



MONGOOSE II

An excellent tail dragger pattern ship for the novice and beyond. It has all the basic good points without the fancy goodies. By Harold and Tracy Ackeret.

fter Tracy had been flying pattern for a year or so we came to the conclusion that what he really needed was a plane that had very good flying characteristics but didn't need all the fancy goodies associated with pattern planes.

What kind of goodies didn't he need? First, retract gear really wasn't necessary for Novice class; second a plane which could do all the necessary pattern without using a expensive .60 engine with tuned pipe, etc. One that didn't tear up the sky and do maneuvers so fast that a beginner couldn't keep up with it. What was needed was one that was fairly simple to build and repair. One that looked like an airplane. Well, this is what we started out to accomplish and we believe we have done just that.

Now right away you are going to notice this Mongoose is a taildragger, and you say taildraggers are terrible to take-off and land — not so if designed properly. The Mongoose will go down that runway as straight as an arrow with a little practice. And for take-offs, you don't need to haul back on the elevator to get it off the ground, it just lifts off nice and smooth when it reaches flying speed.

The total weight of the Mongoose has been kept to around eight pounds finished, fueled, and ready to fly. Because of this, any good 60 engine will take it through all the maneuvers. You should find it a joy to fly because it does the manuevers gently and gracefully without a lot of speed. On knife-edge, all you will need is a touch of rudder; and rolls, just ailerons and a touch of elevator inverted. After flying the Mongoose for some time Tracy remarked, "There is only one thing wrong with this airplane, and that is I can't find anything wrong with it." Sound good? Okay, let's start building.

Before we start we want to thank Mr. Dick Russ for all the help he has given us. Mr. Russ not only taught us to fly, he also taught us most of the great building methods used in the Mongoose. Everyone who starts in RC should be so lucky and have such a good teacher.

First off, as with any plane, take a lot of time just studying the plans, before even cutting any wood. Some of the items to note: we have provided templates for all major parts, so you don't have to cut up the main drawing to get good templates. Study the simple way it is constructed. Check out how the tail wheel and rudder work. Check how all formers, etc., fit into the plane; all in all, really give the plans a good going over. As you go along you will find it relatively simple construction.

Cut from the plans all templates, oversize, and glue them onto some type of construction cardboard. We have found 3M 77 spray contact cement a very simple glue to use for this. After the glue dries, cut the templates to size. Take all your templates and cut all pieces from proper wood. You will note you must splice a piece to the 3/16" x 4" x 48" to make the fuselage sides. If you make all your parts now you won't need to stop construction to cut parts out later. Be sure you have 2° down in the front of the fuselage sides. We'll break the construction down into major components. i.e., fuselage, wing, stabs, etc. This will enable you to jump around during construction. Throughout construction we will assume you have already cut out all parts. If you cannot find 3/8" plywood for the firewall, use 1/4" glued to a 1/8" piece. Do not substitute 1/4" for the firewall. Be sure you glue on a flat surface when you splice the fuselage sides; use Hot Stuff to glue.

Fuselage:

Before starting, make sure both fuselage sides are identical. Measure back 3/8" from front edge (firewall) and make a line parallel to edge. Glue the 1/4" x 1/2" top stringer in place using Hot Stuff. Start at the line you just made on the sides. Be sure you make a left and right side. During construction you will find we use a lot of Hot Stuff. It has been our experience that using Hot Stuff for practically the whole plane makes for an exceptionally strong airplane, plus saves a lot of weight and speeds up the building process. Hot Stuff and baking soda make a very good filler where parts do not mate properly, and Super-T Hot Stuff and baking soda works well for those larger gaps. Locate the nose doublers and position per plans; mark the 2° down on the doublers and sand accordingly. Using Super-T Hot Stuff, glue the nose doublers in place. Position the wing saddle doublers in place, use the wing bulkhead to obtain correct spacing between the nose doublers and wing saddle doublers. Glue the wing saddle doublers in place

MONGOOSE II

Designed By: Haroid & Tracy Ackeret

TYPE AIRCRAFT
Pattern
WINGSPAN
641/4 Inches
WING CHORD
101/2" Avg.
TOTAL WING AREA
690 Sq. In.
WING LOCATION
LOW Wing
AIRFOIL
Symmetrical

WING PLANFORM

Swept L.E.

13/4 Inches

O.A. FUSELAGE LENGTH
55½ Inches

RADIO COMPARTMENT SIZE
(L)13" x (W)23/" x (H)3/4"
STABILIZER SPAN
25½ Inches
STABILIZER CHORD (inc. elev.)
7%" (Avg.)
STABILIZER AREA
212 Sq. in.
STAB. AIRFOIL SECTION
Symmetrical
STABILIZER LOCATION

Mid-Fuselage

VERTICAL FIN HEIGHT

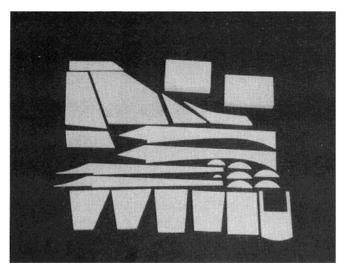
6% Inches

DIHEDRAL EACH TIP

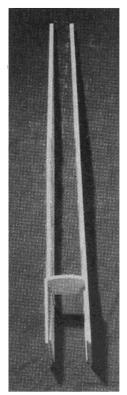
VERTICAL FIN WIDTH (inc. rud.)
63%" (Avg.)

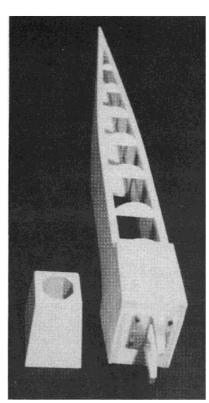
REC. ENGINE SIZE
.61 Cu. In.

FUEL TANK SIZE
14 OZ.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
RUd., Elev., Ail., Throt.
BASIC MATERIALS USED IN CONSTRUCTION
FUSelage Balsa, Ply & Basswood
Wing Balsa, Ply, Foam, Basswood



Parts cut out.





LEFT: Ready to join fuselage sides. RIGHT: Completed fuselage and nose block, without top sheeting.

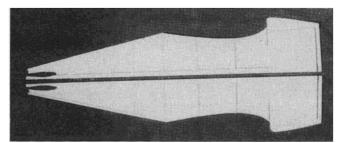
using Super-T Hot Stuff. We have tried many glues for gluing doublers in place but have found that Super-T really works great and it is fast.

Using 1/4" x 1/4" balsa, glue the lower stringers to the fuselage sides(s) starting at back of the wing saddle doubler. We have not made templates for stringers, etc., just cut to size as you go. Lay the fuselage sides(s) on the drawing and mark the position of all vertical stiffeners. Cut stiffeners and glue in place with Hot Stuff. Cut out the first three on each side to go over the wing saddle doublers.

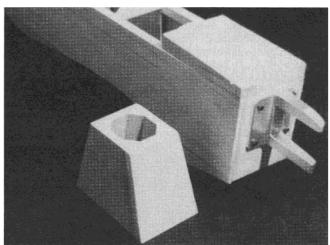
Mark the position of the wing bulkhead on one fuselage side, directly behind the nose doubler. Make sure the bulkhead is square with the side and Super-T Hot Stuff in place. Turn so the fuselage is upside down, apply Super-T to exposed edge of the bulkhead and glue to opposite fuselage side, making sure both sides are square with the bulkhead. It is very important on the next steps to assure the fuselage is straight and true. If you use a fuselage jig you have no problem. If you do not use a jig you must make sure



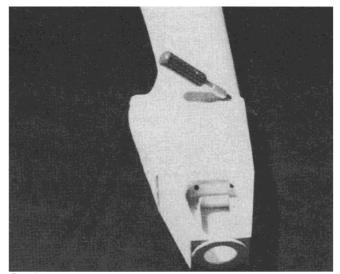
Cutting fuselage side.



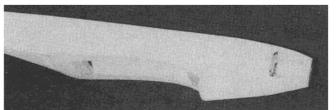
Fuselage sides complete.



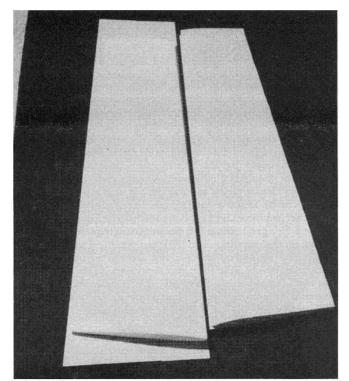
Nose section with Fox mount.



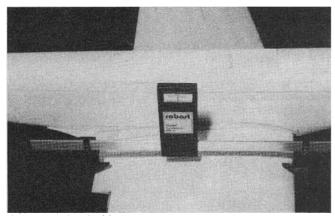
Starting to carve nose section.



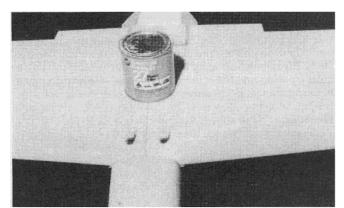
Fuselage carved and sanded to shape.



Sheeting wing.

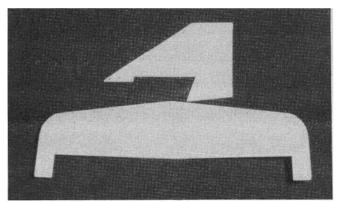


Checking wing incidence.

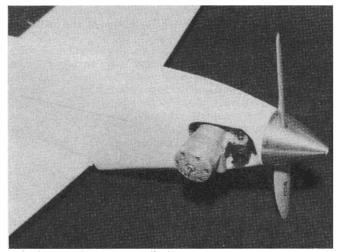


Ready to start forward bottom wing fillet.

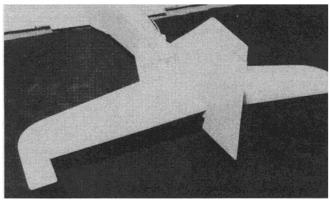
everything is squared up some other way. We draw a line on our building board, longer than the fuselage sides, then draw another line parallel to the first, the width of the fuselage apart, next draw a line down the center of these lines. Place the fuselage, upside down on the lines, put waxpaper between the fuselage and board, pin in place.



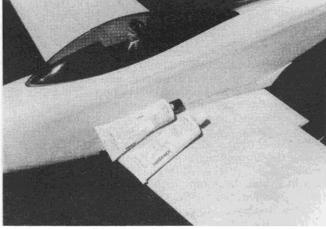
Tall feathers complete.



Checking engine and spinner installation.



Installing tail feathers.



Ready to start building wing fillets.

Join the sides together, at the tail, sand stringers to form a V at the tail, check drawing for proper width at the tail. When you are sure of the angle and everything lines up on the centerline, Hot Stuff together at tail. Cut the first four top braces, 1/4" square, starting at the wing bulkhead to length; these are all the same size and square with the fuselage sides. Hot Stuff in place the 2nd, 3rd and 4th braces, making sure you keep the fuselage in line. You will install the number one later after you install the firewall since it is located over the wing bulkhead.

Starting behind the wing saddle, glue the first cross grain bottom sheet in place; note the first is 1/4" x 3" and fits inside the wing saddle doubler cutouts. Sand this piece flat with the bottom of the fuselage. Position the first 1/8" x 3" cross piece in place over the 1/4" you just installed. Do not glue. Now position the next piece of 1/8" in place and Hot Stuff in place. Continuing gluing the remainder of the bottom pieces in place. Note the last piece on the bottom is 1/8" plywood.

Next install the firewall, but first you should drill holes and install blind nuts for your engine mount. We recommend you use the Fox aluminum engine mount. This mount taps very well and the holes will not strip out after a few engine removals. You will find you have to round off the tips of the mount to accommodate the cowling. The firewall template shows the centerline for the engine; work from this point when installing mount.

Align the fuselage to the lines on the board and epoxy the firewall in place, clamp and let dry. Remove from board, turn over, and install the remaining top braces, including number one; the remaining braces need to be tapered ends to fit the curve of the fuselage. Hot Stuff the 3/4" triangle firewall braces in place, behind firewall. Now is a good time to drill the holes for your throttle cable. Fit the tank floor in place and Hot Stuff the floor and the triangle floor braces in place. We have found the Kraft 14 oz. Slim Line tank works best in this installation. Before you install the fuselage top block you want to coat the tank compartment using a good sealer. We use Devcon 5-Minute Epoxy thinned down with Dope Thinner or MEK,, so you can brush it on. Be sure to cover the inside of the top block. Using Hot Stuff Super-T, glue the top block in place.

Glue the fuselage formers F1 through F6 in place with Hot Stuff. Fabricate the nose cowl from the parts cut out, using Hot Stuff. Note the sides fit inside the top and bottom pieces. Hot Stuff the 1/2" triangle pieces inside the cowl with Super-T. After sanding the back of the cowl, check the fit to the fuselage, with the engine mount on the firewall. Now is a good time to drill your drain hole in the bottom of the cowl.

Draw two lines, one 3/8" down and one 1" down (use a felt tip pen, so as not to groove the wood) parallel to top of fuselage. The 1" line will be necessary when you start installing the wing and stab, as the 1" line will be the "0" degree of the fuselage. Since you will be sanding the top to fit the top sheet you will lose the "0" degree line, which is the top of the fuselage sides. Using a plane and/or sanding block, sand the fuselage forming chamfered edge from the top block to the tail using the top formers as a guide. Also sand F1 through F6 to the proper slope to accept the top sheet, front to back. using a light medium 1/8" x 4" x 36" balsa sheet, wet the entire sheet with warm water or, if you don't mind the odor, use ammonia, the kind your wife uses in the kitchen. We personally have found the ammonia works best. Apply a film of white glue to the formers and along the entire length of the fuselage sides, chamfered edge. Place the top sheet in place and hold in place with masking tape (don't tape so tight it dents the wood) until dry. When dry, remove the tape and trim the sheet to the sides of fuselage.

Install the bottom nose block on the fuselage. You may want to place a large piece of balsa between the tank floor

and the bottom block on the right side only. With one engine we found the muffler would not clear the fuselage without extending it outward, so we installed a block as noted and carved it out to fit the muffler, see picture.

Tack the cowl in place using Hot Stuff. Cut a large hole in the center of the right cowl and gradually enlarge the size of the hole, to accommodate engine installation and removal. Temporarily install the engine and the CB spinner and backplate on the engine and check alignment of the nose cowl (where nose ring fits), and engine position. Sand as required to obtain clearance and alignment needed for the 1/8" nose ring. If for some reason the cowl is too short to give a good fit, increase the nose ring thickness as necessary. Draw a line around the nose ring when you are sure of the fit. Remove the spinner and engine. Super-T the nose ring in place. Using X-Acto knives and sanding blocks (80 and 120 grit) shape the fuselage to shape and contour shown on the drawing. You will find you need to carve off a lot of wood in shaping, particularly around the nose section. but you must cut off to shape properly. After shaping, check the engine and spinner fit; if all okay, remove the cowl and Super-T permanently in place. After shaping, sand with 320 grit and finish with 400 for a nice smooth finish.

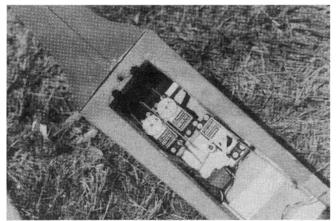
Wing:

If you use the Dirty Birdy foam wing kit, or the kit available from Wing Mfg., follow the instructions received with the wing, with the following exceptions. Position of gear will be different, follow measurements on drawing. Use the gear blocks, etc., but not the wire gear; you will need to make new ones using the dimensions on the drawing. Note the new wing tips; be sure to hollow the tips to keep them light. When you install the wing bolt bushings (we use fiberglass arrow shafts), let them stick through the bottom of the wing about 1" (this is to accommodate the fillet on the center front of the wing later). If you buy wing cores from another source, use standard foam building techniques. For gluing the wing sheeting on we use 3M 77 spray contact cement. (Caution: do not use 3M 77n, it will attack foam.) As a safety precaution always check any glue you use on a scrap piece of foam before using. Be sure to sand the core lightly before applying the sheeting and sand well before covering. We have covered the wing with MonoKote to cut down weight. We cover the complete wing with MonoKote then cut out the slots in the gear blocks for the gears. Install the gear and recess the gear straps, then cover the area with another piece of MonoKote. In case you need to remove the gear later this makes it easier, just peel off the cover piece and remove the gear. Do not cover the wing at this time since you will install the front fillet later. If you should like a built-up wing and not the foam, go right ahead and use the Dirty Birdy built-up wing kit. One of our prototypes has a built-up wing and the other foam, and we see no difference in performance. Both wings came out very close, as far as weight, to being the same.

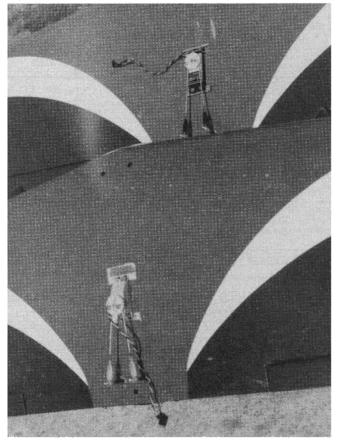
Horizontal Stab and Vertical Stab and Rudder:

Here, again, if you use the Dirty Birdy horizontal stab kit or one from Wing Mfg., follow the directions with the kit, except that we have added anhedral in the stab. So before you join the two halves check the drawing for anhedral and how to measure. The reason we use anhedral is that the plane will track better on outside loops and be more stable inverted. The stab is later installed on the fuselage and painted as part of the fuselage. We recommend you use standard control horns on the elevators, and not the metal ones that come with the Dirty Birdy stab.

Glue two pieces of the rudder together using Hot Stuff. Make sure you glue on a flat surface. You can make the rudder from one piece if you wish. Now Hot Stuff the basswood sub-rudder to the rudder. Before you glue, rub some baking soda on the basswood where it fits to the



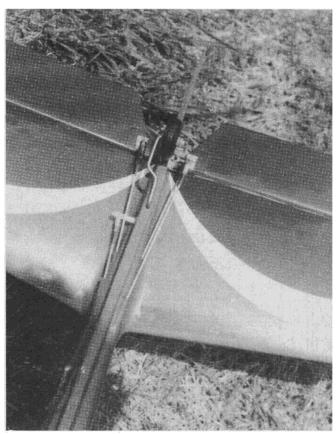
Servo installation, note steering reduction.



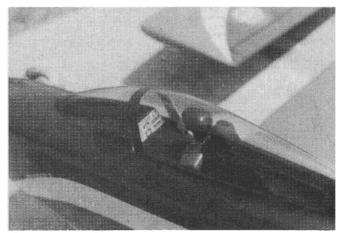
Alleron servo installation, can you tell the built-up from foam?



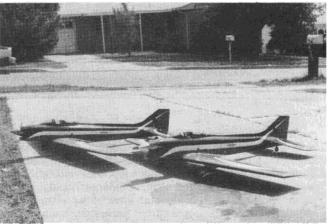
OS .61FSR installation, note wheel pants.



Tail wheel and pushrods, note steering pushrod.



Completed cockpit.



Twin Mongoose It's, one foam wing and one built-up wing.

rudder. Anytime we Hot Stuff a hard wood to balsa we put baking soda on the harder wood (makes a stronger joint). Lay three pieces of vertical stab on a flat surface and Hot Stuff it together being sure to keep it square. Install the vertical stab tip with Hot Stuff. Temporarily install the rudder on the stab. Sand the stab and rudder to the airfoil shape. Do not sand down the front too far since you will be joining the dorsal fin to the stab later.

Assembly:

We shall assume that you have shaped and sanded all the components to where they are ready for either finishing, i.e., paint or covering. Weight is a critical factor in any plane, as it is in a Pattern ship. To keep weight down, we recommend covering the wing with MonoKote and painting the fuselage with K & B Super Poxy.

Cut your wing hold-down blocks from hard maple or oak, sand and shape as necessary to fit into fuselage, do not glue yet. Position the wing on the fuselage and check the incidence — 1/2 degree positive. If it is not correct, sand and shape the wing saddle until it is correct. Square the wing up on the fuselage by measuring from wing tip to fuselage end. When you are sure of the incidence and squareness, put in the wing hold-down blocks and align with the wing. When you are happy with the fit, epoxy in place. With the wing in place and centered, mark and drill the back hold-down block only, being sure you drill at correct angle. Tap the back hole for a 1/4 x 20 nylon wing bolt. Install the wing and hold in place with back bolt. Make sure the wing is square on the fuselage and drill down through the front bolt bushings into the front hold-down block. Remove the wing and if necessary increase the size of the holes and tap for the 1/4 x 20 bolt. Reinstall the wing and Hot Stuff the first bottom cross grain sheet in place; shape as necessary to fit back of wing. Sand the bottom sheeting to flare into the back of the wing. By putting in the back bolt first, and assuring that the wing is centered when you do, then squaring before drilling the front holes, your wing should be on nice and square.

Position the horizontal stabilizer on the fuselage and

and wing tips. Prior to installing permanently, check for correct incidence — "0" degrees. When you are happy with the alignment, tack in place with Hot Stuff. Now install the vertical stab in place and align. Make sure it is vertical and straight. Align by using wing tips as a reference. Tack in place with Hot Stuff. When you have double checked all alignment, final glue with Super-T, fill any large gaps with scrap balsa, baking soda, and Super-T.

Remove the wing and install the plywood wing fillets. Install the dorsal fin using Hot Stuff. Install the ventral fin with Hot Stuff. **Note:** the rear part of the ventral fin is basswood for fitting the tail wheel assembly; rub with baking soda before Hot Stuffing. All that remains is to make your fillets on the wing and tail assembly. To keep the tail light we recommend you fill in on the stab and fin bases with some scrap triangle balsa; Hot Stuff in place before applying fillets. We use Sears filled epoxy for our fillets. It is already mixed with a filler but we add a lot of micro-balloons to it to make it lighter yet. Keep smoothing fillets with a wet finger until you are happy with contour.

Cover the top of the wing center section with a plastic wrap, hold in is a fine canopy. Mark the position of the canopy on the fuselage, install insert on fuselage. If you want detail, your cockpit before this time. We use the instrument panel provided with the canopy, painting the inside with a black krinkle paint, with an appropriate sized pilot epoxied in place. We also tinted our canopy with a blue dye (follow instructions with canopy). After insert is glued in place, cut and trim the canopy edge to fit the contour of the fuselage. Note canopy extends over dorsal fin. Hot Stuff, sparingly, around canopy edge. Bob Hunter at Hot Stuff told us how to keep the canopy from fogging when using Hot Stuff, and it works. Just wipe a light film of 3-in-1 oil around the inside of the canopy bottom before Hot Stuffing. And if it should fog on the outside, wipe right away with 3-in-1 oil. Using Sears filled epoxy and micro-balloons, build a fillet around the canopy. If you take your time and smooth the epoxy with a wet finger, you should have very little sanding when finished.

Install a very, very small fillet along the dorsal and ventral fins, just enough to cover glue line, no bigger. Using appropriate sized wire, noted on

place with masking tape. Reinstall the wing on the fuselage and hold in place with wing bolts. Using Sears filled epoxy and micro-balloons, build up the wing fillets. Here, again, you can fill some of the area with balsa before you apply the fillet. Just build up your wing fillets using the base as a guide for size. Allow to dry overnight before removing wing. Install the wing on the fuselage, put plastic wrap between leading edge and fuselage. We now are going to build up the wing bottom fillet to the contour of the fuselage. You should have left the wing bushings long in front. One at a time cut these down to proper length - we cut them down to about 1/4" below the fuselage contour. Then take a small plastic bottle - a little bigger diameter than the head of your wing bolts — drill a 1/4" hole in the center bottom of the bottle. Put the wing bolt through the hole in the bottom so the head is inside the bottle, install screw back on wing. What you are going to end up with is the heads of the two forward wing bolts will be recessed into the fillet. We have found a product called Evercoat Formula 27 plastic filler (it is a putty type of resin available at most hardware stores) works great to make this fillet. Use cardboard and tape to form your mold and fill and contour. When dry, sand to shape. Cover the wing with MonoKote.

We use the Wing Mfg. Sport Canopy with insert for the Mongoose because its lines blend well to the design, and it ●

drawing, make your landing gears. You will note the main gear is left long so you can install the wheel pants. Pants are not necessary but you will find they really finish it off and make it look great. Note how the tailwheel is installed, using a 1/8" I.D. brass tube for bushing in the fin. By using an Allied Hobbies steering reduction arm at the rudder servo (see photo) and a separate pushrod to the tailwheel, then you can set the throw of the wheel for what you need and no more. This arrangement makes for very good ground handling since the rudder may deflect full and the tailwheel only moves a small amount.

Install the rudder and elevators and make sure they deflect okay before gluing. When you install the control horn on the rudder you will find that a ball link works best, due to the angles involved with rudder deflection. The way we install our ball link is to use one that threads onto a 4-40 bolt. Take a bolt of appropriate length and cut off the head. Now find a scrap piece of thin aluminum and cut two 3/8" square pieces. Drill correct size hole in the center of each for the 4-40 bolt. Place one piece of aluminum on each side of the rudder, thread a nut onto the bolt and push through aluminum plate and rudder and other plate on

other side; now secure with a nut. Now thread the ball link on the end of the bolt. After you have adjusted the bolt length for correct rudder throw, put a drop of Hot Stuff on the nuts. Be sure to keep all surface hinge gaps to a minimum. We use Rocket City Super-Flex nylon hinges on all our control surfaces, Hot Stuffed in place.

Fabricate your pushrods for rudder, elevator and tailwheel steering. We use 3/8" wood dowels. We do not recommend the use of fiberglass pushrods, since the fuselage is wood, and the expansion rate of fiberglass and wood is different, thus your plane could change trim with weather changes. The rudder and tailwheel pushrods are just straight with the appropriate length of threaded rod on one end and just rod on the other. We make adjustment only at the surface and not at the servo. The elevator is single wire one end and a V rod connection the other, the elevator is split and adjustable separately. The way we make our pushrod exits is to cut a hole in the fuselage at the proper location, then we put a short piece of Ny-Rod, outer piece in hole and adjust for correct angle; hold in place with Super-T. Then build a streamlined fillet around the exit. This makes for a good exit and cuts down rod flex.

Install the servo rails and the steering reduction arm for the tailwheel. Check the radio and servo fit and make sure all pushrods fit properly and move freely. Before your final radio installation you may want to make sure your radio and servos are all set up properly. As with any plane, servo centers and travel are very important. A good instrument for checking your radio as well as your engine is the H & N Electronics Ack-U-Tach/Pulse. With this one dual purpose instrument you can check your radio pulses, check servo for center, travel and linearity, and check engine rpm. The unit uses a 4 digit, digital readout for rpm and pulse readouts.

Be sure to check engine and muffler fit before painting, in case you need to fit muffler into fuselage side. Finish sand, prime and paint with K & B Super Poxy. Be sure to coat the engine compartment with a good sealer before painting.

Set-Up and Flying:

Before you even taxi once, take some extra time and check all the surface throws and C.G. and balance. We suggest you start with the following surface throws: Elevator 1/2" up and 5/8" down; rudder 1" both sides; ailerons 1/4" up and 5/16" down.

You will note we use differential ailerons and elevators, we believe this is necessary for smooth flying. If you should find these throws are too little or too much, change them after flying a few times, but you should find these are enough.

Double check your C.G. and balance and make sure you don't have a heavy wing tip; if so, epoxy a nail in the opposite wing tip to balance. You should have no surprises as far as flying the Mongoose. If you haven't flown a taildragger, spend some time just taxiing and making speed ground runs before that first take-off. Take-offs are no problem, you will find the plane just lifts off when it reaches flying speed. After some practice you may want to show your skill and get the tail up before take-off. We will not go into any details about trimming your Mongoose since a lot of good articles have been written about the subject. If you don't know how to trim your Mongoose we suggest you consult someone who knows, or get a good book on the subject, since trim is all important to having a ship that flies great and not just flies.

Enjoy your Mongoose and safe flying.

From RCModeler Mar.1983