

HAVE YOU been searching for that "just right" new model project? How about a sport-looking sport model with sleek, like lines that starts to build? Are you attracted to compact models that transport easily and use little fuel? How about true schoolyard performance with minimum noise? Or complete aerobatics ability for the novice with gentle behavior for the novice? Of course any new design should also be compatible with the popular four-stroke engines.

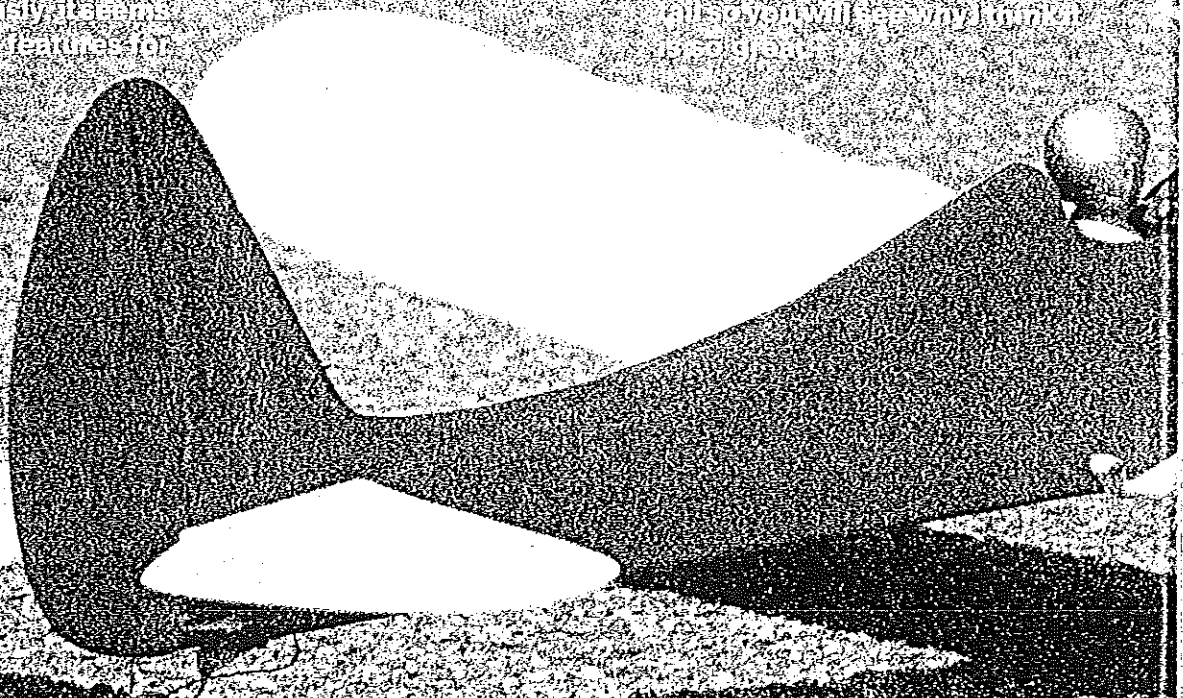
Like a shopping list, would it you say? Obviously, it seems like way too many features for

one model. But Dave Robelen, who has been building model airplanes for 15 years, decided to do it. He used modern technology and materials with a nostalgic 1950s look in appearance and materials. The result is a model that is advanced and modern, but depending mainly on choice of the engine.

Plan towards a feather and nostalgic style of design using open cockpit with all wheels to symbolize a major era in

model aviation. The wings are made from a simple, rounder shape, and the low wing layout was an easy choice as it provides excellent ground handling and stability. The tail is a great example of high performance and clean.

I realize I have made a lot of mistakes that may clash with your local experts' opinion (perhaps yours, too), but I've caught your attention, I've got you talking about Playmate in detail so you will see why I think it's great.



■ Dave Robelen
Playmate

With carefully planned moments of lateral and control surface areas, this low-wing RC sport design proves that three-channel controls can have great maneuverability and that ailerons aren't required for a low wing. For 18 to 22 engines and having a 50 in. wingspan, it is easy to transport.

In the matter of size I wanted a model large enough to fly smoothly and handle well on bumpy ground. It's essential for transporting easily in modern cars. Also, it should have excellent fuel economy and be roomy enough for standard RC equipment. The size chosen, 50 in. wingspan, has worked out very well for these considerations and is compatible with the 15 to 25 size of two-cycle engines (6 to 25 four-strokes). This general engine group is also among the quietest running, especially

in the case of the 30 cc engines. In addition, theiler airbrakes and wing droops also reduced the wing's profile lines from the wing. The saved airpockets in time and effort are considerable, as well.

That's all well and good, you say, but doesn't a low wing airplane need ailerons? I'm glad you asked that. Actually, what I am doing is taking up the Playmate with a substantial yaw-roll coupling through the proper use of wing dihedral and vertical tail area. If you look closely, the movable rudder is

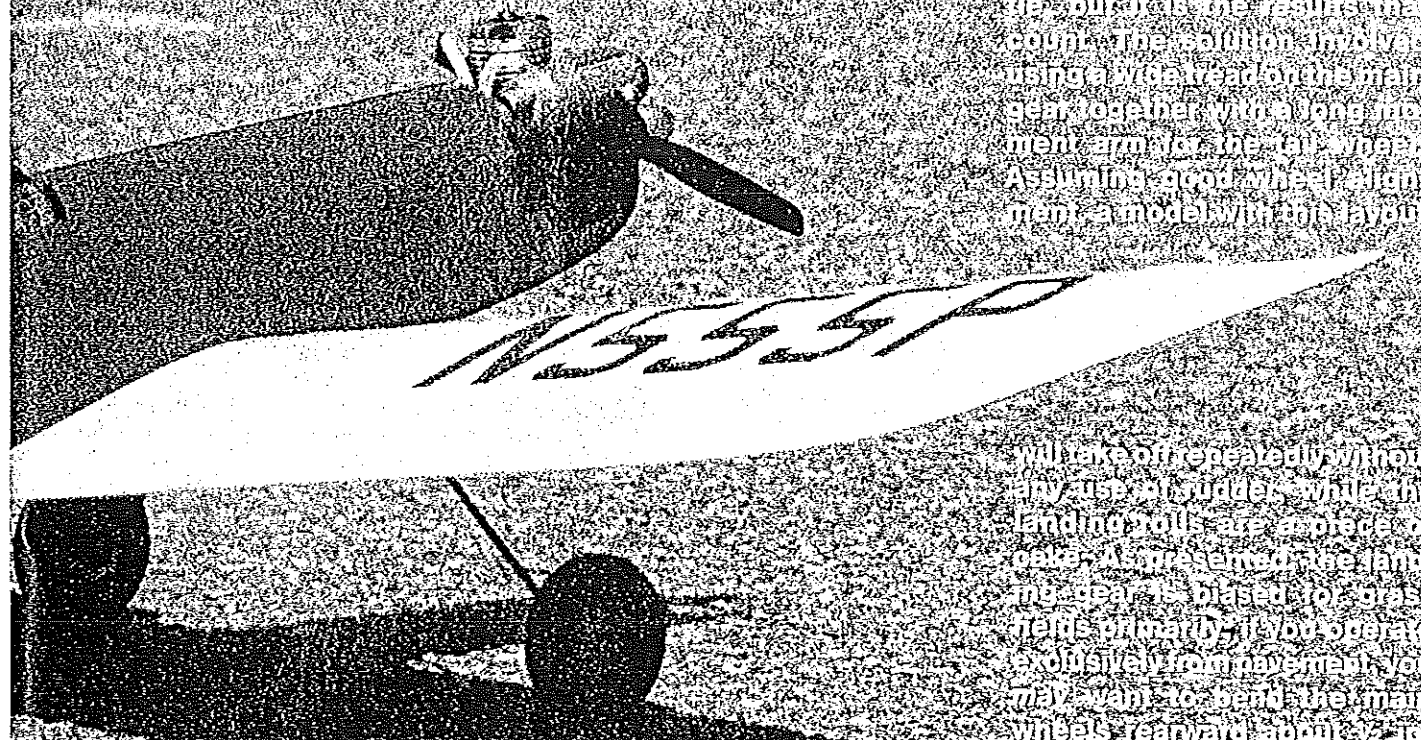
basically a low wing airplane. Ground handling is a little more difficult, which all for that, it has been discovered. Many of the early full-scale aircraft had rather bad manners on rough ground, and as a result, pilots stayed after them were usually confronted with the same difficulties. My approach for the Playmate was a little different from many I treat as the design as a miniature airplane controlled remotely over bumpy terrain, not a scale-like model. Admittedly, the concept that was involved may be a bit subtle, but it is the result that counts. The solution involved using a wide tread on the main gear together with a long moment arm for the tail wheel. Assuming good wheel alignment, a model with this layout

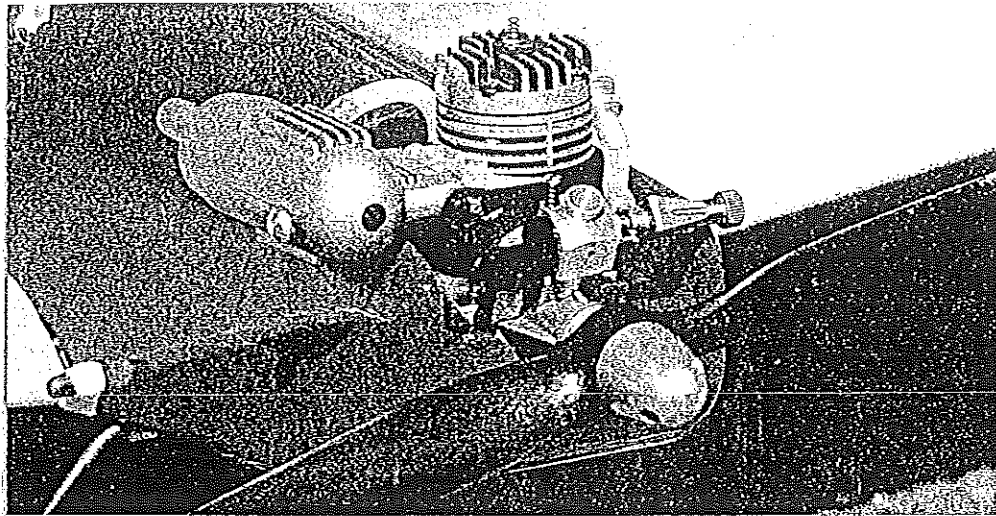
will take off repeatedly without any use of rudder, while the landing rolls are a piece of cake. As presented, the landing gear is biased for grass fields primarily; if you operate exclusively from pavement, you may want to bend the main wheels rearward about 1/2 in. Please notice the layout as shown, and only make changes if there are problems.

Throughout the Playmate development, weight control has been a prime concern. Aside from all the geometric differences, the wing loading can be considered to control the degree of difficulty involved in flying any model, whether it be a low wing airplane, low wing, etc. At 12 oz. per sq. ft. the wing loading for a polished model is very low; therefore, it is quite easy to fly. Omitting the airion system and nose spar, it

Model's graceful lines, open cockpit, and tail-dragger landing gear give it that wonderful appearance from the Golden Age of aviation well suited for noise-sensitive flying sites. The choice to develop the Playmate as a three-channel design came quite easily when I considered the situation. There is the matter of total weight, combining one servo linkage, control surfaces and structure for rudding the ailerons saved about a quarter of a pound. Not much, but this model weighs only 2 1/2 pounds,

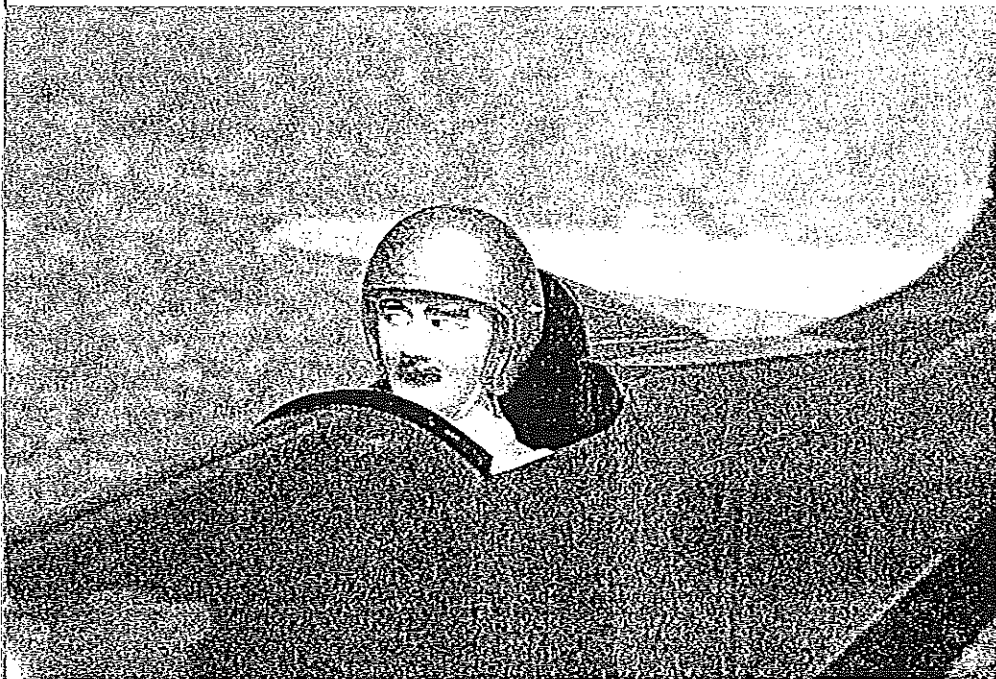
much larger than usual for this sort of model, and I use generous travel. Proper tailoring of these factors provides a model that is nearly decent in crosswinds and will fly beautifully with the rudder. A clean axial four-point roll is easily accomplished, for example, yet the model's overall handling is simple. In fact, the generous stability of the Playmate combined with its efficient aerodynamic trimms make it fun for flying a thermal for long periods (five or 10 minutes) at idle power. The tail-wheel landing gear



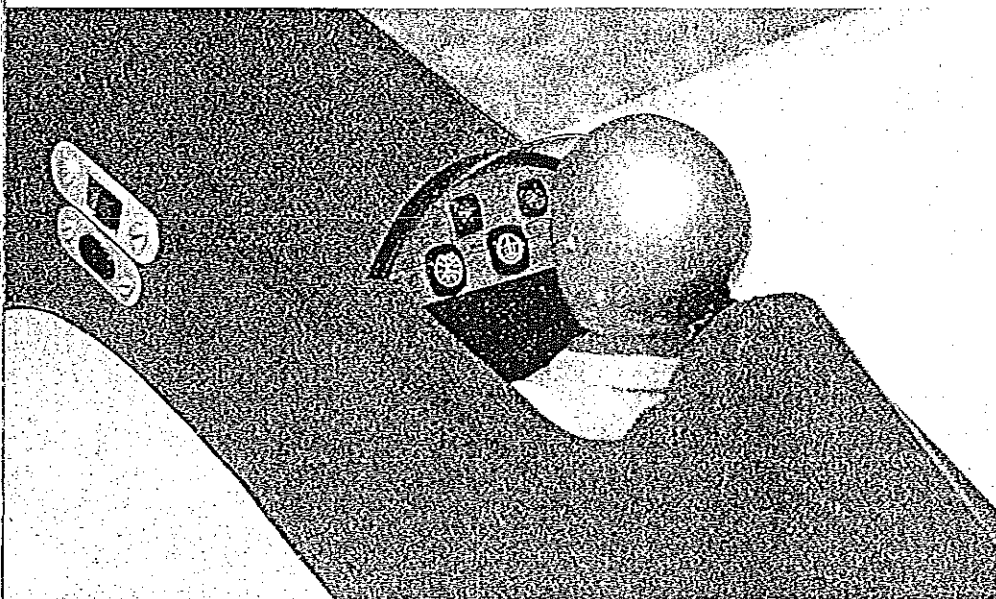


The Enya .15 IV engine fitted with an O.S. 702 muffler is unusually quiet. The 9-4 prop the author uses also holds down the noise by reducing the rpm. It's a good-neighbor package.

Photos by Grace and Dave Robelen



Our intrepid aviator is a Williams Bros. 2 in. = 1 ft. sport pilot figure trimmed slightly to fit. It is painted with enamels, then with clear epoxy to protect against the exhaust products.



Who says a sport model can't be realistic? Circus Hobbies has the instruments, and the dash is a scrap of 1/64 wing skin. Coat the entire cockpit area with slow-cure epoxy for protection.

sembly are major factors in weight control, as is the type of construction.

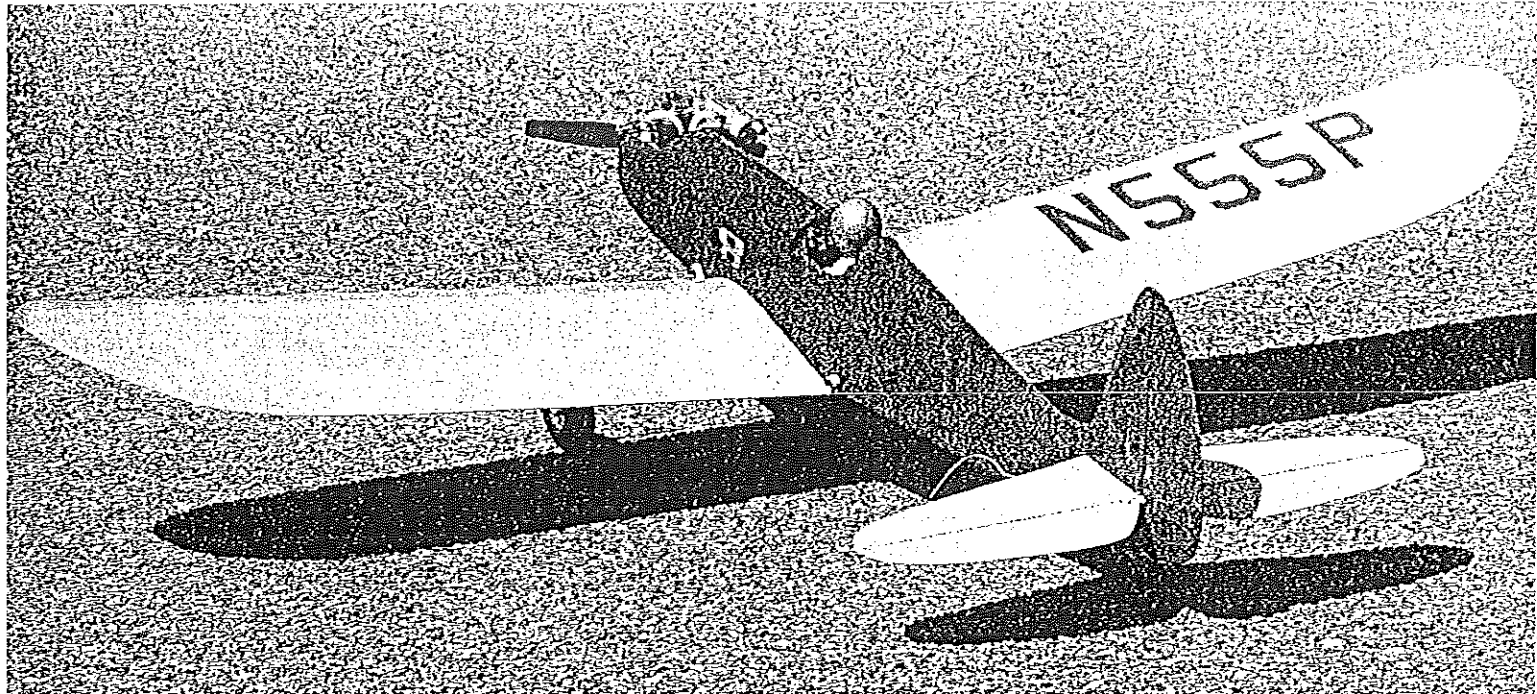
Many sport RC models are built to survive a major crash with little damage; however, there are severe weight penalties in this approach. The Playmate can withstand all normal, vigorous flight loads and, for that matter, many minor accidents. However, if you crash, it will break! In the era of cyanoacrylate (CyA) glues, Mono-Kote, and such, I would rather enjoy the extra performance of a lighter model (and if it breaks, fix it).

When choosing equipment, keep in mind that the performance and flying qualities are directly affected by weight. Initially the prototype model was flown with standard Kraft servos, a 450 mAh battery, and a .15 engine. Even this combination, which is the least peppy that's likely to be assembled, was completely acceptable in every respect. Later, after much flying, the servos were replaced with Micro units, the battery was changed to a 325 mAh SR pack, and an O.S. .25 std. RC was mounted. This is an amazing package. While gentle as a lamb at reduced throttle, the Playmate becomes a real fireball at full power. All aerobatic maneuvers are available with this setup. In fact, continuous flight at full throttle can be pretty wild. In local informal racing, the Playmate will stay even with a .45 FSR-powered Sweet Stick at approximately 75 mph! Of course, you don't have to fly at full throttle. I was just making a point, not trying to scare you off.

Much of the success of the Playmate also lies in the wing. The elliptical tips help minimize drag, while the airfoil chosen exhibits a very wide speed range. Do not let the simplistic flat-bottom shape of the airfoil put you off; in fact, it was developed specifically for this size and type of model with open-frame construction. The high-lift qualities of this airfoil together with the low wing loading provides extremely low landing speeds with excellent stall behavior. Yet the inverted performance is excellent.

Construction. Along with the attractive appearance, easy-going ways, and sparkling performance, the Playmate is also very easy to build. Once you have chosen an engine and equipment, the next step is to make yourself a "kit." The task of building almost any model from scratch is made easier by rounding up all needed materials at the start, making the appropriate patterns, and cutting the parts to shape before starting assembly.

One major influence on the quality of your finished model is the quality of the building materials. Translated into Playmate terms, this means you should find and use only the best balsa wood. I have been well pleased with Sig products and do not hesitate to recommend them. My prototype model is built from medium (6-8 lb. per cu. ft.) balsa, except for the wing spars, which are quite firm. Time spent selecting really good materials will be well spent, indeed. Also watch for warped or crooked sheets of



A few curves here and there, and what is basically a box structure becomes fully transformed. Which EAA home-built does it remind you of?

wood, and avoid them were possible (after all, you are building a custom model). If you have access to a jigsaw or small band saw, the job will go much quicker; however, a small hand coping saw, razor saw, and basic X-Acto set are completely sufficient.

I made extensive use of the modern CyA glues in building the prototype, along with 45-min. epoxy (Hobbypoxy II) and some Titebond wood glue.

Fuselage. My preference is to start construction here, but this is not critical. If you choose to build your wing first, that is fine. Start the fuselage by bonding the doublers to the basic sides with slow CyA glue (or contact cement). Mark off and install all of the forward bulkheads back to the rear of the doublers. Be very careful in this step to keep the fuselage in perfect alignment, placing the assembly over the plan side and top views as necessary to check the alignment. If required, it is better to break and reglue a joint now instead of letting it go and

having a crooked fuselage.

Install the engine mounts, watching alignment carefully. Pull the sides together at the tail, and join them with the filler block. Again, be very careful with alignment, as any twist introduced here will really push the tail assembly out of trueness. Continue to install the tail-cone bulkheads, stringers, and nose planks, along with the bottom sheeting and landing gear mount plates.

Use a firm piece of $\frac{1}{8}$ balsa for the cockpit floor; install it now. At this point, it is time for a decision. If you are going to use film covering for the cockpit interior (I did), now is the time to do it. Also cover the inside surfaces of the cockpit side pieces.

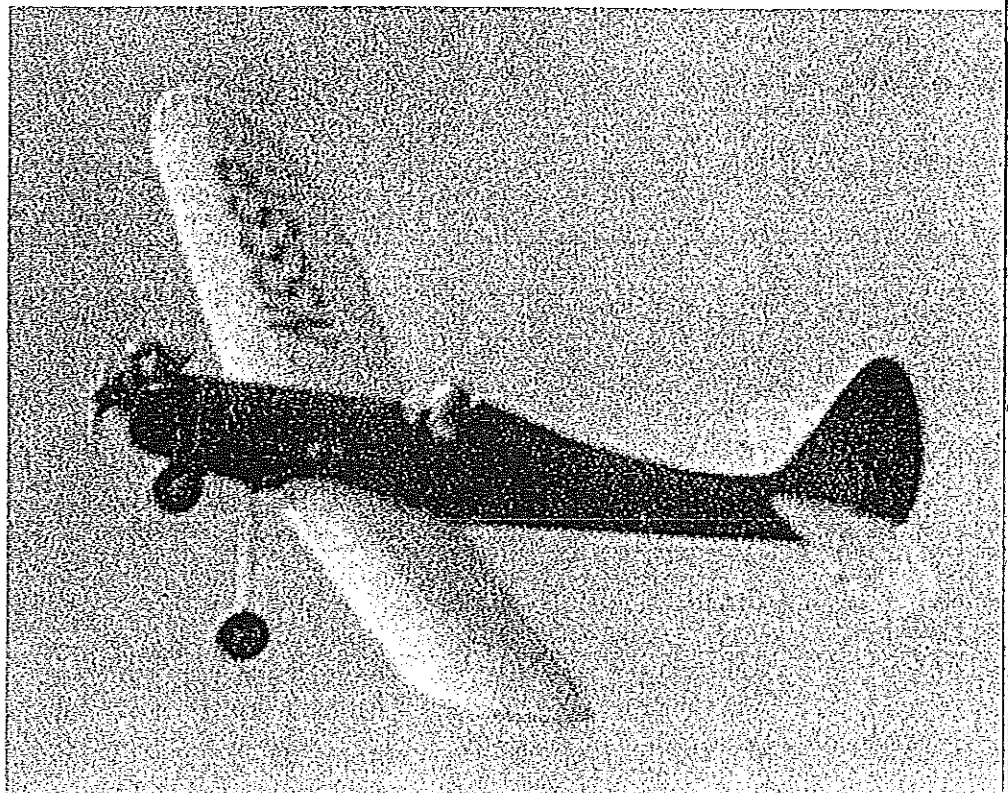
Carefully sand and trim the side pieces to fit, and glue them in place with CyA. Install any remaining balsa pieces in the fuselage except for the headrest, and go over all the glue joints, inspecting for good bonding. This is the time to add a little more glue if needed. You can't do it when it's 100 feet high and climbing!

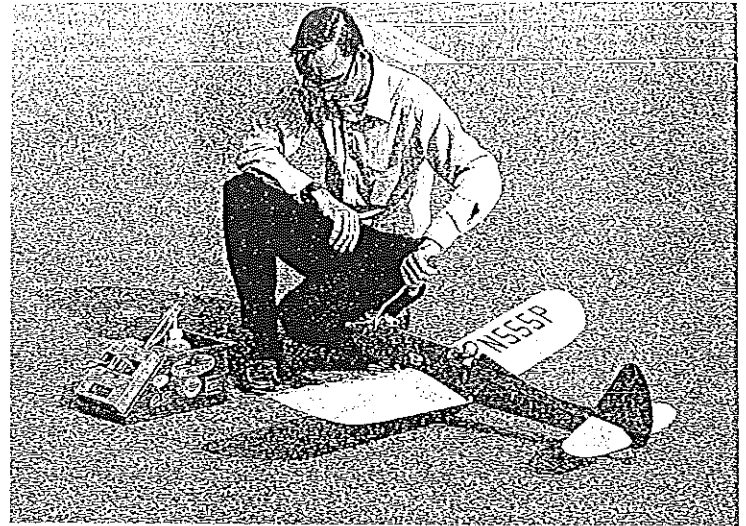
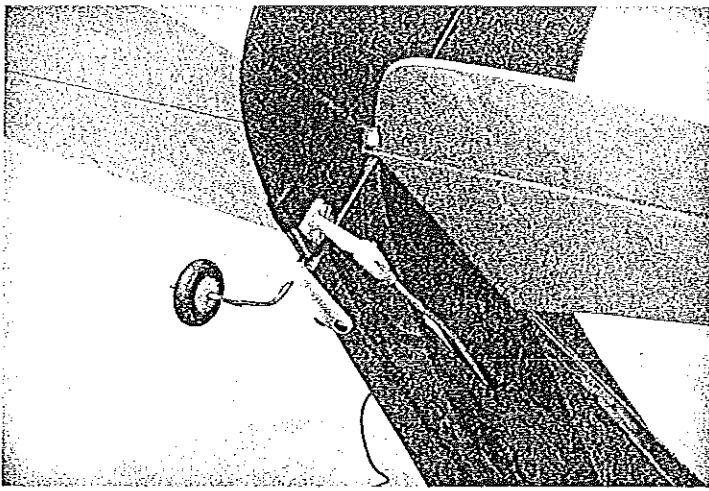
This is a good time to shape and sand the fuselage to final contour. I use a whittler's blade (#54) in my X-Acto knife and #120-grit garnet sandpaper on a flat wood block (2 x 8 x $\frac{3}{4}$ in.) for this operation. While the tools are out, you might as well shape and sand the tail surfaces. Pay special attention to the bevel on the leading

Ready for racing, the Playmate is quite agile in flight. Here, it is rounding an imaginary pylon with ease. With a Schnuerle .25, it makes a super-quick plane for fun-files and sport racing.

Playmate Specifications

Wingspan: 50 in.
 Wing Area: 385 sq. in.
 Weight: 2-2½ lb. dry
 Wing Loading: 12-15 oz. per sq. ft.
 Airfoil: Original 12%
 Control System: Three channels (rudder, elevator, throttle)
 Engine Size: .15-.25 two-cycle
 .20-.25 four-cycle
 Maximum Control Movement: Elevator, 30° up and down; Rudder, 30° left and right
 Center of Gravity: 32% of wing chord, without fuel
 Fuel Tank: 4 oz.
 Stall Velocity: 16 mph at minimum weight
 Maximum Velocity: 75 mph with .25 two-cycle engine





Left: Small Goldberg control horns, tail wheel mount, and fittings work well. Lightweight tail wheel is from Sig. Right: Dave demonstrates the manual fuel pump (a squeeze bulb) which is completely practical with the plane's 4-oz. tank. Also check out the compact tote box.

edge of the rudder and elevator; this should be a sharp angle as shown on the plans—not rounded off. This touch, alone, will reduce

considerably the battery drain from the servos. Wing. With the fuselage and tail in a safe

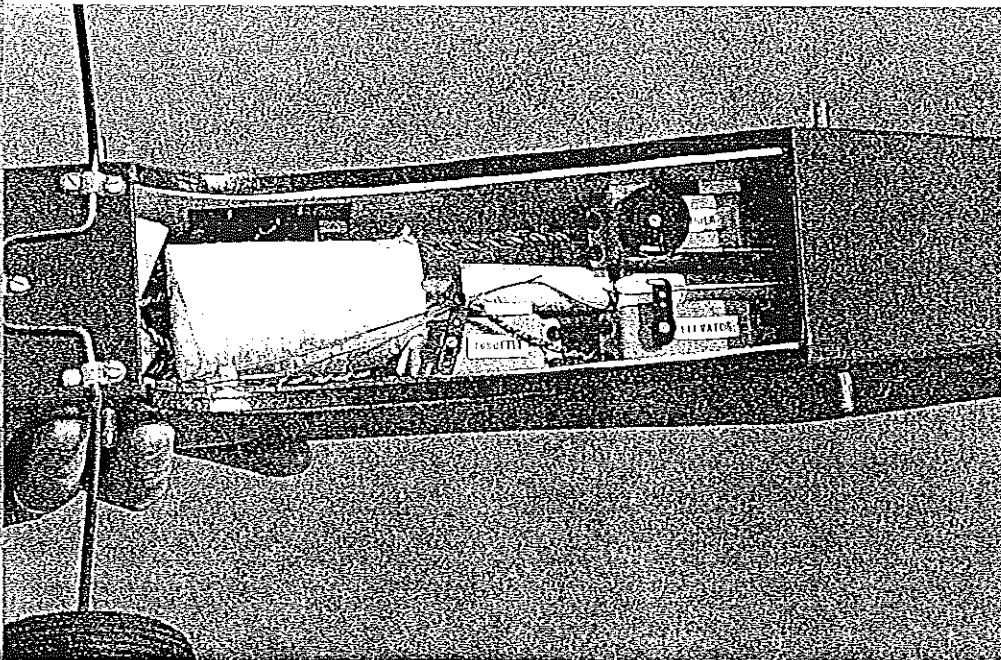
storage place, the wing can be tackled. First of all, locate and use a flat, warp-free work board, either a hollow-core door panel or, as in my case, an old drafting board with a basswood core. It is safe to say that the success of your entire project will depend on building flat, warp-free wings. Start construction by laminating the spar assemblies and notching the trailing edges. Next, glue the wing tip assemblies together. Set the tips aside for the moment.

The plan should be smoothly fastened down and protected from glue with a plastic film. Super MonoKote backing does a great job, or you can use one of the kitchen clear plastic wraps (no wax paper, please). Start with the bottom spars and trailing edges, clamping down carefully. Install the ribs, noting proper thickness as you go, and then glue in the spar fillers. Glue the leading edges and wing tips, blocking the tips to the proper angle. Carefully fit and install the top spars, paying special attention to the glue joints around the center section.

Remove the panels from the plan, and trim the center ribs to the dihedral angle shown on the plan, taking pains to get a good-fitting joint all around. Glue the panels together. Then, using a razor saw, remove the portion of the center ribs necessary to install the dihedral brace. Glue the ply brace in place, and check over all the glue joints for good bonding.

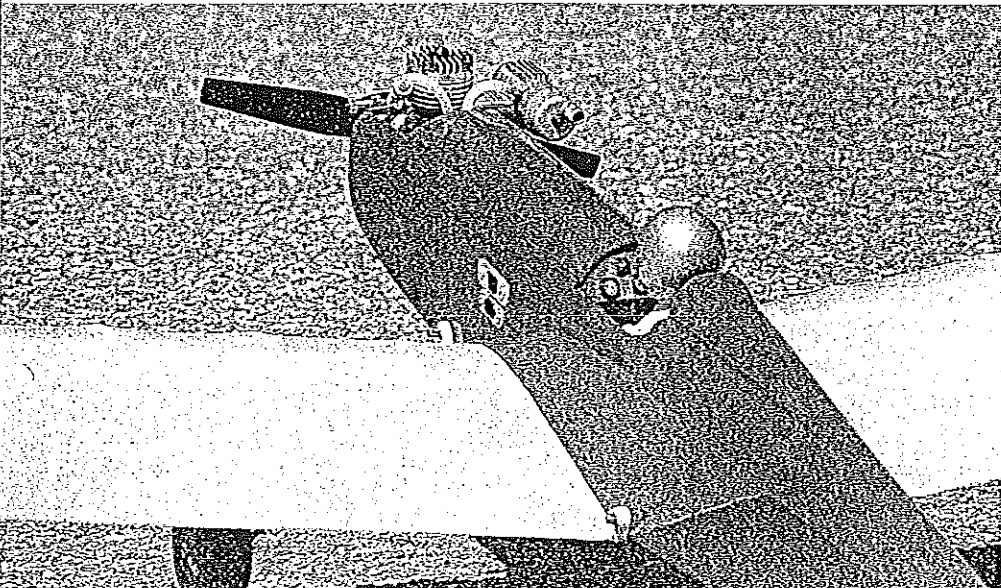
At this point the wing should be capable of being bent like a long bow—with a tip in each hand and your knee in the middle. Please do not omit this important load test, as it will detect gluing problems. Prepare the wing for covering by sanding it smooth all over and rounding tip edges, etc. Do not sand the trailing edge round; leave it with square corners for the best flight qualities.

Covering, installations, etc. Follow the manufacturer's instructions for best results with plastic films—along with information from such excellent publications as produced by Harry Higley and Sons. I prefer Super MonoKote and highly recommend it on this type of wing construction. Assemble the fuselage, tail, and headrest, being very



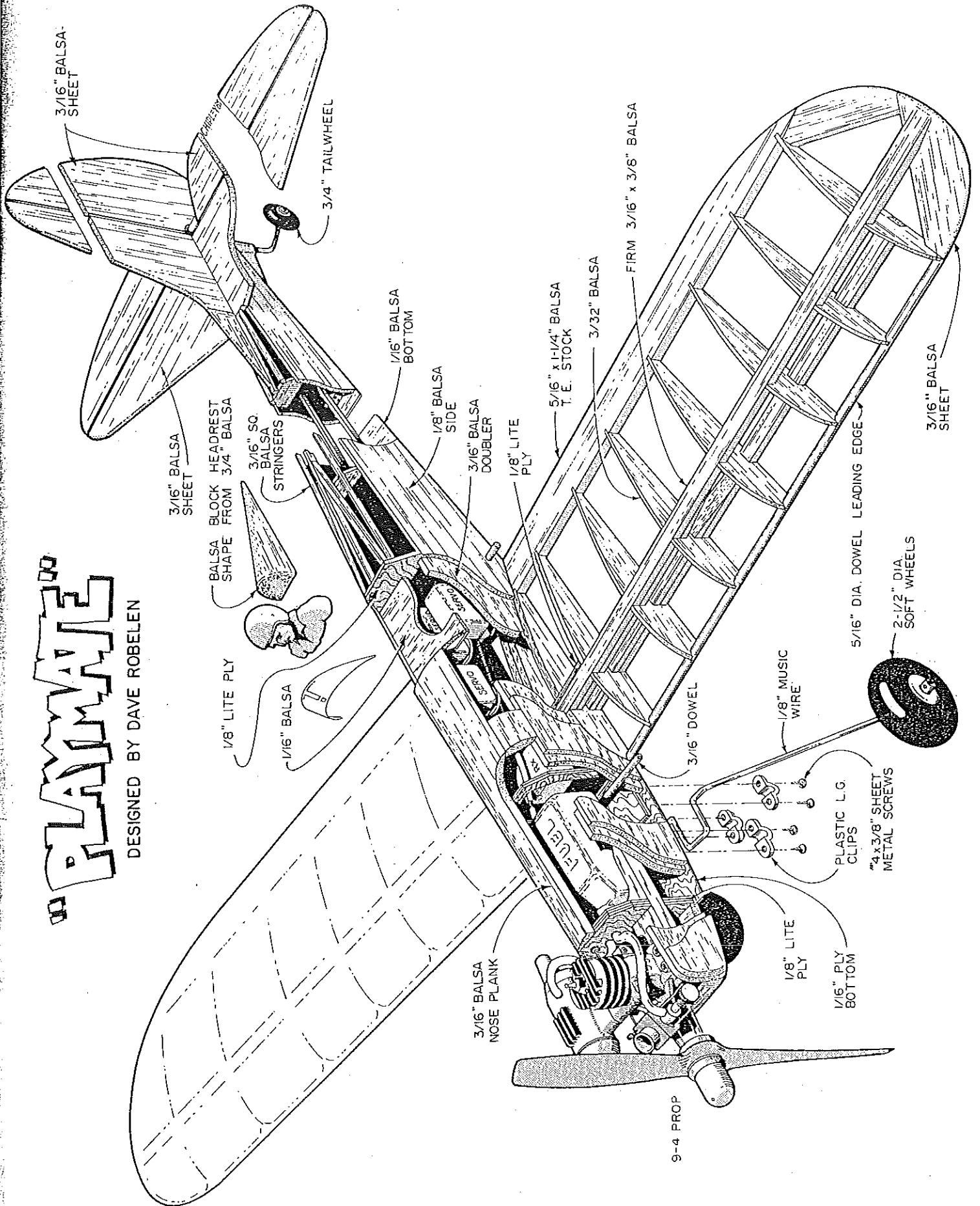
Radio compartment has ample room for standard-size equipment. Servo mounting tape works fine here, and it is simple to use. Note various servo arms used for different throws.

Switch and charging jack should be mounted in a convenient spot well away from the exhaust spray. Rubberband wing attachment is very forgiving and barely noticeable.



PLAYMATE

DESIGNED BY DAVE ROBELEN



3/16" BALSASHEET

3/4" TAILWHEEL

3/16" BALSASHEET

BALSABLOCK HEADRESTSHAPE FROM 3/4" BALSAS

3/16" SQ. BALSAS

STRINGERS

1/16" BALSABOTTOM

1/8" BALSASIDE

3/16" BALSADOUBLER

1/8" LITEPLY

5/16" x 1-1/4" BALSAT. E. STOCK

3/32" BALSAS

FIRM 3/16" x 3/8" BALSAS

3/16" BALSASHEET

1/8" LITEPLY

1/16" BALSAS

5/16" DIA. DOWEL LEADING EDGE

2-1/2" DIA. SOFT WHEELS

3/16" DOWEL

1/8" MUSIC WIRE

PLASTIC L.G. CLIPS

4x3/8" SHEET METAL SCREWS

3/16" BALSANOSE PLANK

1/8" LITEPLY

1/16" PLY BOTTOM

9-4 PROP

careful with the tail alignment. In fact, the wing should be strapped to the fuselage at this stage for alignment reference. Do not cut through the covering to install the headrest or dorsal fin; just glue these in place with CyA (this will be a big help in avoiding wrinkles on the fuselage top).

Although the pilot bust and instruments will not improve the flight qualities one bit, I urge you to include them. My Playmate has a cut-down Williams Bros. 2-in.-scale pilot, instruments from Circus Hobbies, and an instrument panel made from some old 1/4 plywood wing skin.

Normally, the pilot and instruments tend to be damaged by the hot exhaust spray, causing them to look grubby. There is a solution: use a stiff brush to apply a thin coat of Hobby epoxy 2 glue to the entire instrument panel (after installation). Also coat the pilot after painting. This treatment has been a real boon for me, keeping the cockpit area looking neat indefinitely. Also use this glue to coat the entire inside of the fuselage from the wing trailing edge forward for excellent fuel resistance. Take care to spread the glue very thin to avoid excess weight; a heat gun will help with this.

Make up and install the fuel tank, and mount the engine (#4 x 1/2-in. sheet metal screws) along with the landing gear (#4 x 3/8-in. sheet metal screws). Assemble the tail wheel, and install it at this time. I use four layers of MonoKote ironed over the tail wheel arm to connect it to the rudder.

Construct the two pushrods from 1/16 sq. balsa and threaded rod, and carefully install them. Pay special attention to keeping the rods very stiff with a minimum of bends and no binding; you will be rewarded with reduced battery drain and excellent control response. Install the servos in the area suggested. I have had very good results using servo mounting tape for this job. I prefer to connect the throttle with a Sullivan thin cable set along with a Du-Bro ball-link on the throttle arm.

Flight preparations. The proper balance of any model is critical to successful flight. Loosely place the receiver and battery in

the fuselage, and mount the wing. Locate the battery and receiver where it will help the most in achieving the correct balance position; use proper sponge padding for protection. As a last resort, lead weight may be used to get the proper balance point—but please do get it to balance correctly. I have been routing my receiver antenna out the tail cone, letting the excess trail from a pushrod exit slot.

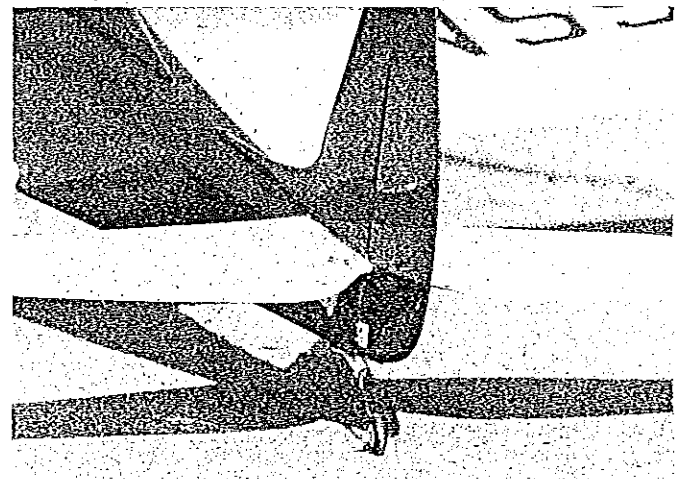
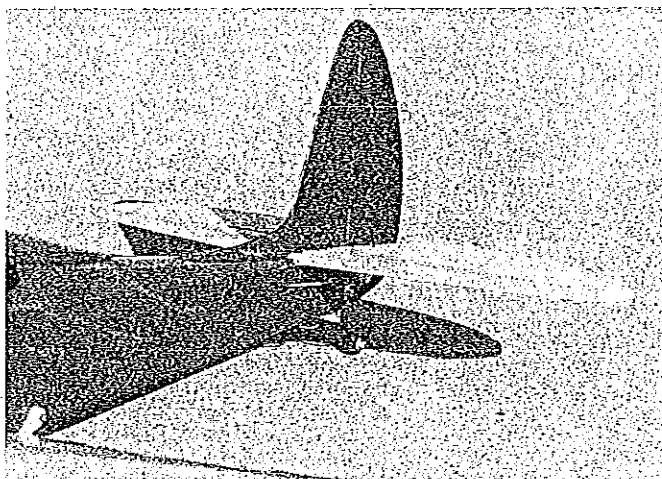
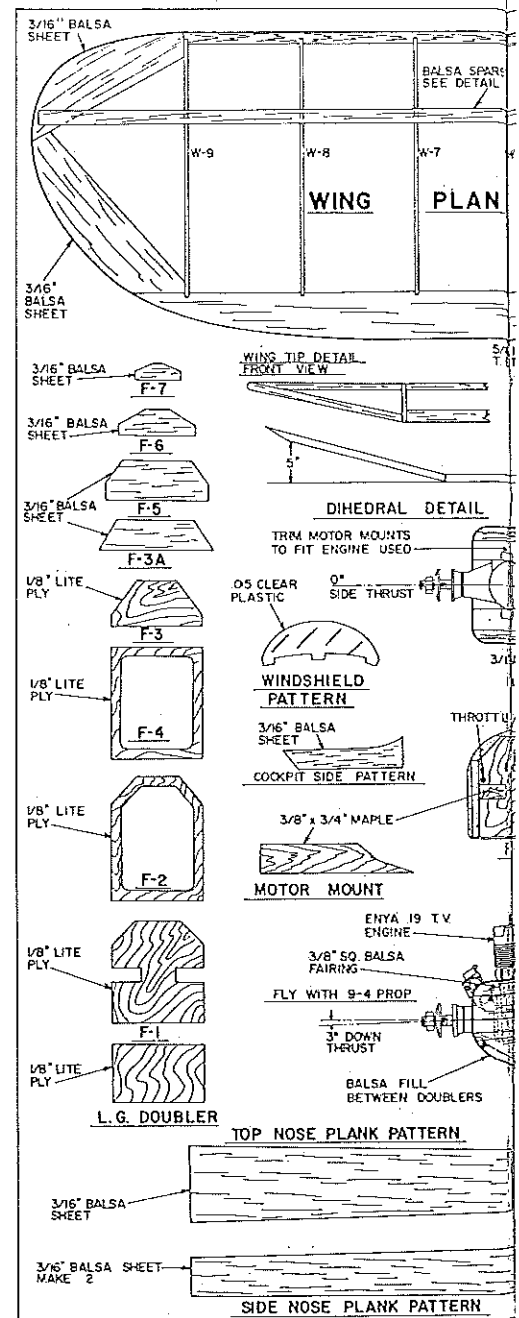
Mount a 9-4 propeller (if you are using a two-cycle engine). I have excellent results with a Master Airscrew. Depending on your own engine, you may need to shorten the prop somewhat for best results. (My .15 worked best at 8 1/2-4.) Do not exceed 4-in. pitch.

Flight tests should be uneventful and rewarding with proper preparation. Set the controls for about 15° up and 15° down on the elevator and 25° each way on the rudder initially. Then make changes after the first flights if desired. I am using 30° up and down on the elevator and 30° each way on the rudder, but this is a pretty wild setup to be approached gently. Please recheck the wing for warps, and remove any you find (a Formica countertop is usually a nice flat surface).

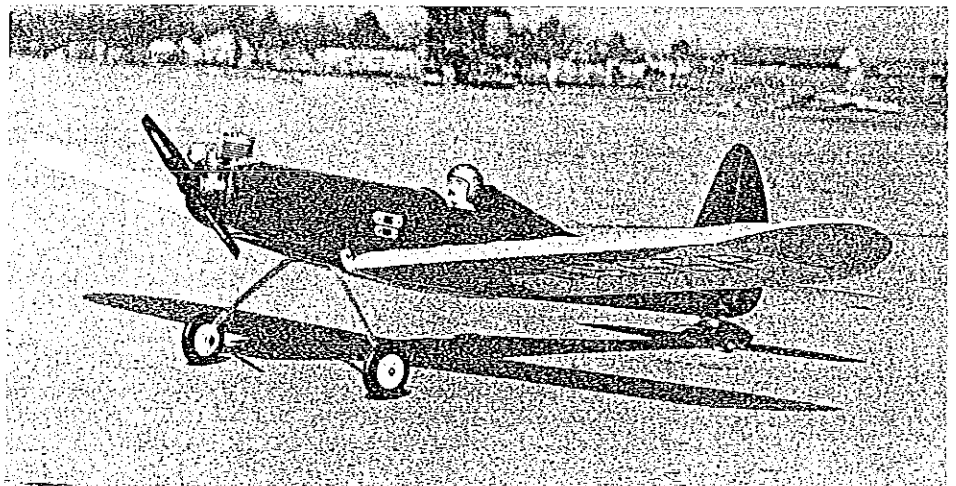
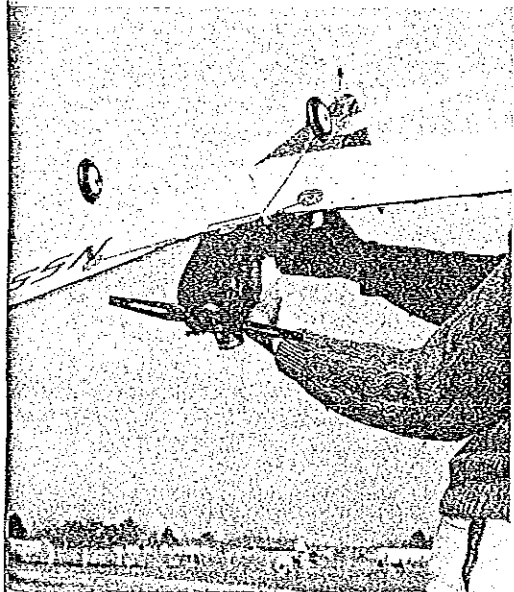
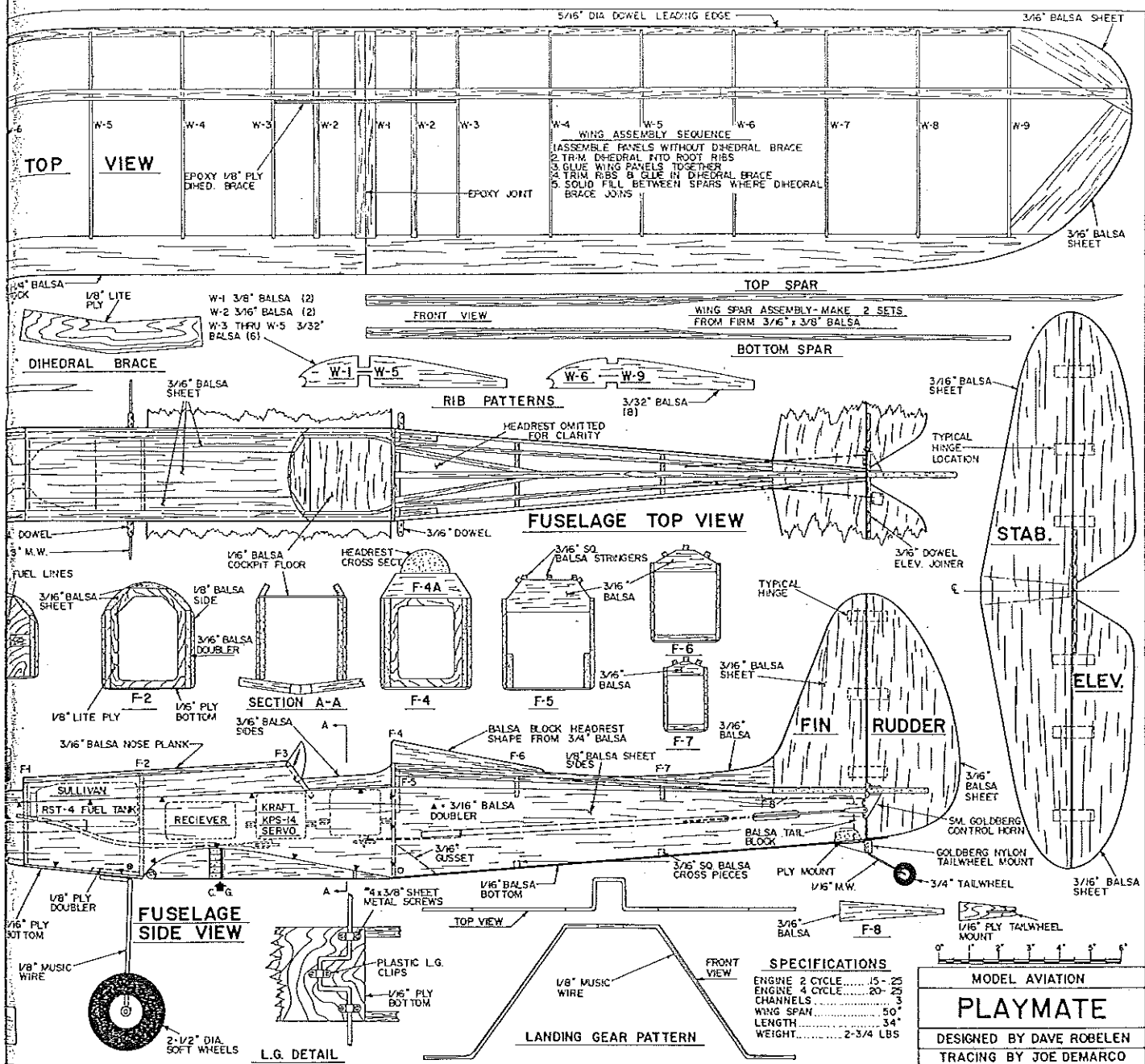
You will have a lot more fun if you fully break in the engine before flight and set it for a good, smooth idle with proper throttle response. Check the full power mixture setting while holding the Playmate's nose up about 45°.

Now, for the fun. Fill the tank, start the engine, idle back, and taxi onto the runway. Stop, facing the wind, and recheck the control response one more time. Advance the throttle gradually, holding up in the elevator for the first five to 10 feet of ground roll; then move the stick to neutral. Continue to accelerate with throttle, and only use up-elevator for lift-off if your Playmate will not come unstuck. Climb to adequate altitude, check the trim and control response, noting any desired changes—and have a ball! The Playmate may either be flared for landing or brought in a little faster for a tail-up touch-down; it's your choice.

I hope you enjoy your new Playmate.



Left: It takes a little extra effort, but sanding the tail surfaces to a pleasing contour will rid them of that flat-plate look. Right: The tail wheel strut should be rather long and angled back for best ground handling. Three layers of MonoKote over the wire secure it to the rudder.



Left: This delicate landing gear was cut down from a Sig blank and filed oval for a significant weight and drag reduction. This is not the gear shown on the plans! Above: The up-swept tips and the generous dihedral angle are the secrets behind excellent control without ailerons. If you reduce either of these, the turn and bank performance will really suffer.