CHEETAH

Full throttle, flat out, this Half-A machine flies as good as it looks, equaling its big brothers in performance, as well as eye appeal. By Ken Eubanks.

● In these days of the energy crisis, this is one pattern ship that doesn't require a gallon of fuel for an afternoon of flying.

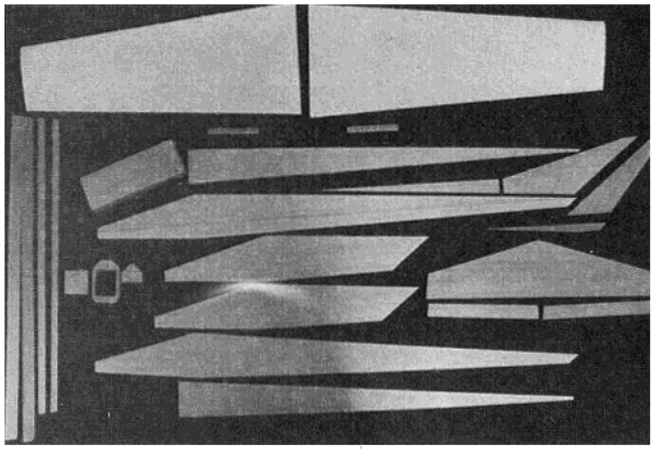
"Cheetah", as everyone knows, is Southern for "cheater", which is what this design does best. If you want a fast, sleek pattern ship, but hesitate to lay out the cash for a good 60 engine, a 4 or 5 channel radio, and $50.00 worth of balsa and hardware, then cheat! Cheetah uses a Tee Dee .051 running flat out — who needs throttle?

Probably the least necessary of the four necessary controls is rudder, another channel Cheetah doesn't have. The main use of rudder is during ground handling, and without throttle, ground handling is something else Cheetah doesn't have. The plans show a tricycle landing gear which is optional and is good for protecting the belly on landings. Cheetah will take-off from a smooth runway, and the wheels don't slow it down appreciably, but the small wheels don't roll very well in grass. If you fly off grass, you can forget the landing gear and install a skid as shown in the photographs.

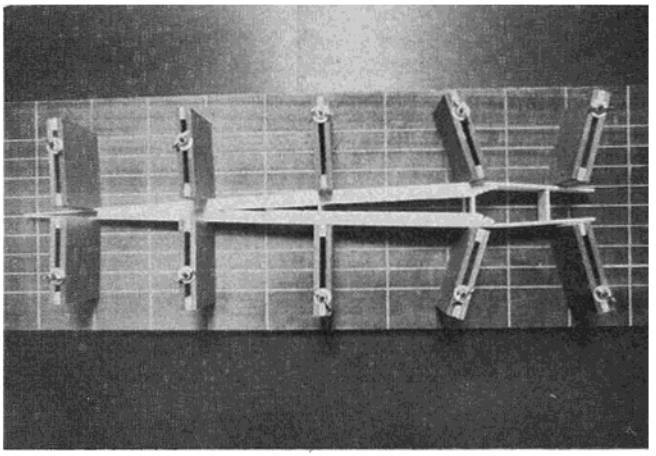
Now that you know what Cheetah doesn't have, I'll tell you what it does have. Elevator and aileron control is really all the control necessary on the Cheetah, and it's definitely a handful. Some of you may want to put in throttle and rudder, but the power lost through an exhaust restrictor throttle and the extra weight of two more servos would seriously affect Cheetah's high speed performance. At 1 pound, 7 ounces, Cheetah's performance is nothing short of fantastic. Keep it simple and stay with aileron and elevator. Stop and think now, have you ever considered trading your two-stick transmitter for a single stick? Build a Cheetah and you have an automatic single-stick conversion, and you don't have to worry about a rudder knob.

The prototype Cheetah uses a Dorffler receiver and decoder available through C & C Avionics, 6831 Hubbard Drive, Dayton, Ohio 45424 in two or four channel kit. Two D & R Bantam or World Engine S-9 servos and a 225 mah flat battery pack, also available from C & C, complete the guidance system. If you plan to use another flight pack, it's important to check its fit before starting construction. It may be necessary to fatten the fuselage a bit to accomodate your particular radio.

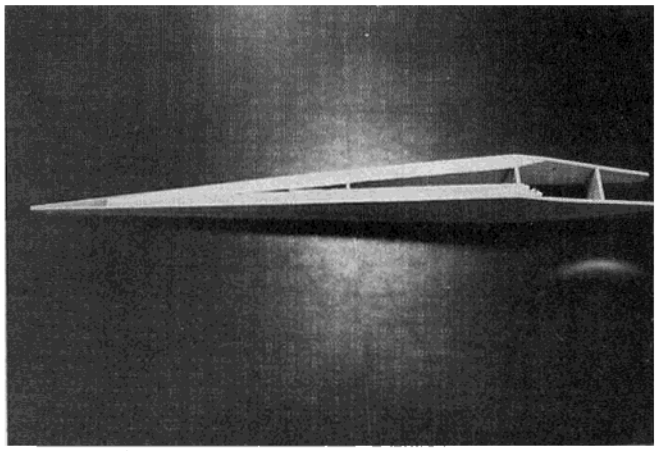
If you went to Toledo and have a sharp eye, you may have seen the prototype Cheetah on the original design table hiding under the wings of the 1st and 2nd place ships. Although Cheetah did not place in the competition, and was not the most impressively unusual design, I feel Cheetah represents a new, practical design concept in that



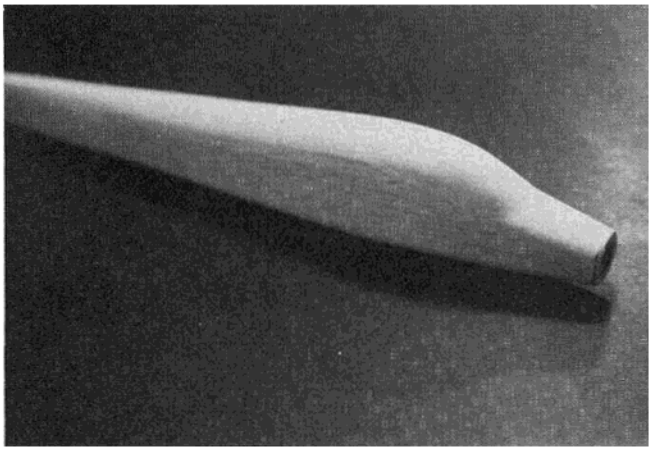
Make yourself a Cheetah kit first.



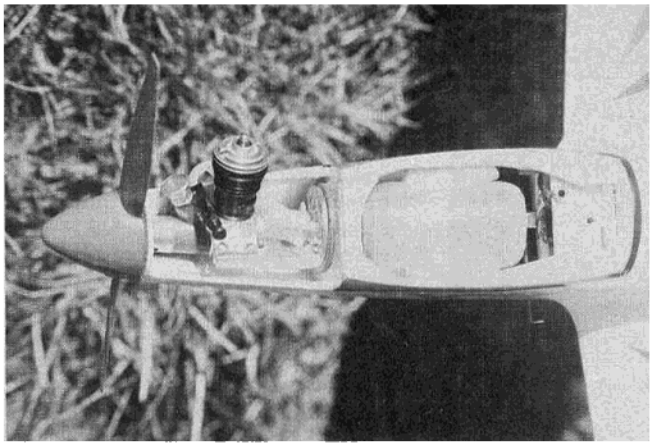
The RCM fuselage jig used during construction.



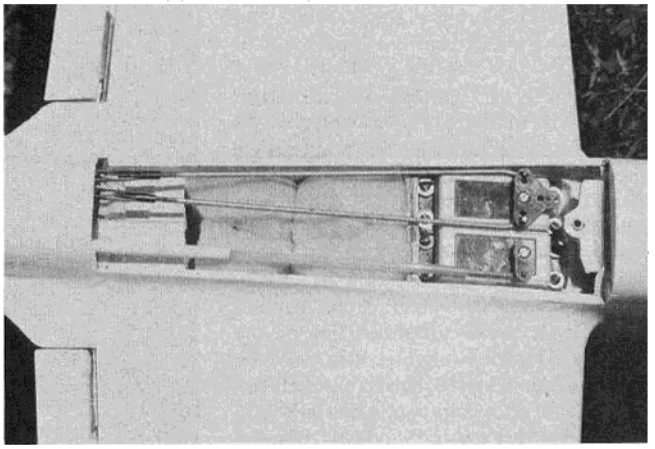
The basic Cheetah fuselage structure.



A bit of sanding, and it begins to shape up.



The Tee Dee engine and tank installation.



It's tight, but the radio does fit.

it is a compact, inexpensive high performance design that fills a need.

My inspiration for the Cheetah, aside from being economical, was a season of flying aileron and elevator Jr. Falcons. These little screamers have been popular in our club, the Dayton Wingmasters, for several seasons for club pylon racing. If you don't build a Cheetah, at least try a Jr. Falcon with zero incidence, a Tee Dee, ailerons, and elevator — it'll surprise you. Cheetah uses the same basic set-up and size, but is designed for smoother maneuvers and has sexy curves instead of boxy corners.

Now go out and buy yourself a pint of fuel and build yourself a Cheetah. Better get a fifth of your own fuel to celebrate the maiden flight — you'll be pleasantly surprised.

The prototype Cheetah uses a foam wing sheeted with .0035 thick drafting Mylar. This material has a frosted finish on one side and is slick on the other side. The slick side is sanded to break the glaze, then Formula II Hobbypoxy is used to stick it to the cores. The frosted side gives good adhesion with K & B Superpoxy. Mylar is strong, cheap, and easy to use, but with epoxy it gives a slighly wavy surface in comparison to balsa sheeting. Perhaps contact cement would be better.

Cheetah's fuselage is built up of 1/16" balsa sides, triangular balsa corners, and 3/8" and 1/4" balsa sheet top and bottom. This gives a heavy, ugly box, but then the transformation begins. Carve and sand to the outline shown on the plans and round the corners and you'll be inspired to go on.

The tail feathers are simply 1/8" and 3/16" balsa sheet sanded to sharp airfoil sections.

One note of caution- - - although Cheetah is small and relatively easy to build, it is not recommended as a beginner's airplane. Keep control throws to no more than 1/4" total movement. This little beast not only looks like a high performance pattern airplane, it acts like one too!

Begin fuselage construction by cutting out the sides and doublers from medium 1/16" sheet. Draw the thrust line on the fuselage sides for future use. Make sure the sides are identical and glue on the doublers — don't forget one left and one right! Use Titebond to glue the 1/2" and 1/4" triangular stock to the fuselage sides. While the glue is drying, cut out the formers and install the blind nuts in the firewall (F2) for mounting your long Tatone Tee Dee mount. When the sides are dry, taper the 1/2" triangular stock to allow bringing the tail together. Epoxy in formers F3 and F4, being sure to maintain alignment. Next, epoxy in F2 and pull the ends of the tail together. Make F1 by cutting out a 1⅜" diameter disc from 1/16" plywood. Drill a hole through the center to match the engine's prop screw. Remove the cylinder and piston and mount the crankcase in the fuselage without the 3/32" spacer. Install F1 on the crankcase and pull in the fuselage sides, trim to fit, and glue in place. In this manner, when the spacer is installed behind the engine mount, there will be 1/32" clearance between F1 and the spinner, and then the spinner will be aligned with F1. Install Gold'N-Rod for the elevator and glue on the top and bottom blocks except the block to be used for the front hatch. After these blocks are dry, remove the engine and temporarily cement the hatch block in place with a small amount of airplane cement.

Now the fun begins. This is best done in your living room, because you don't want all those shavings and balsa dust all over your airplane factory. Carve to rough outline, then use an idea I got from a fellow Wingmasters' member. Cut very coarse sandpaper in long strips about 2" wide and, while holding the fuselage between your knees, pull the sandpaper across the fuselage back and forth just like shining you shoes. This method really eats through balsa and results in uniformly rounded corners. When you're happy with the shape, go to progressively finer sandpaper to obtain a smooth finish.

CHEETAH
Designed By: Ken Eubanks

TYPE AIRCRAFT
Mini Pattern
WINGSPAN
36 Inches
WING CHORD
5⅞" (Average)
TOTAL WING AREA
216 Square Inches
WING LOCATION
Mid-Wing
AIRFOIL
Symmetrical
WING PLANFORM
Double Taper
DIHEDRAL, EACH TIP
3/8 Inches
O.A. FUSELAGE LENGTH
31¾ Inches
RADIO COMPARTMENT AREA
(L) 6" X (W)1½" X (H) 2"
STABILIZER SPAN
13 Inches
STABILIZER CHORD (incl. elev.)
3 Inches (Average)
STABILIZER AREA
38.25 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Mid-Fuselage
VERTICAL FIN HEIGHT
3¼ Inches
VERTICAL FIN WIDTH (incl. rudder)
3½ Inches (Average)
REC. ENGINE SIZE
Tee Dee .051
FUEL TANK SIZE
1 Ounce
LANDING GEAR
Tricycle
REC. NO. OF CHANNELS
Two
CONTROL FUNCTIONS
Elevator & Aileron
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa and Ply
Wing	Foam, Ply & Balsa
Empennage	Balsa
Weight Ready-To-Fly	23 oz.
Wing Loading	15.3 Oz/Sq. Ft.

Break the engine-tank hatch block loose and hollow and trim to clear the engine. Install a 1/8" dowel in front of the block to mate with the hole in F1 and install the screw hold-down to hold the hatch in place.

Cut out the rudder parts from hard 1/8" sheet and epoxy together on a flat surface. Cut out the stab-elevator from medium 3/16" x 4" sheet. Sand the rudder and stab-elevator to a smooth symmetrical airfoil and separate the elevator from the stabilizer. Cut the stab slot on the thrust line and epoxy the stab and rudder in place while holding in correct alignment. Assemble the sub fin from 1/16" plywood with 1/32" balsa on each side and cement in place. Set the fuselage in a safe place and handle it as little as possible because the rudder tip is particularly susceptible to hangar rash.

The wing starts with making accurate templates. I've always used conventional shaped templates, but got a very good idea from a friend and WORKS member. Instead of using male templates with the cutting wire going around the outside, make rectangular templates with the airfoil shape cut in a hole so the wire goes inside the template. This way the wire is easier to control when going around the leading edge.

After cutting cores, cut a slot 3/32" x 12" for a plywood spar at the thickest point of the airfoil and sheet with your choice of materials — mylar, 1/32" balsa, cardboard, or whatever. Cut the plywood spar to fit and slop epoxy in the slots and on the spar and align carefully. It is not necessary to epoxy the center joint full length because a good part of it will be cut out later to clear the servos and receiver.

Now go back to the fuselage and be careful of hangar rash on the tail. Line up your wing root template exactly on the thrust line reference referred to earlier and trace around it to locate the cut-out for the wing. Cut on the line and slide the wing in place. Epoxy the wing in place after checking the alignment and trimming the slot if necessary. Saw through the fuselage with a thin bladed saw just behind F3 and ahead of F4, then cut horizontally through each side just under the wing to form a belly hatch.

Cut out enough foam to clear the servos and receiver and install the hardwood servo mounting blocks. Make the aileron horns from 1/16" piano wire and brass tubing, and epoxy to the trailing edge of the wing, being careful of their placement. This is one of the crowded areas, so be sure to leave room for free movement without interference with the elevator control rod or hatch hold-down. Install the hold-down dowel in the belly hatch rear and the screw hole in front of the hatch.

Cut out the rear wing fillets, sand, and Titebond to the fuselage and wing trailing edge. Carve, sand, and epoxy the wing tips in place. Cut the ailerons from 3/4" trailing edge stock and sand.

Fill any thin areas in the engine compartment with scrap balsa and coat the inside of

. . . . a scribed line on which it bends. This scribed line needs to be lined up very carefully so that all hinges in each surface are in the same line. One needs to drill holes also in these for glue adhesion. The Robart type, I find very useful, especially for scale type hinging when the pivot is situated well into the movable surface. (Figure 7.)

. . . the engine compartment, tank compartment, and engine-tank hatch with Formula II Hobbypoxy for fuel-proofing. Cut out the engine spacer from 3/32" plywood and fuel-proof as above.

Make your fillets for the wing, stab, and rudder, using micro-balloons and primer resin, then go over the entire model and fill any dents that might remain. Now do your thing with the sandpaper all over and apply your favorite finish. I used surfacing resin (not on Mylar) and K & B Superpoxy white all over, then applied Solarfilm trim and decals from the AMA. From experience, I can recommend not using white because this little screamer is hard to keep up with if painted a light color.

Install your hinges and seal the gap in the ailerons with a strip of Solarfilm or MonoKote. It's surprising what a difference sealing the gap makes and is very important with this design. Install a standard length CG control horn on the elevator and install your radio.

Now comes the really good part that makes it all worthwhile — flying. Pick a calm day and grab the best flyer in your club. On second thought, if he's seen your Cheetah, he probably has already volunteered. Make sure your control throws are tamed down to 1/4 inch total. Fill the tank only half full (with no throttle, you can't abort if you get in trouble), fire up that little toy engine, and launch Cheetah into the blue where it really lives. Now, walk back to your hot dog pilot and listen to him tell you your Cheetah "flys as good as it looks." Reset the linkages to neutral trim and fly it yourself this time. Make the hot dog test pilot build his own Cheetah, or else he'll be constantly asking to fly yours!

Cheetah has no bad habits, other than overshooting the runway on landing because it just doesn't want to come back to earth. There seems to be no tendency to snap roll and a flared landing results in its taking off again to further overshoot the runway. Perhaps it's unfair to compare this plane to a .60 pattern ship, but that's its closest relative. Vertical climbs run out of steam, understandably and there is no rudder or throttle to drive around the runway like an R/C car, but in all other respects, Cheetah equals its big brothers in terms of eye appeal and performance.

In my airplane factory (spare bedroom) there is now a Cheetah X1.5. It is one and a half times the size of the original Cheetah with room for a .40 and retracts. The fuselage is molded glass and the wing will be foam with glass skin.

If it's as good as the small one, it'll be a winner! □

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