input. Once it clears the ground, a little elevator and a healthy .40 will give it a good climbout. Landings are easy to manage, also. Drop the gear and practice approaches, gradually slowing to an acceptable landing speed. Use the rudder to keep it straight as it slows on approach. You'll find that this airplane will slow down nicely without threatening to stall.

For my first flights I followed conventional practice by pairing a 10 x 6 prop with my .40 engine, but experimentation quickly taught me that other prop sizes work better with this model. A 12 x 4 Zinger seems to give the best pull, while an 11 x 6 seems better for speed. The moral: Experiment with different prop diameters and pitches on any aircraft.

With its clean lines and easygoing flying disposition, the FW-190 makes a good choice for your workbench next building season. Not too demanding to build, and very satisfying at the flying field.

## Radio Technique/Myers

*Continued from page 33*

so I'm not the one to ask "Why?"

The 2-6 mixer puts flaps opposite elevator (like a Ukie Stunt model) or flaps with elevator. I can't imagine why you'd want flaps going the same way as elevator, unless it was to take care of some installation peculiarity. With reversing switches on all channels, it seems redundant.

The 6-2 mixer puts a neutral offset into the elevator channel, whether or not the flaps are lowered. Again, strange. When I use elevator trim with flaps, I like the trim to be proportional to the flap setting. Mr. Lanterman told me that the mixers will be different soon.

The servo construction looks pretty durable,

## CENTURY SYSTEMS

O-Z QUALITY PRODUCTS  
 FROM DOWN UNDER

Features a range of back-up and safety equipment for all RIC models:

Helicopter Gyro, Fixed Wing Gyro, Battery Cyclor, Battery Checker, Lost Model Alarm, Battery Backer, 4 Channel Fallsafe, 2 Channel Mixer, Mulli Charger, Field and Home Charger, Electronic Switch, Electronic Speed Control, Thermal Cut-Off Charger.

Send \$1 postage for free catalog.

P.O. Box 4085, Costa Mesa, Ca 92626  
 Phone: (714) 962-2488

DEALERS INQUIRIES WELCOME

featuring an O-ring-sealed case, brass-on-steel bearings at critical locations, splined shafts for the output wheels, and convenient size. They should be adequate for planes with engines up to .60 size, though they might be too big for a narrow-fuselage Sailplane like the Sagitta.

When you realize that you are getting a narrow-band FM seven-channel system with all of the mixing/reversing features, with four servos, all Ni-Cds, a neck strap, and a charger for about \$165 retail, I think you won't have much excuse for hanging onto that old set that you keep trying to convert for \$10. Look at it this way:

**It isn't the cost of the radio  
 that's important,  
 it's the cost of the repairs  
 after the crash!**

## Hinges/Michaelis

*Continued from page 36*

want free to stretch.

Photo 10: A tweezers is used to poke and pull hinges through the aileron slots.

Photo 11: The 1/64 ply strip is used to apply wax just behind the slot to avoid unwanted bonding.

Photo 12: The moment of truth: Zap is applied to the skin as the loose hinge end is wrapped up against the waxed stick under slight tension, poised to quickly jam down until the glue fires. How much tension? In this case, about 1/8 in. was right. Use a sharp blade to remove excess hinge material. Apply a bit more Zap if needed until at least 1/4 in. is bonded.

Photo 13: The aileron is spread with scraps along the hinge line so that the bottom can be accurately positioned to be glued on.

Photo 14: Depending on your care in making a good butt fit, the hinge line can be extremely fine.

Photo 15: This shows a flap installation. Because the hinges are low in such an arrangement, full down deflection imparts negligible tension. Up flap adds a little more tension, but if the hinges are installed with sufficient allowance for stretch, the effect is nominal.

Photo 16: I just had to include one of my JM Glascraft P-51s like this Penetrator. I used tip ailerons with rubber hinges and