

# SQUIRE MK III

By DICK THOMAS

**For the Newcomer to R/C, the Multi Novice, the Sport Flier . . . in fact, for YOU if you really want to FLY . . .**



**W**ANT to taxi? Want to brake? Want to take off unassisted? Want to make a thousand effortless touch-and-go's? Want to really fly?

This, then, is an article for you — the newcomer to R/C, or the RC'er who is about to go into multi, or is already there and floundering. The Midwest Tri-Squire, with a few simple modifications and six channel, or proportional equipment, can really give you your wings!

The Squire was originally designed for escapements and a .15 engine, rudder-only (possibly kick-up elevator), no brakes or steering. But our Squire has steerable nose gear, a Super Tigre .23 for power, and three servos inside for rudder, elevator, and engine control. Steering is attached to the rudder servo and the brakes work off down elevator. We will also have larger moving sur-

faces for more sensitive response and some reinforcements here and there. And last, since we are not bound by the limitations of escapements, a few changes in configuration to produce a plane with some real eye appeal! And the latter, to me, is a MUST in R/C. A model plane doesn't have to be ugly to fly, any more than the real ones.

When I started in R/C, I decided after much deliberation, to buy a 10 channel outfit and start out on a six channel plane. I made this decision in the face of well-meant advice to cut my teeth on single channel, rudder only. I have never regretted the determination to go multi from the start, that is, from the standpoint of investment, since I only had to make one equipment purchase, and it has substantial resale value. But, from the standpoint of being able to fly my first plane, the whole thing was

a nightmare! I built a Falcon and stalled it on takeoff — a sensational crash and some “I told you so” comments from my contemporaries at the field. But it came to pass that I could get the Falcon off the ground, and though every second was comparable to torture and pain, I could get it around the sky in big circles.

But land? My landings were all accidents to one degree or another, and took place in the general vicinity of where the plane wanted to go . . . never where I was standing! And, although I made fifty flights with the Falcon, I never really flew it. I dreamed of a plane I could control and command . . . one that would do my bidding gently. I next built a Tauri and found myself with the same trouble. Let me say here, and emphatically, that I have the highest regard for both the above designs and kits. But, from my experience, they are projects for the RC'er with substantial air time. I was very discouraged. The vision of that plane I could take off and land, touch-and-go, and maneuver in the air short of constant crisis seemed more remote than ever.

I conferred with Frank Schwartz who is the equivalent of my Patrol Leader and/or Faculty Advisor in R/C, and he again urged me to build a Midwest Tri-Squire modified for six channel, reminding me of the beautiful performance of one at the 1964 Mid-South R/C Championships. This, by the way, was flown by none other than Nickie Neville, now Class II Nats Champ! This contest is held in my home town of Nashville and sponsored by the Middle Tennessee R/C Society during the first weekend in June.

My secret hesitancy about building the Squire was my conviction that it was about the homeliest plane I had ever seen! It embarrasses me to come right out and say so, but it's the truth! When I bought the first kit I couldn't bear to look at the picture on the front. But, needless to say, I took Frank's advice, and besides the suggested flying alterations, found myself adding some face-lifting to the Squire.

That decision to build the Tri-Squire has resulted in more genuine flying pleasure, to say nothing of thrills, than I would have dreamed could be mine in R/C! It also resulted in a sound foundation on which to move into hotter multi ships.

I could easily take ten pages to describe the sheer ecstasy of setting the Squire up on a long approach, engine idling, feeding in minor corrections, and have the plane seemingly slide down a wire to the runway, flare out, touch down, brake and turn, or full throttle and up again. Man . . . that's livin'!

On my first two Tri-Squires (the one pictured in this article is my fifth), I conservatively estimate that I put in 500 flights and made four times as many

touch-and-go's. The truth is I'm nuts about touch-and-go's . . . I dream about 'em! But think about it . . . it is the one maneuver requiring absolute control on the part of the pilot and precision performance on the part of the plane and equipment. Practice your T&G's diligently and the in-air maneuvers will be perfected a lot easier. And another word of advice — let some qualified RC'er get the plane off the ground . . . you take over in-air and give it back to the expert for landing. And don't fly the plane ragged when you get a little air-time! I see guys who know only one way to fly — wide open! And on each flight they “wring out” the ship through their own little set of maneuvers like every flight would be their last. And, all too frequently, it is! Get in the air, throttle back, and enjoy the thrill of relaxed flying and the systematic improvement of your proficiency. This way, believe me, you'll get more stick-time and far less bench-time!

For you proportional enthusiasts, the Squire is an excellent trainer. There are a couple of them in the area using the RCM Digitrio and are racking up excellent performance. But enough of this hangar flying — let's get on with construction!

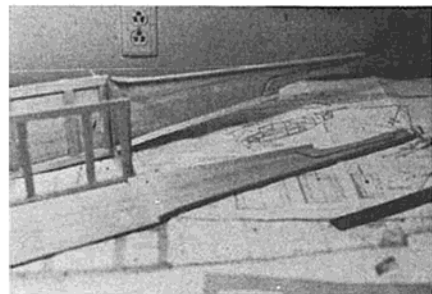
#### Fuselage

Construct the frames as directed in the kit. Using bulkhead 5 as a pattern, cut a new bulkhead from  $\frac{3}{32}$ " plywood, measuring  $3\frac{3}{4}$ " in width. Remove the center so that the sides, top, and bottom are  $\frac{1}{2}$ " in width. This gives the additional width necessary to permit placing three servos abreast. Other dimensions on the bulkhead are the same. This extra width is necessary for Bonner servos but might not be so for Ancco or other smaller units. In any case, Bulkhead #5 is of plywood. Bulkhead #4 is omitted. Attach Bulkheads 3 and 5 to frames.

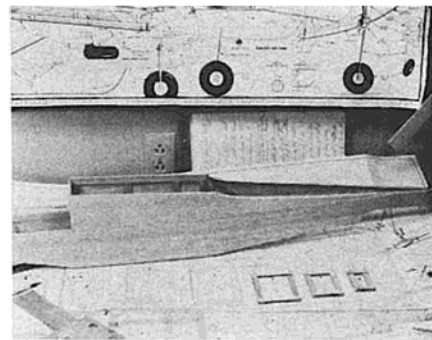
We are now ready to cut and modify the  $\frac{3}{32}$ " sheet sides. Cut them to plan outline first. The shaded areas are to be cut off the plan sides. The strip on the bottom of the fuselage comes off for appearance and gets rid of that bulky look in this area.

Next, carefully, and accurately, modify the stab incidence as indicated. This is done after the fuselage sides have been cut for the original stab and after the rear doublers are in place. This increase in stab incidence is desirable since we are increasing power and speed, and thus will reduce the tendency to balloon.

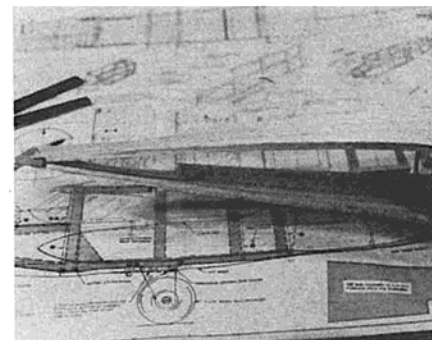
Now glue  $\frac{1}{4}$ " triangular strips along the top and bottom of the fuselage sides from bulkhead 5 back. Make several knife or saw cuts in these strips immediately behind Bulkhead 5 to facilitate . . . curving the top strips at this point. These strips increase the strength factor as well as allowing the rounding off of fuselage corners.



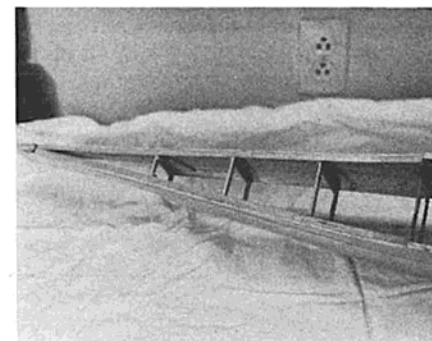
Joining fuselage sides to pre-assembled framework.



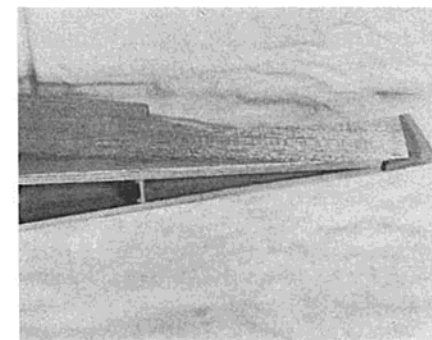
Basic fuselage structure with balance of formers in place on plans.



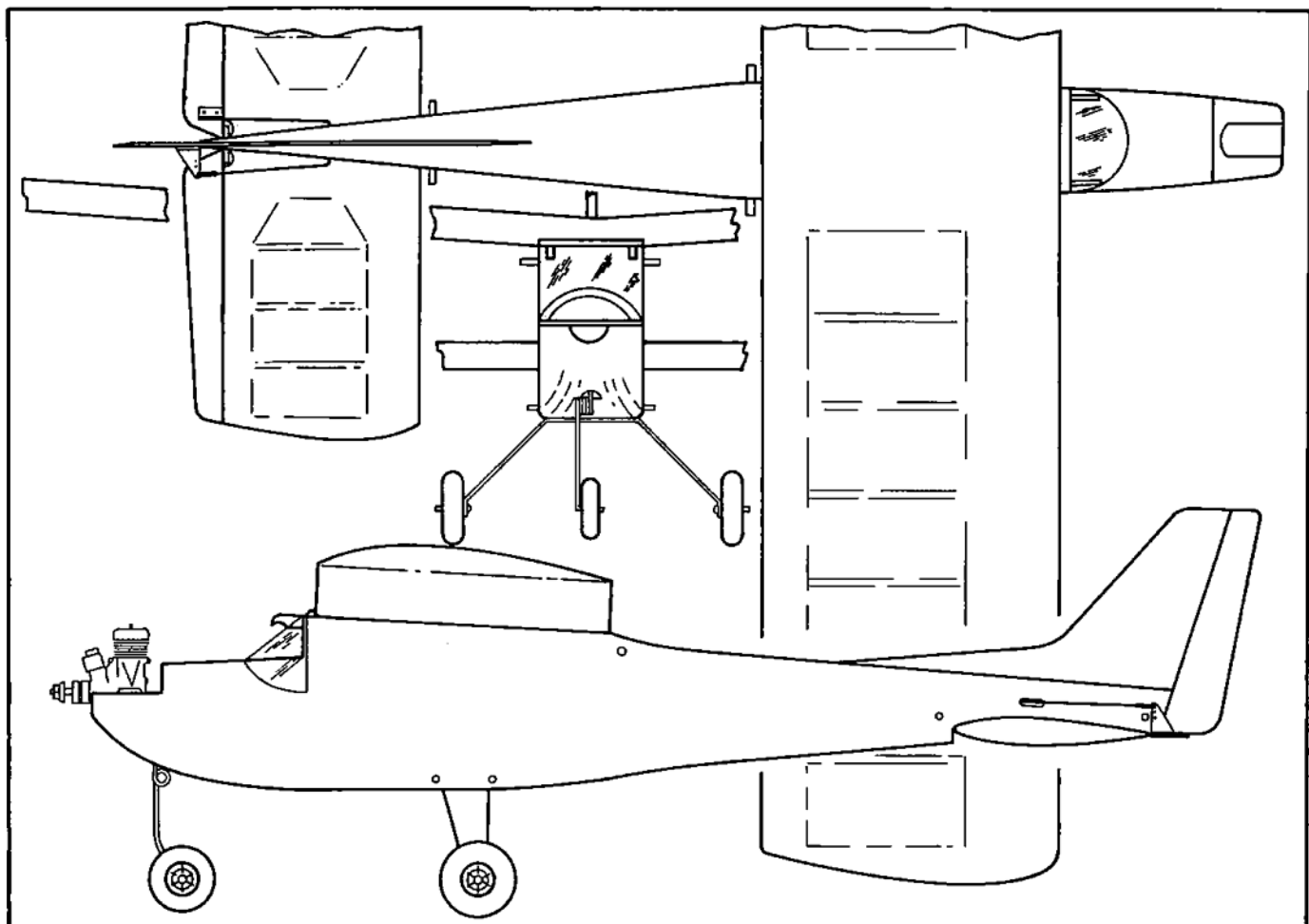
Close-up of modified tail assembly.



All fuselage aft formers in place.



Close-up of modified tail block.



Glue the fuselage sides to the frames. Build formers 6, 7, and 8 on plans but do not glue on the cross pieces at the bottom. Cut off  $\frac{1}{4}$ " triangles at top corners to allow for triangular strips. Now join the fuselage sides at rear with the  $\frac{3}{8}$ " tail block cut to shape as shown in the outline. Note how the servo area widens out in a gentle curve when the sides are joined. This extra width is desirable and is certainly not unpleasing in appearance, so plank the bottom, when the time comes, without regard to plan width in this area.

Now, back to those incomplete bulkheads. Since we reduced the height of the fuselage sides aft of bulkhead 5, we will have to custom fit #6, 7, and 8. Slip each into place, mark and cut, then glue in position. At the same time, glue in the bottom cross pieces.

Let's go back, now, and assemble the nose gear on Bulkhead #1. Using the kit bulkhead as a pattern, cut another from  $\frac{3}{8}$ " plywood. We need a total of  $\frac{1}{4}$ " on this bulkhead for extra strength. It could be cut from  $\frac{1}{4}$ " stock, but the  $\frac{3}{8}$ " is easier to work. Glue the two together and assemble the Top Flite nose gear so the top bearing is flush with, or slightly below, the top of the engine mounts, and the lower mount is positioned flush with the bottom of the bulkhead. Put a touch of solder on each nut to lock. This is a good time to bevel off the sections of the motor mount that the

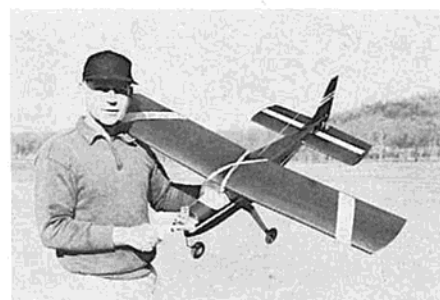
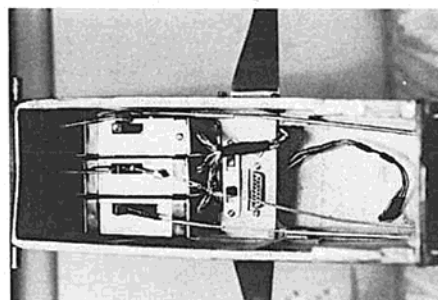
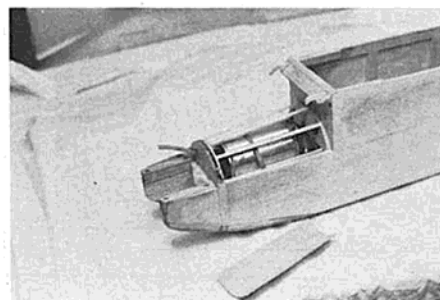
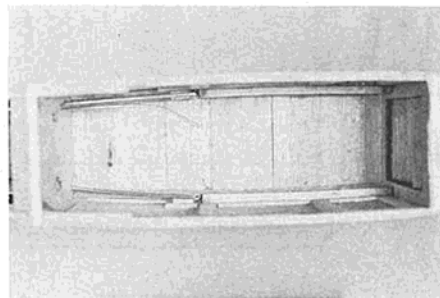
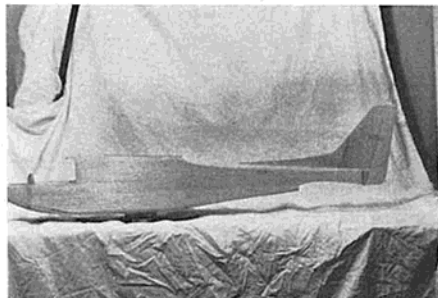
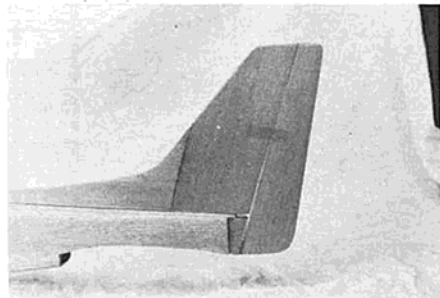
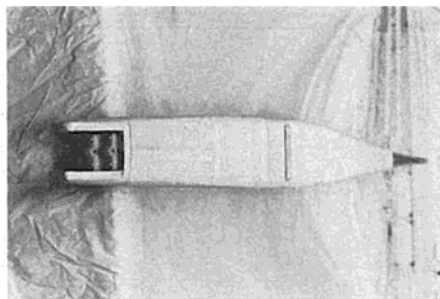
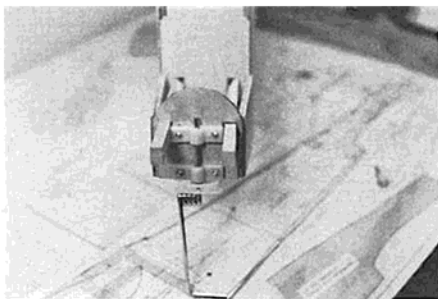
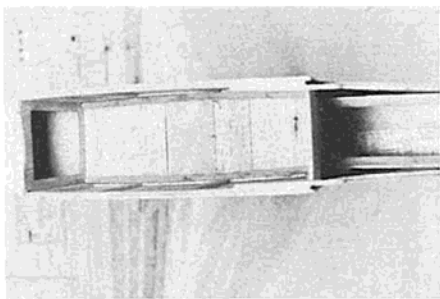
tank will be seated on. Since we are increasing power, we will use a Dmeco 4 ounce tank. I have used a six, but you'll get all the flying you want with a 4 and the Super Tigre 23. Now position the nose gear bulkhead and the motor mounts and glue in place.

Now, let's talk about the tank for a moment. Beveling the motor mounts permits seating the tank below bulkhead height. Bulkhead #2 is omitted and the  $\frac{3}{8}$ " stringer extends from bulkhead 1 to 3A. Due to the longer spanning, put in two extra stringers at the 11 and 1 o'clock positions on bulkheads 1 and 3A. I prefer to cut off the filler tube on the top of the tank and seal it with solder, using the fuel line at the engine to fill through. I have found the amber surgical tubing preferable for fuel tubing because of its flexibility in all kinds of weather and for its extreme resiliency and toughness. Ultimately, the tank should be secured with a  $\frac{1}{2}$ " strip of thin sheet metal (tin can stock) across the top and held in place by wood screws in the motor mounts. Preparations for tank installation should be made as above, but do not place in position at this point since we first need to install the tubing for the motor and steering pushrods and brake cable. This can be a bugaboo and quite messy, but not so if we make and use a 10" piece of  $\frac{5}{32}$ " landing gear rod, sharpened on one end to 4 flat sides (like a nail). Lo-

cate where you want the throttle and landing gear tubing to exit and drill away through both bulkheads. The hole for the brake cable can be drilled in bulkhead #3 by dropping down while the bit is still in the hole for engine tubing in bulkhead #1. I prefer aluminum tubing for lightness and ease of bending. Glue all tubing in place. Now seal the tank area and all the engine area with a coat of Hobbypoxy II. Install the tank with fuel and overflow tubing attached. Sheeting of the top of the tank area can be facilitated by cutting one half of the sheeting to shape and then lightly coating the outside with water and bending to desired curve. Each half can then be glued in with a minimum of assistance from the pin box.

I have found nothing more satisfactory for brake cable than nylon-encased, braided fishing leader, 15 pound test. It can be secured neatly by folding back and securing the double strand with a wrapping of fine copper wire. My experience has been that brakes need frequent adjustment and the turnbuckle depicted on the plans works very well for this. Pick up some small swivels to install as shown when purchasing the brake cable.

Plank the top of the fuselage, increasing thickness to  $\frac{3}{32}$ " sheet from beginning of the fin aft. Install the same triangular stringers on each side of



fuselage bottom from bulkhead #3 to #5. The main gear is set back one inch from plan position. Install it first when planking the bottom. Cut the landing gear mount from  $\frac{1}{4}$ " plywood, increasing the width (fore and aft) to 2". The main gear is a Dmeco, preformed and precut,  $1\frac{1}{2}$ " wide where it is seated on the mount. On the rear edge of the plywood mount, epoxy a  $\frac{3}{32}$ " strip of plywood  $\frac{1}{2}$ " wide that has been tapered on the rear edge. This will back up the main gear which could otherwise gouge the fuselage bottom on one of those embarrassing slam-in landings. **DO NOT KEY GEAR IN PLACE WITH SCREWS.**

Plank the fuselage bottom and build up the cowl. I do not fill the center section below the engine since minor streamlining problems can be tackled on some later project and good access to the nose gear is desirable. If you prefer, remember to leave access for the lock collar so the nose gear can be removed.

Next, trim the top and bottom sheeting and sand to shape. A word on sanding: starting from the position that it can get tiresome and/or wavy, I recommend two corrections. A sanding block, 9" x 3", on which a half sheet of sandpaper is used is a must. And for rough sanding of corners and thick balsa sheeting, try D weight (50) open coat aluminum oxide production paper by

3M. This is the only way I know to get clean continuous shaping. Shape carefully and round out all corners to such a degree that we expose approximately  $\frac{1}{8}$ " of the triangular stringers in these areas. On the inside corners of bulkhead #3, glue a  $\frac{1}{2}$ " triangular reinforcing strip from the fuselage top to the motor mounts, notching to allow for the plywood wing mounts. Using HobbyPox Formula 2 glue and a piece of Sig glass cloth, secure in place over these mounts, allowing the cloth to generously overlap. In the event of a major pile-in with the Squire, this will show up as the weakest point, and the above reinforcement will allow us to continue our day's flying after attempting to execute some portion of a maneuver below ground.

The servo tray is mounted on  $\frac{1}{4}$ " square rails of spruce which extend from bulkhead #5 forward  $6\frac{3}{4}$ " and are positioned 1" above the floor of the fuselage. The servo tray may be held in place by small wood screws or by the bracket shown in the drawing. The latter require a little more work but make for trouble-free securing of tray plus easy removal. Fill between frame uprights with  $\frac{1}{8}$ " x  $\frac{1}{2}$ " balsa and glue rails in place.

I like a completely self-contained tray unit, down to charging jack, and have shown an installation that includes switch, receiver plug, and jack, all on

the same tray. The use of a World Engines slide switch permits soldering of all four groups of "common" wires in the harness to the switch poles. Insulate each at the solder joint with a piece of transparent fuel tubing. This goes a long way toward eliminating the "bird nest" problem. I, personally, "turn on" when I assemble the plane at the field, the idle drain on the receiver batteries being no problem. But, if your frequency is too popular, make a small hole in the fuselage side through which a small wire, right-angled on the end, can be inserted to turn on and off. Thus can end the era of exterior electrical components and the accompanying hazards and inconvenience.

Use DuBro Kwik Links with threaded adjustments at the rudder and elevator horns and at the engine servo. A small hole can be drilled through the threaded back end of the elevator servo eye and the turnbuckle and swivel, previously mentioned, attached by wiring on. Obtain a heavier gauge windshield material and use the kit shield to cut a new one. Secure on the finished fuselage with a careful application of HobbyPox 2.

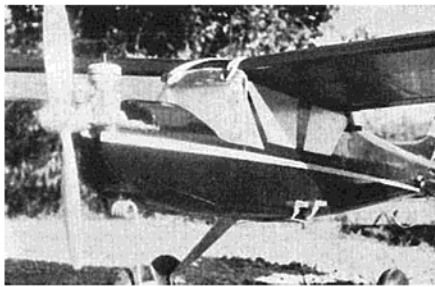
#### Wing

Construction of the wing is the same as on the Midwest kit plans with the following exceptions. The dihedral is

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reduced to a total of  $3\frac{1}{2}$ " measured from the top of the end of the wing. Make the top trailing edge sheeting from a  $\frac{1}{16}$ " x  $1\frac{3}{4}$ " strip. Let this match up with the rear of tapered  $\frac{3}{4}$ " trailing edge and extend forward over the ribs, rather than using the kit  $\frac{1}{16}$ " x  $\frac{3}{4}$ " strip. A slight amount of sanding may be necessary, but the single sheet affords additional strength in this area. Make all trailing edges square. Do not round or taper to a point. The reasoning behind this is set out in an article by Hal deBolt in a recent article in another publication, in which tests have shown this to be preferable. So, no more necessity for tediously shaping trailing edges — simply square up with a sanding block. Reinforce the wing center section by epoxying a double thickness of glass cloth (4" wide) completely around the wing.

### Stabilizer

Construct the rib frame as shown on the plans. Next, sheet the leading edge, top and bottom, with a piece of  $\frac{1}{16}$ " x  $1\frac{1}{2}$ ". Reinforce the rear corners with a piece of 1" x  $\frac{1}{2}$ " triangular block of  $\frac{3}{8}$ " stock fitted down into the "V" formed by trailing edge sheeting. The elevators are joined by  $\frac{1}{16}$ " wire and attached with nylon hinges.

### Fin

Cut the fin from  $\frac{3}{32}$ " stock to pattern shown on plans. I have found nothing more satisfactory for attaching the fin to the fuselage than HobbyPoxy 2, after covering. Use your index finger to make a fillet type joint. Use sparingly. If a larger fillet is desired, add HobbyPoxy Stuff over cured HobbyPoxy 2.

### Covering and Finishing

There are so many ways to finish a plane, now, that I hesitate to give details, but for a good dope finish, seal all bare wood with two coats, sanding after each. Apply silk. I prefer to lay on, then wet with a spray and apply a coat of dope to all wood areas. Do not dope open areas or rib cap strips at this time. Let dry. Now apply clear dope all over. Continue to apply clear dope until the silk is sealed . . . this may take three or four coats. Let dry thoroughly. Sand with 320 or 400 wet or dry automotive finishing paper. Use

it wet, dipping repeatedly into a container of water to "unload" sanded buildup. The wet or dry is the only way I know to achieve a desirable finish. Lay on successive coats of dope, wet sanding between each until a desirable finish is achieved. Last, apply final color by spraying. All contrasting trim colors should be applied with the use of masking tape over which a coat of clear has been applied to prevent "run-under." Trim colors can be brushed on to taped areas.

### Flying

It will probably be found that one washer under each rear engine mounting bolt (Top Flite brass) is desirable for additional down thrust, and these can be installed prior to first flights. Check the CG carefully, using two pencils (erasers up) under wings to locate. Do not fly until it is correct. Using a Controilaire receiver, Bonner Transmite servos, and a 500 mah nicad pack with a Super Tigre .23, I have never had to add any weight to achieve proper balance. I do recommend extensive pre-flying at home so that field time can be flying time. Run in a new engine until it starts quickly, sounds good, and idles well. On the first flights, run slightly rich. Vibration check the plane by having your co-pilot lift the plane by two rubber bands positioned outboard around each wing tip. Run up the engine, work all surfaces, and observe closely to make sure that no surface is being moved by unwanted reed activity. If vibration is observed, repack the receiver. Somewhere along about this time, range check the radio and don't compromise on the manufacturers standards. Be certain of simultaneous operation of rudder and elevator and rudder and engine. Adjust brakes.

Now we can take our "pride and joy" to a paved surface and get in a little taxiing. This should be harmless, but I recall my first flight with a Perigee occurred, quite unscheduled, while taxiing in front of my house and the engine stuck in high! Did I get it back? More or less . . . it went through my dining room window! Note: select open areas for flying. Anyway, taxiing around helps get the feel of the ship while building confidence. Try it! On the first trip to the field take along a well supplied field box. Before flying be certain that all surfaces are trimmed to zero. A slight touch of up will raise the Squire on takeoff. Remain in a gentle climb and gain some altitude. If all is well, throttle back a little and start getting in that long awaited Flying Time!

I know the Squire can do for you what it did for me. I would like to hear any comments or questions that arise. Write to me, Dick Thomas, 4414 Forsythe Place, Nashville, Tennessee, 37205.

Happy Touch-and-Go's!