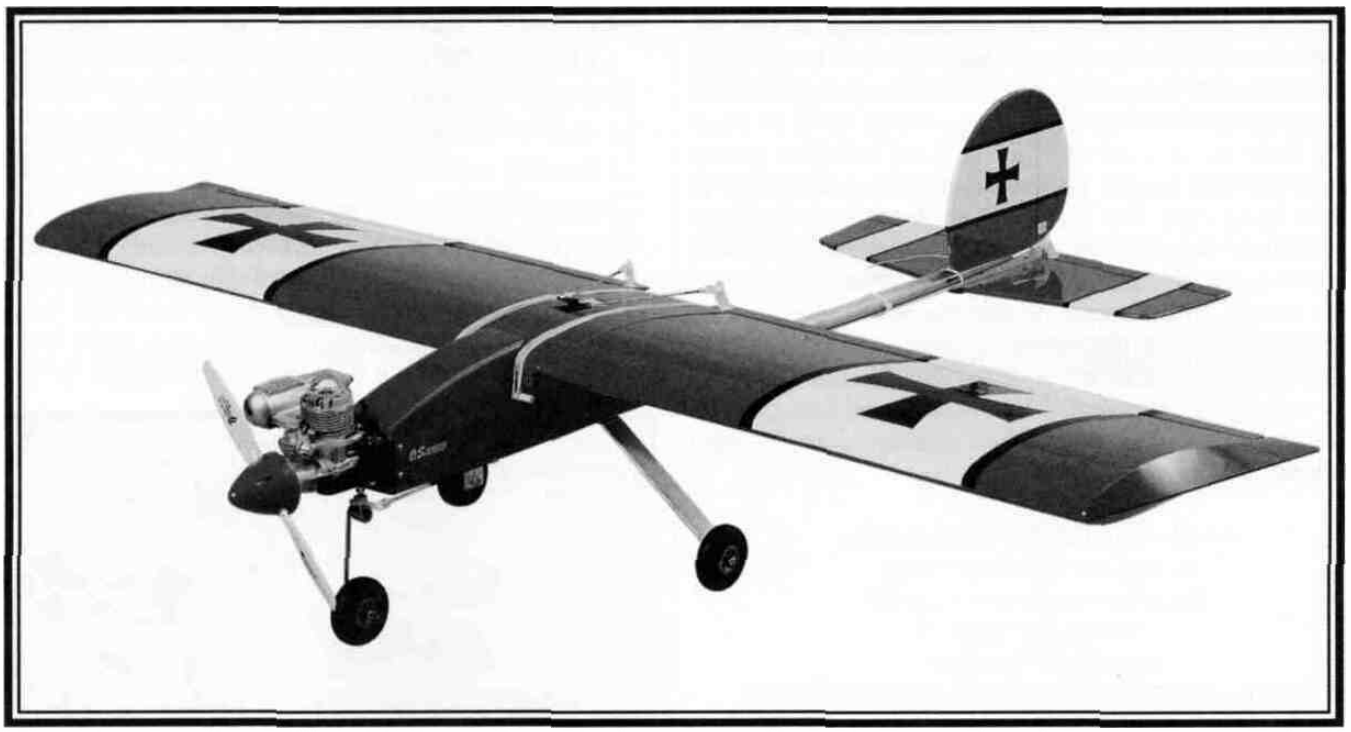
DuraPlane DuraStik™ 40



Assembly Instructions

Specifications:

Wingspan:	56 in (1422 mm)	**Weight:**	5.5 to 6 lb (2743 g)
Wing Area:	594 sq in (37.9 sq dm)	**Engine Required:**	
Fuselage Length:	49 in (1117.6mm)	2-stroke .40 to .46 engine w/muffler, or	
Radio Required:	4-Channel with 4 servos	4-stroke .48 to .52 engine	

READ THROUGH THIS INSTRUCTION MANUAL BEFORE STARTING CONSTRUCTION. IT CONTAINS IMPORTANT INSTRUCTIONS AND WARNINGS CONCERNING THE ASSEMBLY AND OPERATION OF THIS MODEL.

DuraPlane guarantees this kit to be free from defects in both material and workmanship at the date of purchase. This warranty does not cover any component parts damaged by use or modification. In no case shall DuraPlane's liability exceed the original cost of the purchased kit. DuraPlane reserves the right to change or modify this warranty without notice.

WARNING Radio control models are intended for adults or use under the close supervision of an adult. Flying model airplanes can be dangerous and can cause serious injury. DuraPlane assumes no responsibility for accidents or injury caused by this product.

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Introduction

Thank you for purchasing the DuraPlane DuraStik 40 The DuraStik 40 is the third generation of DuraPlane models specifically designed for aerobatic flight The *stick* configuration is reminiscent of the popular Great Planes stik™ series and is a perfect subject for a fast building aerobatic, fun flying DuraPlane model Because the DuraStik 40 is fully aerobatic featuring a wing that has no dihedral (and does not possess the *self-righting* characteristics found in a trainer), it is recommended that you do not attempt to fly the DuraStik 40 as your first model.

If this is your first model, the best way to learn to fly R/C is to join a flying club The Academy of Model Aeronautics is the national organization that charters model clubs, sanctions competitions, and insures flying fields across the United States We urge you to join the AMA Membership will bring you flying insurance, a subscription to *Model Aviation* Magazine, and many other benefits The AMA will gladly send you membership information and lists of AMA chartered clubs in your area where you can seek the help of experienced modelers.

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, Indiana 47302-9252
(800) 435-9262
FAX (765) 741-0057
Web Site: HTTP .//WWW.MODELAIRCRAFT.ORG

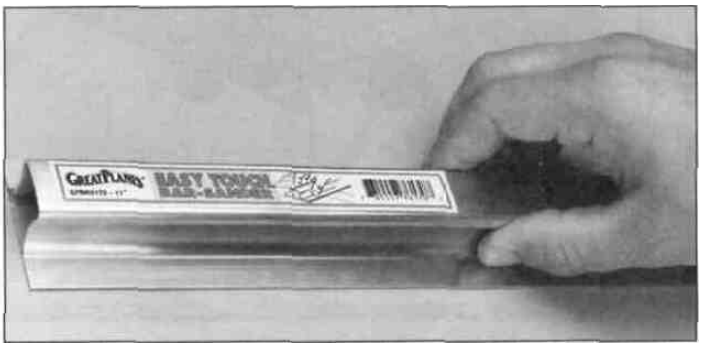
Your hobby shop is also an invaluable place for service, parts and information that you require We urge you to patronize your local hobby dealer - he s there to help you enjoy your hobby.

Table of Contents

This instruction manual provides step-by-step instructions for assembling the DuraStik 40 kit Assembly of the DuraStik 40 consists of six major steps, completed in the following order

Suggested Tools

- ❑ #11 Blades (HCAR0311, 100 qty.)
- ❑ Razor Plane (MASR1510)
- ❑ Standard and Phillips screwdrivers
- ❑ Needle nose pliers
- ❑ Electric drill
- ❑ Drill Bits 1/16", 3/32", 7/64", 1/8", 5/32", #19 (or 11/64"), 3/16", 15/64" (or 1/4")
- ❑ X-Acto Building Square (XACR7726)
- ❑ Kyosho *Lexan* Curved Scissors (KYOR1010)
- ❑ Masking Tape
- ❑ Waxed paper
- ❑ TopFlite Sealing Iron (TOPR2100)
- ❑ Top Flite "Hot Sock" (TOPR2175)
- ❑ Easy-Touch "Bar Sanders"
- ❑ Great Planes C G Machine (GPMR2400)



*A flat, durable, easy to handle sanding tool is a necessity for building a well finished model Great Planes makes a complete range of **Easy-Touch Bar Sanders** (patent pending) and replaceable **Easy-Touch Adhesive-Backed Sandpaper** While building the DuraStik, we used a 5-1/2" Bar Sander and an 11" Bar Sander equipped with 80-grit and 150-grit Adhesive-backed Sandpaper.

Here's the **complete list** of Easy-Touch Bar Sanders and Adhesive Backed Sandpaper.

5-1/2" Bar Sander (GPMR6169)
11" Bar Sander (GPMR6170)
22" Bar Sander (GPMR6172)
33" Bar Sander (GPMR6174)
44" Bar Sander (GPMR6176)

Adhesive-backed 12' roll of:
80-grit (GPMR6180)
150-grit (GPMR6183)
180-grit (GPMR6184)
220-grit (GPMR6185)

Assortment pack of 5-1/2" strips (GPMR6189)

We use 3M 320-grit wet-or-dry sandpaper for finish sanding.

Accessories & Supplies

These are additional items you will need to complete your DuraStik that are *not included* with **your** kit. Suggested order numbers are in parentheses

- ❑ Four channel radio w/4 servos
- ❑ 40 to 46 2-stroke engine w/muffler, or 48 to 52 4-stroke engine
- ❑ Propellers recommended by your engine manufacturer
- ❑ 1 Roll EconoKote or Black Baron film low-heat model covering (see Covering, page 16)
- ❑ Fuel-proof spray paint (see Painting, **page** 16)
- ❑ (3) 2 1/2" wheels (GPMQ4223)
- ❑ 2-1/4" Spinner (GPMQ4517 - red)
- ❑ 8 oz Fuel tank (GPMQ4103)
- ❑ Medium silicone fuel tubing (GPMQ4131)
- ❑ #64 Rubber bands (HCAQ2030)
- ❑ 1/4" R/C foam rubber sheet (HCAQ1000)
- ❑ 3/4" Wide fiber reinforced *strapping* tape
- ❑ 1/16" Wing seating foam tape (GPMQ4422)

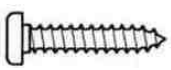
Here's a checklist of supplies you should have on hand while you're building *We always use **Great Planes Pro"** CA and Epoxy.*

- ❑ 1 oz Medium CA+ (GPMR6008)
- ❑ 1 oz Thin CA (GPMR6002)
- ❑ CA Accelerator (GPMR6035)
- ❑ CA Applicator Tips (HCAR3780)
- ❑ 30-minute (GPMR6047) or 6-minute **epoxy** (GPMR6045)
- ❑ Pro Wood Glue (GPMR6161)
- ❑ Pro Threadlocker (GPMR6060)
- ❑ Lightweight Hobby Filler (White, HCAR3400)
- ❑ Denatured or Isopropyl Alcohol (to clean up excess epoxy)

Important Building Notes

There are two types of screws used in this kit:

Sheet metal screws are designated by a number and a length.



For example #4 x 3/4"

Machine screws are designated by a number, threads per inch and a length.

For example 4-40 x 3/4"

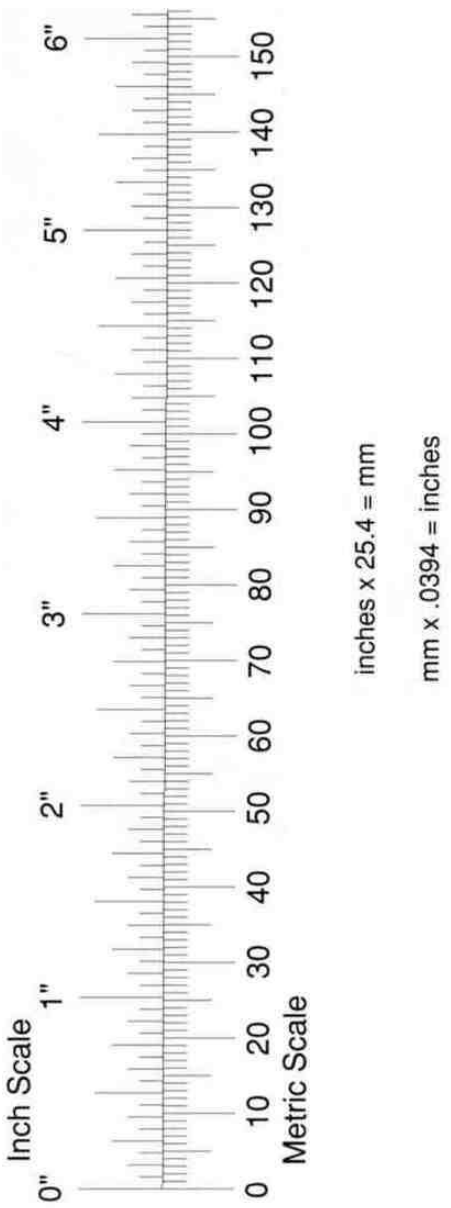
When you see the term *test fit* in the instructions it means that you should first position the part on the assembly **without using any glue** and then slightly modify or *custom fit* the part as necessary for the best fit.

When a specific type of adhesive works best for that step, we will tell you what type of glue to use **CA dissolves foam so do not use it on any part of the wing where it will contact the foam.** Whenever just ***epoxy*** is specified you may use ***either*** 30-minute epoxy ***or*** 6-minute epoxy When 30-minute epoxy is **specified** it is **recommended** that you use **only** 30-minute epoxy because you will need the working time and/or the additional strength

When you get to each step, read that step **completely through to the end** before you begin Frequently there is important information or a note at the end of the step that you need to know before you start **Photos** and **sketches** are placed **ahead** of the step they refer to You can study photos in the following steps to get another view of the same parts.

Refer to the Parts List for a description of the parts and hardware included with the DuraStik 40 kit

Metric Conversion

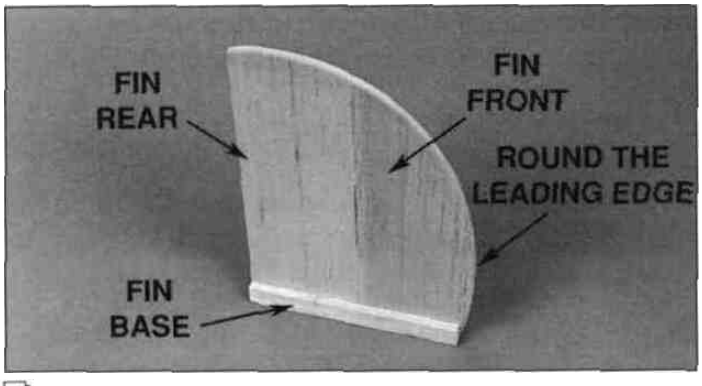


BUILD THE TAIL FEATHERS

Assemble the Fin & Rudder

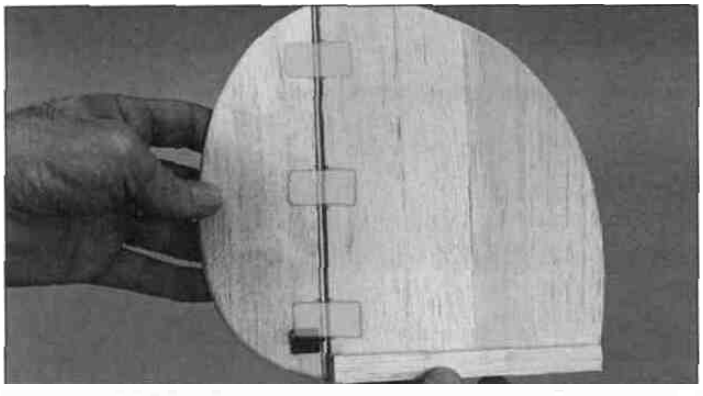
❑ 1. Test fit the shaped 1/4" balsa **fin front** to the shaped 1/4" balsa **fin rear** as shown in the following photo. If necessary, true the joining edges with a bar sander and 150-grit sandpaper so there is no gap between the two pieces.

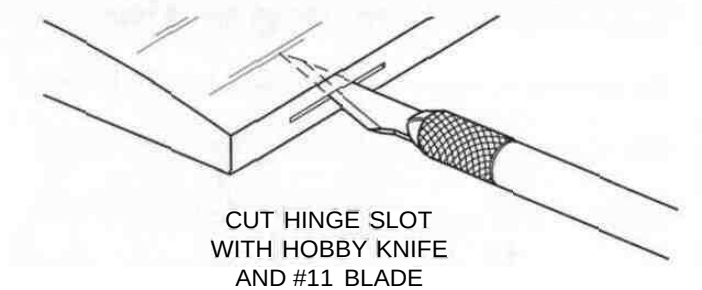
❑ 2. Glue the fin front to the fin rear with medium CA. From now on we will call this assembly the ***fin.*** Use your bar sander and 150-grit sandpaper to sand the sides of the fin flat and even and round the leading edge. Sand the fin smooth with 320-grit sandpaper.



❑ 3. Use medium CA to glue the 1/4" x 1/2" x 5-5/8" balsa **fin bases** to both sides of the fin. Make sure that the bottom of the fin and the bottom of the fin bases align.

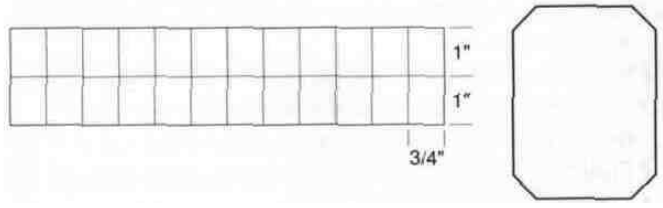
Use this photo for the next four steps





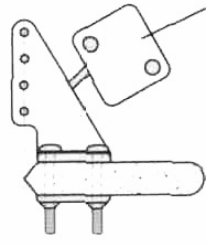
CUT HINGE SLOT
WITH HOBBY KNIFE
AND #11 BLADE

❑ 4. Mark the locations of the hinges on the rudder and fin where shown in the photo. Use a hobby knife with a #11 blade to cut the hinge slots in the **center** of the fin TE and the **center** of the rudder LE at the locations you marked.



❑ 5. Cut three **hinges** from the 2" x 9" **CA Hinge Strip** and snip the corners off as shown in the sketch. Test fit the rudder to the fin with the hinges. **Do not glue in the hinges until we instruct you to do so.** If necessary, adjust the hinge slots so the rudder and fin align.

❑ 6. While the fin and rudder are still temporarily joined with the hinges, round the trailing edge of the rudder so it matches the fin. Remove the rudder from the fin. Use a razor plane or sandpaper to shape the leading edge of the **rudder to a "V".**

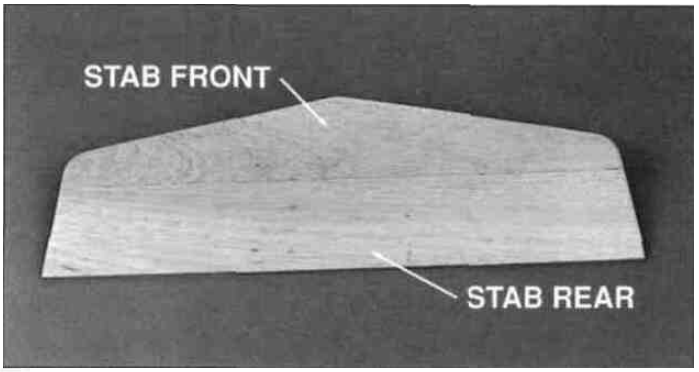


Position the horn **so** the holes align with the leading edge.

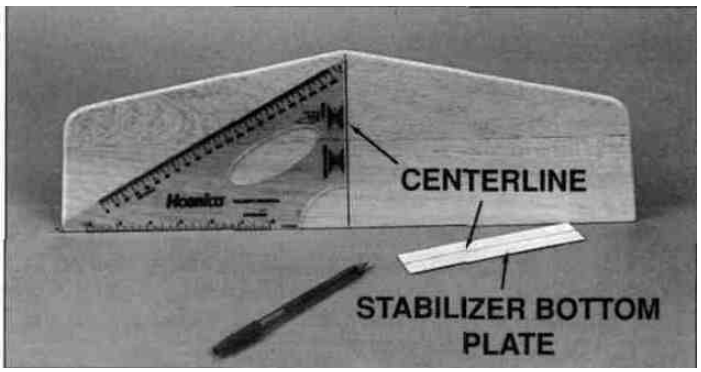
❑ 7. Cut the **horn plate** off a large nylon **control horn.** Position the control horn on the right side of the rudder so the **base** is 9/16" from the bottom of the rudder, and the four holes (for the clevis) align with the LE. Use a ballpoint pen to mark the location of the two holes in the base of the control horn on the rudder and drill two 1/16" holes through the rudder at the marks. Mount the control horn to the rudder with two 2-56 x 1/2" screws and the horn plate.

Assemble the Stab & Elevator

❑ 1. Test fit the shaped 1/4" balsa **stab front** to the shaped 1/4" balsa **stab rear.** If necessary, true the joining edges with 150-grit sandpaper and a bar sander so there is no gap between the two oieces.



❑ 2. Glue the stab front to the stab rear with medium CA. From now on we will call this assembly the ***stab.*** Use 150-grit sandpaper and a sanding block to round the leading edge of the stab and sand the top and bottom flat and even. Sand the stab smooth with 320-grit sandpaper.

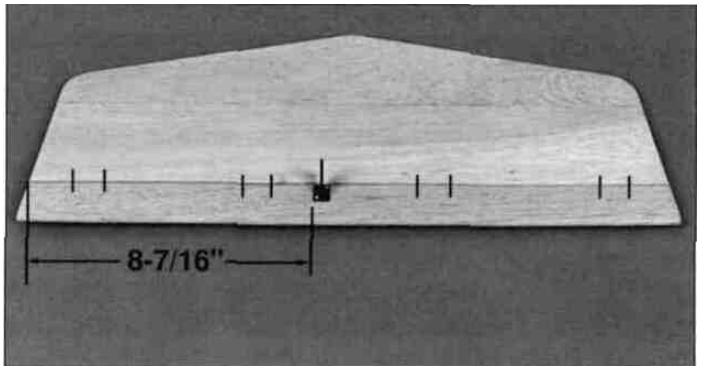


❑ 3. Draw a vertical *centerline* on the center of the stab and the 1/16" x 1-1/8" x 6" plywood **stabilizer bottom plate.**

❑ 4. Use medium CA to glue the stab bottom plate to the stab with the centerlines aligned. After the CA hardens, shape the front of the stab bottom plate so it matches the front of the stab.

❑ 5. Mark the locations of the hinges on the stab and 1/4" shaped balsa **elevator** as shown in the photo at step 7. Cut the hinge slots in the stab and elevator the same way you did the fin and rudder. Cut four more hinges from the CA hinge strip and test fit the elevator to the stab with the hinges. If necessary, adjust hinge slots that don't align.

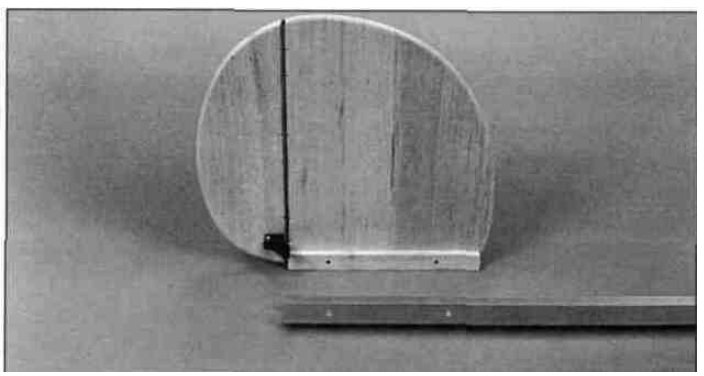
❑ 6. While the elevator and stab are still temporarily joined with the hinges, round the ends and TE of the elevator to match the stab. Remove the elevator and use a razor plane or sandpaper to shape the leading edge of the elevator to a "V".



❑ 7. Mount a control horn to the **top** of the elevator with two 2-56 x 1/2" screws and the horn plate. Position the edge of the horn *base* 8-7/16" from the **left** edge of the elevator.

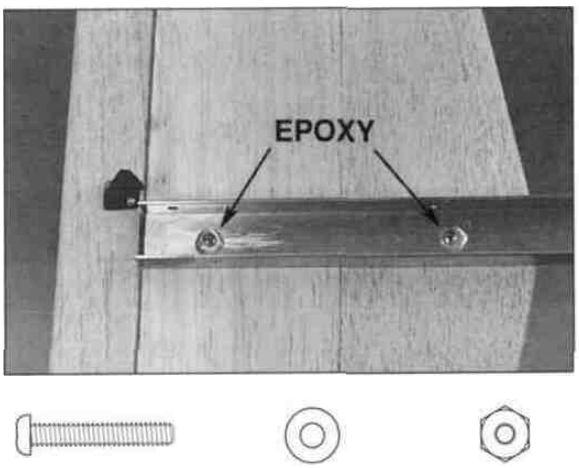
Mount the Fin & Stab

a 1. Inspect the holes in the **aluminum fuselage channel** and remove any burrs you find with a metal file.



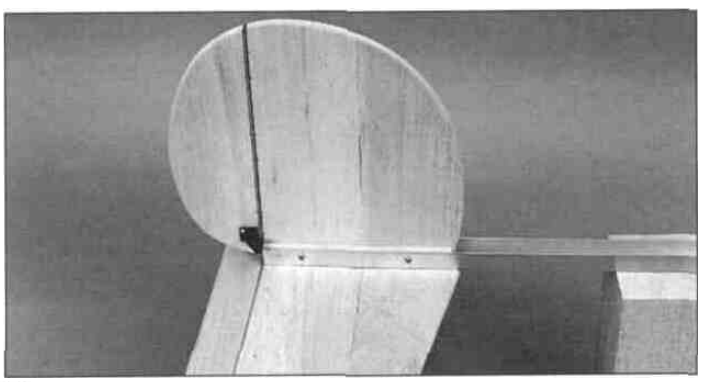
❑ 2. Insert the fin in the aluminum fuselage channel so the trailing edge aligns with the **aft** edge of the channel. Mark the location of the holes in the bottom and sides of the fuselage channel onto the fin. Remove the fin and drill 1/8" holes through only the marks on the **side** of the fin.

❑ 3. Place the fuse channel on the **bottom** of the stab (on the 1/16" ply bottom plate). Align the centerline you drew on the stab bottom plate with the holes in the bottom of the fuse channel and align the trailing edge of the stab with the aft edge of the fuse channel. Make sure that the stab trailing edge is perpendicular to the fuse channel. Mark the holes in the fuse channel onto the stab bottom plate. Drill 1/8" holes at the marks on the stab.



❑ 4. Use epoxy to glue two 4-40 x 5/8" screws in the holes in the bottom of the **rear** of the fuselage channel. After the epoxy has cured, temporarily mount the stab to the fuselage channel and secure it with two 4-40 nuts and #4 washers.

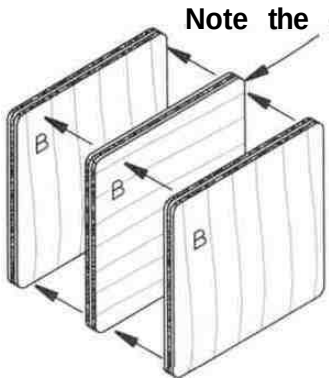
Note: The **bottom** of the stab is the side with the 1/16" plywood stabilizer bottom plate.



❑ 5. Remove material from the bottom of the fin as needed to accommodate the heads of the screws in the fuse channel that hold the stab on. Temporarily mount the fin to the fuselage channel with two 4-40 x 1" screws and 4-40 nuts.

ASSEMBLE THE FUSELAGE

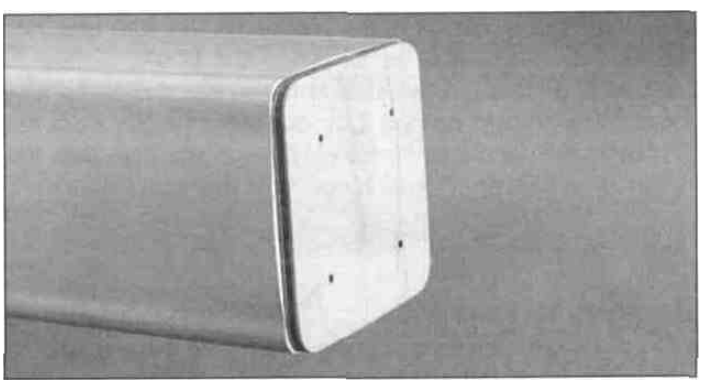
Mount the Engine & Install the Fuel Tank



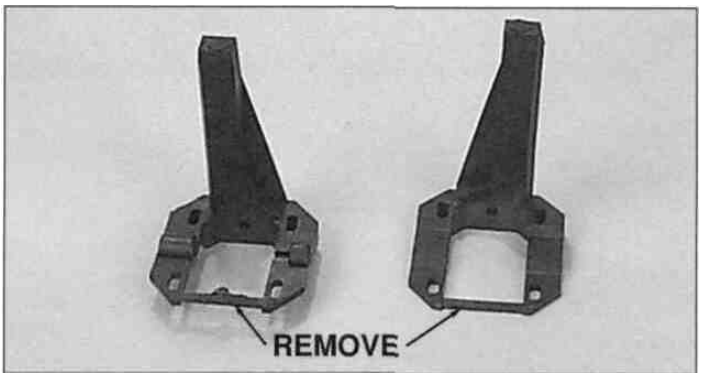
❑ 1. Glue the three die-cut 1/8" plywood **firewall formers** B together with epoxy so the edges accurately align and the grain direction of the middle former is 90 degrees to the grain direction of the outer two formers. Wipe away excess epoxy before it cures.

❑ 2. Test fit the *sandwiched* formers in the front of the extruded PVC **fuselage.** If necessary, sand the edges of the formers so they fit.

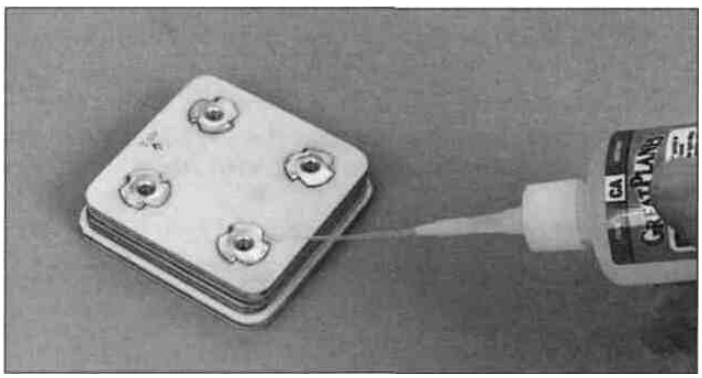
❑ 3. Glue the die-cut 1/8" plywood **front firewall former A,** centered, to the three formers. Alternate the grain direction again. From now on this assembly will be referred to as the ***firewall.***



❑ 4. Fit the firewall to the front of the fuselage. Sand the edges flush with the fuselage sides.



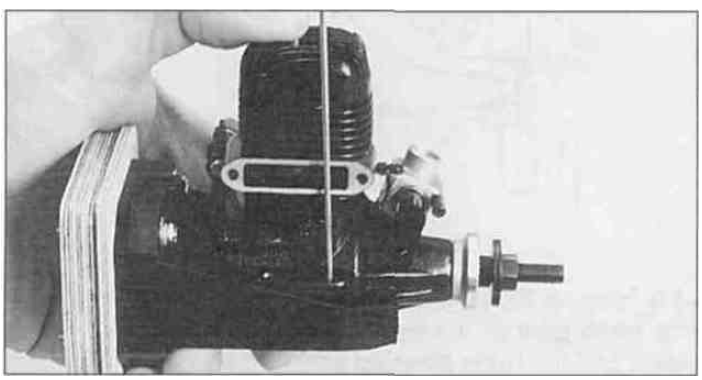
❑ 5. Cut the *spreader bar and* other *flashing* from the right and left Great Planes 40-70 **engine mount** halves.



❑ 6. Drill four 5/32" holes through the firewall at the four punch marks in firewall former A. Use a hammer to lightly tap four 6-32 blind nuts into the holes in the back of the firewall. Permanently secure the blind nuts to the firewall with thin CA.

❑ 7. Fasten the engine mount to the firewall with four 6-32 x 1-1/2" bolts and #6 lock washers and flat washers. Do not fully tighten the bolts so you can adjust the engine mount to fit your engine.

For a sportier appearance, you may *side mount* your engine. Just rotate your engine mount (or the firewall) 90 degrees and drill the holes for the fuel lines and throttle pushrod accordingly. This also locates the muffler below the fuselage which greatly reduces exhaust residue deposited on your model!

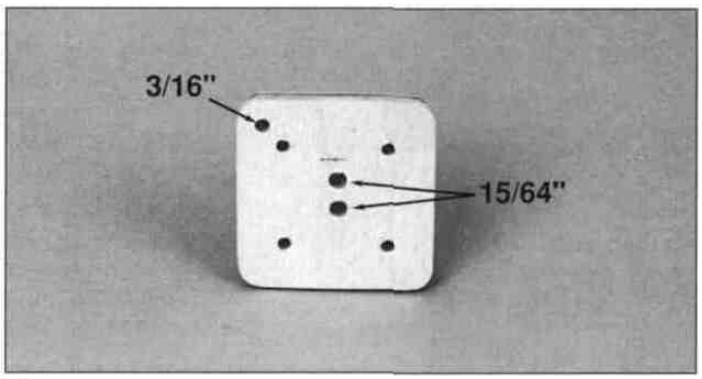


❑ 8. Slide the engine mount halves in or out to fit your engine. Tighten the 6-32 bolts so the engine mount is secure. Position your engine on the mount and mark the location of the mounting holes.

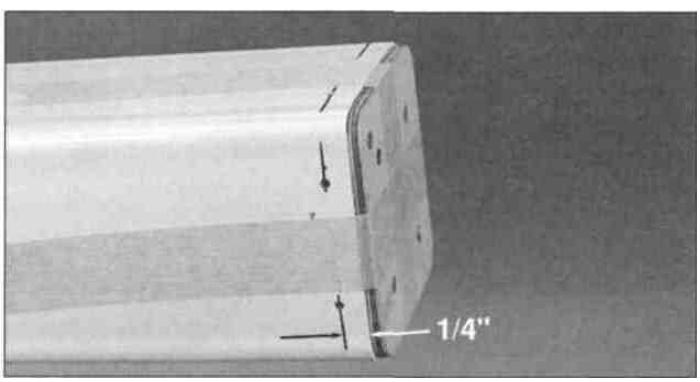
Hint: Sharpen the end of a 1/16" wire rod to a point. Heat the rod with a lighter and use it to mark the mounting holes on the engine mount.

❑ 9. Drill four 3/32" holes at the marks you made for mounting your engine with #4 x 3/4" sheet metal screw and #4 washers included with this kit. If you prefer to mount your engine with 4-40 screws, drill the holes with a #43 (or 3/32") drill. Tap the holes with a 4-40 tap. Use 4-40 x 3/4" screws (not included).

Note: #4 or 4-40 screws are intended for sport engines such as the O.S. LA or FP' series. If you are using a more powerful engine, use #6 or 6-32 screws to mount your engine. Drill the holes with a 7/64" drill for #6 screws or a #36 or 7/64" drill for 6-32 screws.

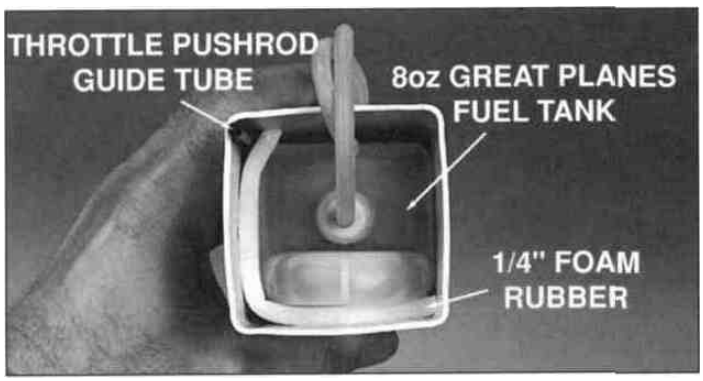


❑ 10. Take the engine mount off the firewall. Drill a 3/16" hole through the firewall that aligns with the carburetor arm. Make sure you don't drill the hole where the engine mount will be. If the engine mount will be in the way, drill the hole close to the engine mount to give the throttle pushrod the *straightest run* possible to the carburetor arm. Drill 15/64" (or 1/4") holes through the firewall for the fuel lines. Make sure the holes will not interfere with the engine mount. When you're done, your firewall should look something like the one in the photo.



❑ 11. Mark the locations on the sides, top, and bottom of the front of the fuselage for the firewall mounting holes, evenly spaced, 1/4" behind the front edge. Fit the firewall

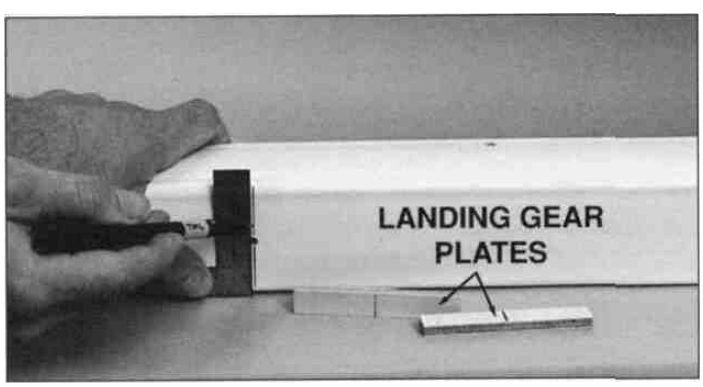
into the fuselage, making sure the hole for the throttle pushrod is in the correct orientation Tightly tape the firewall in place with masking tape Confirm that the locations of the holes will not interfere with the throttle pushrod If they do, adjust the locations of those holes Drill holes through the fuselage and into the firewall with a 3/32" drill.



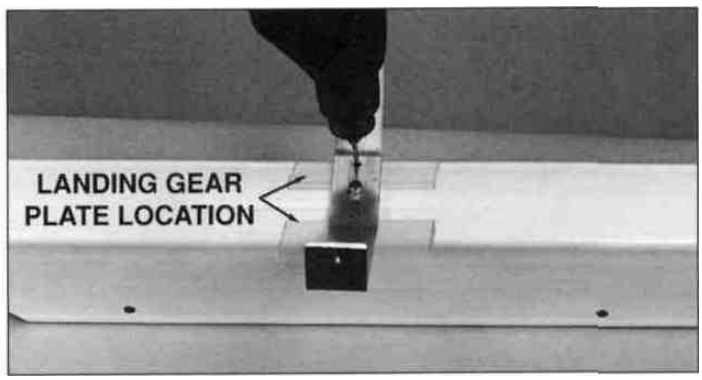
❑ 12 Remove the firewall Assemble your fuel tank Connect about 8" of fuel line onto the *pickup* and *pressure* fittings on your fuel tank Place an approximately 4" x 4" piece of 1/4" thick R/C foam rubber in the fuselage as shown in the photo so the front edge is about 3/4" aft of the front edge of the fuse Insert the fuel tank into the fuse with the R/C foam rubber Slide the 12" long, 3/16" grey outer **pushrod guide tube** into the fuse between the R/C foam and the fuse so the end will fit in the hole you drilled in the firewall

❑ 13 Fit the firewall to the fuselage, simultaneously routing the fuel lines and the throttle guide tube through the holes you drilled Temporarily fasten the firewall to the fuse with eight #4 x 3/8" screws

Mount the Landing Gear



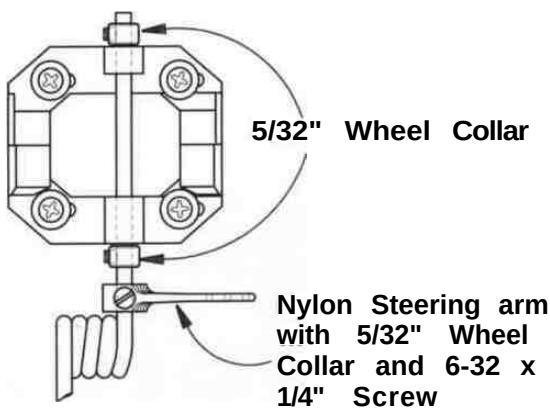
❑ 1 Place the fuselage flat on its side so the firewall is off the end of your workbench Use a 90 triangle or a builder's square to mark a line across the front hole in the bottom of the fuselage Draw a line across the middle of each 1/4" x 5/8" x 3-1/2" plywood **landing gear plate.**



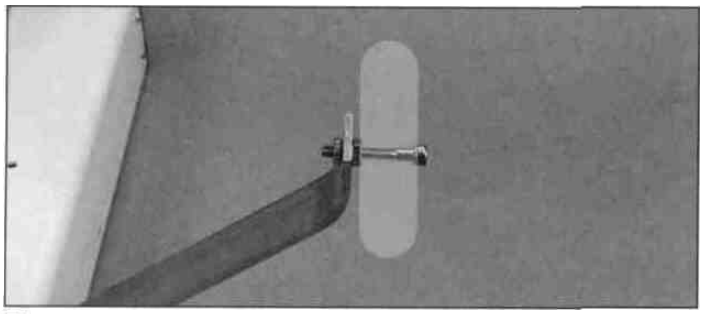
❑ 2 Enlarge the middle hole in the pre bent aluminum **landing gear** with a 3/16"dnll Place the landing gear on the bottom of the fuse and insert an 8 32 x 1/2" socket head cap screw (from now on referred to as *cap screw)* into the middle hole of the landing gear and into the fuse Drill a 7/64" hole through the fuselage where the outer holes in the landing gear align with the line on the bottom of the fuselage The shaded areas show the location of the landing gear plates that will be installed in step 3.

❑ 3 Round one corner on the bottom of both landing gear plates so they fit the curve inside the fuselage The bottom of the landing gear plates is the side with the line you drew. Place one of the landing gear plates inside the fuselage **so** the line you marked is visible through one of the holes you drilled in the bottom of the fuse Mark the location of the hole on the landing gear plate Drill a 7/64" hole through the plate at the mark you made Mark and drill the other landing **gear** plate in the other side of the fuse the same way

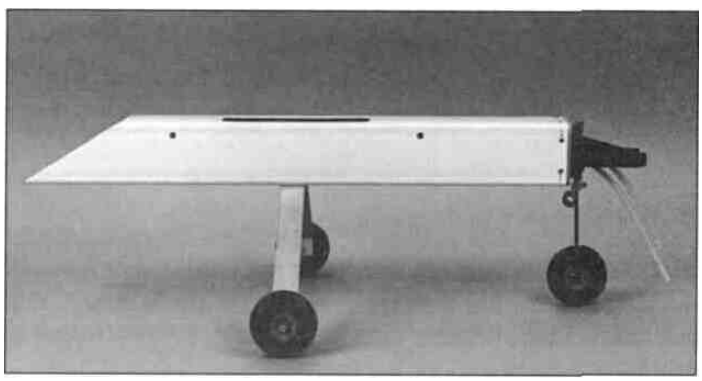
❑ 4 Enlarge the outer two landing gear holes **in the fuselage only** with a 5/32" drill bit Use two #6 x 1/2" screws to mount the landing gear to the fuselage with the landing gear plates inside You may glue the landing gear plates to the fuselage with epoxy, but this is not necessary.



❑ 5 Remove the engine from the engine mount Secure the wire **nose gear** to the engine mount with two 5/32' wheel collars and the nylon **steering arm** with another wheel collar as shown in the sketch Use two 6 32 set *screws* in the wheel collars and a 6-32 x 1/4" screw in the nylon steering arm



❑ 6. Drill the *hub* of two 2-1/2" main wheels with a #19 (or 11/64") drill. Secure each wheel to the landing gear with an 8-32 x 1-1/4" cap screw and two 8-32 nuts as shown in the photo. Use thread locking compound on the nuts. Mount the front wheel to the nose gear with two 5/32" wheel collars. For a finished appearance, cut the excess wire off the landing gear that protrudes beyond the wheel collar (you should do this on all your models').

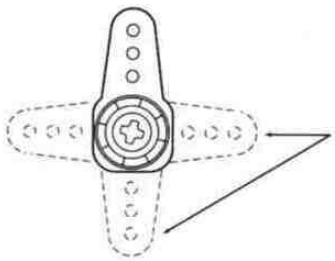


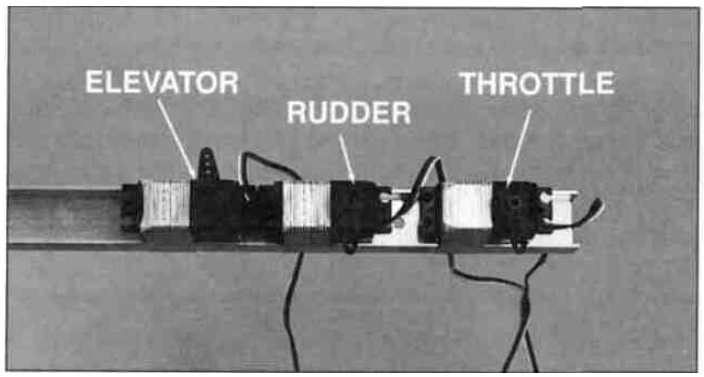
❑ 7. Place the fuselage on your workbench. Adjust the wheel collars on the nose gear so the fuselage is level. Secure the 6-32 screws in the wheel collars with a drop of **thread lock or CA.**

Optional: For extra security, file *flat spots* on the nose gear where the set screws lock on.

RADIO INSTALLATION

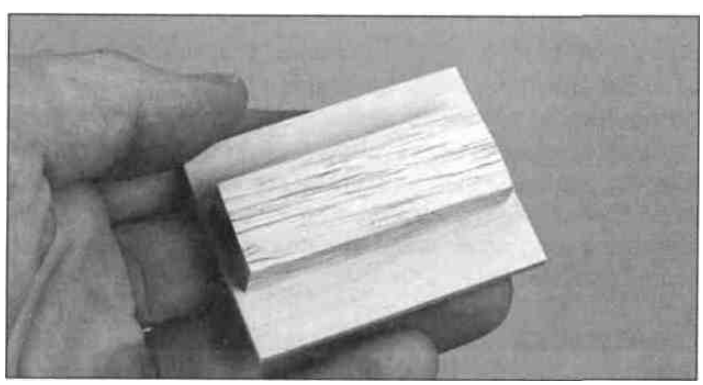
Mount the Servos





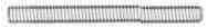
❑ 1. Insert three servos into the fuselage channel in the orientation shown in the photo. The **front** servo (throttle) should be about 1/2" from the front of the fuse channel. The **middle** servo (rudder) should be as far forward as possible, yet not concealing the hole for the front screw that holds the fuse channel to the fuse. The **aft** servo (elevator) should be as close as possible to the rudder servo without touching it. Securely wrap two layers of 3/4" wide fiber reinforced tape around the servos and the channel. Install a servo arm on each servo as shown in the photo.

❑ 2. Temporarily connect the servos to the receiver and the battery pack. Turn on your radio and center the servo arms on the servos. Turn off the transmitter and receiver and disconnect the receiver and battery.



❑ 3. Center and glue the 1/2" x 3/4" x 2" **balsa block** to the die-cut 1/8" plywood **receiver plate.**

Connect the Elevator and Rudder Pushrods

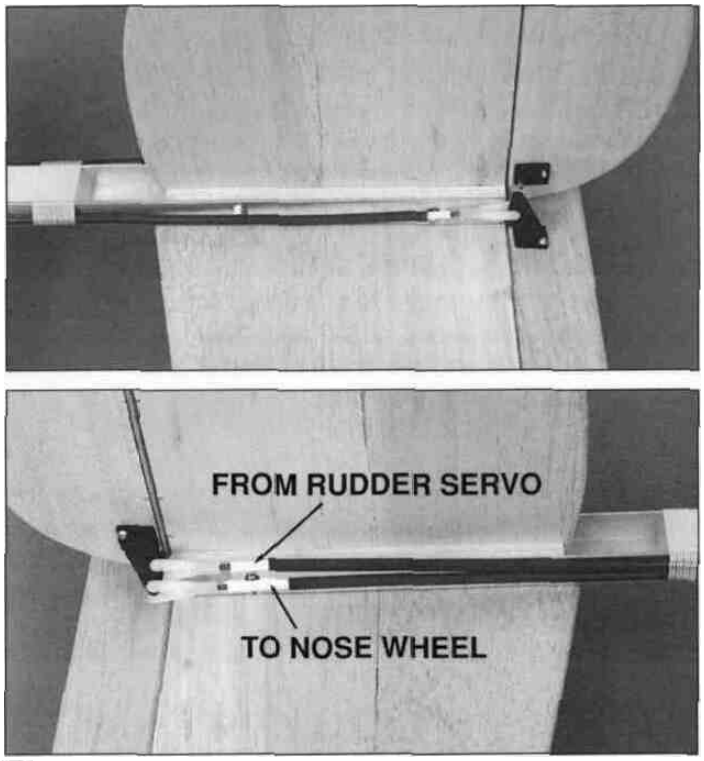


THREADED STUD

❑ 1. Thread a nylon **clevis** onto a 1" **threaded stud** about 20 full turns. Thread the other end of the stud about 1/2" into a 36" **inner pushrod tube.** Connect the clevis to the control horn on the **elevator** and slip a 36" grey **outer pushrod guide tube** over the inner pushrod tube.

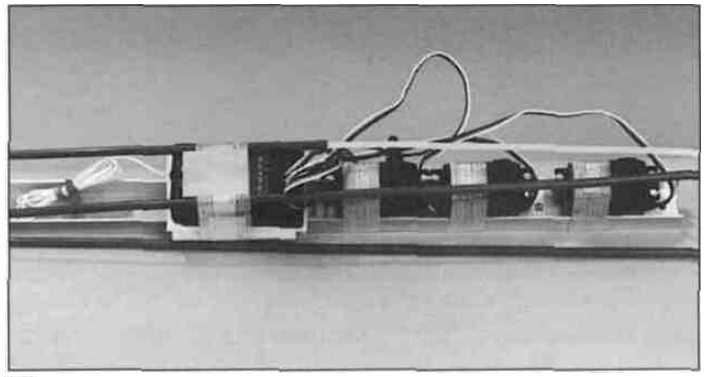
❑ 2. Connect another 36" inner pushrod tube and another 36" outer pushrod guide tube to the second from the **inner** hole on the rudder horn the same as the elevator.

❑ 3. Thread one more nylon clevis onto a 1" threaded stud and thread the stud into one end of the 48" inner pushrod tube. Connect the clevis to the second from the **outer** hole of the rudder horn. Slide a 36" outer pushrod guide tube over the 48" pushrod tube.

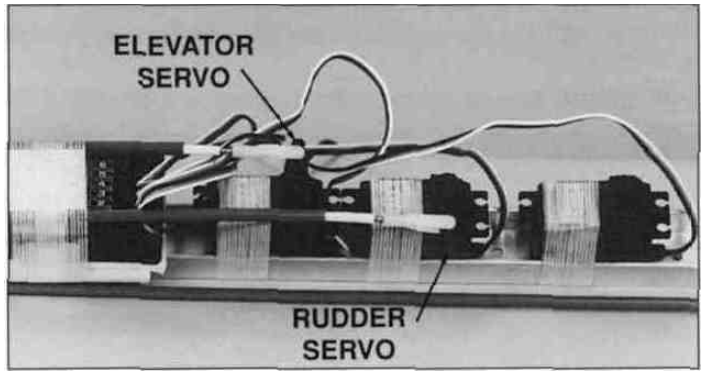


❑ 4. Securely tape the outer pushrod tubes to the fuselage channel about 1" ahead of the stab with fiber reinforced tape. Make sure the aft end of the tubes do not interfere with the clevises when you move the rudder and elevator to full deflection. The short rudder pushrod tube should be **above** the long nose wheel steering tube on the right side of the fuse channel.

❑ 5. Place your receiver and the receiver plate on the fuse channel with 1/4" R/C foam rubber under the receiver. Connect your on/off switch, throttle, rudder and elevator servo cords and an aileron extension cord to your receiver.



❑ 6. Trim the 3/16" x 1" x 1-1/4" balsa **pushrod spacer block** so that when you place it on top of your receiver, the pushrods will align with the elevator and rudder servo when you run them alongside the block on top of the receiver. Wrap two turns of filament reinforced tape around the assembly and the fuse channel to hold everything in place.



❑ 7. Disconnect the clevises from the rudder and elevator horns and slide the pushrods out of the guide tubes. Cut the rudder and elevator guide tubes about 1-3/4" *short* of the elevator and rudder servos. Reinsert the pushrods in the guide tubes. Cut the pushrods to the correct length and connect them to the elevator and rudder servo with two more 1" threaded studs and nylon clevises.

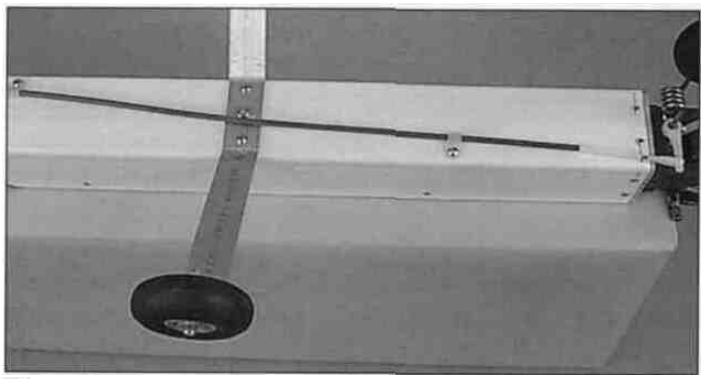
Hook Up the Throttle and Nose Gear Steering Pushrods

At this point your receiver should be securely (yet softly) mounted to the fuse channel, your servos should be securely mounted to the fuse channel and plugged into your receiver, your elevator and rudder pushrods should be connected, and your fuel tank and fuel lines should be installed.

❑

8-32 x 1/2" cap screws, #8 washers and 8-32 nuts and a drop of thread lock. Mount your engine to the engine mount.

Refer to this photo for the next two steps.

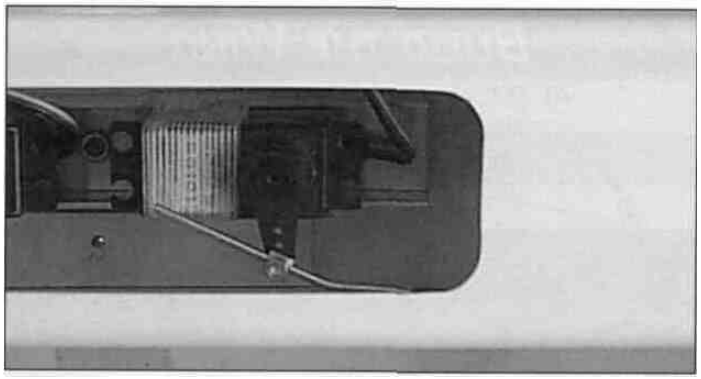


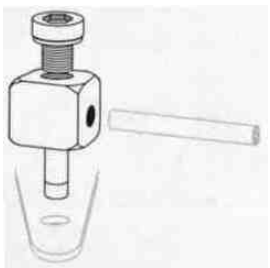
❑ 2. Secure the nose wheel steering outer pushrod guide tube to the bottom of the fuse with two nylon **pushrod clamps** and two #6 x 1/2" screws. Position the front pushrod clamp so the pushrod aligns with the nose wheel steering arm. Position the aft pushrod clamp so the guide tube makes a smooth transition from the right side of the fuse to the left side of the fuse. Drill 7/64" holes in the fuse for the #6 screws. **Make sure you do not drill a hole into the fuel tank.**

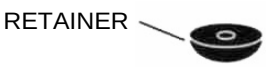
❑ 3. Cut the nose steering pushrod to the correct length and connect it to the nose wheel steering arm with a 1" threaded stud and a nylon clevis.

❑ 4. Slide the throttle pushrod guide tube toward the front of the fuselage so the aft end is approximately 1-1/4" from the throttle servo arm. Cut the front of the throttle guide tube 1/2" ahead of the firewall. Roughen the front of the guide tube with coarse sandpaper and use medium CA to glue it in the firewall. Do not get CA inside the tube.

❑ 5. Make the throttle pushrod from a 2-56 x 36" wire rod that's threaded on one-end and a nylon clevis. Insert the pushrod in the throttle guide tube. Bend the front of the wire as necessary so you can connect the clevis to the carburetor.







❑ 6. Bend the aft end of the rod so it aligns with the throttle servo arm. Connect the throttle pushrod to the throttle servo arm with a brass body **screw-lock pushrod connector** and a 4-40 x 1/8" cap screw. Secure the **screw-lock pushrod connector** to the servo arm with a nylon **retainer.**

❑ 7. Mount your muffler to your engine. Cut your fuel lines to the correct length and connect them to the carburetor and the pressure fitting on your muffler.

❑ 8. Mount your on/off switch to the fuselage. You may simply hold it in place with foam mounting tape or cut holes in the fuse and mount it from the inside with the mounting screws and face plate included with the switch.

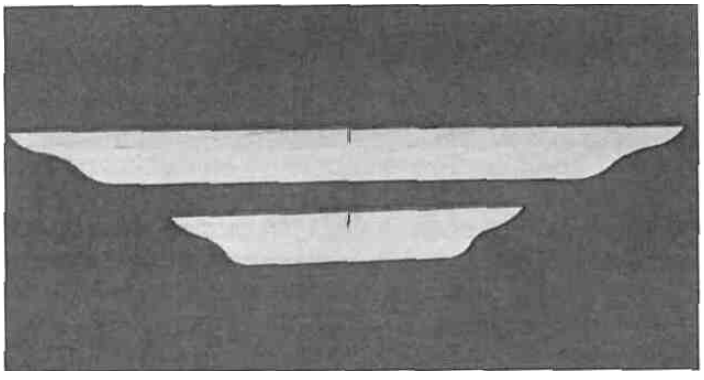
❑ 9. Slightly round the ends of both 1/4" x 4-9/16" hardwood **wing dowels** and coat them with fuel proof paint or a thin layer of epoxy. Insert the dowels in the fuse. It is not necessary to glue them in the fuse.

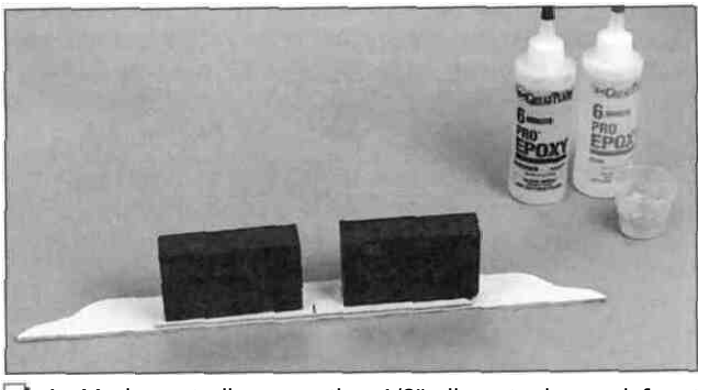
BUILD THE WING

Join the Wing Halves

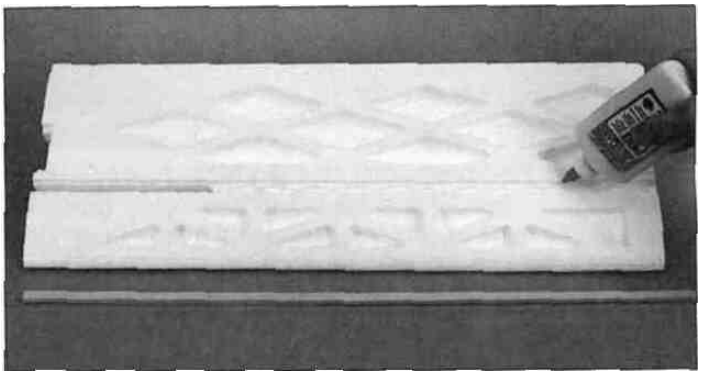
Make a *dry run* of the following three steps so you can gather all the items you'll need and to make sure you understand how to join the wing halves.

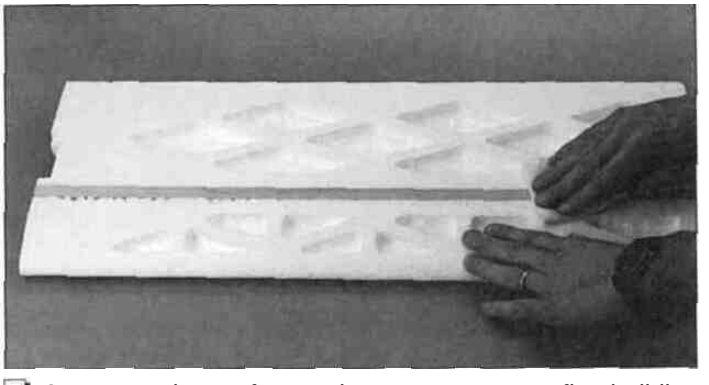
Note: We used aliphatic resin *(wood worker's* glue such as Great Planes *Pro wood glue)* to glue the wing together. You may also use 45- or 30-minute epoxy.



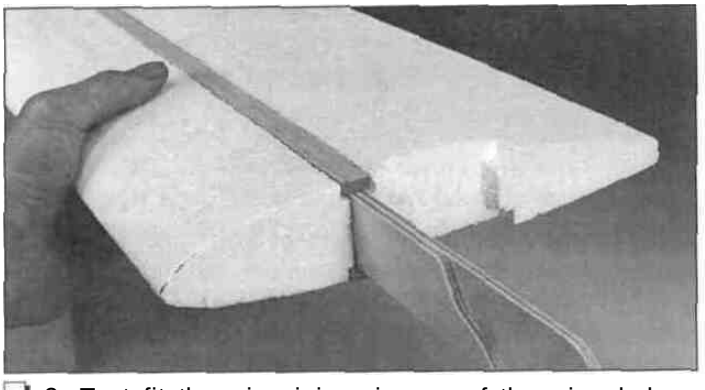


❑ 1. Mark centerlines on the 1/8" die-cut plywood **front** and **aft wing joiners.** Glue the joiners together with epoxy so centerlines align. If the joiners are slightly warped, glue them together so the warps *cancel out.* Lay the joiners on a flat surface and place a weight on top of them to hold them flat until the epoxy cures.

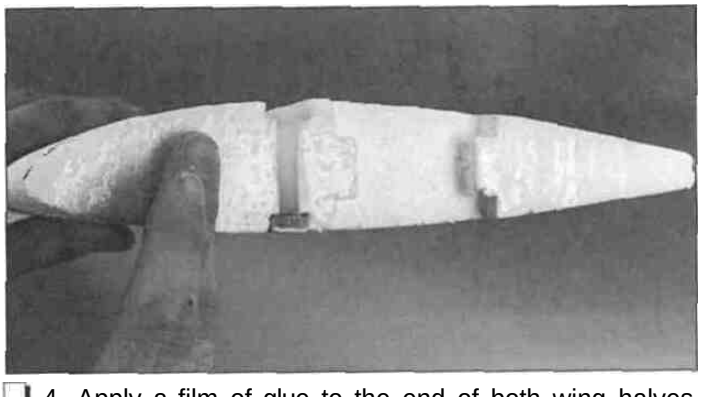




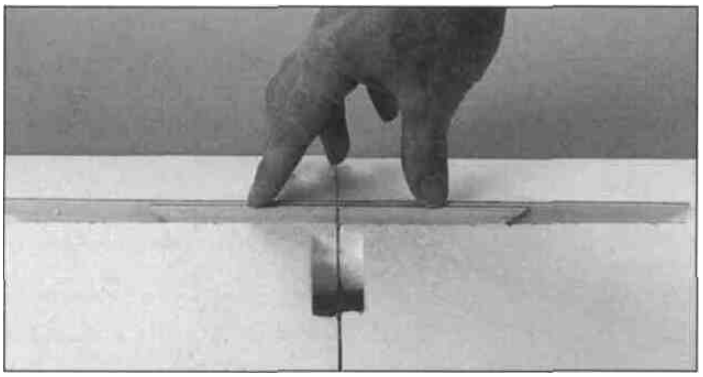
❑ 3. Lay a sheet of waxed paper over your flat building table that is the same length as your wing (approximately 54"). Working quickly, apply glue to the grooves that hold the main spars in the **bottom** of **both** wing halves. Apply glue to the bottom spars. Insert the spars into the notches. Remove excess glue with a paper towel. Hold the bottom spars in place with masking tape so they won't fall out of the wing when you turn it upside down. Immediately proceed to the next step.



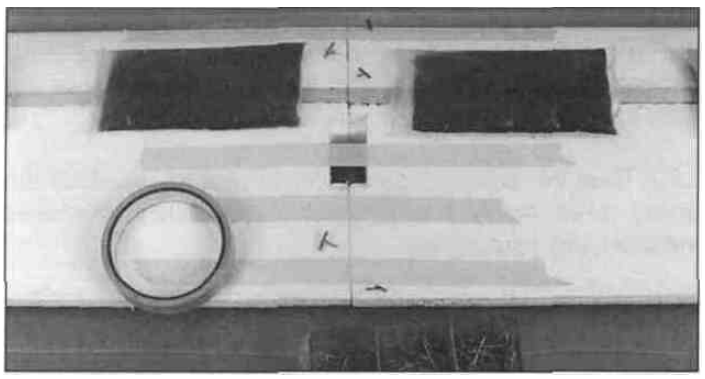
❑ 2. Test fit the wing joiner in one of the wing halves. Place a 3/16" x 1/2" x 30" basswood top and bottom **spar** in the spar notches of the wing. If necessary, sand the top and bottom of the wing joiner to allow the spars to fully *seat* into the spar notches so the spars will be flush with the top and bottom surface of the wing.



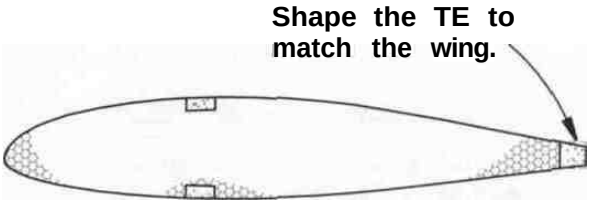
❑ 4. Apply a film of glue to the end of both wing halves. Turn the wing halves over and place them on the waxed paper over your workbench. Push the wing halves together.

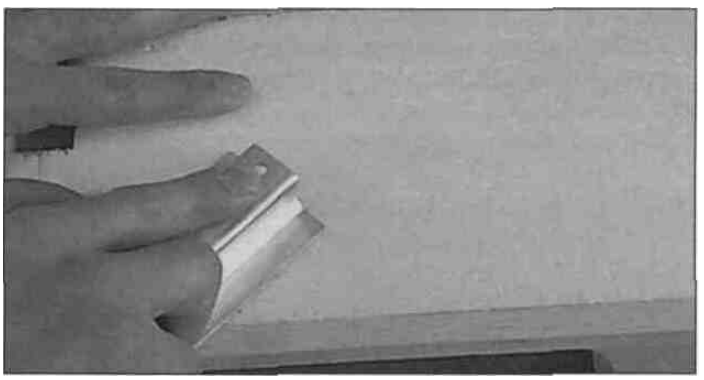


❑ 5. Apply glue to the top spar notches and the notches where the wing joiner fits. Apply glue to the wing joiner. Insert the wing joiner into the wing.



❑ 6. Apply glue to the top spars and insert them into the notches in the top of the wing the same way you did the bottom spars. Wipe away any excess glue. Tightly tape the wing halves together with masking tape and hold the center section in alignment with T-pins. Lay weights on top of the wing along the top spars. Do not disturb the wing until the glue is dry.

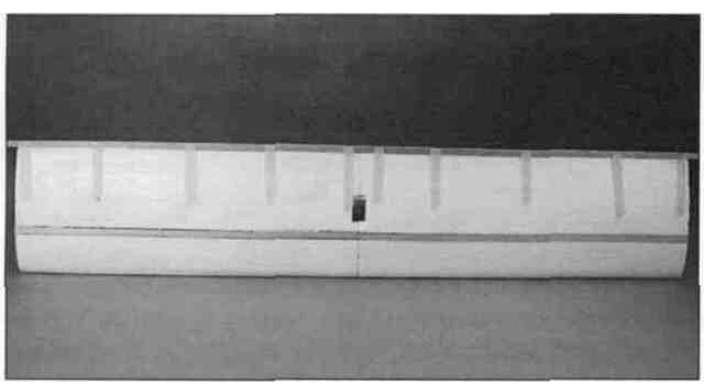




❑ 2. After the glue dries, use a razor saw to cut the spars and TE'S so they are even with the tips of the wing. Use a hobby knife or a razor plane to shave the balsa TE'S so they match the shape of the wing. Finish with a bar sander and 80-grit sandpaper. When you sand, use the foam wing only to *guide* your bar sander but apply pressure **only to the spar.** This way, you will sand **only the wood** and not the foam wing.

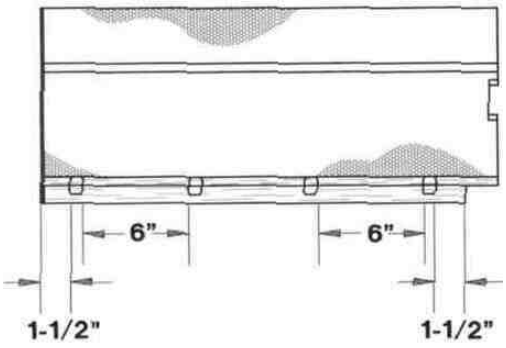
❑ 3. If necessary, sand the top and bottom spars so they blend to the wing.

Assemble the Wing

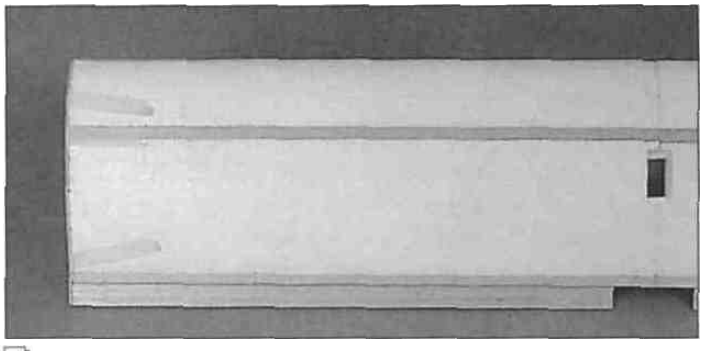


❑ 1. Glue both 1/2" x 1/2" x 30" balsa **trailing edges** to the trailing edge of the wing with aliphatic resin or epoxy.

❑ 4. Use aliphatic resin or epoxy to glue the die-cut 1/8" plywood **wing tip ribs** to both ends of the wing. Use masking tape to hold the wing tip ribs in place until the glue dries.



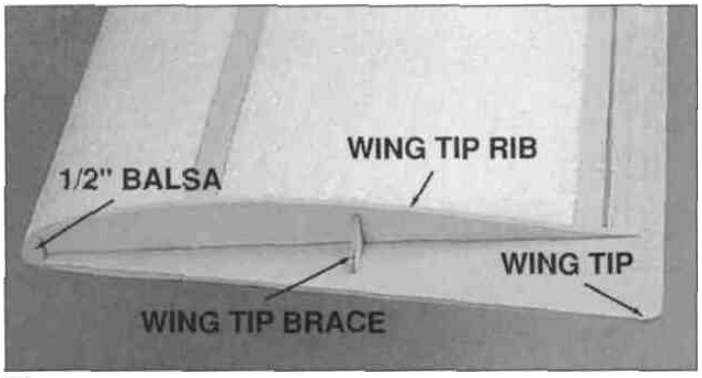
❑ 5 Mark the locations of the hinges on the aileron and the trailing edge of the wing as shown in the sketch Cut the hinge slots and temporarily join the ailerons to the wing with the hinges to make sure the hinge slots align Make adjustments if required



❑ 6 Remove the ailerons from the wing and use a razor plane, a hobby knife, or a bar sander and 80 grit sandpaper to shape the leading edge of both ailerons to a "V" to allow for control movement Temporarily reattach the ailerons to the wing with the hinges.

❑ ❑ 7 Sand the wing tip ribs so they are even with the wing Glue one of the die-cut 1/8" plywood **wing tips** and the **wing tip brace** to the left wing tip Be careful not to use **too** much CA because it will dissolve the foam.

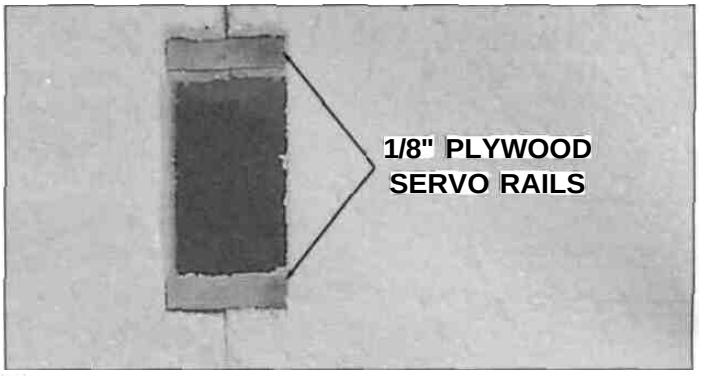
❑ ❑ 8 Glue a piece of leftover 1/2" x 1/2" balsa to the wing tip rib and the wing tip Shape the block to blend the wing, wing tip and wing tip rib together.



❑ When you re done, your wing tip should look like the one in the photo

❑ 9. Finish the right wing tip the same way.

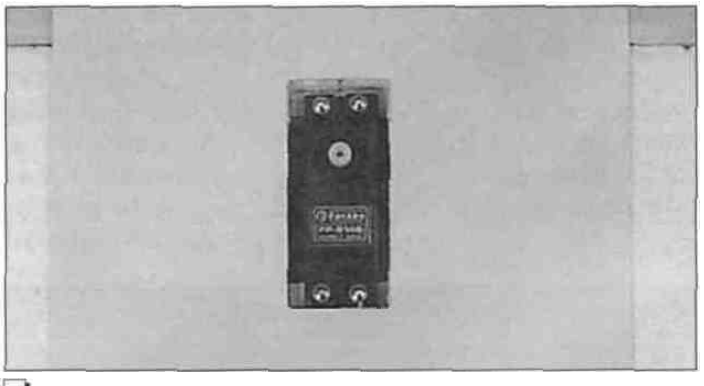
Hook Up the Ailerons



❑ 1 Temporarily place the die-cut 1/8" plywood **servo rails** in the top of the wing Position your aileron servo in the wing on top of the rails to make sure it fits If necessary, make adjustments to the *servo cavity* in the wing so your servo will fit

❑ 2 Glue the servo rails in the wing with epoxy After the epoxy cures, mount your servo to the rails with the screws included with vour servo

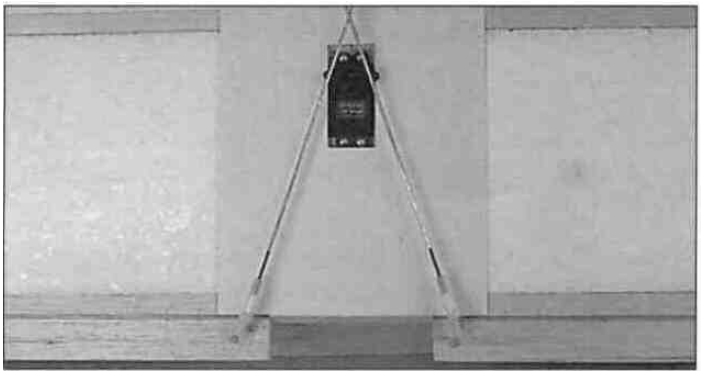
❑ 3 Use Kyosho Lexan Scissors or a hobby knife with a sharp #11 blade to trim the plastic **wing shield** along the molded-in outlines The outlines are most easily seen from the underside of the wing shield True the edges of the wing shield with a bar sander and 150 grit sandpaper



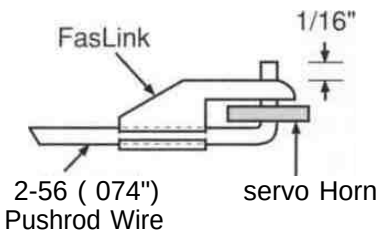
❑ 4. Place the wing shield on the wing but **do not glue it until told to do so.** Use a pencil or a ball point pen to **lightly** trace the sides of the wing shield onto the wing This will show you where **not** to apply covering so you can glue the wing shield directly to the wing

❑ 5 Make a two-armed servo arm for the aileron servo. Install the servo arm on your aileron servo.

❑ 6 Screw a nylon **clevis** about 20 turns onto each 12" wire **pushrod** Connect a nylon control horn to each clevis in the second hole from the bottom



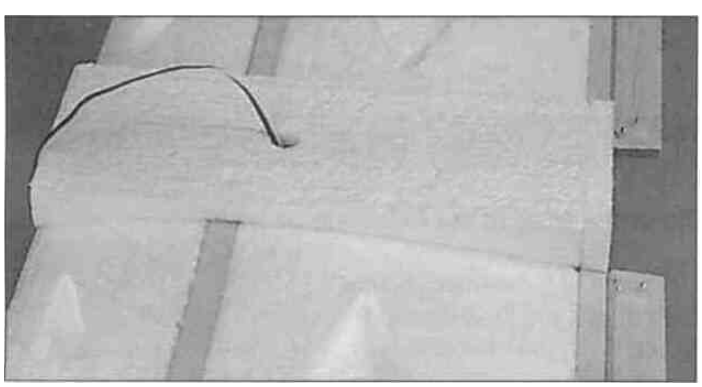
❑ 7 Mount both control horns to the ailerons with two 2 56 x 1/2" screws and the **mounting plate** you cut from the control horn The edge of the horns should be 1/4" from the edge of the ailerons and the control rods should align with the servo arm



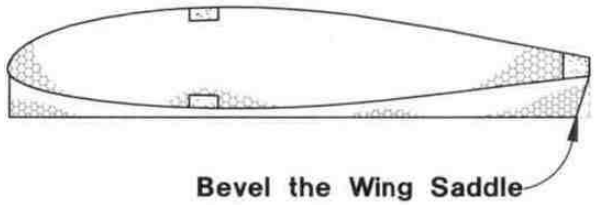
❑ 8 Cut the pushrods to the correct length and make a 90 degree bend in the end Connect the pushrods to the servo arm with nylon **Faslinks**

Finish the Wing

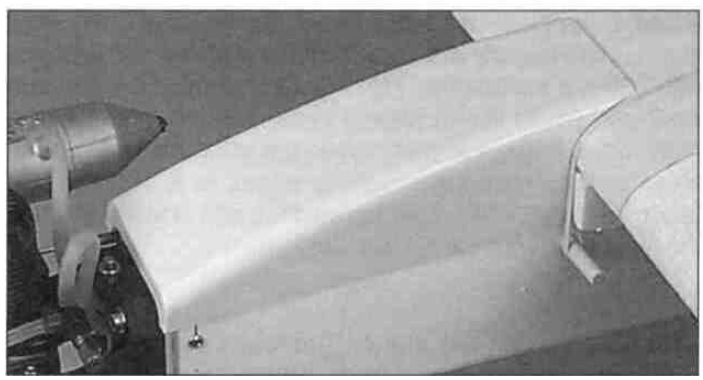
❑ 1. Apply Hobbico" HobbyLite™ filler to any dents or molding imperfections in the foam wing After the filler has dried, use a sanding block and 220-grit sandpaper to **carefully** sand the filler, the seam on the leading edge and any other molding irregularities For the best appearance, it is recommended that final sanding be done with 320-grit sandpaper but without a sanding block



❑ 2 Test fit the foam **wing saddle** on the bottom of the wing Cut a hole in the wing saddle to allow the aileron servo cord to pass Use aliphatic resin or epoxy to glue the saddle to the bottom of the wing, making sure it is centered and aligned Place a weight on top of the wing to hold it to the saddle until the glue dries



❑ 3 Bevel the TE of the wing saddle with a bar sander and 150-grit sandpaper so it will not interfere with the rubber bands that hold the wing to the fuse.



❑ 4 Temporarily mount the wing to the fuselage with two #64 rubber bands and the wing shield Trim the molded **front deck** along the outlines (seen best from the inside) and sand the edges so they are straight and true Test fit the front deck to the fuselage and the wing Trim where necessary for a good fit Do not mount the front deck to the fuselage until instructed to do so.

COVER THE WING & TAIL

We presume that the DuraStik will be built by experienced modelers but due to its simple, rapid construction, the DuraStik may appeal to beginner modelers as well For new modelers, or those unfamiliar with finishing techniques, we have provided some basic information about the covering materials available and the sequence recommended

The foam wing and the balsa surfaces, including the ailerons and tail feathers, must be covered with a protective, fuel proof finish Among the many model airplane covering materials available, Top Flite EconoKote film or Black Baron film is recommended Both coverings are applied with a hobby heat seal iron The temperature required to activate the adhesive on some coverings is too high to be used over a foam wing Be sure to check that the covering you have chosen is for a low-temperature application A low-temperature covering like **EconoKote film or Black Baron film must be used on the wing.**

One six foot roll will be enough to cover the DuraStik but, if you wish to add trim colors or other designs, you will have to purchase more than one roll

Covente also offers graphics, numbers, stars and lettering

Prepare the Wing & Tail for Covering

❑ 1 Disconnect the elevator and rudder pushrods from the tail surfaces and remove the control horns and hinges Remove the stabilizer and fin from the fuselage channel If you haven t already done so, final-sand all the tail surfaces with 320-grit sandpaper **Tip:** If you don't mind a little extra work and would like to have a better looking model with a more *finished* appearance, taper the ailerons, rudder and elevator by sanding the trailing edges to a thickness of approximately 3/32" This is optional and does not effect the flight performance of your DuraStik.

❑ 2 Disconnect the aileron pushrods and remove the control horns from the ailerons Detach the ailerons from the wing and remove the hinges

❑ 3 Make sure you have final sanded the wing, tail surfaces and control surfaces.

❑ 4 Before covering, remove as much balsa and foam dust as possible left from sanding This can be done with compressed air, a shop-vac with a brush, or a tack cloth

Now the DuraStik wing and tail feathers are ready to cover.

Painting

If you plan to paint any parts of your DuraStik such as the fuselage, landing gear front deck or the wing saddle, now would be a good time to do it Use your favorite fuel proof model airplane spray paint We recommend Top Flite LustreKote" or Black Baron spray paint.

Follow the instructions included with the covering you have selected.

Tips For Covering A Foam Wing With EconoKote Film

Many modelers are experts at applying iron on coverings to wood surfaces but have never tried it over foam. Here are some tips:

A Top Flite Hot Sock is highly recommended for covering the foam wing. It helps distribute the heat and keeps dents, scratches or *swirls* from being added in the foam during covering.

Find the optimum temperature of the iron. *The hotter* the better up to the point of distorting the foam. The Top Flite MonoKote Iron can be set at around 2-1/4 or the Coverite 21st Century iron set at 225, but this may vary from iron to iron. Use the flat center section on the bottom of the wing as a test area. Cut out a piece of covering and apply it to the bottom of the wing in the center. Increase the heat of the iron until the covering gets that *pig skin* look (like the surface of a football). At that point the iron is slightly too hot; turn the heat down a little and you're ready to apply the covering.

Start by touching the iron to the covering in the middle and work outward when *covering the wing (or* other large surfaces),

Lightly *push out* wrinkles and air bubbles as you get to the edges.

Don't be afraid to press down on the iron and apply a little pressure to the covering. This helps bond it to the foam and will eliminate wrinkles or air bubbles from appearing later.

Avoid moving the iron in a circular motion and hold it as flat as possible.

Always use a sharp hobby knife to cut the covering. Some modelers prefer to use a single edge razor blade.

Covering Sequence

Cover the wing in the following order:

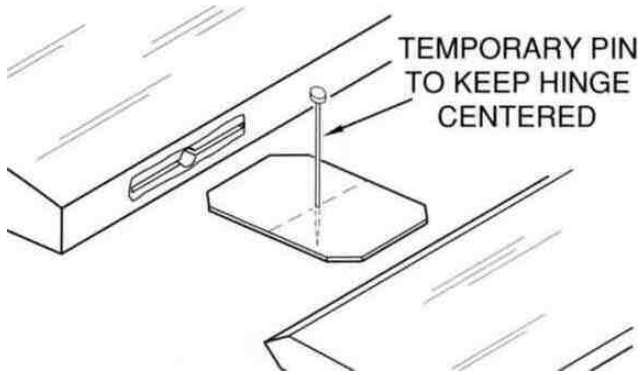
1. Bottom of the center section
2. Bottom right, then left side
3 Top right, then left side
4 Ailerons*

* Some modelers cover the **ends** of the ailerons separately If you use this method cover the ends first You can cover the top and bottom of the ailerons separately or cover them in one piece, wrapping the covering all the way around Try to make all seams in the covering face

rearward or downward Overlap the lines you drew on the top of the wing for the wing shield by 1/4" Leave the rest of the foam exposed for a good glue bond to the wing shield.

Cover the tail in the following order:

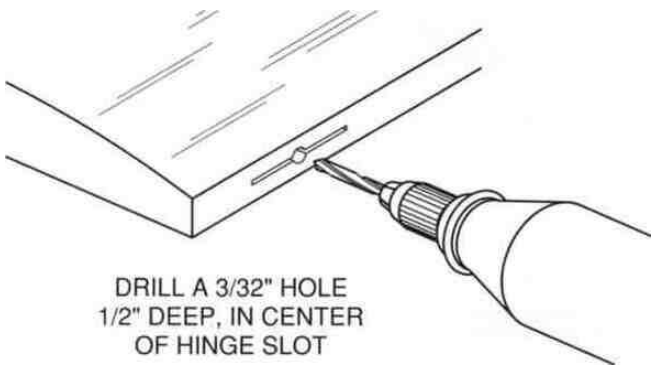
1. Stab bottom, then top
2. Elevator
3. Fin right, then left side
4. Rudder right, then left side

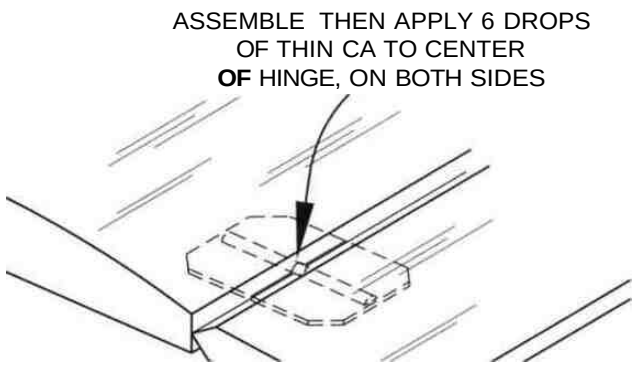


❑ 2 Insert the hinges and join the elevator to the stab Make sure there is a very small gap between the TE and the LE of the control surface This will keep you from inadvertently gluing the controls together If the hinges do not stay centered, insert a pin through the middle of the hinge before you join the surfaces Pull the pin out after the surfaces are connected.

FINAL ASSEMBLY

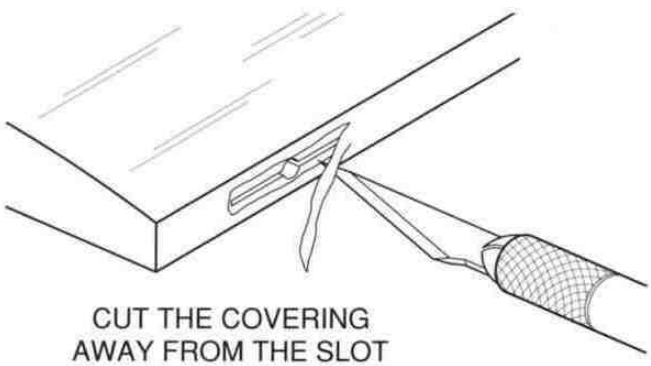
Glue the Hinges





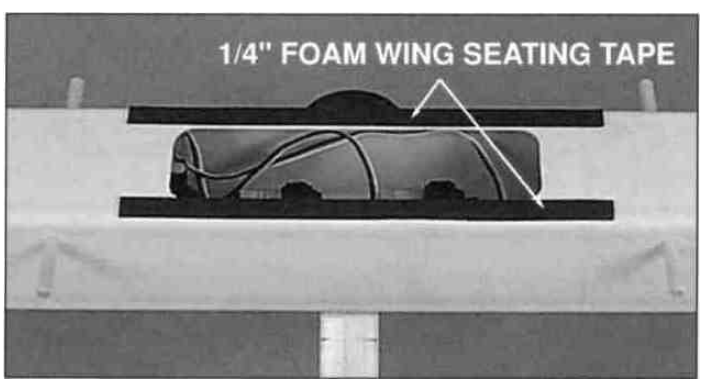
❑ 3. Glue the hinges by applying 6 drops of thin CA to the center of the hinge, on the top and bottom of the stab

❑ 4. Hinge the rudder and ailerons the same way.

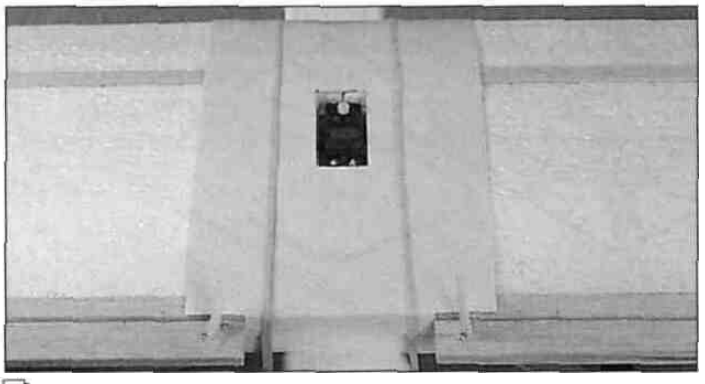


❑ 1 Start with the stab Slit the covering over the hinge slots Drill a 7/64" hole 1/2" deep in the center of the slots that were cut previously This will enable the CA to "wick" into the hinge. Remove the covering from over the hinge slots.

Reassemble the Model



❑ **1 Add** strips of 1/4" x 1/16" thick wing seating foam tape to the wing saddle area on the fuselage This will keep the wing from shifting during flight.



❑ 2 Place the wing shield on the wing and set the wing on the fuselage Apply a film of 30 minute epoxy to the wing and the underside of the wing shield Place the wing shield on the wing *Clamp* the wing shield to the wing by mounting the wing on the fuselage with #64 rubber bands Wipe away excess epoxy before it cures with a **cloth** dampened with rubbing alcohol.

Note: Your wing will be covered at this point.

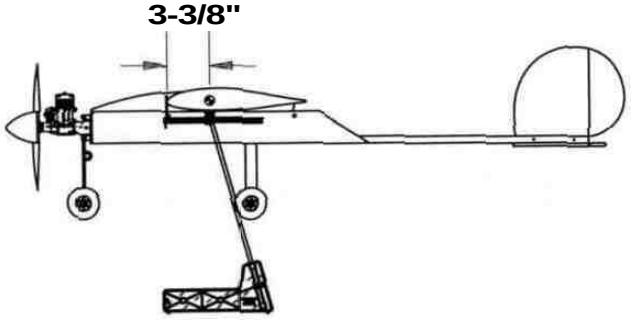
❑ 3 Mount the front deck to the fuselage with double sided adhesive tape.

❑ 4 Mount the stab and rudder to the fuselage channel as /ou did during construction Use threadlock or CA on all the nuts Install the control horns on the rudder, elevator and ailerons and connect the pushrods.

❑ **5. Mount a** 2-1/4" **spinner** (optional) and a propeller within the range recommended by the engine manufacturer **to** the engine

Balance the Model

This procedure (checking the center of gravity) must not be omitted. A model that is improperly balanced will be unstable and possibly unflyable.

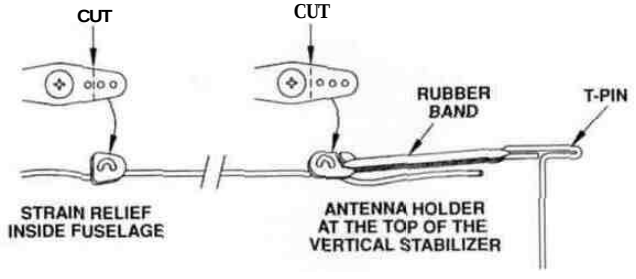


❑ Mount the wing to the fuselage with a couple of #64 rubber bands With your battery pack handy, place the model on your Top Flite C G Machine at the C G location (3-3/8" back from LE) on each side of the wing If you do not have a C G Machine, lift the model with your fingers at the C G point (mark the C G on the bottom of the wing with a felt tip pen or a piece of tape so you know where to lift) Position the battery pack on the fuse until the model is level This is the position where you should mount the battery pack inside the fuselage Try to position the battery pack so no ballast will be required to correct the C G **The C.G. must be determined with the fuel tank empty.**

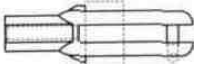
Final Hookups & Checks

❑ 1 Mount the battery pack There are several ways to do this Wrap the battery pack in 1/4" thick foam and place it inside the fuselage so it will not shift during flight or a rough landing Or, mount the battery pack to the inside of the fuselage with foam mounting tape On our prototype, we mounted a 500 mAh flat battery pack directly to the inside of the fuselage next to the front servo In this location, no additional weight was required to achieve the correct C G.

❑ 2 Recheck the C G. Add stick-on lead weights to the nose or tail if required to arrive at the correct C.G.



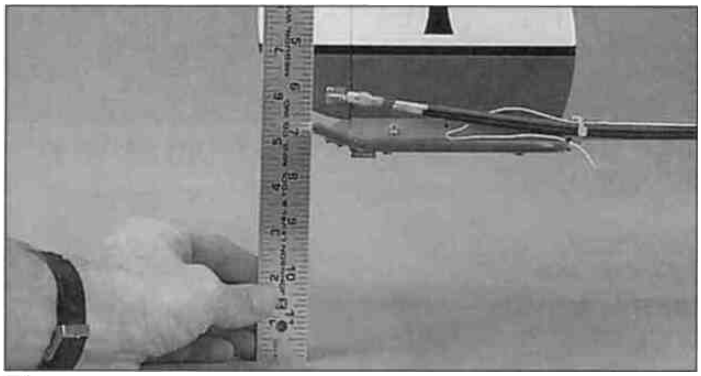
❑ 3 Route the receiver antenna You can simply secure it to the top of the fin with a piece of tape or make a strain relief and antenna hook out of a servo arm as shown in the sketch Connect the rubber band to a pin inserted into the top of the fin.



❑ 4. Add a silicone Clevis Retainer (cut from excess fuel tubing) to all the clevises on the model.

❑ 5 Check to make sure all the servo mounting screws and servo arm screws that hold the servo arms to the servos are installed and secure Make sure all wheel collars are secure and have threadlocker if necessary

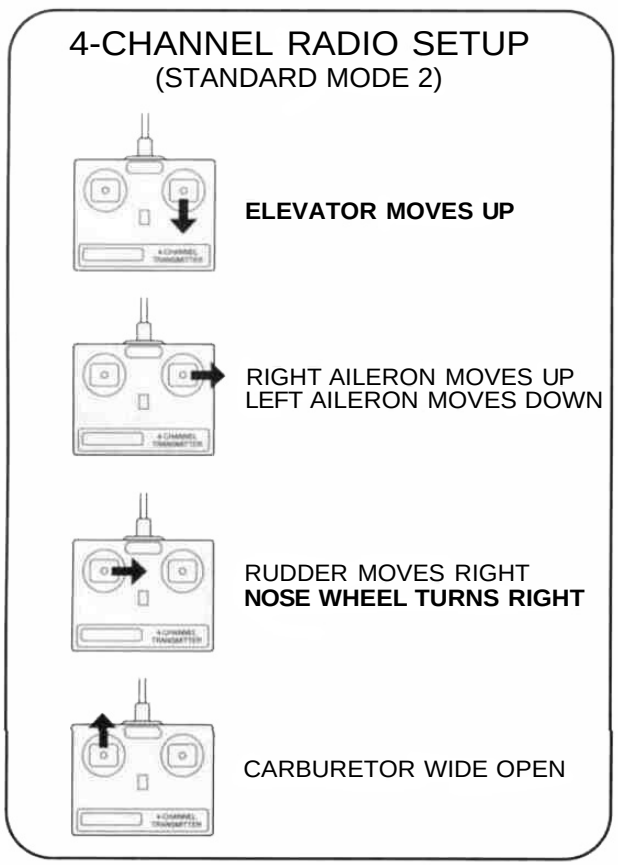
Control Surface Throws



❑ We recommend the following control surface throws. The throws are measured at the **trailing edge** of the ailerons, elevator, and rudder:

	High Rate	Low Rate
Elevator	3/8" Up and Down	1/4" Up and Down
Ailerons	5/16" Up and Down	3/16" Up and Down
Rudder	1" Left and Right	3/4" Left and Right

Before You Go to the Flying Field



❑ 1. Confirm the direction of the controls.

❑ 2. Balance your propellers. Vibration from an unbalanced propeller can cause poor engine performance and damage your in flight radio system. Purchase a Top Flite Power Point Magnetic balancer (TOPQ5700) or a Great Planes Fingertip Prop Balancer (GPMQ5000) to accurately balance your propellers.

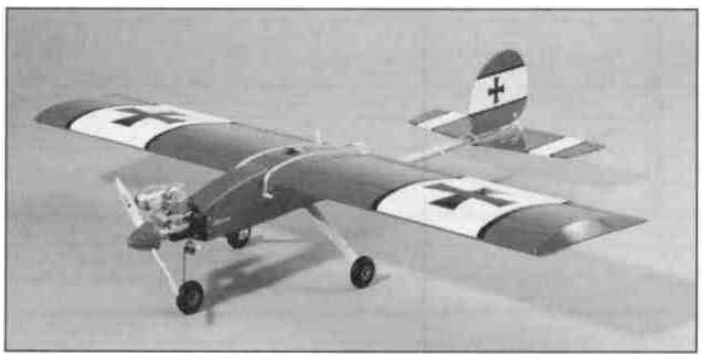
❑ 3. Make sure the fuel lines are properly connected. An in-line fuel filter is recommended.

❑ 4. Make sure the transmitter and receiver batteries are fully charged.

❑ 5. Perform a range check of your radio system as described by the radio manufacturer.

❑ 6. When it's time to mount your wing to the fuselage **at** the flying field, use eight to ten #64 rubberbands. Criss-cross the last two.

FLIGHT



The DuraPlane DuraStik 40 is intended for intermediate to expert level pilots although beginners can have success with the DuraStik if they have had some time on a trainer model.

TAKEOFF: Control throws are not provided for the nose wheel as this varies greatly depending on the conditions of the field. More nose steering will be required if taking off from a grass field than would be required if taking off from a paved runway. Too much nose wheel throw will make it difficult to keep the model on heading during roll out - especially if using a paved runway. Move the clevis **out** one or two holes on the steering arm of the nose gear for less response.

Unless you are a highly experienced pilot, first flight attempts should be reserved for days when the prevailing wind is calm and down the runway if possible. Advance the throttle slowly at first, then a little more rapidly apply full throttle. Build as much ground speed as your strip will allow, then smoothly apply up elevator until the nose wheel rotates and the airplane lifts into the air. Don't "yank up" on the stick but relax some of the up elevator and allow the DuraStik to steadily climb to a comfortable altitude before executing the first turn.

FLYING: The DuraStik is a straightforward model with no unexpected tendencies Once airborne, it is a good idea to get the trims corrected before attempting any aerobatics Fly a few straight and level passes, adjusting the trims each time The most important recommendation we have is to get used to the feel of the model and the control rates The recommended throws are relatively mild so experts will most likely wish to add a little more aileron and elevator throw after becoming familiar with the model If the model seems unstable or reacts too quickly to control inputs, the C G may be too far aft Add some weight to the nose if this is the case At a high altitude, throttle back to see how the DuraStik will handle during the slower landing approach speeds

LANDING: Make sure you have enough fuel left to make a few landing approaches Use a normal landing circuit and keep a few clicks of power on until you are over the runway threshold Plan to land a little faster on your first few attempts until you really get the feel of the DuraStik

The DuraStik is a tough "kick around" plane but it does look rather sporty and is lots of fun to fly. So get carried away and have a blast'

<u>DuraPlane</u>
P.O. Box 788
Urbana,IL61803
(217)398-8970

FLIGHT LOG

DATE	COMMENTS
	Started Construction
	Finished Construction
	First Flight