

ROCKET



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What I like best about little airplanes is that they can be flown anywhere and anytime. They do not need elaborate support equipment, just a NiCd starting battery and a half-pint of fuel. The airplanes will fit in a 6" x 10" x 30" cardboard box for travel, so they don't even take up much space. But, best of all, they are a blast to fly.

When I said anywhere, anytime, I meant it. The Pocket Rocket is hand launched into the air, and any little patch of smooth ground will serve to land it. Wind is not really a factor to fly. Many times while I lived in Wyoming, our fly-in meets would get blown out in the afternoon. So, while the guys were tying down their big birds, I'd get out my little .020 airplane and fly.

I built my first .020 powered R/C model back in 1969, a 30" Sterling Piper Cub. It used a Pee Wee .020 and an Ace R/C pulse

The Pocket Rocket is an exciting little 2-channel sport model designed for the Cox TD .020 engine and micro sized servos. It is quick to build and a blast to fly.

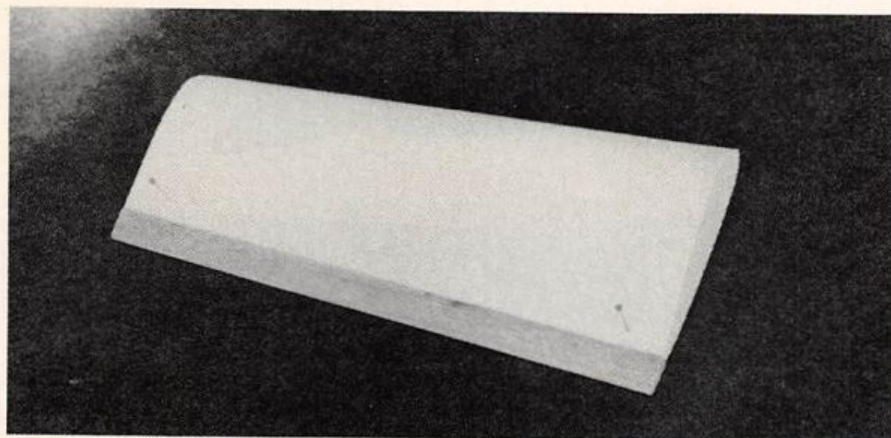
By Fred Reese

rudder control system. I flew the little Cub a lot, and eventually built a second Cub from the plans using sheet balsa for the fuselage and tail. Covering was silk and dope and power was a TD .020 engine. Control was still the Ace R/C rudder only system. The second Cub flew much better than the first

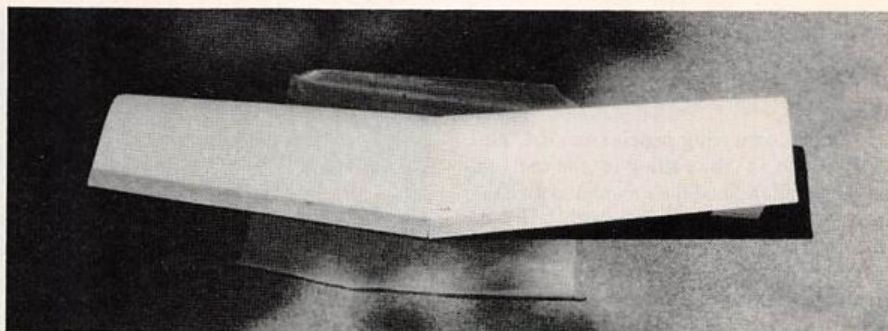
with the more powerful engine. I followed the Cub with a Guillows 24" Fairchild Ranger 24 with the same TD .020 and Ace R/C radio. This model was hot!

In the early 70's, Phil Kraft's Ugly Stick was very popular and it was being built in several sizes. I built my Littlestick, a Cox TD .010, rudder-only version with a wingspan of only 19". The plans were published full size in RCM and Ace R/C is still kitting the model, 20 years later.

In 1982, I doodled a funny little airplane while talking on the phone and then built it. I called it Buttercup because it was covered with yellow MonoKote. It was cute, and it was the best flying little airplane to date. Power was a TD .020 and it used the new Ace R/C micro servos and a 100 mA battery pack. This is the airplane that I flew in Wyoming and it is still flyable after hundreds of flights. Buttercup is pretty tired



LEFT: On a flat surface, covered with plastic food wrap or waxed paper, pin the wing panels to the surface, right side up, with the trailing edge down, glue on the trailing edge stock. **BELOW:** Glue the two wing panels together with 5-minute epoxy, blocking up one wingtip 3".



POCKET ROCKET

Designed By:
Fred Reese

TYPE AIRCRAFT

(1/4A) Powered Sport

WINGSPAN

28 Inches

WING CHORD

5 1/8 Inches (Avg.)

TOTAL WING AREA

143 Sq. In.

WING LOCATION

Top of Fuselage

AIRFOIL

Semi-Symmetrical

WING PLANFORM

Double Tapered

DIHEDRAL, EACH TIP

1 1/2 Inches

OVERALL FUSELAGE LENGTH

21 1/8 Inches

RADIO COMPARTMENT SIZE

(L) 8 1/4" x (W) 1 3/4" x (H) 2"

STABILIZER SPAN

9 1/2 Inches

STABILIZER CHORD (incl. elev.)

2 3/4 Inches (Avg.)

STABILIZER AREA

26 Sq. Inches

STAB AIRFOIL SECTION

Flat

STABILIZER LOCATION

Top of Fuselage

VERTICAL FIN HEIGHT

4 Inches

VERTICAL FIN WIDTH (incl. rud.)

2 1/8 Inches

REC. ENGINE SIZE

.020 to .030 2-stroke

FUEL TANK SIZE

Stock Cox Tank Mount

LANDING GEAR

Conventional

REC. NO. OF CHANNELS

2

CONTROL FUNCTIONS

Rudder & Elevator

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage Balsa & Lite Ply

Wing Foam & Balsa

Empennage Balsa

Wt. Ready To Fly 10 Ozs.

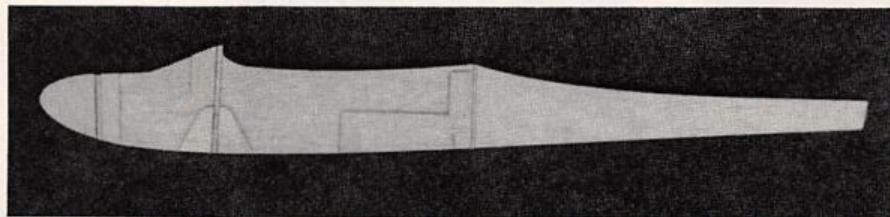
Wing Loading 10 Oz./Sq. Ft.

and the engine is worn out, so I designed Pocket Rocket to replace it. The wing of the Pocket Rocket is a shortened Ace R/C tapered mini-foam wing. I have used this wing many times in the past, full sized for .049 models, but at 35" it is too big to give spirited performance with a .020 engine. My first Pocket Rocket had a wingspan of 26", the same as Buttercup, and did not use trailing edge stock on the wing. It flew, but it was touchy and would snap roll if it was slowed down at all. A second wing was tried at 30" to reduce the wing loading, but it wouldn't fly at all. With this wing, the model snap rolled into the ground the instant I moved the elevator control. As I thought about it, I realized I had run into this in the past, but always assumed it was my design that was at fault and never considered it to be the wing. But now I was totally perplexed, this model did fly, so I began to test wing panels. I found that the molding process caused some of the wings to be thicker than others. I taped a row of pieces of thread along the high point of a wing panel and held it out my car window, changing the angle of attack while driving slowly. It clearly showed that the wing stalled at the tip, before the center which explained the tip stall, snap roll, and crash syndrome. Conversations with Tom Runge at Ace R/C did not answer my questions, but

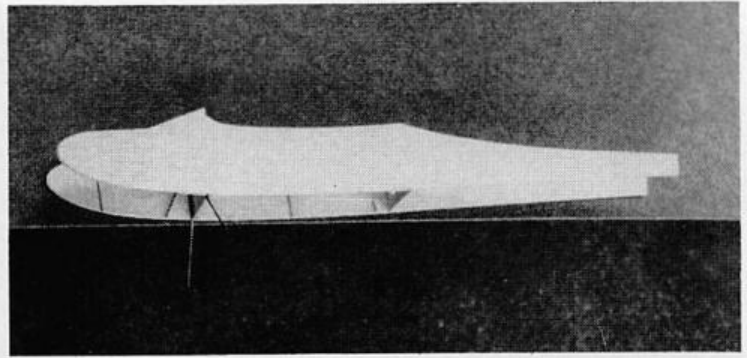
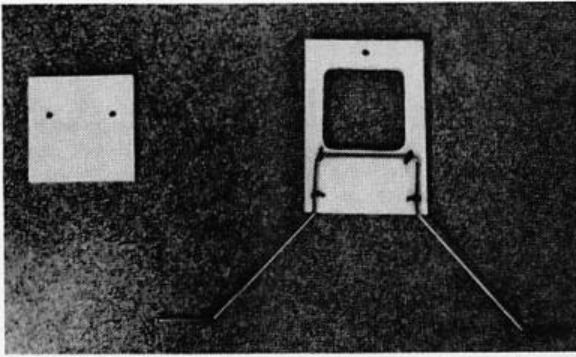
I did get a solution. Tom said they had not experienced this problem with the tapered wing panels, but they had always used trailing edge stock to widen the chord or had trailing edge stock ailerons. I tested the same panels that tip stalled before, with trailing edge stock added, and the problem went away. The new wing flew great with no tendency to tip stall. The reason that this problem took me so long to figure out is that many times I used the tapered panels without trailing edge stock and they worked.

The trailing edge stock provided other benefits as well, the radio compartment is now 3/4" longer and it is easier to get everything inside and balanced. I also lengthened the nose and tail a little on the second model, making it a little more graceful looking.

Flying the Pocket Rocket is just plain fun. It can be flown in small areas and though it appears to be going very fast (because of the size), it actually has a top speed of only 30 to 35 mph based on prop pitch and engine rpm. Handling is very solid, smooth, not at all twitchy or sensitive, and is really very easy to fly. When I let others fly the Pocket Rocket, they quickly relax and the usual comment is, "Oh! This is nice." They then proceed to loop and roll it around the sky. As one friend put it, "I had forgotten how



Lay the fuselage sides over the plan and mark the positions of the bulkheads. Glue on the nose doublers, bulkhead supports and servo rail support.



LEFT: Drill the engine mounting holes in the fire wall and install 2-56 blind nuts. Bend the 1/16" wire landing gear to match the plan and bind to F-2 with thread and glue. **RIGHT:** With the bottom edge of one fuselage side along the edge of the workbench, glue on bulkheads F-2 and F-3. Glue on the second fuselage side.

much fun these little models can be."

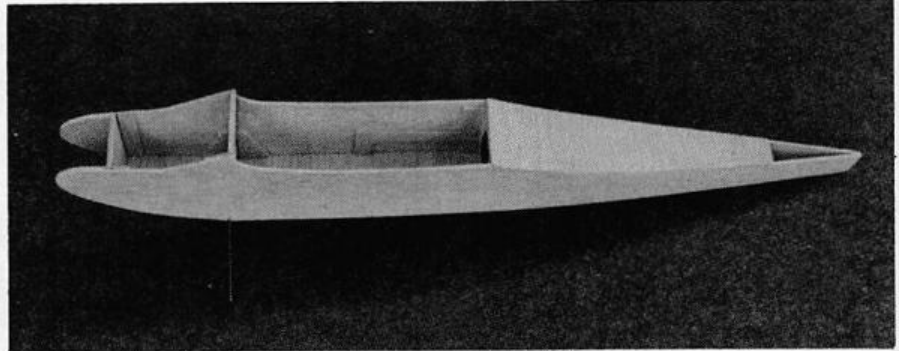
CONSTRUCTION

Wing:

Cut the foam wing panels (Ace R/C No. 50K101) to 14" by cutting off the root end of the parallel. Sand the root end to give the correct dihedral angle. Trim off 3/16" of the foam trailing edge with a razor blade and straight edge. Glue on the 3/4" trailing edge stock to the foam wing panels with white glue or epoxy. Other glues may attack the foam. Pin the wing panels to the table, right side up, while the glue is drying. Glue the two wing panels together over waxed paper with 5-minute epoxy, while blocking up one wingtip 3". Sand off any bumps or flashing from the wing with #220 fine sandpaper. Cover the wing with low temperature film such as UltraCote, Black Baron, 21st Century, or EconoKote.

Fuselage:

Cut two fuselage sides from medium density 1/16" x 3" wide balsa. To mark the outline of the sides on the wood, place the wood under the plan and mark the outline with a pin through the plan. Tape or tack cement two sheets of wood together and cut out as one. Lay the sides over the plan and mark the top and bottom edges for the positions of the bulkheads and fire wall. Separate the two sides and connect the dots between the top and bottom for the bulkhead positions. Be sure to make a right and left



Pull the fuselage sides together at the tail and glue. Glue in the fire wall F-1. Glue on the top and bottom 1/16" balsa cross-grain sheeting.

side. Glue on the nose doublers (F-4 and F-5). Add the landing gear supports (F-7 and F-8), the top bulkhead support (F-6), the servo rail support (F-9), and the wing mount support (F-10). These doublers position the remaining parts and make assembly easier.

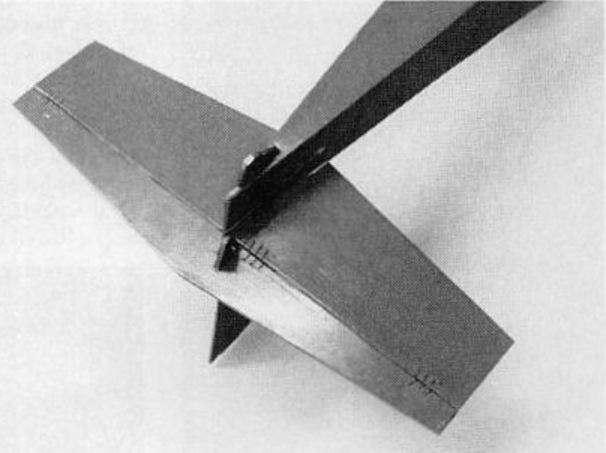
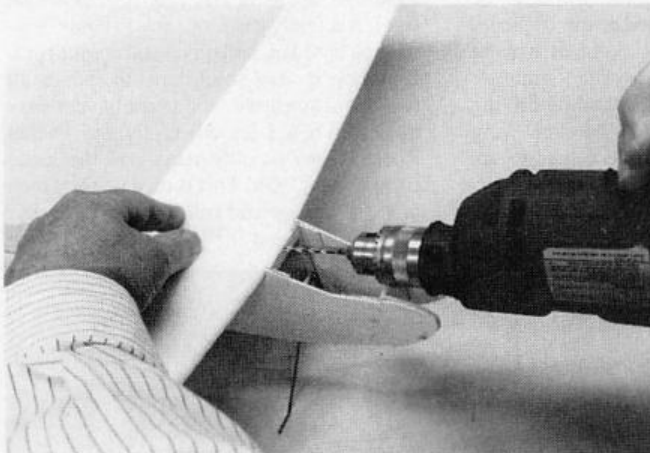
Cut out the fire wall (F-1) from 1/8" lite ply or regular plywood. Drill two 1/8" holes for engine mount 2-56 blind nuts. Glue the blind nuts into the fire wall. Bend the 1/16" holes through F-2 and bind the landing gear to F-2 using a needle and thread. Apply a drop of glue over the thread.

Lay one of the fuselage sides on the bench with the bottom edge along the edge of the bench. Glue F-2 with the landing gear in place to the fuselage side. Also glue on

bulkheads (F-3). Glue on the second fuselage side. Pull the tail together and glue. Glue in the fire wall (F-1), while pulling the sides together evenly. Check the fuselage for alignment before proceeding. If the fuselage is not straight, crack loose any glue joint necessary and reglue.

Glue on the 1/16" cross-grain balsa bottom sheet.

Glue in the rear wing mount (F-11). Position the wing in the fuselage and drill a 1/8" hole, 1" deep, into the wing through the hole in the top of F-2. Remove the wing and epoxy a 1/8" dowel into the wing, leaving 1/4" sticking out, and round off the end. When cured, place the wing into the fuselage again and drill a 3/32" hole through the center of the trailing edge down



LEFT: Hold the wing in place and drill a 1/8" hole, 1" deep into the foam wing through the hole in the top of F-2. Epoxy a 1/8" dowel into the wing for the front wing hold-down. A #4 SM screw holds the wing in place at the trailing edge. **RIGHT:** Cover the wing, fuselage, and tail parts separately and then assemble. Glue in the plywood tail skid and control horns. The hinges are thread, sewn in a figure eight stitch.

through F-11 for the hold-down screw. Screw in a #4 x 1/2" SM screw to secure the wing.

Add the top 1/16" cross-grain sheeting. Finish sanding the fuselage with #220 fine sandpaper, rounding all of the edges. Cover and decorate the fuselage.

Tail Surfaces:

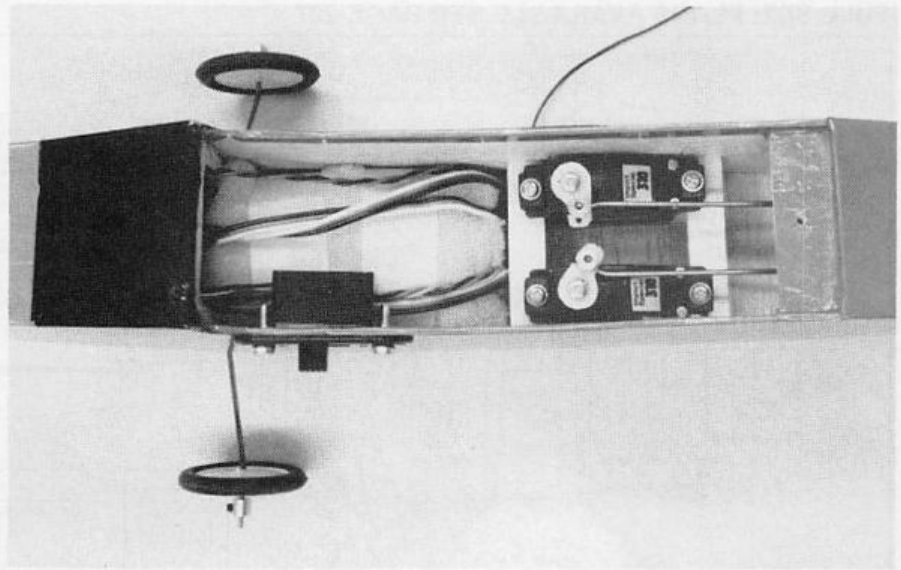
Cut out the tail parts, sand the edges, and cover. Hinge the fin-rudder and the stabilizer-elevator with a needle and thread using a figure eight stitch. Snug the thread up tight, apply a drop of thin CA glue over each hole through the wood, and clip off the thread ends. Cut away the covering on the bottom of the stabilizer where it will be glued to the fuselage and glue in place. Cut away a strip of covering on the top of the stabilizer and fuselage for the fin. Glue the fin in place.

Cut a slot in the bottom of the fuselage for the tail skid and glue in place. Drill 1/16" holes in the plywood control horns. Cut away strips of covering on the rudder and elevator for the control horns and glue in place. Paint the control horns and tail skid to match the covering or just coat with glue.

Radio and Balance:

The Pocket Rocket was designed for the

Finished Pocket Rocket.
Power is a Cox TD .020 and flying weight is about ten ounces. The vinyl lettering came from the hardware store.



Radio installation showing the new Ace R/C Mini servos.

reference. Do not try to balance the model on your fingertips as it is not accurate enough. The model must be balanced with all of the radio gear installed. Place pieces of foam rubber into the forward compartment to cushion the battery pack and insert the battery. The servos are mounted on 3/8" lite ply rails. Mount the servos on the rails, but do not glue them in place now. Place the receiver, wrapped in

zag" in the pushrod at the servo end to shorten it.

Control surface movement should be about 5/16" in each direction for both rudder and elevator. New holes may be



smaller radio systems. Any receiver will fit, but the servos should be of the mini or micro size. Battery packs can be as small as 100 mA, but the larger 225-270 mA battery packs will fit and are recommended. The larger batteries are more reliable and will allow longer flying sessions.

Balance and radio installation need to be addressed at the same time, as there is such limited space to shift components to get the balance point correct. Balance the model carefully by sticking pins into the wingtips, 1/8" back from the leading edge. Suspend the model between two cans. The model must hang level using the stabilizer as a

foam, in the fuselage and lay the switch on top of the receiver. Hook up the servos and run the antenna out the bottom of the fuselage . . . just let it hang loose or it will affect the balance. Attach the wing and suspend the model from the pins in the wingtips. Lay the unbent, .045 wire pushrods in place on top of the model and check the balance. You should be able to move the radio enough to get the balance right. Glue in the servo rails and mount the switch in the fuselage side. Bend the wire pushrods as shown on the plan and drill the exit holes. Minor length adjustments of the pushrods can be made by bending a "zig

needed in the servo arms, closer to the center to get this small movement.

Flying:

For maximum performance I recommend using the Cox Super Power fuel and the Cox gray plastic competition 4 1/2 x 2 prop. Hand launch the model, just slightly nose up, into the wind. Climb the model to a comfortable altitude before making any trim adjustments. The Pocket Rocket should fly as if it had ailerons, and be able to do most looping and rolling maneuvers. When the engine quits, let the model glide at its natural pace until the landing flare. I hope you enjoy your Pocket Rocket. □