# Dynaflite™

Bobcat™

- ***F3B-style soarer makes an ideal first aileron model.***
- ***Strong turbulated wing allows winch launching and low-speed sink.***
- ***Rugged, lightweight balsa/life ply construction.***

READ THROUGH THIS INSTRUCTION MANUAL FIRST. IT CONTAINS IMPORTANT INSTRUCTIONS AND WARNINGS CONCERNING THE ASSEMBLY AND USE OF THIS MODEL.
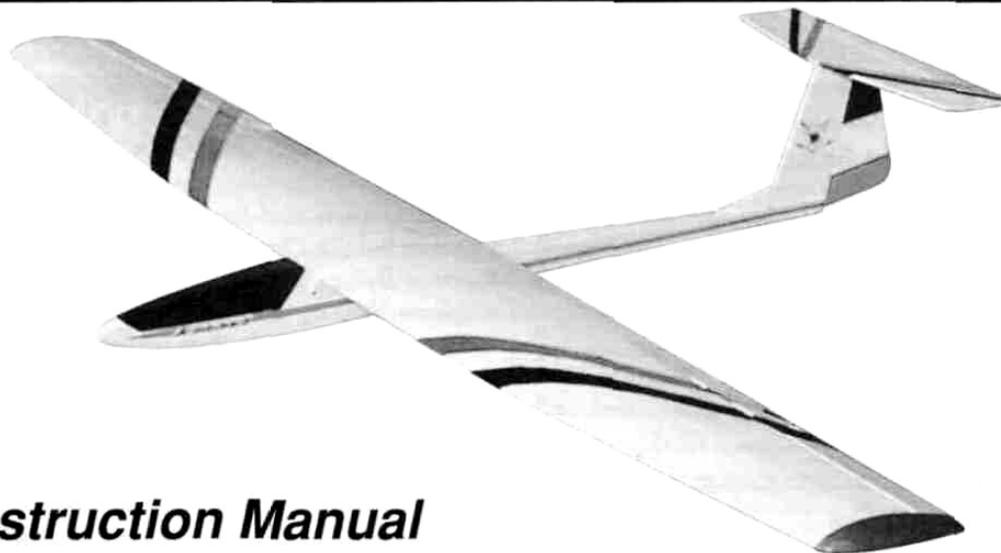
Instruction Manual

WARRANTY

Dynaflite 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 Dynaflite's liability exceed the original cost of the purchased kit. Further, Dynaflite reserves the right to change or modify this warranty without notice. In that Dynaflite has no control over the final assembly or material used for final assembly, no liability shall be assumed nor accepted for any damage resulting from the use by the user of the final user-assembled product. By the act of using the user-assembled product, the user accepts all resulting liability. If you are not prepared to accept the liability associated with the use of this product, return this kit immediately in new and unused condition to the place of purchase.

MADE IN USA

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INTRODUCTION

Congratulations and thank you for purchasing the Dynaflite Bobcat. Once you have learned the basics of thermal flying, the Bobcat is an ideal "second" sailplane. With its "flat" wing and ailerons, the Bobcat is more maneuverable than beginner, two-channel, rudder-only models so you will be able to chase those elusive thermals more aggressively. The Bobcat's relatively thin airfoil makes it penetrate the wind for competition flying and slope soaring, yet the flat bottom makes it somewhat of a floater as well. You can build the Bobcat with a steerable rudder, but only advanced fliers will be able to take full advantage of the additional steering capability. The instructions tell you how to build a steerable rudder or build a fixed, immovable rudder. You can mount micro, mini or full size servos in the fuselage, but the ailerons require either a mini or a micro servo. Most experts will also use mini or micro servos in the fuselage. The generous cabin area allows the Bobcat to accept full size, standard configuration battery packs and receivers. Let's get started!

PRECAUTIONS

1. You must assemble the plane according to the instructions. Do not alter or modify the model, as doing so may result in an unsafe or unflyable model. In a few cases the instructions may differ slightly from the photos or plan. In those instances the text should be taken as correct.

Your Bobcat is not a toy, but a sophisticated working model that functions like a full-size airplane. Because of its performance, if you do not assemble and operate the Bobcat correctly, you could possibly injure yourself or spectators and damage property. **To make your R/C modeling experience totally enjoyable, we recommend that you get assistance with assembly and your first flights from an experienced, knowledgeable modeler.** You'll learn faster and avoid risk to your model before you're truly ready to solo. Your local hobby shop has information about flying clubs in your area whose membership includes qualified instructors.

2. You must take time to build straight, true and strong.

3. You must install all R/C and other components **so** that the model operates properly on the ground and in the air.

4. You must test the operation of the model before the first and each successive flight to insure that all equipment operates correctly. You must also make certain that the model has remained structurally sound.

You can also contact the national Academy of Model Aeronautics (AMA), which has more than 2,300 chartered clubs across the country. We recommend you join the AMA which will provide you with insurance coverage at AMA club sites and events. AMA Membership is required at chartered club fields where qualified flight instructors are available. Contact the AMA at the address or toll-free phone number below.

NOTE: We, as the kit manufacturer, can provide you with a quality kit and great instructions, but ultimately the quality and flyability of your finished model depends on how you assemble it; therefore, we cannot in any way guarantee the performance of your completed model and no representations are expressed or implied as to the performance or safety of your completed model.

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie.IN 47302
(800) 435-9262
Fax (317) 741-0057

AMA
SINCE 1936

Please inventory and inspect all parts carefully before starting to build! If any parts are missing, broken or defective or if you have any questions about building or flying this model, please call us at (217) 398-8970 and we'll be glad to help. If you are calling for replacement parts, please look up the part numbers and have them ready when calling.

REQUIRED ACCESSORIES

These are the items "not included" with your kit, that you will need to purchase separately. Items in parentheses (OSMG2691) are suggested part numbers recognized by distributors and hobby shops and are listed for your ordering convenience. **GPM** is the Great Planes® brand, **TOP** is the Top Flite® brand and **HCA** is the Hobbico® brand.

- ❏ 4 Channel Aircraft Radio System with 1 or 2 standard, mini or micro servos and 1 mini or micro servo
- ❏ 2-Meter Hi-Start Launch System
- ❏ Approximately 2 rolls Top Flite MonoKote® covering
- ❏ 1 /4" Latex Foam Rubber Padding (HCAQ1000)
- ❏ 1/16" Foam Wing Seating Tape (GPMQ4422)
- ❏ #64 Rubber Bands (1 /4 lb box - HCAQ2020)
- ❏ (3 sets) 36" Flexible Cable Pushrod for Elevator and Ailerons (GPMQ3702)
- ❏ 36" Solid Wire Pushrod Set (optional) for Steerable Rudder (GPMQ3716)
- ❏ (1 pc.) 2-56 Nylon Clevis (optional) for Steerable Rudder (GPMQ3800, pkg. of 2)
- ❏ (3 pcs.) Standard Solder Clevises (for .074 wire/cable) (GPMQ3810, pkg. of 2)
- ❏ (1 pc.) 1/16" Threaded Ball Link for Aileron Servo (GPMQ3842)
- ❏ (2 pcs.) 2-56 Screw-Lock Pushrod Connectors (GPMQ3870, pkg. of 2)

REQUIRED SUPPLIES AND TOOLS

These are the building tools and adhesives that you will need to build your Bobcat.

We recommend Great Planes Pro™ CA and Epoxy

- ❏ 2 oz. Thin CA (GPMR6003)
- ❏ 2 oz. Medium CA+ (GPMR6009)
- ❏ CA Applicator Tips (HCAR3780)
- ❏ CA Accelerator (GPMR6035)
- ❏ 30-Minute Pro Epoxy (GPMR6047)
- ❏ #1 Hobby Knife Handle (XACR4305)
- ❏ #11 Blades (Qty 100. - HCAR0311) or (Qty. 5-XACR2911)
- ❏ Hobbico Builders Triangle (HCAR0480) or similar
- ❏ Medium T-pins (HCAR5150)
- ❏ Wax Paper
- ❏ Electric Drill
- ❏ Drill Bits: 1/16", 3/32", 5/32", 3/16", #36 (or 7/64"), 11/64" (or 5/32")
- ❏ #1 Phillips Screwdriver
- ❏ Top Flite Covering Iron (TOPR2100)
- ❏ Hot Sock'" (for your covering iron, TOPR2175)
- ❏ Single-edge Razor Blades (100, HCAR0312)
- ❏ Denatured or Isopropyl Alcohol (for epoxy clean-up)
- ❏ HobbyLite" Balsa Filler (HCAR3401)
- ❏ Bar Sander or Sanding Block and Sandpaper (coarse, medium, fine grit - see next page)

A flat, durable, easy-to-handle sanding tool is a necessity for building model airplanes. Great Planes makes a complete range of Easy-Touch" Bar Sanders and replaceable Easy-Touch adhesive-backed sandpaper.

For future reference, here's a list of Easy-Touch Bar Sanders and adhesive-backed sandpaper:

5-1/2" Bar Sander (GPMR6169)
11 "Bar Sander (GPMR6170)
22" Bar Sander (GPMR6172)

12" Roll of adhesive-backed sandpaper,
80-grit (GPMR6180)
150-grit (GPMR6183)
220-grit (GPMR6185)

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

BUILDING NOTES

• When you see the term **"test fit"** in the instructions, it means you should first position the part on the assembly **without using any glue.** Slightly modify or "custom fit" the part as necessary for the best fit.

• Whenever just **"epoxy"** is specified, you may use *either* 30-minute epoxy **or** 6-minute epoxy. When 30-minute epoxy is **specified,** it is **highly recommended** that you use only 30-minute epoxy because you will need either the working time and/or the additional strength.

• **Do not throw away any leftover material** until after you have completed your Bobcat. Some small pieces of leftover balsa or plywood are used during construction.

TYPES OF WOOD

**Balsa**   **Basswood**   **Plywood**

Inch Scale

0"   1"   2"   3"   4"   5"   6"

0   10   20   30   40   50   60   70   80   90   100   110   120   130   140   150

Metric Scale
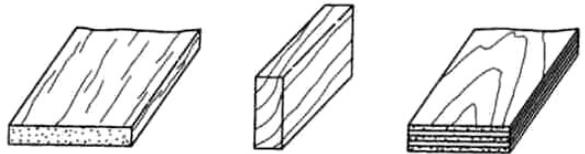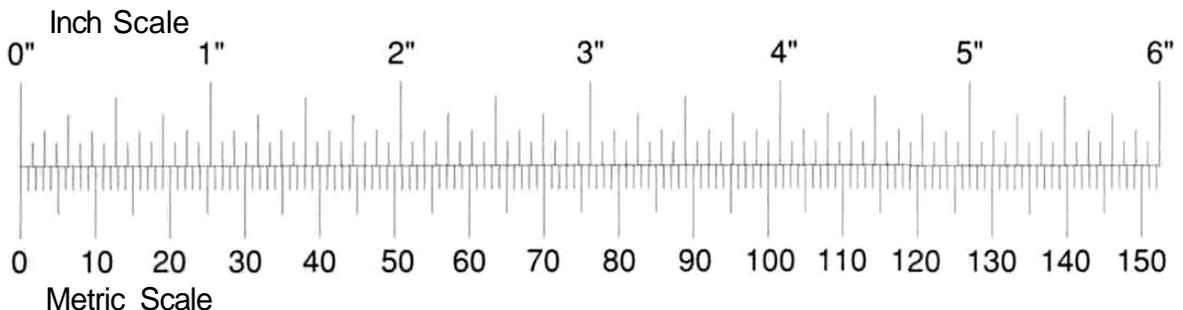
BUILD THE FUSELAGE

BUILD THE FUSELAGE SIDES

All the parts in the following steps are die-cut 1/8" plywood unless otherwise noted. After you remove die-cut parts from their die sheets, remove slivers and die-cutting irregularities with a bar sander and 80-grit sandpaper.

❏ 1. Unroll the fuselage plan. Reroll it the opposite way so it will lie flat. Align the side view of the fuselage plan over a **flat** building board into which you can stick T-pins.

❏ 2. Lay a piece of wax paper on the fuselage plan over the joint between the forward and aft fuselage sides so glue **will** not stick to the plan. Pin the **forward right fuselage side** over its location on the plan. Test fit the **aft right fuselage side** to it. Use your bar sander to adjust the forward edge of the aft fuselage side so it accurately aligns with its location over the plan. Glue it to the forward fuselage side with medium CA.
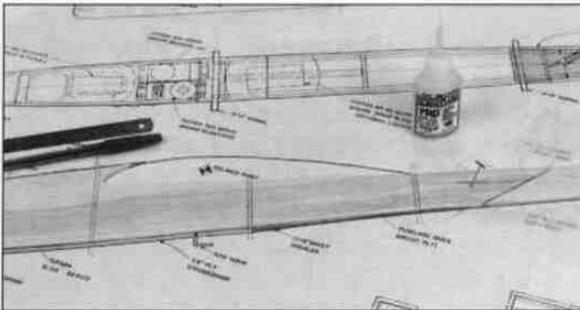
❏ 3. Before you remove the right fuselage side from the plan, use a straightedge and a ballpoint pen to accurately mark the location of the three formers onto the fuselage side.

❏ 4. Remove the right fuselage side from the plan. Glue the **forward *left* fuselage side** to the **aft *left* fuselage side** the same way.

❏ 5. Sand the glue joint on both sides of the fuselage sides so it is smooth and even.

❏ 6. Place the fuselage sides together and accurately align them. Drill 3/16" holes in the dimples on the left fuselage side for the wing hold-down dowels.

❏ 7. Transfer the lines you marked on the inside of the right fuselage side to the left fuselage side by marking them on the top and bottom of the left fuselage side. Draw the lines with a straightedge and your ballpoint pen.

❏ 8. Use medium CA to glue the **left** and **right fuselage side joiners** to the *inside* of the left and right fuselage sides, respectively, so their **top edges** are 1/16" below the top edges of the fuselage sides.
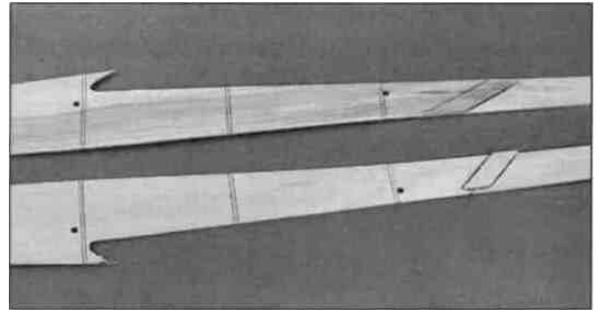

❏ 9. Sand the **bottom edges** of the joiners so they are even with the bottoms of the fuselage sides.

JOIN THE FUSELAGE SIDES
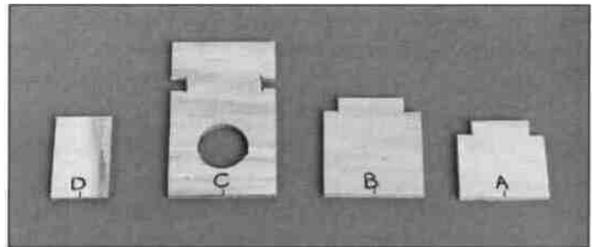
❏ 1. **Accurately** mark the center of the bottom of the bulkheads. Label them as shown on the plan and in the photo.

☐ 2. **Optional:** Drill a 3/16" hole near the bottom of bulkheads A and B for an antenna guide tube (not included). The hole in bulkhead B must be slightly off center so the guide tube will not interfere with the tow hook block.
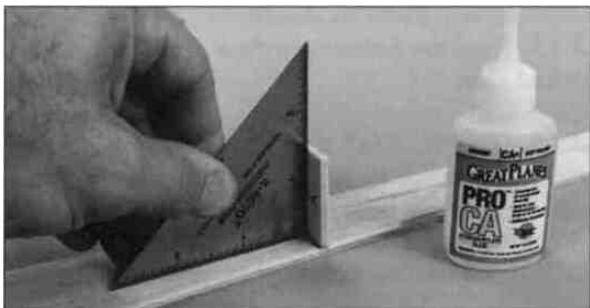
☐ 3. Use medium CA to glue **bulkhead A** to the right fuselage side so it is even with the fuse bottom. Use a small 90 degree triangle to hold the bulkhead perpendicular to the fuse side while you glue.
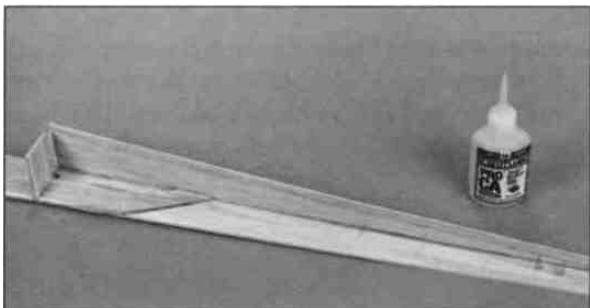

☐ 4. Remove the die-cut 1/16" balsa crutch from the die sheet and sand off slivers and die-cutting irregularities. Cut the aft end of the crutch so it matches the length shown on the plan.

☐ 5. Use thin CA to glue the crutch to the right fuselage side so it is perpendicular and the front of the crutch overlaps bulkhead A as shown on the plan.

☐ 6. Join the left fuselage side to the right fuselage side. Accurately align bulkhead A with the lines you marked on the left fuse side and align the crutch with the left fuse side. Use medium CA to glue bulkhead A to the left fuse side.

☐ 7. Use a straightedge and a ballpoint pen to extend the centerline on the top view of the fuselage plan an additional 9" from the rear of the fuselage on the plan. Cover the top view of the plan with wax paper from bulkhead A to bulkhead D.
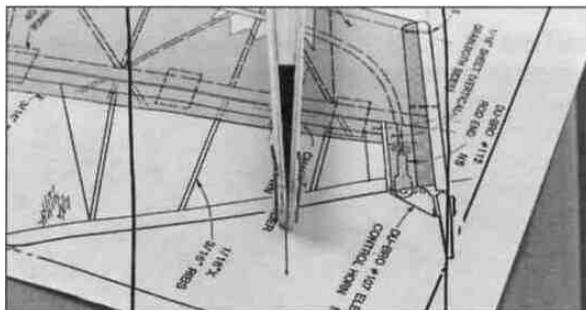

☐ 8. Position the fuselage on the top view and accurately align the aft end of the fuselage over the centerline, then hold it in position with a large T-pin on both sides. Align the centerline on bulkhead A with the centerline on the plan. Hold the fuse in position with a balsa block and T-pins on both sides of the fuse.
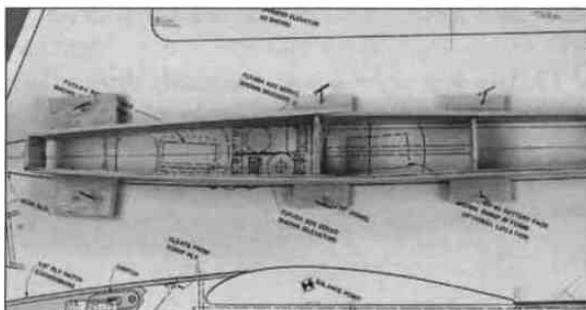
☐ 9. Fit, but **do not glue,** the rest of the bulkheads between the fuse sides. Use the "balsa block and T-pin" technique to hold the fuselage in position **so** the centerlines of the formers align with the centerline on the plan. Hold the fuse sides to bulkhead D with masking tape.

☐ 10. Double-check that the formers align with both the plan and the lines you marked on the inside of the fuse sides. Also make sure that the bottoms of the formers align with the bottoms of the fuse sides. Glue the formers to the fuse sides with thin CA, followed with medium CA.

❏ 11. Remove the fuselage from your building board. Sand the bottom so the formers and fuselage sides are even. Sand the top of the fuselage sides and the crutch so they are even.
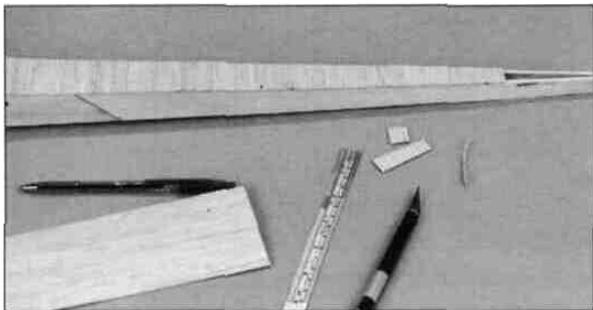

❏ 12. Glue the **cross-grain sheeting** cut from a 1/16" x 3" x 24" balsa sheet to the aft fuselage top. The cross grain sheeting should extend from bulkhead A aft to the end of the crutch.

❏ 13. Use a straightedge to accurately draw a line with a ballpoint pen down the center of the 1/8" x 2" x 23-7/8" cross-grain plywood sheet. Cut the sheet to a length of 12-3/4".
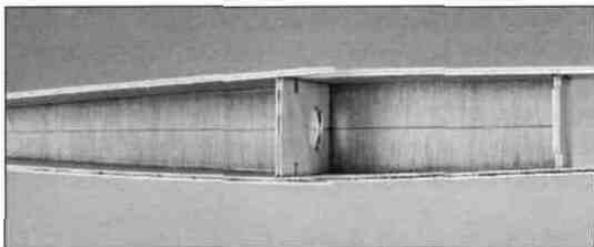
❏ 14. Use medium CA to glue the 12-3/4" cross-grain plywood sheet to the bottom of the fuselage so the aft edge aligns with the middle of bulkhead B and the centerline on the bottom sheet aligns with the center marks on the bulkheads.
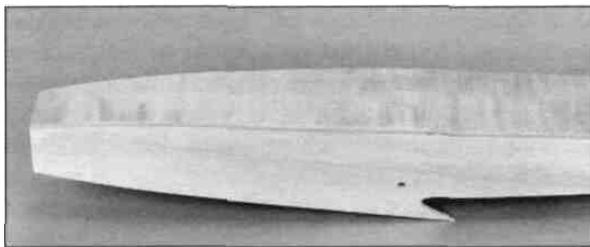

❏ 15. Sand the bottom ply sheet so it is even with the fuse sides.

❏ 16. Glue the 1/4" x 3/8" x 4-1/4" basswood **tow hook anchor** to the inside of the forward fuse bottom, between bulkheads A and B with medium CA. Note that the 1/4" side of the anchor is the side that contacts the fuse bottom.

BUILD THE FIN

Note: Perform step 1 **only** if your are an experienced pilot who will be able to take advantage of a steerable rudder. Ailerons alone will allow intermediate fliers to turn the Bobcat properly.
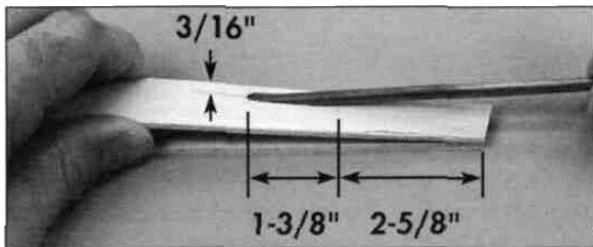
❏ 1. Make the slot for the **rudder pushrod guide tube** in the rear of the **left** fuselage side at the location shown in the photo and on the plan. Use a 3/16" brass tube sharpened at one end, a 3/16" drill or a hobby knife.

Do not use CA Accelerator while you build the fin. Residual accelerator may cure the CA you use to glue on the fin sheeting before you have a chance to position it.
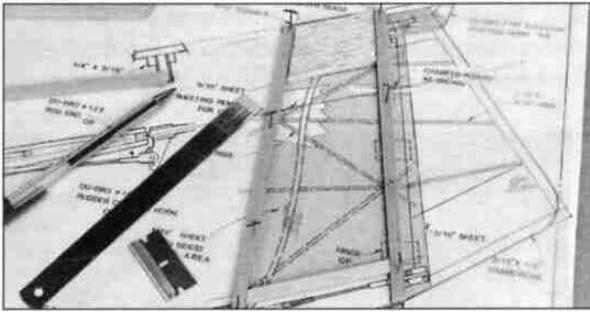
☐ 2. Place a sheet of wax paper over the rudder and fin plan. Build the fin frame from the 3/16" x 1/4" x 24" balsa stick and the 3/16" x 1-3/8" x 24" balsa sheet. Build accurately because the fin establishes the incidence of the stab.

☐ 3. Cut the **fin ribs** from the 1 /16" x 3/16" x 24" balsa stick. Glue them in position.

☐ 4. Remove the fin from your building board and peel off the wax paper. *Carefully* sand both sides of the fin flat.

☐ 5. Use a ballpoint pen to mark the left side of the fin where the elevator pushrod tube (not included, GPMQ3702) intersects the braces, base and tip.

☐ 6. Sheet the right side of the fin with a 1/16" x 3" x 24" balsa sheet. The bottom of the sheet should align with the bottom of the horizontal 3/16" x 1/4" "base" portion of the fin. The grain of the sheet should run parallel to the LE. Use a small piece of leftover 1/16" balsa sheet for the corner of the fin at the bottom of the TE.
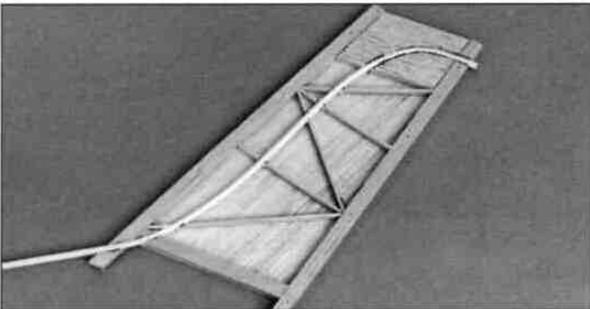

☐ 7. Use a MultiPro™ or a hobby knife to cut grooves for the elevator pushrod guide tube in the tip of the fin and in the cross braces. Test fit the tube to make sure the grooves are deep enough.

☐ 8. Glue the tube in place with medium CA. Sheet **the** left side of the fin the same way as the right.

☐ 9. Sand the tip of the fin so it **accurately** matches the plan. Round the leading edge.

☐ 10. If you will be building a functioning rudder, mark the location of the hinges on the fin and cut the hinge slots.
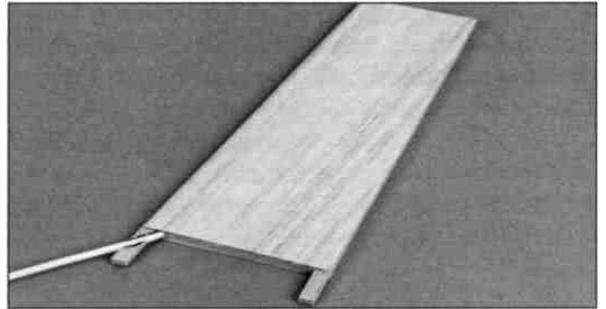
A nice little piece of workmanship you have there, isn't it?

JOIN THE FIN & FUSELAGE

☐ 1. Test fit the fin and the guide tube in the fuselage. If necessary, trim the aft edge of the 1/16" balsa crutch and cross-grain sheeting so the TE of the fin aligns with the end of the fuselage.

☐ 2. Place a piece of wax paper under the back of the fuse to protect your workbench. Place weights on top of the fuselage to keep it from moving around while you work. Wrap masking tape 1/8" above the bottom of the fin to keep excess epoxy off the fin.
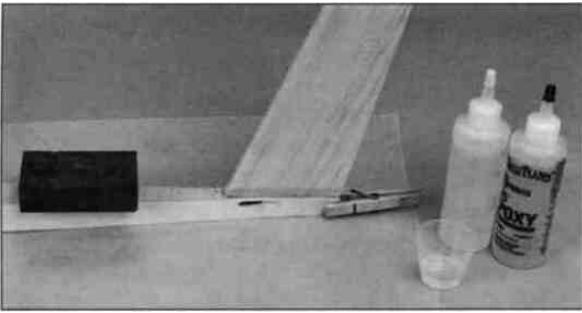
□ 3. Apply 30-minute epoxy to the base of the fin, the top of the fuse sides and all other mating surfaces. Insert the fin into the fuse. Clamp the fuse sides to the fin TE with a clothespin. Push a T-pin through the top sheeting into the LE to hold the front of the fin down. Immediately proceed to the next step.

□ 4. Make a fillet of epoxy joining the base of the fin and the fuse. Use a 90 degree triangle to make sure the fin is perpendicular. Remove the masking tape before the epoxy cures and do not disturb the model until the epoxy is fully cured.

FINISH THE FUSELAGE

□ 1. Cut two 2" pieces and one 5-3/4" piece from the remaining cross-grain 1/8" x 2" plywood strip. Use medium CA to glue one of the 2" strips to the front of the fuselage as shown on the plan.

□ 2. Use the 5-3/4" plywood strip (which will become the top of the hatch) as a spacer to glue the other 2" plywood strip to the aft portion of the fuselage cabin. Leave a small gap at both ends of the hatch to provide clearance for the covering material.

□ 3. Use the remaining 1/8" x 2" plywood strip to make two 3/8" wide **hatch tongues.** The aft hatch tongue should be the same width as the inside of the fuse sides at the back of the hatch. The front hatch tongue should be the same width as the fuse sides at the front of the hatch.

□ 4. Glue the front hatch tongue to the bottom of the hatch so half of it protrudes past the front edge of the hatch.
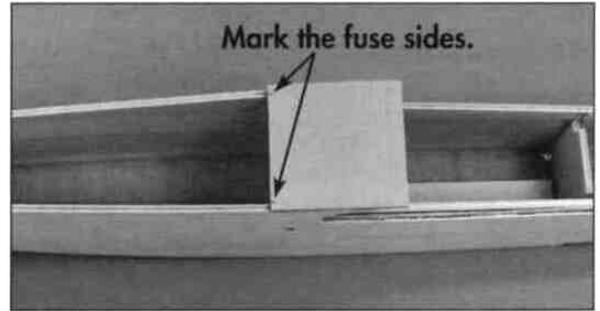
Mark the fuse sides.

□ 5. Use a ballpoint pen to mark the inside edges of the fuse sides on the aft 2" plywood strip.
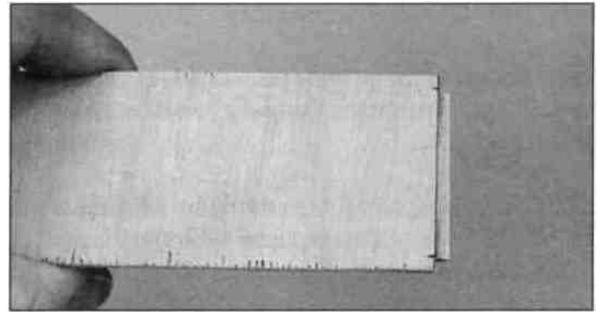
□ 6. Position the hatch on the fuselage and transfer the marks to the hatch so you know where to glue the aft hatch tongue. Glue the aft hatch tongue so 1 /8" of the tongue extends past the aft edge of the hatch.


□ 7. Fit the hatch to the fuselage by first inserting the front hatch tongue under the front fuse top. Next, bend the hatch so you can slip the aft tongue under the aft cabin top. Sand all the plywood pieces **so** they are even with the fuse sides.

Skip to step 11 if you will not be building the functional rudder.

❏ 8. Cut a 36" outer pushrod guide tube to a length of 29". Use coarse sandpaper to roughen the outside so glue will stick. Slide the tube through the exit slot in the rear of the fuselage until the front of the tube extends past bulkhead C the same amount **as** the elevator guide tube (this should be about 2"). Make sure the rudder guide tube does not interfere with the fin LE or the elevator guide tube. If it does, adjust the position of the exit slot until there is **no** interference.
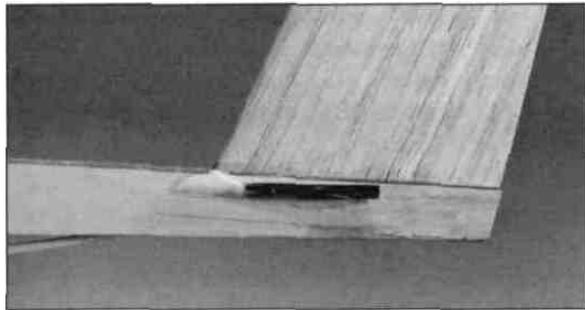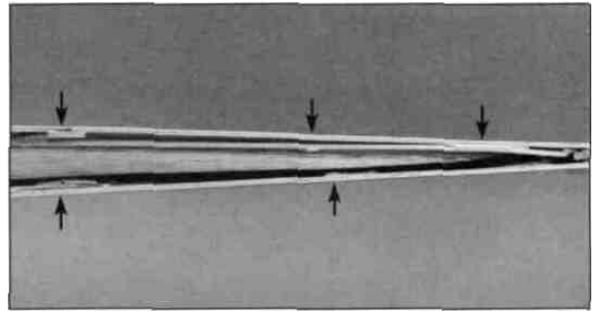
❏ 9. Glue the guide tube to the fuselage side in the exit slot with 30-minute epoxy and microballoons or just thin CA. If you use thin CA, fill the slot around the guide tube with lightweight balsa filler such as Hobbylite".
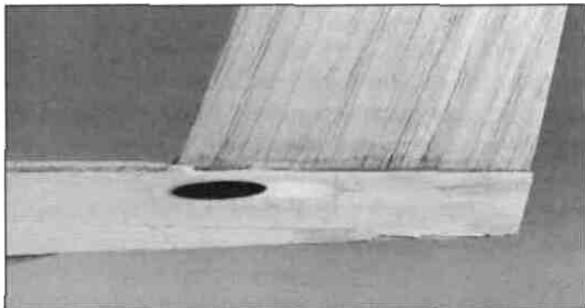
❏ 10. Use your bar sander and 80-grit sandpaper to sand the exit tube and filler flush with the fuselage side.

❏ 11. Glue the elevator guide tube and the rudder guide tube (if you have one) to the inside of the fuselage sides in a few locations with epoxy. Because of the angle at which the guide tubes enter the fuselage at the rear, they should naturally contact the inside of the fuselage sides in a few spots. This is where you should glue them.

❏ 12. Sheet the bottom of the fuselage in a cross-grain fashion with the remainder of the 1/16" x 3" x 24" balsa sheet you used for the top of the fuselage.
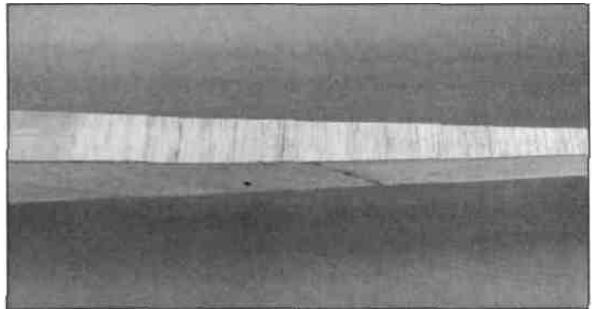
❏ 13. Cut, but do not glue, a strip of 1/16" x 3" balsa to fit on the bottom balsa sheeting joining the aft edge of the bottom ply sheeting as shown on the plan. Taper the aft edge of the sheet. Glue it in position. Use your bar sander and 80-grit sandpaper to sand the bottom sheeting even with the fuselage sides and plywood sheeting.

❏ 14. Make the **tail skid** from a piece of leftover 1/8" plywood. You can glue it now to the bottom sheeting in the location shown on the plan or you can wait until after you cover the fuselage.
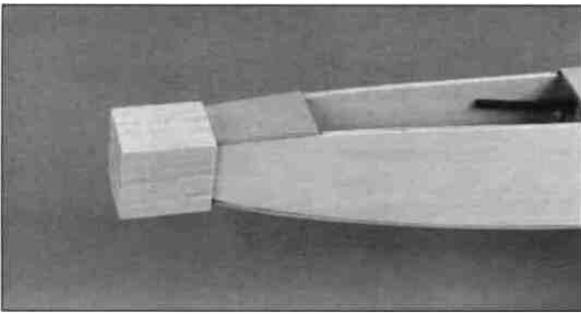
☐ 15. Make sure the front of the fuselage sides, top and bottom are flush with the front bulkhead D. Securely glue the balsa **nose block** in position with medium or thick CA.
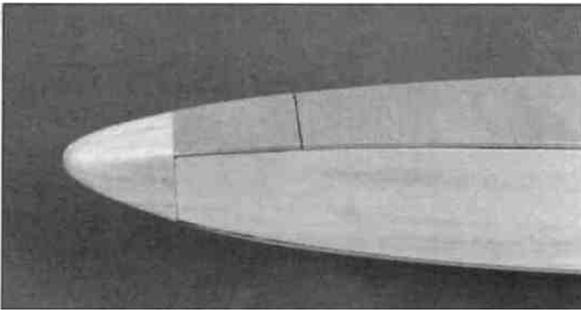
☐ 16. Shape the nose block with a razor plane or a hobby knife, followed by progressively finer grits of sandpaper, to match the **contour of** the fuselage shown on the plan.

☐ 17. If you have drilled holes in bulkheads A and B for the antenna guide tube, install the guide tube. Cut a hole in the bottom of the fuselage near the aft end so the guide tube can exit. Glue the tube in position. Fill the gaps around the tube at the exit and sand it flush with the bottom sheeting after the filler dries.

BUILD THE RUDDER

☐ 1. Position the rudder portion of the plan over your building board. Cover it with wax paper.

☐ 2. Use the remainder of the 3/16" x 1/4" x 24" balsa stick you used to build the fin and an additional 3/16" x 1/4" x 24" balsa stick, to build the rudder framework. Cut the pieces to the correct length. Pin them in their location over the plan and glue them together with medium CA.
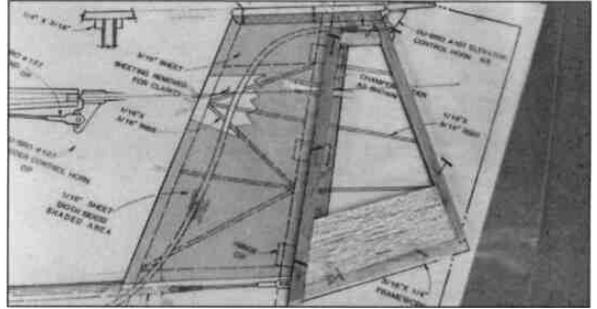

☐ 3. Use the remainder of the 3/16" x 1-3/8" x 24" balsa sheet you also used for the tip of the fin to make the base of the rudder. Glue the base in position with medium CA.

☐ 4. Cut the rudder ribs from the remainder of the 1/16" x 3/16" x 24" balsa stick you originally used for the fin ribs. Glue them in position with medium CA.

☐ 5. Remove the T-pins. Lift the rudder from the plan and peel off the wax paper. Lightly sand the rudder to remove any glue bumps and high spots. If you use a sanding block, be careful not to snag the 1/16" ribs with the edges of the sandpaper.

☐ 6. Round the bottom of the rudder as shown on the plan. Taper the rudder toward the trailing edge to a thickness of approximately 3/32" or round the trailing edge the same as the leading edge of the fin.

Perform steps 7, 8 and 9 only if you are going to build a **functional** rudder.

☐ 7. Cut the hinge slots in the rudder in the location shown on the plan. Shape the leading edge of the rudder to a "V" as shown on the plan.

HINGED RUDDER

1/16" X 1/2" BALSA SHEETS EVEN WITH AFT EDGE OF "V" ON LEADING EDGE OF RUDDER

☐ 8. Cut two 1 /2" x 7" strips from the remainder of the 1/16" x 3" balsa sheet you used to sheet the fin. Glue the strips to both sides of the leading edge of the rudder with medium CA so the front edge of the 1/16" strips are even with the aft edge of the "V as shown on the plan.
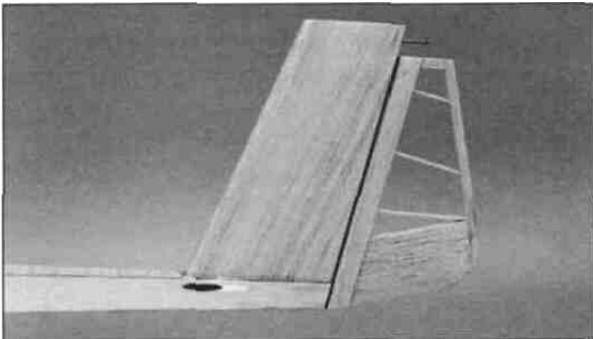
☐ 9. Mark the location of the hinges on the rudder where shown on the plan. Cut the hinge slots. Cut three hinges to the size shown on the plan from the supplied CA hinge strip. Test fit the rudder to the fin with the hinges. If necessary, adjust the width or position of hinge slots that don't align.

Perform steps 10, 11 and 12 only if you are building a <u>fixed</u> rudder.

FIXED RUDDER

1/16" X 1/2" BALSA SHEETS EVEN WITH LEADING EDGE OF RUDDER

☐ 10. Cut two 1/2" x 7" strips from the remainder of the 1/16" x 3" balsa sheet you used to sheet the fin. Glue the strips to both sides of the leading edge of the rudder with medium CA so the front edge of the 1/16" strips are even with the leading edge of the rudder.

☐ 11. Sand the ends of the 1/16" strips so they are even with the top and bottom of the rudder.

☐ 12. Use medium CA to glue the rudder to the fin. Use a straightedge to make sure you glue the rudder on straight.

Tne **optional** *fin tip filler* *constructed in the next three steps enhances your Bobcat's appearance.*
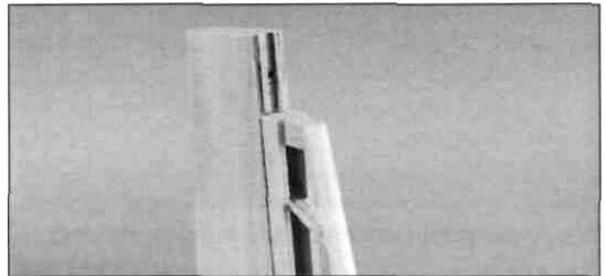
☐ 13. Cut two 1/16" x 1/16" x 1" strips from a piece of leftover 1/16" balsa. Glue them to the top trailing edge of the fin above the rudder with medium CA. The strips should be inset from the outer skin of the rudder by 1/16" but must not obstruct the hole in the pushrod guide tube for the elevator cable.
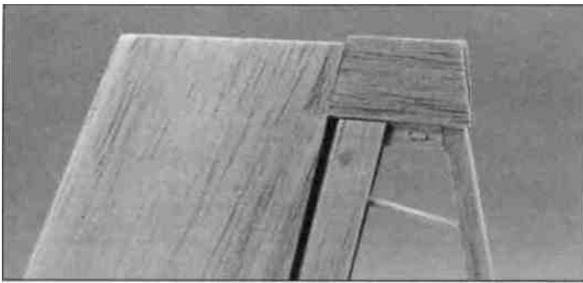
❏ 14. Make two fin tip *fillers* from leftover 1/16" balsa sheeting. Glue them to the trailing edge of the fin so there is 1/16" clearance between the fillers and the top of the rudder (if you have built a non-functioning rudder, the fillers should extend all the way to the rudder tip). Make the fillers oversize so you can sand them to exact shape after you glue them in position.

❏ 15. Sand fillers so they are even with the fop of the fin and the TE of the rudder.

BUILD THE STABILIZER

❏ 1. Position the stabilizer portion of the plan over your building board. Cover it with wax paper.
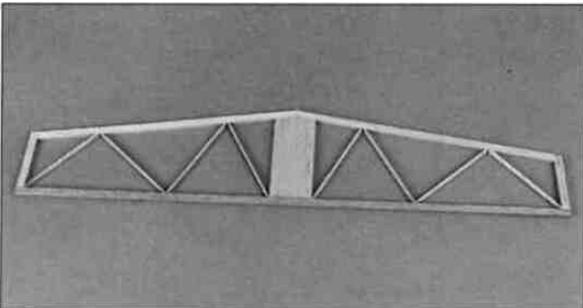
Refer to fhis photo while you are building the stab.

❏ 2. Use the remainder of the 3/16" x 1/4" x 24" balsa stick you used for the rudder and two additional 3/16" x 1/4" x 24" balsa sticks to build the stab framework. Cut the pieces to the correct length. Pin them in their location over the plan and glue them together with medium CA.

❏ 3. Use a hobby knife and a straightedge to bevel one end of the 3/16" x 1-3/8" x 3-3/4" balsa sheet to make the **stab center.** Glue it to the stab LE and TE with medium CA in the location shown on the plan.

❏ 4. Cut the stab ribs from a 1/16" x 3/16" x 24" balsa strip. Glue them in position with medium CA.

Q 5. Remove the T-pins. Lift the stab from the plan and peel off the wax paper. Lightly sand the stab to remove any glue bumps and high spots. With such a lightweight structure it is necessary to even only *the high spots,* so don't weaken the structure by sanding too much.

❏ 6. Use the remainder of the 3/16" x 1-3/8" balsa sheet you used for the fin tip and rudder base to make the elevator. Mark the location of the hinges. Cut the hinge slots and bevel the leading edge to a "V" as shown on the cross section. Taper the elevator toward the trailing edge to a thickness of 3/32" or just round-off the trailing edge.

❏ 7. Test fit the elevator to the stab with four more hinges cut to the size shown on the plan from the hinge strip. If necessary, adjust the width and position of the hinge slots so they align.

❏ 8. Starting with your bar sander, round the leading edge and tips of the stab as shown on the plan. Finish by hand-sanding with progressively finer grits of sandpaper. Blend the ends of the elevator to the stab tips for a finished appearance.
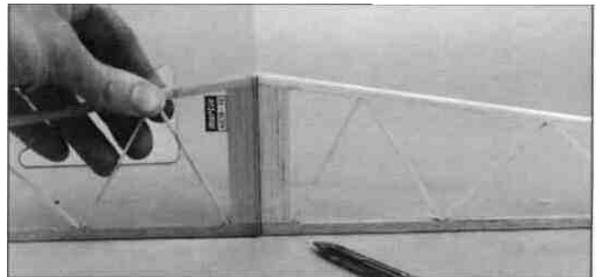
❏ 9. Separate the elevator from the stab and remove the hinges from the stab. Mark a vertical centerline on the both sides of the stab.

MOUNT THE STAB TO THE FIN

Some modelers prefer to glue the stab to the fin *after* they cover them with MonoKote® film. If this is your preference, perform the following steps but use T-pins to temporarily hold the stab to the fin instead of permanently gluing it in position. Continue building, skipping the rest of the steps that can't be done without the stab joined to the fin. Cover the fin, fuse and stab with MonoKote film after the parts have been final sanded. Leave the balsa exposed on the center of the bottom of the stab where it will contact the fin and the triangle stab reinforcements. Return to this part of the manual and glue the stab to the fin. Perform the steps that you skipped.

❏ 1. Drill two 3/32" vertical holes through the centerline on the stab at the locations shown on the plan.

❏ 2. Use a straightedge to draw a centerline on top of the fin. Place the stab on top of the fin as shown on the plan. Align the centerlines on the stab with the leading and trailing edges of the fin and align the holes in the stab with the centerline on the fin.
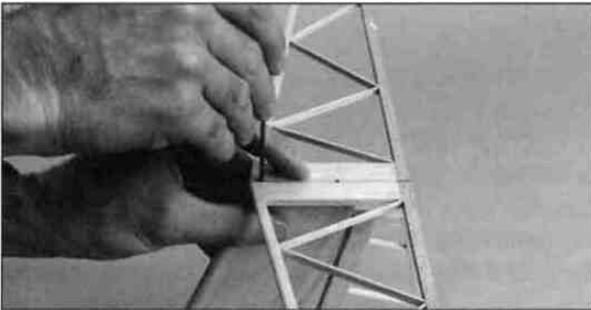
❏ 3. Use the holes in the stab as a "template" to mark the location of the holes on top of the fin with a 3/32" brass tube sharpened at one end, a ballpoint pen or a pencil or the 3/32" dowel sharpened to a point at one end.
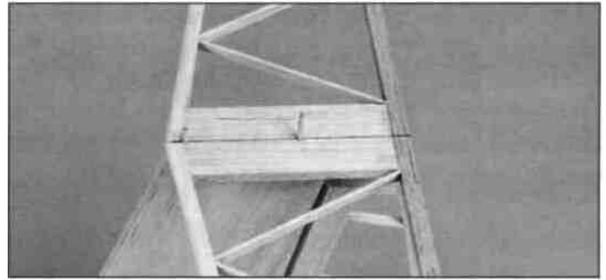
❏ 4. Remove the stab. Drill 3/32" holes in the top of the fin (or use your sharpened 3/32" brass tube to make the holes). Cut two 1" pieces from the 3/32" dowel. Test fit the stab to the fin with the dowels. Remove the stab and the dowels.

❏ 5. Temporarily reattach the elevator to the stab with the hinges.

❏ 6. Spread a film of 30-minute epoxy on top of the fin and the bottom of the stab and pack the holes in the fin with epoxy. Glue the stab to the fin with the dowels using a 90 degree triangle to make sure the stab is perpendicular to the fin. Hold the stab in position with small T-pins and wipe away excess epoxy with a tissue. Do not disturb the model until the epoxy has fully cured.

❏ 7. Trim the dowels so they are nearly flush with the top of the stab. Sand them flush with your bar sander and 220-grit sandpaper.
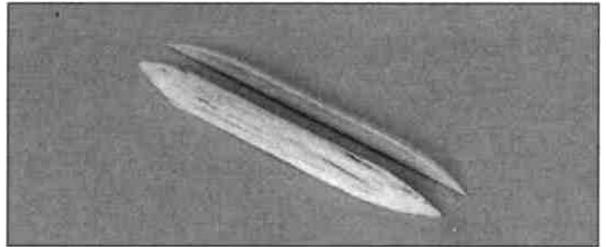
❏ 8. From the 1/4" x 12" triangle stick, cut two 3-1/4" pieces to reinforce the glue joint between the fin and the stab. Bevel the ends of the **stab reinforcements** for a finished appearance.

Note: The plan shows a 1/4" x 3/16" stick in this area, but 1/4" triangle stock is just as strong and provides a more finished appearance.

☐ 9. If you are going cover the model *before* you glue the stab to the fin, set the triangle fin reinforcements aside until you are ready to glue them in place *after* you cover the fin and stab. Otherwise, glue the stab reinforcements to the stab and fin at this time.

A nice-looking fuselage, isn't it? That T-tail is interesting and pleasing to look at. Clean up your workbench, vacuum the floor and get out the wing plan.

BUILD THE WING

BUILD THE CENTER SECTION

☐ 1. Carefully remove the 1/16" die-cut balsa **wing ribs** from their die sheets. If a rib will not easily come out of the die sheet, do not force it. Use a #1 1 blade to cut the wood where necessary. Sand slivers or die-cutting bumps from the ribs.

☐ 2. Arrange the plan so the center section is over your building board. Tape it down.
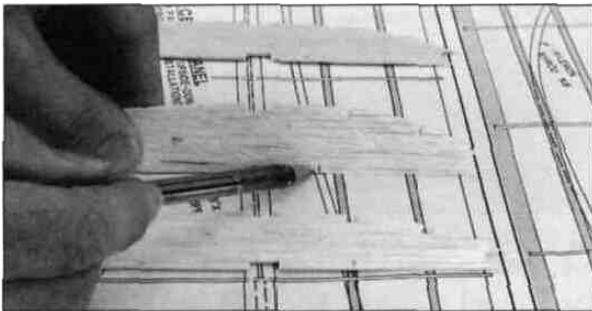
☐ 3. Gather all the #2 ribs (there are fourteen of them). One at a time, position a #2 rib over its location on the plan and use a ballpoint pen to mark the rib where the aileron pushrod guide tube crosses it on the plan.
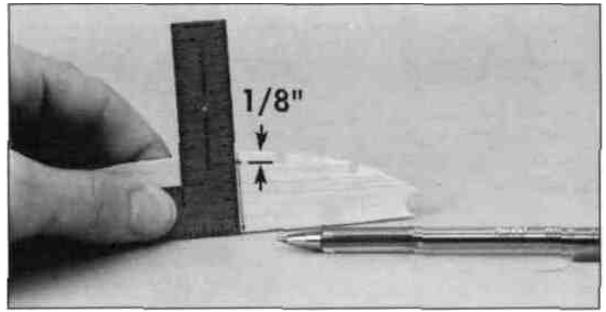
☐ 4. Use a 90-degree square to draw a vertical line on the ribs of the right side panel at the mark you made. Starting at the innermost rib #2, make a mark along the vertical line 1 /8" below the top of the rib. On the next, make a mark 1 /4" below the top of the rib. Continue marking along the vertical line on the rest of the ribs in increments of 1/8" until you reach the sixth and outermost rib, where the mark should be approximately 3/8" from the bottom of the rib.

☐ 5. Mark the ribs of the left side of the panel the same way.
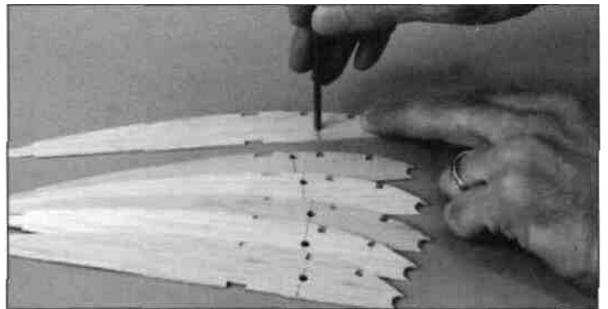
☐ 6. Use a 5/32" brass tube sharpened at one end or a 5/32" drill to cut (or drill) the holes in the ribs at the marks you made. The sharpened brass tube cuts the holes more cleanly. Make a 5/32" hole in the remaining two #2 ribs in the same location as the hole in the outermost #2 ribs. These are the root ribs of the outer wing panels.

☐ 7. Cover the center section of the wing plan with wax paper *(you'll be gluing soon!).*

16

1/8" X 3/8" BASSWOOD SPAR

RIB NO. 1 **1/16" VERTICAL GRAIN SHEAR WEB**

1/16" AFT BOTTOM SHEETING

1/4" STRIP CUT FROM 1/16" LEFTOVER BALSA **BOTTOM TE**
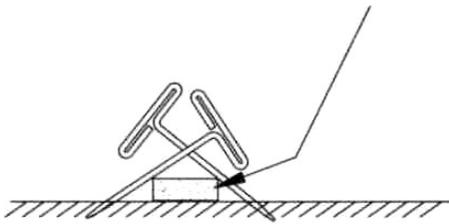
❑ 8. Pin a 1/8" x 3/8" x 30" basswood bottom spar over its location on the plan. Do not attempt to insert the T-pins through the spar *(basswood can be pretty hard stuff).* Insert them over the spar in a criss-cross fashion as shown.

❑ 9. Pin one of the 1/16" x 1-3/8" x 30" balsa **trailing edge sheets** over its location on the plan.

❑ 10. Mark the bottom main spar and the bottom TE where the three #1 ribs contact them.
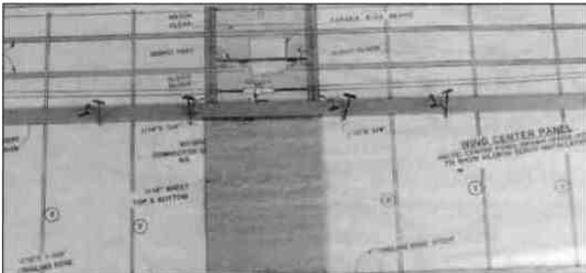
❑ 11. Make the aft bottom **center section sheeting** from the 1/16" x 3" x 24" balsa sheet. Glue it to the bottom spar and bottom TE sheeting.

❑ 12. Cut 1/4" strips from leftover 1/16" balsa sheet to fit under the outer #1 ribs ahead of the bottom spar. Place the strips over their location on the plan but **do not glue** them to the ribs. These are just shims to temporarily align the ribs while you build the wing.

❑ 13. Glue the outer #1 ribs (with the holes you made) on top of the 1/16" aft bottom center section wing sheeting with medium CA. Use a small 90 degree triangle to hold the ribs vertical as you apply the glue.

❑ 14. Use the same 1/16" x 3" balsa sheet you used for the aft bottom center section sheeting to make a vertical grain **shear web** to fit between the #1 ribs. The web should be centered on the spar and extend from the bottom spar to the bottom of the notches in the ribs.

❑ 15. Cut the remaining #1 rib in the middle of the top and bottom spar notches. Discard the front piece.

❑ 16. Test fit the aft piece of rib #1 on the center section sheeting at the marks you made that indicate its location. If necessary, trim the front of the rib so it joins the center web and its notches align with the other #1 ribs (you will probably have to trim about 1/32" off the front of the rib).
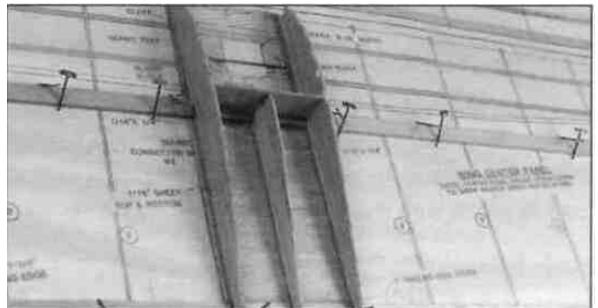
❑ 17. Glue the center rib #1 in position with medium CA.
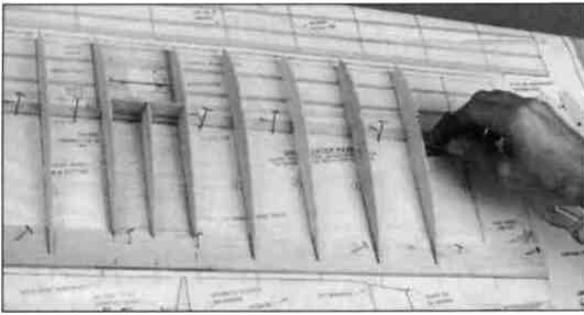
☐ 18. Glue all the #2 ribs to the spar and TE with medium CA. Use a small 90 degree triangle to keep the ribs vertical as you apply the glue.

☐ 19. Read the Tip that follows. Glue the 5/16" x 30" hardwood leading edge dowel to the ribs with medium CA.

Tip: Spray the dowel with CA Accelerator *before* you position it on the fronts of the ribs. This way the CA will be sure to cure immediately, reducing the time you have to hold the dowel in position.
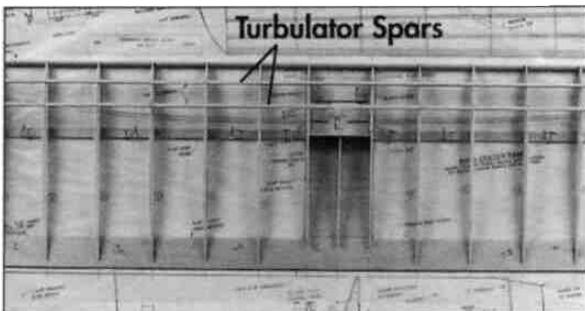
☐ 20. Test fit the 1/8" x 1/8" x 30" basswood **turbulator spars** in the notches of the ribs. Glue them in place with medium or thin CA.

☐ 21. Glue a die-cut 1/16" **gusset** to the bottom sheeting and outer rib #2 at both ends of the wing panel.

☐ 22. One at a time, remove the T-pins from the bottom TE sheeting. Replace them in the rear of the ribs to hold the aft end of the wing panel to your building board. This will allow you to glue the top TE sheeting in position without interfering with the T-pins.

☐ 23. Test fit and final shape the 1/4" x 6" tapered balsa **trailing edge stock** so it is the same height and has the same taper angle as the "notched section" of the #2 ribs and there will be enough room to inset the 1/8" x 3/16" x 4" basswood stick so it will be even with the TE.

☐ 24. Use medium CA to glue the trailing edge stock to the end of the #1 ribs and the bottom TE sheeting. Cut a notch in the bottom TE sheeting for the 1/8" x 3/16"x 4" basswood stick. Glue it in position as shown in the photo.

Note: The 1/8" side of the stick should contact the plan while the 3/16" sides should be vertical.
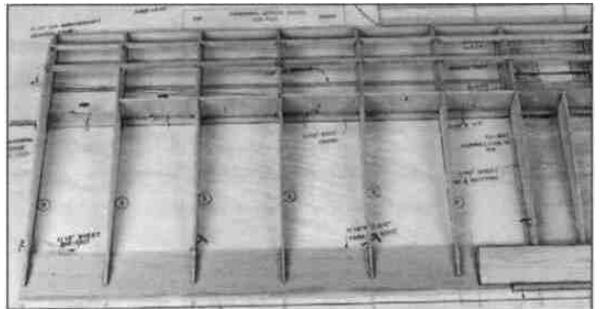
☐ 25. Use the 1/16" x 3" balsa sheet to make six vertical grain shear webs to fit between the #2 ribs of the left side of the panel. Glue all the shear webs - **except the shear web between the outer set of #2**

ribs - to the bottom spar and ribs with medium CA. Set the outermost shear web for the last set of #2 ribs aside for now. Remove the crossed T-pins that are in the way, but reinstall them through the shear web after you glue it in place.

☐ 26. Cut and glue five shear webs in the right side of the center wing panel the same way.

☐ 27. Position the 1/16" x 1-3/8" x 30" balsa upper TE sheet on the ribs. Mark the location of the 1/8" x 3/16" basswood stick and cut a notch in the TE sheet. Glue the TE sheet in position with medium or thick CA.

☐ 28. Test fit the 1/8" x 3/8" x 3" basswood top spar in the notches of the ribs. If necessary, adjust the notches and the tops of the shear webs so the spar is fully seated into the ribs. Glue the spar in place with medium or thick CA.

☐ 29. Use the remainder of the 1/16" x 3" balsa sheet to cover the top center section of the wing between the top spar and the top TE.
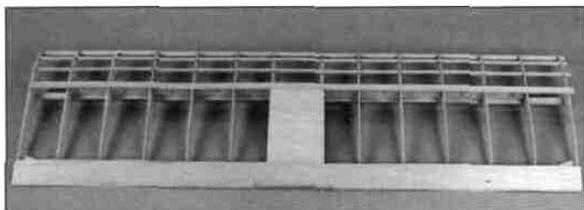
☐ 30. Remove the T-pins. Lift the panel from your building board and peel the wax paper off the wing. The 1/16" shims you placed **under the front of** the #1 ribs should fall off.

☐ 31. Sand the ends of the spars and TE's and LE so they are flush with the end ribs.

BUILD THE AILERON SERVO COMPARTMENT HATCH

☐ 1. From the 1/16" x 3-7/8" x 5-7/8" plywood sheet, cut and glue a 1/2" wide strip to fit between the #1 ribs against the LE. The grain should **run** lengthwise.

☐ 2. Cut a 1/4" x 1/4" **hatch tongue** from the same 1/16" plywood sheet. Glue it to the top of the bottom spar as shown in the *Bottom View Of Servo* Tray sketch on the plan.

☐ 3. Cut the **hatch** from the 1/16" plywood sheet. There should be approximately a 1/8" gap between the sides of the hatch and the #1 ribs. You can see the hatch in the following photo.
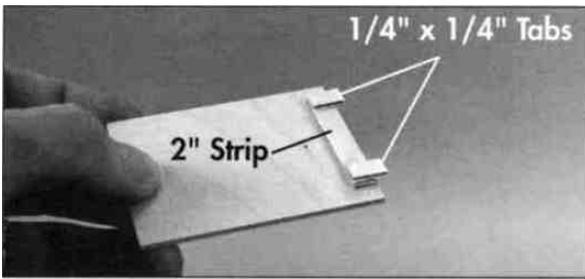
❏ 4. Cut two more 1/4" x 1/4" tabs and one 1/4 x 2" strip to secure the hatch. Glue the 2" strip to the top (inside) of the hatch. Glue the 1/4" tabs to the 2" strip.
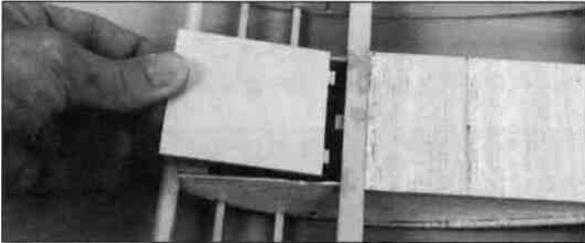
❏ 5. Test fit the hatch over the aileron servo compartment. The tabs on the hatch fit on top of the bottom spar and the tab on the spar supports the back of the hatch.

❏ 6. Hold the hatch in position and drill a 1/16" hole through the hatch and the 1/16" x 1/2" plywood hatch retainer (named "cleat" on the plan). Remove the hatch and enlarge the hole **in the hatch only** with a 3/32" drill bit. Temporarily secure the hatch to the wing with a #2 x 3/8" screw (not included).
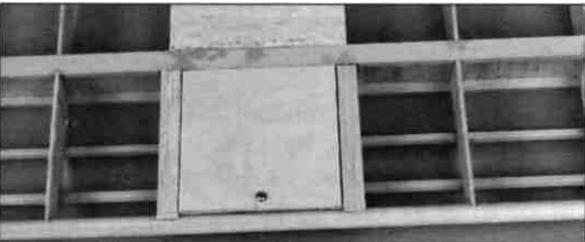
❏ 7. Glue two strips cut from 1/16" balsa to the bottom of both #1 ribs. The strips should align with the sides of the hatch with an approximately 1/32"gap.

❏ 8. Cut the 2" basswood grooved **slider block** into two 13/16" long pieces.

❏ 9. Make the **servo tray** from the remaining 1/16" plywood sheet. For now, cut only the outside edges. Do not cut to fit your servo until the next step. Start by making the tray slightly too long and slightly too wide so you can little by little "fine tune" it for the best fit by sanding the edges. Test fit the servo tray between the #1 ribs with the slider blocks but **do not glue** any of the parts at this time. With the blocks on either side of the servo tray, the assembly should fit tightly between the ribs.
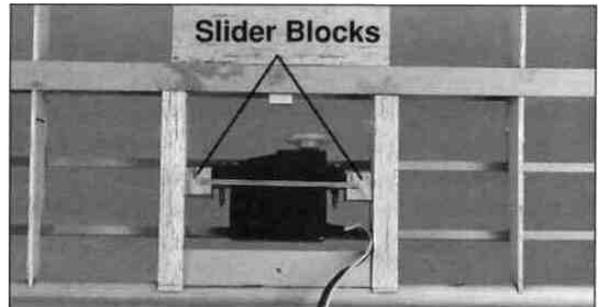
❏ 10. Remove the servo tray and cut out the middle to fit your servo. Make sure that the slider blocks will not interfere with the mount portion of your servo and the rubber grommets. Mount your servo to the tray and reposition the assembly in the wing **without using any glue.** The exact position of the servo will be determined when you connect the servo the aileron control cables.

There, the center section is ready to join to the outer panels. Oops, we'd better build the outer panels then!

BUILD THE OUTER WING PANELS

Build the right wing panel first so your progress matches the photos.

❏ 1. Arrange the wing plan so the right wing panel is over your building board.

❏ ❏ 2. Mark ribs #3, 4, 5 and 6 where the aileron pushrod guide tube crosses them. Cut or drill a 5/32" hole 3/8" above the mark on the ribs.

❏ ❏ 3. Cover the plan with wax paper. Pin a 1/8" x 3/8" x 24" balsa bottom **outer spar** over its location on the plan. Since the spar is balsa, you can stick T-pins through it.

❏ ❏ 4. Cut the **wing tip dihedral gauge** template (located on the back cover) along the outer dotted line. Use rubber cement or spray adhesive to glue the template to a piece of balsa, thin cardboard (the kind from cereal boxes) or plywood. Accurately cut the gauge to the solid outline of the template. You can see the gauge in the photo at the next step.
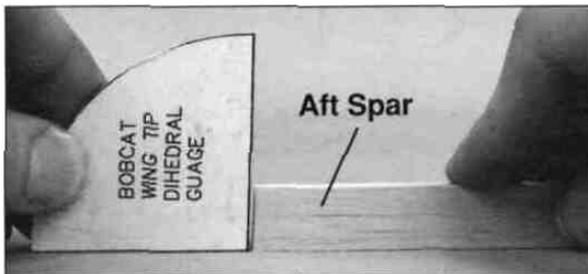
❏ ❏ 5. Use the wing tip dihedral gauge to accurately bevel the end of a 3/16" x 5/8" x 24" balsa **aft spar.** Pin the spar to your building board over its location on the plan so the root end aligns with the plan.

Note: For the best fit between the aft spar and root rib #2, bevel the spar as seen from the top view to account for the forward sweep of the trailing edge.

TRIM 1/16" FROM THE TOP OF RIBS 6 AND 7 BEHIND THE SPAR
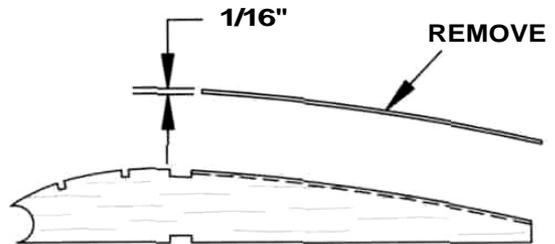
❏ ❏ 6. Use a #11 blade to trim 1/16" **off the top** of ribs #6 & #7 behind the spar.
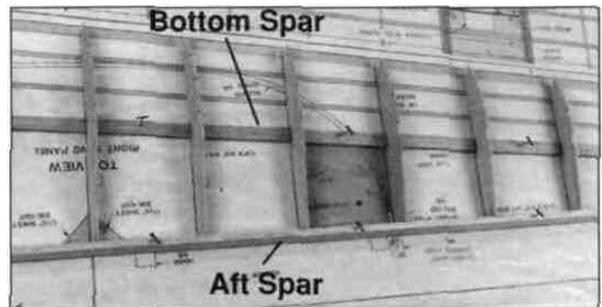
❏ ❏ 7. Test fit and use medium CA to glue ribs #3 through #10 to the bottom spar and the aft spar. Use a small 90 degree triangle to hold the ribs perpendicular as you glue them.
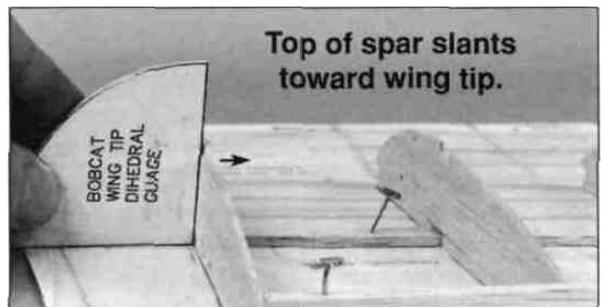
❏ ❏ 8. Position root rib #2 over its location on the plan. Use the dihedral gauge to hold it at the correct angle and glue it to the bottom spar and the aft spar with medium CA.

❏ ❏ 9. Glue the 5/16" x 24" hardwood dowel **leading edge** to the ribs. Use the dihedral gauge to make sure rib #2 it is at the correct angle when you glue the dowel to it.

❏ ❏ 10. Glue the 1/8" x 1/8" x 24" **outer turbulator spars** in the notches of the ribs. Use the dihedral gauge to make sure rib #2 it is at the correct angle when you glue the spars to it.

❏ ❏ 11. Make six shear webs from the 1 /16" x 3" x 24" balsa sheet to fit between the sets of ribs from #2 out to #7. Cut or drill a 5/32" hole 7/16" from the bottom of the web where the aileron cable guide tube passes through.

❏ ❏ 15. Use your bar sander to angle the end of the 5/8" x 1 -3/4" x 24" balsa **trailing edge stock** so it fits against rib #2 when placed against the aft spar. When you have achieved the correct angle on the end of the trailing edge stock, cut it where shown on the plan. Glue it to the aft spar and #2 rib. The approximately 18" of remaining trailing edge stock will be the **aileron.**

❏ ❏ 12. Do not glue the shear web between ribs #2 and #3, but glue the rest of the shear webs between the ribs with medium CA.

❏ ❏ 13. Test fit the 1/8" x 3/8" x 24" balsa top outer spar in the notches of the ribs. If necessary adjust the notches and the tops of the shear webs so the spar is fully seated into the ribs. Glue the spar in place with medium or thick CA. Use the dihedral gauge to hold rib #2 at the correct angle when you are gluing it to the spar.

❏ ❏ 14. Use medium CA to glue three 1/16" die-cut balsa gussets to the ribs and aft spar where shown on the plan.

❏ ❏ 16. From the 1/16" x 3" balsa sheet you used for the shear webs, cut and test fit the sheeting for the aileron pushrod guide tube exit that fits on top of ribs #6 and #7. It is okay if the sheeting extends past the ribs by approximately 3/32" or so. Glue the sheet in position.

❏ ❏ 17. Remove the T-pins from the wing panel. Lift it off your building board and peel the wax paper off the panel. Look for glue joints that don't look strong and reinforce them with medium CA. Pay special attention to the glue joints between the shear webs and the spars.

FINISH THE OUTER PANELS

❏ ❏ 1. Use a razor saw to trim the spars and leading edge dowel so the ends are *nearly* flush with rib *#2* at the root of the panel and rib #10 at the tip of the panel. Sand the ends of the spars and leading edge dowel flush with the root and tip ribs.
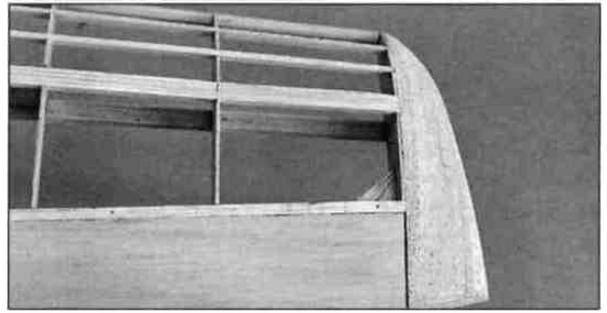
❏ ❏ 2. Sand the end of the 5/8" x 1-3/4" x approximately 18" balsa **aileron** so it accurately matches the end of the trailing edge stock you glued to the wing.
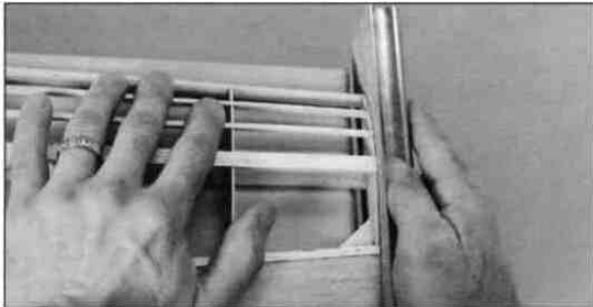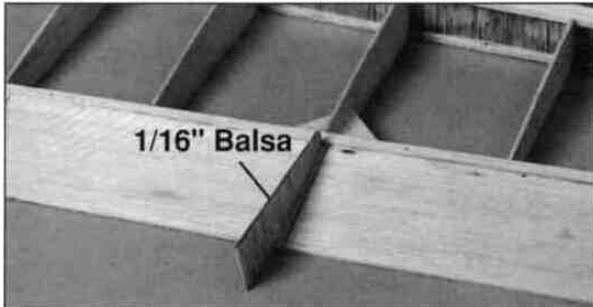
1/16" Balsa

❏ ❏ 3. Place a piece of leftover 1/16" balsa between the end of the aileron and the trailing edge stock to act as a spacer. Cut and sand the tip end of the aileron so it is flush with tip rib #10.

❏ ❏ 4. Cut the 7/8" x 1 -3/8" x 12" tapered **wing tip** stock into two 6" pieces. Use medium CA to glue one of the tips to the panel joining them together while they are both laying flat (so the tip curves down) on your building table covered with wax paper.

❏ ❏ 5. Use a hobby carving knife or a razor plane to roughly carve the tip to the approximate shape. Final shape the tip with progressively finer grits of sandpaper to blend it to the wing and the shape shown on the plan. When you get to the final stages of shaping the tip, place the aileron on the wing to help guide you in shaping the aft end of the wing tip.

USE THE DIMENSIONS SHOWN BELOW TO BEVEL THE AILERON

1/8"

9/32"
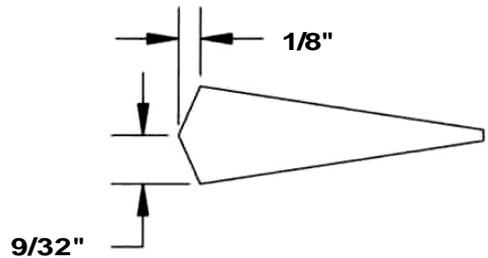
❏ ❏ 6. Mark the locations of the hinge slots on the aileron and the aft trailing edge of the wing. Cut the hinge slots. Make sure the height of the hinge slots on the aft TE and the aileron are the same so the aileron will be centered when you join it to the wing with the hinges. Bevel the leading edge of the aileron as shown in the sketch. Test fit the aileron to the wing with the hinges.

Hey, you've completed the first wing panel already!

❏ 7. Arrange the plan so the left wing panel is over your building board. Return to step 2 at **Build The Outer Wing Panels** on page 21 and build the left wing panel. **Don't forget to switch to the left wing panel so you don't build two rights!**

PREPARE THE WING PANELS FOR JOINING

❏ 1. Sand all three wing panels with fine-grit sandpaper to remove glue bumps. Blend all the ribs to the spars, LE and TE. Smooth all surfaces.
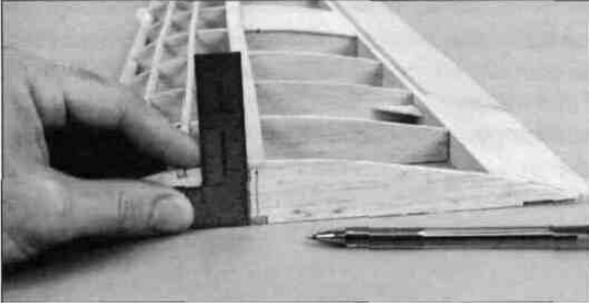
❏ 2. Use a small 90 degree triangle or square to draw a 1/8" wide slot centered between the spars on the #2 ribs on both outer wing panels.

Cut slot to fit dihedral brace.
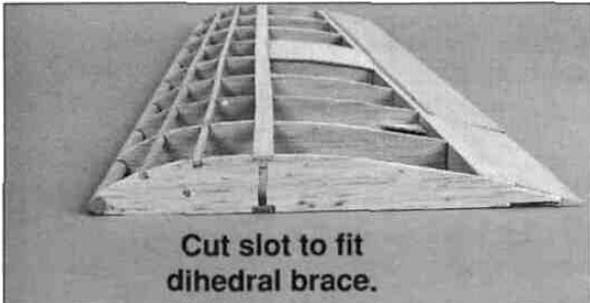
❏ 3. Use a sharp #1 1 blade to cut the #2 ribs along the lines and remove the balsa for the dihedral brace.

❏ 4. Mark and cut the slots on the #2 ribs at both ends of the center wing panel the same way.

❏ 5. Remove the die-cut 1/8" plywood **dihedral braces** from their die sheets and remove slivers or die-cutting irregularities with your bar sander. Position the dihedral braces over the drawing on the plan and mark the "root" and "tip" ends of the dihedral braces as shown.
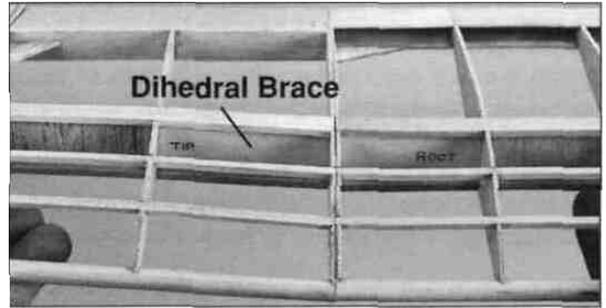
Dihedral Brace

❏ 6. Test join the wing panels with the dihedral braces and adjust the slots in the ribs or the length of the braces so the spars and LE's align and the wing panels fit together without gaps.

JOIN THE WING PANELS

*First join the **right** outer panel to the center panel so your progress matches the photos.*

Weights

3/4"
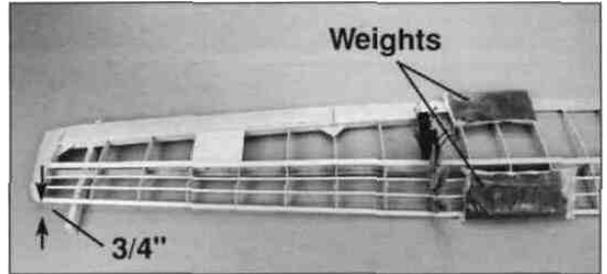
Refer to *this photo for joining the wing panels.*

❏ ❏ 1. With the outer panel temporarily joined to the inner panel, raise the outer panel with a balsa stick, a stack of balsa sheets or something similar, so the tip at the last rib is 3/4" above your building table. Temporarily clamp the panels together with C-clamps, spring clips or clothespins so you will know where to put them when you are actually gluing.

Note: If your aileron servo is mounted in the wing at this time, make sure the cord and connector are not sticking out of the bottom. The center section must rest flat on your table while you join the outer panel.

❏ ❏ 2. Remove the clamps and separate the panels. Lay a piece of wax paper on your building table. Mix a batch of 30-minute epoxy. Coat the joining surfaces with 30-minute epoxy. Join the inner wing panels with the dihedral brace. Refrain from using excess epoxy so the shear webs will fit later. Place the wing on your building table. Immediately proceed to the next step.

o o 3. Place a weight on the center section to hold it down. Prop up the outer panel so the tip is 3/4" above your table. Clamp the wing halves together the same as you did in the first step.

❏ ❏ 4. Wipe away excess epoxy before it cures. Do not disturb the wing until the epoxy is fully cured.

❏ 5. Return to step 1 and join the left panel to the center section the same way.

FINISH THE WING

Glue shear webs to front of dihedral brace & spars.

❏ 1. Use epoxy to glue the four shear webs you cut earlier to the plywood dihedral braces and spars on both sides of the joining wing panels. It does not matter whether you glue the shear webs to the front or back of the shear webs, but do it the same way on all four webs for symmetry.

❏ 2. Sand-off glue bumps and blend the spars **and** LE's and TE's of the joining wing panels.

❏ 3. Make sure the holes in the joining #2 ribs of both wing panels align so you can route the outer aileron cable guide tube. If the holes do not align, open them up with a hobby knife.

INSTALL THE AILERON CABLES

Note: These instructions are written for connecting the ailerons with Great Planes* Flexible Cable Pushrods, though Sullivan Gold-N-Push Rods are shown on the plan. If you decide to use the Sullivan Gold-N-Rods, the instructions are the same for installing the guide tubes, but connect the clevises and ball links as shown on the plan.

❏ ❏ 1. Roughen the outside of a Great Planes 36" Flexible Cable Pushrod guide tube (not included, GPMQ3702) with coarse sandpaper so the glue will stick. Route the guide tube through the holes in the ribs of the right wing panel.

❏ ❏ 2. Use a #11 blade to cut an approximately 1/2" diameter circular notch in rib #1 where the guide tube passes. This will allow the solder connector to clear the rib without interfering. See the photo at step 5.

approx. 1-1/4"

❏ ❏ 3. Cut a 1/2" long slot in the sheeting between ribs #6 and #7 where the guide tube will pass through. Be careful not to make the slot too far aft or the clevis will interfere with the guide tube and limit aileron throw. The aft end of the slot should be approximately 1-1/4" from the aft edge of the aft spar. Route the guide tube through the slot and cut the tube so it protrudes from the sheeting (on top of the wing) about 3/8".
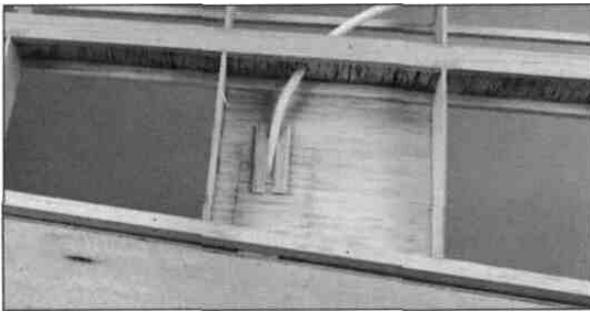
❏ ❏ 4. Glue a 1/16" balsa strip to the inside **of** the sheeting on both sides of the slot to keep the sheeting from splitting.
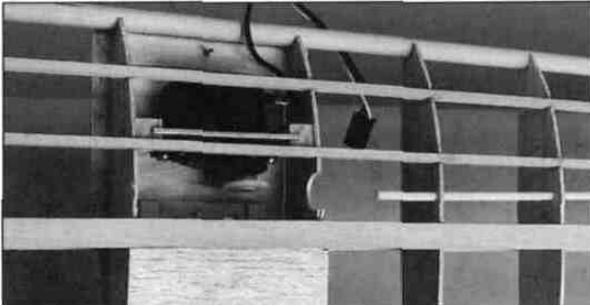
❏ ❏ 5. Cut the "servo end" of the tube about 3/4" from rib#1.

❏ ❏ 6. Glue the guide tube in the slot with microballoons and epoxy. Glue the tube to the ribs with medium CA.

❏ ❏ 7. After the microballoons and epoxy filler has **fully cured,** use your bar sander and 220-grit sandpaper to sand the guide tube and the filler flush with the sheeting. See the photo at step 13.

❏ ❏ 8. Remove the aileron servo. Temporarily install a Great Planes 1/16" Ball Link (not included, GPMQ3842) onto the servo arm or wheel of your servo. Reinstall the servo - the sliders should not yet be glued in place so you can determine the location of the servo after the exact location of the cable and ball link socket have been set.

❏ ❏ 9. Reinstall the aileron servo with the ball link on the servo arm.

❏ ❏ 10. Cut the threads off a Great Planes 2-56 (1/16") Threaded Coupler (included with the Great Planes Flexible Cable Pushrod set) so that 5/16" to 3/8" of the threaded portion remains. **Silver solder** the threaded coupler to one end of the aileron cable. Thread the coupler **all the way** into the dual end ball link (included with this kit).
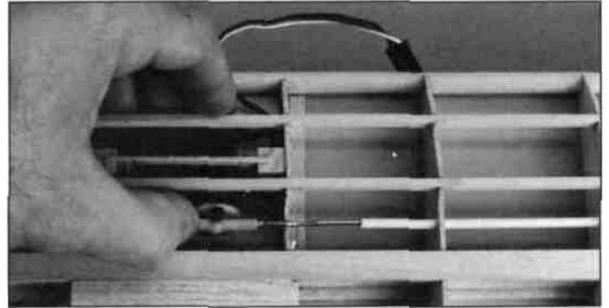
❏ ❏ 11. Route the cable through the guide tube. Align the ball link socket with the ball link on the servo but **do not snap it on.**

❏ ❏ 12. Connect a small control horn (included with this kit) to a Great Planes 2-56 Solder Clevis (not included, GPMQ3810). Place the control horn on the aileron as shown on the plan next to the cable protruding from the wing.

Note: The control horn should be 1/8" **aft** of the aileron pivot point (as shown on the plan) for aileron differential.
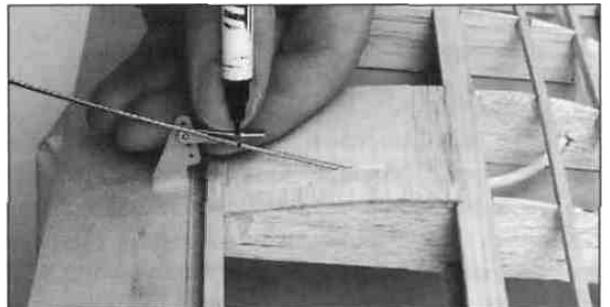
❏ ❏ 1 3. With the aileron neutral, mark the cable where to cut it so you leave enough extra to securely solder it into the clevis. Remove the clevis from the control horn. Cut the cable at the mark you made.

❏ ❏ 14. Silver solder the clevis to the cable. If you find it difficult to cut the cable with wire cutters, use a MultiPro with a cut-off wheel or tin the cable in the area where it is to be cut with wire cutters.

Soak the holes with thin CA.
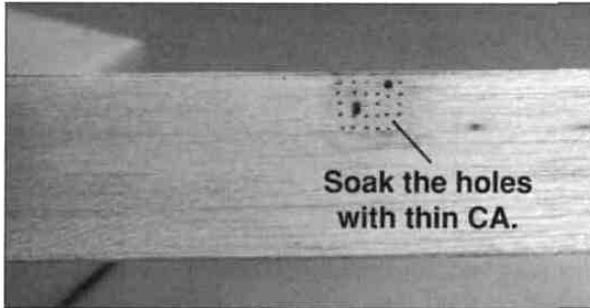
❏ ❏ 15. Place the control horn on the aileron. Drill 1/16" holes in the aileron for the horn mounting screws. Remove the aileron and use a pin to poke holes in the aileron where the control horn will be mounted. Saturate the area and the holes for the horn mounting screws with thin CA. Sand the area smooth.
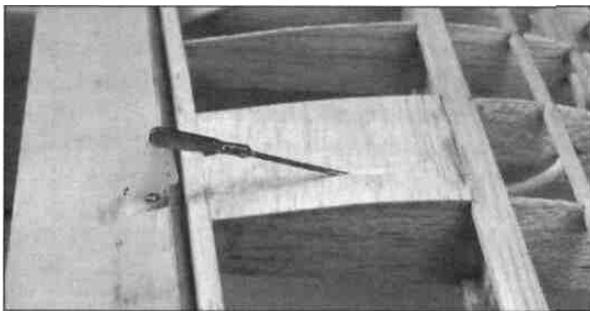
❏ ❏ 16. Mount the control horn to the aileron with two #2 x 1/2" screws. Fit the aileron to the wing with the hinges and connect the clevis to the control horn.

❏ ❏ 17. Place the ball socket over the ball link but **do not snap it on.** Adjust the ball socket on the threaded coupler so the aileron is neutral.

❏ 18. Return to step 1 and connect the other aileron the same way. Do not snap the ball socket onto the ball link until instructed to do so.

MOUNT THE AILERON SERVO

❏ 1. Connect the aileron servo to your receiver and turn on your radio. Center the aileron servo with your transmitter and make sure both ailerons are neutral. You can still do this without snapping the ball socket onto the ball by just fitting the ball socket over the ball, but not snapping it on. It is easiest to center the aileron servo and ailerons now while the ball linkage is easily accessible rather than at the flying field when you will have disconnect the ball link and remove the servo to make an adjustment.

❏ 2. Connect the ball link to the servo arm or wheel on your aileron servo with the small nut included with the ball link. Use thread locking compound or epoxy to make sure the nut is secure.

Servo in line with aileron cables
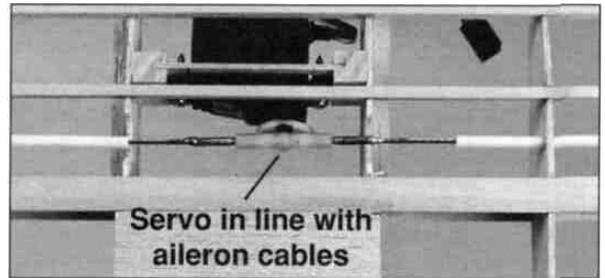
❏ 3. Mix a batch of 30-minute epoxy and glue the sliders to the #1 ribs. Adjust the sliders so you can connect the ball socket to the ball on the servo without bending the aileron cable out of its way. Snap the ball socket onto the ball. Do not disturb the assembly until the epoxy is fully cured.

❏ 4. If you have to make any adjustments to the aileron servo or connection, make them now before you sheet the rest of the center section. You can easily remove the servo from the compartment after you sheet the center section by sliding the servo tray out, but it is easier to access the ball and socket now.

❏ 5. Use the remainder of the 1/16" sheeting to sheet the top center section of the wing forward of the main spar.

INSTALL THE ELEVATOR & RUDDER SERVOS

Back to the fuselage for a little while. It will soon be time for covering!

❑ 1. Cut two 1/4" x 4" strips from leftover 1/8" plywood. Glue them together with medium CA to make the **servo** rails.

❑ 2. From the strips you glued together, cut two servo rails that will fit between the fuselage sides in the servo compartment.

❑ 3. Position your servo(s) on the rails in the fuselage as shown on the plan. Raise or lower the rails so the servo arms (or wheels) will align with the pushrods but make sure the servos will not interfere with the forward wing dowel. There is enough room for standard size servos but most advanced fliers will use mini or micro servos for the least amount of weight.

Servo Rails
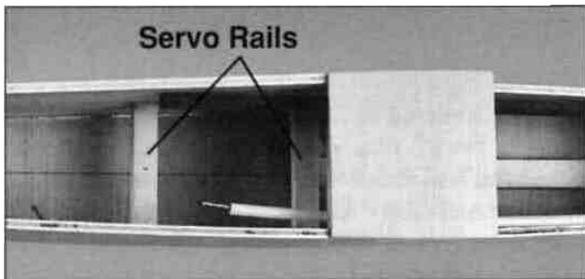
❑ 4. Make sure there is enough space between the rails so you can remove the servos. Glue the rails to the fuselage sides with medium or thin CA.

❑ 5. Mount the servos to the rails with the screws, grommets and brass inserts included with your radio system.

❑ 6. Cut the elevator and rudder (if you have a moveable rudder) guide tubes so they extend approximately 1/4" forward of bulkhead C.

(Servo horn dyed black for clarity)
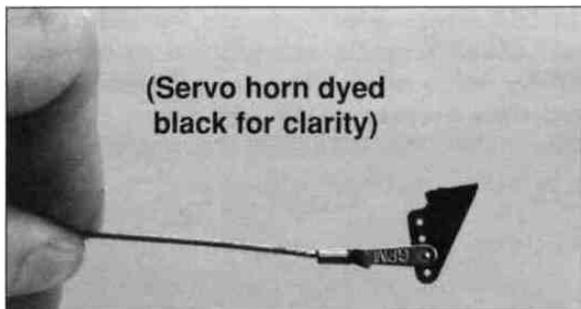
❑ 7. Use silver solder to solder a Great Planes Standard Solder Clevis (not included with this kit, GPMQ3810) onto the elevator cable (included with the Great Planes Flexible Cable Pushrod set previously recommended). Connect the clevis to the second or third hole of a small nylon control horn included with this kit.

❑ 8. Route the cable through the guide tube and position the control horn on the elevator as shown on the plan.

❑ 9. Use the control horns as a template to drill two 1/16" holes to mount the control horns to the rudder and elevator with 2-56 x 1/2" screws in the location shown on the plan. Connect the rudder pushrod and elevator cable to the control horns.
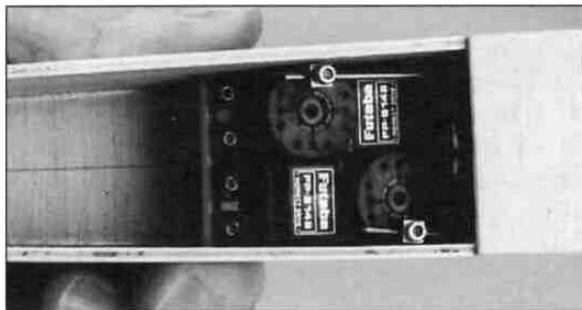
❑ 10. At the servo end, cut the elevator cable and the rudder pushrod to the correct length. Connect them to the servos with your favorite type of connector. On our prototype we used Great Planes Screw-Lock" Pushrod Connectors (not included, GPMQ3870).

❏ 11. Glue the outer pushrod guide tubes to the bulkheads with thick or medium CA.

❏ 12. Wrap your receiver and battery pack in foam rubber. Mount them in the fuselage where shown on the plan. Mount the on/off switch in a location that will not interfere with the pushrods or the radio system.

PREPARE THE MODEL FOR COVERING

❏1. Inspect the wing, fuselage and tail surfaces for glue joints that don't look strong. Reinforce them with thin or medium CA. Make sure the fuselage bottom is securely glued to the fuselage sides in the area of the tow hook anchor.

❏ 2. Temporarily fit the 3/16" wing dowels through the holes in the fuselage. Test fit the wing on the fuselage. If necessary, adjust the shape of the fuselage sides and the aft plywood fuselage top where they fit over the wing.

❏ 3. Remove pushrods, wing dowels, control horns and any other hardware that may interfere with covering.

❏ 4. Fill dents, scratches and glue joints on the surface of the model that may show through the covering with HobbyLite filler. Sand the fuselage so **it** is smooth and even.

COVERING

COVERING TIPS

We recommend you cover your Bobcat with **Top Flite MonoKote** iron-on model covering film. **If this is one of the first times you have covered a model, refrain from attempting a complicated trim scheme.** Add stripes, graphics and various designs to your Bobcat cut from different colors of MonoKote film. Iron them directly over the base color. Try only a single color base (usually a lighter color such as white or yellow) with perhaps a single stripe, your AMA number or even some stick-on graphics. A simple trim scheme will get you in the air faster and look much better than an ambitious a trim scheme that makes your model too difficult to cover.

Here is a "rule of thumb" to keep in mind before you begin: Where possible, apply the covering so all seams face downward or rearward. You can do this by covering the bottom (of the wing, fuse, stab, etc.) first.

Never cut the covering after you iron it to the wood except near the tips. Modelers who do this may weaken the structure which could cause it to fail during flight.

SUGGESTED COVERING SEQUENCE

Tail Surfaces:
1. Stabilizer bottom right and left half
2. Stabilizer top
3. Fin right, then left side
4. Rudder
5. Elevator

Fuselage:
  1. Bottom*
  2. One side, then the other
  3. Top forward, then aft of the hatch
  4. Top aft of wing
  5. Hatch

* Many modelers cover the forward bottom section of the fuselage with two layers of covering or glass cloth and paint the forward bottom section for better protection during landings.

Wings:
  1. Center panel bottom, then top
  2. Outer panel bottoms, then tops
  3. Ailerons
  4. Hatch

If you decided to cover your Bobcat before you glue the stab to the fin, return to page 15 and follow the instructions to glue the stab.

ADD WASHOUT & CORRECT TWISTS

❏ 1. Due to the lightweight structure of the Bobcat and the shrinkage of the covering, the wing and stab can warp or twist. Correct the twists by carefully twisting the part in the opposite direction. Heat the covering with your iron or heat gun until the part **is** flat and free of warps.

Add "washout" to the wing tips. Washout is where the trailing edge of the wing at the tip is twisted upward. This gives the wing tip a lower angle of attack than the rest of the wing, which will reduce the tendency for the wing to "tip stall."

❏ 2. Lay the center section of the wing on your building table. Place weights on top of it to hold it down. Twist the trailing edge upward while you heat the covering until the wrinkles disappear. Let the covering cool. Measure the distance between the trailing edge of the wing at the tip and your building table. It should be 1/4". You may also have to heat the bottom of the outer wing panel.

❏ 3. Add washout to the left outer panel the same way. Make sure the center section of the wing is flat and warp free as described in step 1.

HINGE THE CONTROL SURFACES

Use the instructions below to hinge the ailerons, elevator and rudder (if you have built a steerable rudder). Hinge the elevator first because it's the easiest.
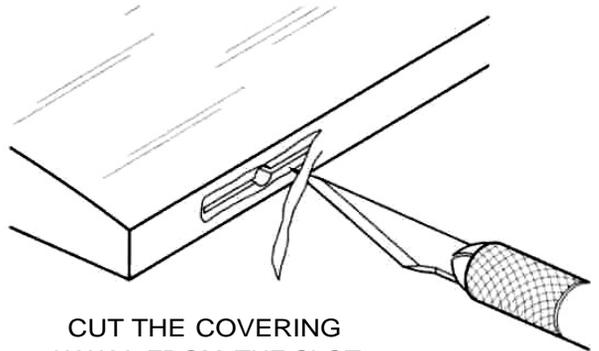
CUT THE COVERING
AWAY FROM THE SLOT

❏ 1. Use your hobby knife and a sharp #11 blade to remove a small strip of covering from the hinge slots.

TEMPORARY PIN
TO KEEP HINGE
CENTERED
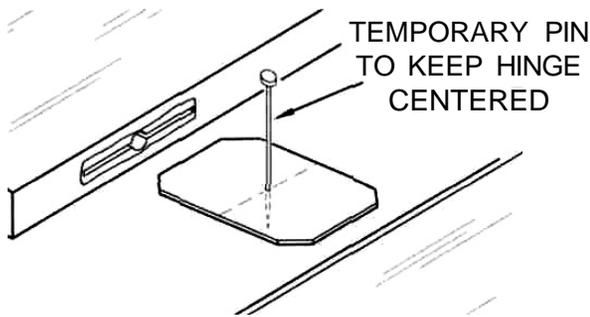
❑ 2. Join the elevator to the stab with the hinges. If the hinges will not stay centered, stick a pin through the center of the hinge. Remove the pins after the hinges are glued in place.

❑ 3. There should be a **small** gap between the control surfaces (just enough to see light). A small gap is desirable so you do not inadvertently glue the parts together.

❑ 4. Carefully apply 4 drops of thin CA to both sides of the hinges. Keep a cloth handy to wipe away excess CA. If you spill a few drops of CA on the covering, you can use CA Debonder (GPMR6039) to remove it or carefully peel it off with a hobby knife after it fully cures.

Do not use accelerator on any of the hinges. Do not glue the hinges with anything other than thin CA and do not attempt to glue one half of the hinge at a time with medium or thick CA. They will not be secure and the controls could separate while the model is flying.

❑ 5. Let the CA fully cure. Carefully Rex the elevator several times to check the movement.

❑ 6. Hinge the rest of the controls the same way.

FINAL HOOKUPS & CHECKS

❑ 1. Reinstall the pushrods and connect the servo control horns the same way you did during construction.

CUT   CUT

RUBBER BAND   T-PIN

STRAIN RELIEF INSIDE FUSELAGE

ANTENNA HOLDER AT THE TOP OF THE VERTICAL STABILIZER
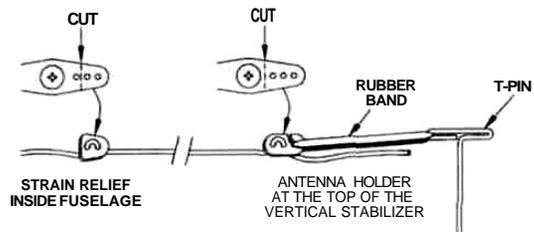
❑ 2. Route the receiver antenna through the guide tube (if you installed one) or make a **strain relief** and an **antenna hook** from a cut-off servo arm as shown in the sketch.

❑ 3. Cut a hole in the covering over the wing dowel holes in the fuselage. Install the dowels and glue them in position with medium CA.

❑ 4. Apply 1/16" thick Great Planes Single-Sided Foam Tape (GPMQ4422) to the wing saddle of the fuselage.

❑ 5. Drill a #36 (or 7/64") hole through the fuselage bottom and the tow hook anchor. From the top, enlarge the hole **1/4" deep in the tow hook anchor only** with an 11/64" (or 5/32") drill to accept the 6-32 blind nut for the tow hook.

TOW HOOK ANCHOR

6-32 BLIND NUT

FLAT WASHER

6-32 NUT

NO. 6 TOW HOOK
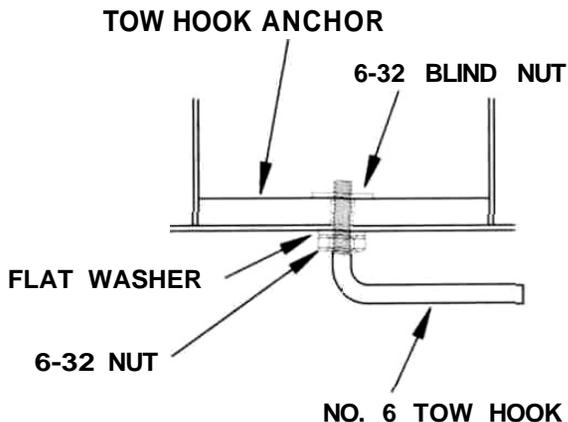
❑ 6. Install the tow hook as shown in the sketch and secure the blind nut and the hex nut with thread lock.

BALANCE THE MODEL

This section is important and must NOT be omitted. A model that is not properly balanced will be unstable and possibly unflyable.

❏ 1. **Accurately** mark the balance point on the bottom of the wing near both sides of the fuselage with tape or a felt-tip pen. The balance point is shown on the plan and is 3" (77mm) aft of the leading edge.

❏ 2. Place the wing on the fuselage. Hold it in place with two or four #64 rubber bands. When it is time to fly your Bobcat, you should secure the wing with at least eight rubber bands crossing the last two.
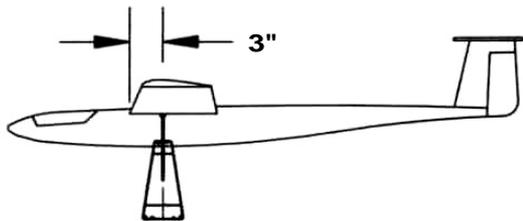
❏ 3. Lift the model with your fingers at the balance point or make a simple stand as shown in the sketch. Shift the battery pack and/or the receiver to get the model to balance. Only if necessary, add additional weight to the nose or tail to achieve the correct C.G. Great Planes Adhesive Lead Weights (GPMQ4485) work well for this task.

SET THE CONTROL THROWS

❏ 1. Center the servos before you measure the control throws. With the transmitter and receiver turned on, neutralize the elevator, rudder and ailerons on the model.

❏ 2. Measure the throws at the widest part of the trailing edge of the rudder and elevator. After a few flights you may change the throws to suit your flight style or the weather conditions.

We recommend the following control surface throws:

Ailerons: 1 /2" up and 1 /4" down

Elevator: 1 /4" up and down

Rudder: 3/4" right and left

❏ 3. After you set the control throws and position the pushrod connectors in the correct holes in the servo wheels, securely fasten the pushrod connectors to the servos with the nylon fastener on the bottom of both connectors. Install the screws that hold the servo wheels to the servos.

PREFLIGHT

AT HOME:

Charge Your Batteries

Follow the battery charging instructions in the manual that came with your radio control system. You should **always** charge your batteries the night before you fly and at other times recommended by the radio manufacturer.

Ground Check Your Model

Inspect all screws and connectors. **Make sure you install the screw that holds the servo arm onto the servos** and that the servo cords are securely connected to the receiver. Check the security of the hinges by lightly tugging on the control surfaces.

AT THE FLYING SITE:

Range Check Your Radio

Check the operational range of the radio before the first flight. **Before you turn your radio on the first thing you always must do is make sure no one else is on you frequency (channel).** Most model flying fields utilize frequency control so familiarize yourself with their system. Collapse your transmitter antenna and turn on the transmitter, then the receiver (preferably the receiver should never be on by itself). You should be able to walk at least 100 feet away from the model and still have control. Have an assistant stand by your model and tell you what the control surfaces are doing while you operate them from the transmitter.

If the control surfaces do not **always** respond correctly, don't fly! Find and correct the problem first. Look for loose servo connections or corrosion, a defective on/off switch, low battery voltage or a defective cell, a damaged receiver antenna or a receiver crystal that may have been damaged from a previous crash.

FLYING

The Bobcat is intended for intermediate to experienced fliers, but here are some flying notes for those nearer the "intermediate" end of the scale.

FIND A SAFE PLACE TO FLY

If a club flying site is not available, find a large, grassy area at least 6 miles away from houses, buildings, streets and other R/C activity like boats and cars. Avoid flying R/C models near traffic or areas such as parks, school yards, office buildings, etc. that may attract unrestrained observers,

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If you are at a club site or another area where there are other fliers present, make sure you are not on the same frequency. Learn the frequency control system if one is used.

If you are not an experienced pilot, find an expert to help you with your first flights. Although the Bobcat is an easy model to fly, an experienced pilot can save you lots of time and frustration by helping you get the Bobcat in the air and back to the ground safely for the first couple of launches.

TRIM FLIGHTS

Make a couple of trim flights before each flying session (and especially before the maiden voyage) to make sure your Bobcat is properly trimmed and the controls work properly. Fly the trim flights over a clear, grassy field or strip. Turn on the transmitter first, then the receiver. Hold the Bobcat by the fuselage under the wing with the wings level, the nose pointed slightly down and facing into the wind. It is important that you hand launch the model with the wings level and the nose pointing at a spot **on** the ground about 50 feet ahead. Have a friend stand to the side and tell whether the nose is pointing up or down. If you launch your Bobcat with the nose up or throw it too hard it will climb for a few feet, stall and fall nose first straight into the ground. With the nose pointed down slightly the sailplane will accelerate until it picks up enough speed to level off and glide. Launch the plane with a gentle push forward. With a little practice you will be able to launch the Bobcat perfectly so it makes a long, straight flight path. Don't attempt to climb but maintain altitude or a gentle descent.

Once you are confident with hand launching, you can execute gentle turns with a light touch of aileron (and rudder if you've built it in). Go light on the ailerons - remember the wing will dip slightly when you apply ailerons. Relax the ailerons just before the model touches the ground. You can also practice "flaring" by slowly applying up elevator as the

Bobcat nears the ground. It will continue to fly just a few inches off the ground for a surprisingly long distance. It is important you don't over-control the model. Make control inputs **slowly** and **smoothly.**

HI-START LAUNCH

If you are an inexperienced pilot, you should reserve first flight attempts for calm days when the wind is five to seven mph or less. Inexperienced pilots can find it difficult to keep a non-powered model upwind in heavy wind conditions. A calm evening an hour or so before sunset is a great time for a relaxing first flight.

Follow the instructions that came with your Hi-Start and lay it out directly into the wind. Turn on your transmitter and receiver. Pull the Hi-Start approximately twice as far back as the length of the rubber tubing (pull back 200' if you have 100' of rubber tubing) or whatever the Hi-Start instructions state. If you have a scale, approximately 8 pounds of tension is adequate. You may use more tension after you are acquainted with the launching procedure.

Hook your Bobcat to the Hi-Start and hold it above your head with the wings level. Point the nose slightly upward and directly into the wind. Give a gentle push forward and it will climb like a kite. You should not have to touch the elevator while the Bobcat is climbing, but you will probably have to work the ailerons a little bit to keep it going straight. As the rubber relaxes, the model will level off and the ring at the end of the Hi-Start will release from the tow hook. Sometimes a little bit of down elevator is required to release the Hi-Start. The wind will open the parachute on the end of the Hi-Start and it will lay the line and rubber cord on the ground directly facing into the wind for your next flight.

FLIGHT

Keep your Bobcat upwind and perform gentle "S" turns to acquaint yourself with the feel and response of the ailerons. Adjust the trims on your transmitter a little at a time until the plane will fly straight and level. If you are losing altitude rapidly, do not attempt to turn the model. Let it approach the ground the same way you did when you were hand launching it, then land. Always land upwind! If, on the other hand, you have enough altitude and you are ready, execute your first 360 degree circle to the right or the left. Try not to let the model get behind you so it is always upwind. Be ready for the nose to drop a little and flight speed to increase. Toward the middle of the turn, apply a little up elevator to level the nose or maintain a steady descent (again the same as when hand launching). The nose will level as the model turns back into the wind. Be aware that at the moment the nose is pointing toward you, the controls may seem "backward." Just don't do anything radical and hold the transmitter sticks in the same position until the nose is pointing away from you again.

You will probably have only enough altitude to execute one or two turns, so now it should be time for a landing approach. Remember, the landing is the same now as it was when you were hand launching, so it should be nothing new. Estimate the distance required to bleed off your altitude so you do not overshoot the landing too much and fly far past yourself or land short of the field. It is better to land far away **into the wind** than it is to land with the wind (or in a cross wind) or end up landing while the model is in a banked turn with one of the wing tips down. Bring the model around you so it is facing you and pointing into the wind. Set up for a landing. If you get disoriented, turn your back to the model so you are "facing" the same way it is (but turn your head so you can still see it!). Make your landing approach, level the wings, then flair, adding a little up elevator allowing the model to skim the ground until it touches down.

You've done it. Take a break, relax for a *few minutes, then string out that Hi-Start for another flight!*

FLIGHT LOG

Date	Comments
/ /	Started construction
/ /	Finished construction
/ /	First flight
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If you would like to keep your manual intact, photocopy the dihedral gauge shown below and use the copy to make your gauge. Instructions for constructing the gauge are listed at step 4 on page 21.

Note: Be sure to copy the gauge at 100% or a 1:1 setting - no reduction or enlargement.

BOBCAT
DIHEDRAL
GAUGE
1.75 degrees