



NOBLER



Wingspan: 51 in [1295.4 mm]
Wing Area: 550 sq in [35.5 sq dm]
Weight: 3-1/2 to 5-1/2 lb. [1588-2495g]
Wing Loading: 14.7 - 23.0 oz/sq ft.
[44.8-70.2 g/sq dm]
Fuselage Length: 42-3/8 in [1076 mm]

WARRANTY.....Top Flite Models guarantees this kit to be free of 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 Top Flite's liability exceed the original cost of the purchased kit. Further, Top Flite reserves the right to change or modify this warranty without notice. In that Top Flite 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 the buyer is not prepared to accept the liability associated with the use of this product, the buyer is advised to immediately return this kit in new and unused condition to the place of purchase.**

Top Flite Models P.O. Box 788 Urbana, IL 61803

Technical Assistance Call (217)398-8970 productsupport@top-flite.com

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

TABLE OF CONTENTS

INTRODUCTION	2
PRECAUTIONS	3
DECISIONS YOU MUST MAKE	3
Engine selection	3
Retractable landing gear	3
Flaps	4
NOTES FROM THE DESIGNER	4
OTHER ITEMS REQUIRED	5
Building supplies	5
DIE-CUT PATTERNS	6 & 7
Tools	8
IMPORTANT BUILDING NOTES	8
GET READY TO BUILD	9
BUILD THE TAIL SURFACES	9
Build the stabilizer	9
Build the elevators	11
Build the vertical fin	12
Build the rudder	13
Hinge the elevators and rudder	13
BUILD THE FUSELAGE	14
Prepare the fuselage sides	14
Frame the fuselage	16
Install the pushrods and servos	18
Install the receiver	21
Finish the fuselage	22
BUILD THE WING	24
Build the right panel	24
Build the wing tips	30
Build the ailerons	30
Build the flaps	31
Hinge the ailerons and flaps	32
Join the panels	32
Mount the servos in the wing	33
FINAL CONSTRUCTION	35
Mount the wing to the fuselage	35
Mount the stab and fin	38
Mount the fuel tank	39
Rough sand the model	39
Install the landing gear	39
Mount the engine	41
Install the engine cowl	41
Balance the airplane laterally	43

Prepare the model for covering	43
FINISHING	43
Cover with MonoKote	43
Covering sequence	44
Painting	44
Join the control surfaces	44
FINISHING TOUCHES	46
GET YOUR MODEL READY TO FLY	46
Balance your model	46
Final hookups and checks	47
Control surface throws	48
PREFLIGHT	48
Identify your model	48
Charge your batteries	48
Balance your propeller	48
Find a safe place to fly	48
Ground check your model	48
Range check your radio	48
Checklist	49
ENGINE SAFETY PRECAUTIONS	49
AMA SAFETY CODE	50
FLYING	50
Takeoff	50
Flight	50
Landing	50
TWO-VIEW DRAWING	back cover

**PROTECT YOUR MODEL,
YOURSELF & OTHERS
FOLLOW THESE IMPORTANT
SAFETY PRECAUTIONS**

Your R/C Nobler is not a toy, but a sophisticated working model that functions very much like an actual airplane. Because of its realistic performance, if you do not assemble and operate your R/C Nobler correctly, you could possibly injure yourself or spectators and damage property.

To make your R/C modeling experience totally enjoyable, get assistance with assembly and your first flights from an experienced, knowledgeable modeler. You'll learn faster and avoid risking 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.

You can also contact the Academy of Model Aeronautics (AMA), which has more than 2,500 chartered clubs across the country. We recommend you join the AMA which will insure you 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.

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN 47302
(800) 435-9262
Fax (765) 741-0057

or via the Internet at: <http://www.modelaircraft.org>

INTRODUCTION

Congratulations and thank you for purchasing the **Top Flite Gold 30th Anniversary Edition R/C Nobler**. We are sure you are eager to build and fly your R/C Nobler, just as we were eager to build and fly our prototypes.

The original R/C Nobler was popular in the early 1970's and had a reputation for being highly maneuverable and aerobatic. It was a short coupled model, which enhances snap rolls and tumbling type maneuvers.

The new Gold 30th Anniversary Edition R/C Nobler retains all of the original flight characteristics, and builds on them with the use of today's computer radio

systems. The model has been engineered to allow the installation of up to 7 servos, as well as retractable landing gear.

Well, this should be enough to get your juices flowing, so get your other projects off your workbench, say goodbye to your significant other for a while and...keep reading!

NOTE: We, as the kit manufacturer, provide you with a top quality kit and great instructions, but ultimately the quality and flyability of your finished model depends on how you build 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.

Please inspect all parts carefully before you start 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 or e-mail us at:
productsupport@topflite.com.**

We'll be glad to help. If you are calling for replacement parts, please look up the part numbers and have them ready when you call.

PRECAUTIONS

1. You must build the plane **according to the plan and instructions**. Do not alter or modify the model, as doing so may result in an unsafe or unflyable model. **In a few cases the plan and instructions may differ slightly from the photos. In those instances the plan and written instructions are correct.**
2. You must take time to build **straight, true and strong**.
3. You must use a proper R/C **radio** that is in first class condition, the correct sized **engine** and correct **components** (fuel tank, wheels, etc.) throughout your building process.
4. You must properly **install** all R/C and other components so that the model operates properly on the ground and in the air.
5. You must **test** the operation of the model before every flight to insure that all equipment is operating and you must make certain that the model has remained structurally sound.
6. If you are not already an experienced R/C pilot, you must **fly** the model **only with the help** of a competent, experienced R/C pilot.

Remember: Take your time and follow instructions to end up with a well-built model that is straight and true.

DECISIONS YOU MUST MAKE

ENGINE SELECTION

Recommended engine size:

.25 to .46 cu. in. [4.1 to 7.5cc] **2-stroke**
.40 to .52 cu. in. [6.5 to 8.5cc] **4-stroke**

Your Top Flite Gold 30'th Anniversary Edition R/C Nobler will perform well with any of the engines within the recommended range, but will handle best with engines closer to the higher end of the recommended size range. The inexpensive O.S. .40 LA has more than adequate power to perform even the most demanding aerobatic maneuvers.

The included Great Planes Adjustable Engine Mount will hold a range of engines from .25 cu. in. 2-stroke through .52 cu. in. 4-stroke.

RETRACTABLE LANDING GEAR

You may build your R/C Nobler either with fixed or retractable landing gear. All the hardware you need for fixed gear is supplied with this kit. We also provide detailed instructions on how to install retractable landing gear available from Great Planes. The Great Planes mechanical retractable landing gear recommended and shown in this manual is light, inexpensive and strong. You may choose to use another type of retract but it is up to you to make modifications required to fit them.

(continued on page 4)

For Retractable Landing Gear you will need these items (not included):

Great Planes Retracts (GPMQ2905)
Retract servo (FUTM0670 or HCAM0160)
(2) 2-1/4" [57mm] wheels (GPMQ4222)
(2) Nylon Clevis (GPMQ3800)
(2) 2-56 x 12" [305mm] pushrod, threaded one end (GPMQ3750)
(2) Screw-Lock connectors (GPMQ3870)
(8) #4 x 3/8" [9.5mm] flat head sheet metal screws

FLAPS

Your R/C Nobler is designed to incorporate flaps. You must build these flaps, but you do not have to make them operational. If you do not want operational flaps simply glue them into place. As the wing is removable, the flaps cannot be mechanically coupled to the elevator as the original R/C Nobler could.

For normal (independent) flap operation, only one servo is required. This allows the flaps to be used as normal flaps as well as for elevator to flap mixing with a computer radio system.

Slight trim changes are needed when flaps are extended. The trim corrections are discussed later in the control surface throws section and you will find more information on the flaps in the *Flying* section and the radio installation section.

For Flaps, you will need the following additional item:

one standard servo.

NOTES FROM THE DESIGNER

When I became interested in modeling as a kid the Top Flite Nobler was a very popular control line model. I built and flew several of them and still have many fond memories from that time, almost fifty years ago.

When the Top Flite R/C Nobler was introduced I just had to have one. That was thirty years ago, and it was a great flying model in its day. Now I design models for Top Flite and jumped at the chance to redesign the model for the anniversary re-release of this classic model. Isn't this hobby great!

While the original R/C Nobler was a great flying model, it did have a number of problems. It was difficult to build, had terrible die-cutting and required a lot of sanding and shaping. It also had some structural problems. We have tried hard to correct these problems. You will note that the aft section of the model and the tail feathers have been changed to improve the flying characteristics.

The original R/C Nobler had a D-tube wing construction, but the spar was just a 1/16" balsa web - with nothing else, no spars. It was not uncommon for the wing to fail during snap rolls. The new version of the model also has a D-tube wing construction, but it has top and bottom basswood spars with a die-cut 3/32" I-beam type web. The original model had balsa block wing tips that needed to be carved and sanded. The new version of the model has wing tips built from die-cut parts, much like the control line model did.

The fuselage of the original R/C Nobler was built from die-cut sides with many balsa blocks added. These blocks required considerable carving, shaping and sanding. The turtle deck had an annoying habit of cracking, causing the tail feathers to loosen. The

new version of the model has no blocks at all. The model has die-cut sides and formers that are then sheeted. The turtle deck and tail section have been redesigned and strengthened.

The tail feathers on the original R/C Nobler were made from 1/4" sheet balsa and were a bit heavy. On hard landings the weight of the tail feathers would cause the turtle deck to crack at various glue joints. The tail feathers on the new version are built-up for lightness and strength from sticks that are then sheeted with 1/16" balsa.

I did not enjoy building the original version of the model. The die-cutting was bad, parts fit was poor and it required a lot of carving and sanding. I hope you find the new version fun to build. The die-cutting is great and the parts fit is right on, thanks to modern computer CAD design systems. And it takes only about 15 minutes to sand the entire model! If you are a quick builder it would be possible to build the model and have it ready to cover in a long weekend.

The original R/C Nobler had a fixed wing that could not be removed from the fuselage, and could be a bit difficult to transport and store. The new version of the model has a removable wing held in place with three nylon bolts.

While the original model required only four servos to operate ailerons, rudder, throttle and elevators with coupled flaps, the new version requires six servos. You can also add a seventh servo for retractable landing gear. That's right, you can now build the model with retractable main landing gear.

Our prototype models, with seven full size servos and retractable landing gear weighed 5 lbs 8 oz, almost exactly the same weight of the original model. The structure of the new version is much lighter due to the elimination of all the balsa blocks and also the built up tail feathers. At the same time, it is also much stronger.

Radio installation

The radio installation can be as simple as five standard servos - or as challenging as seven servos that must be fitted in a confined space. Pay very close attention to the instructions and it will all fit easily. Drift off on your own if you want, but be prepared to spend a lot of time getting things to fit properly.

Nose heavy/Tail heavy

Most models require some nose weight to balance properly. This one requires tail weight! The built up tail feathers are light yet very strong. The tail is also very short, resulting in a model that is slightly nose heavy. If you power the model with a .46 size glow engine you will need about 1 oz of lead on the tail.

Engine size

This model can be flown on a .25 size engine, but - why. With an O.S. .46 FX, nine servos and retracts the model weighs close to 5-1/2 lbs. That gives a wing loading of 23.0 oz/sq ft. The engine will produce more than six lbs of thrust if it is properly broken-in.

Think about those numbers for a minute.

Start building! Build light!!

OTHER ITEMS REQUIRED

These are additional items you will need to complete your R/C Nobler that are *not included* with your kit. Order numbers are in parentheses (GPMQ4130). Our exclusive brand is listed where possible: **TOP** is the Top Flite brand, **GPM** is the Great Planes® brand, and **HCA** is the Hobbico® brand.

- 4 to 6 channel radio with 5 to 7 servos
- 5 standard servos for Ailerons (2), Elevator, Rudder, Throttle (Stationary flaps).
or:
6 standard servos for ailerons (2), Elevator, Rudder, Throttle, Flaps (Electronic Elevator to Flap coupling)
or:
7 servos gives above plus retractable landing gear. (**Note:** Recommend 6 standard and 1 retract servo)
- (1) 'Y' Connector for aileron, (if only one aileron channel is used)
Note: 'Y' connector not needed if ailerons, are mixed to separate receiver channels.
- (2) 12" [305mm] Servo extensions for aileron servos
- (1-4) 6" [152mm] Servo extensions (1 or 2 for ailerons, 1 for flaps, 1 for retracts)
(Simplifies wing installation at flying field - optional)
- Switch/charge plug mount (GPMQ1000)
- (2) 2-1/2" [63.5mm] Main Wheels (GPMQ4223)
or:
(2) 2-1/4" [57mm] Main wheels (GPMQ4222) with retracts
- 1-1/4" [31.8mm] Tail wheel (GPMQ4242)
- Optional retracts (GPMQ2905)
- 10 oz. [300cc] Fuel tank (GPMQ4104)
- Silicone fuel tubing (GPMQ4131)
- Fuel filler valve (GPMQ4160)

- 2-1/2" [63.5mm] Spinner (GPMQ4521, black)
- 1/4" [6.4mm]R/C Foam rubber padding (HCAQ1000)
- 2 rolls Top Flite Super MonoKote® covering, see *Finishing* on page 43
- 1 roll Top Flite Super MonoKote trim color
- Paint, see *Finishing* on page 43
- Propellers (see engine instructions)

BUILDING SUPPLIES

Here's a list of supplies you should have on hand while you're building. Some of these are optional. Use your own experience to decide what you need. We recommend Great Planes Pro CA and Epoxy.

Glue/Filler

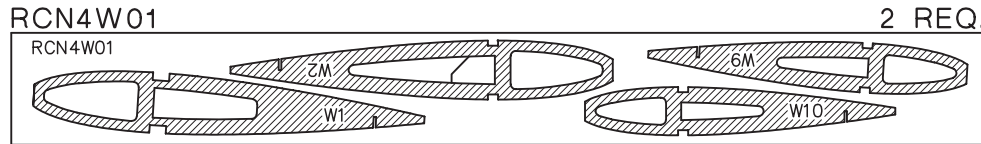
- 2 oz. [60g] Thin CA (GPMR6003)
- 2 oz. [60g] Medium CA+ (GPMR6009)
- 1 oz. [30g] Thick CA- (GPMR6014)
- CA Accelerator (GPMR6034)
- CA Debonder (GMPR6039)
- CA Applicator Tips (HCAR3780)
- 30-minute (GPMR6047) or 45-minute (GPMR6048) epoxy
- 6-minute epoxy (GPMR6045)
- Pro™ Wood Glue (GPMR6161)
- Microballoons (TOPR1090)
- Milled Fiberglass (GPMR6165)
- Lightweight Hobby Filler (Balsa Color, HCAR3401)
- Auto body filler (Bondo® or similar)
- Denatured or Isopropyl Alcohol (to clean up excess epoxy)

(continued on page 8)

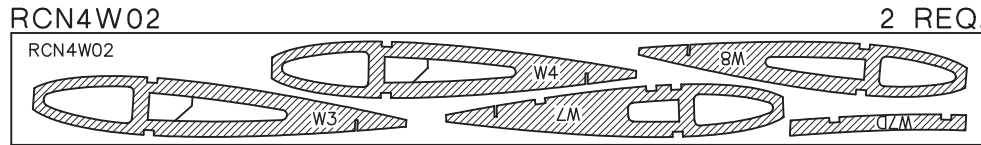
DIE-CUT PATTERNS

IMPORTANT

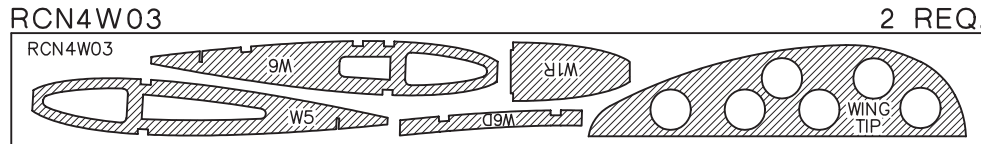
Do not remove the wing ribs or other wing parts from the die-cut sheets until instructed to do so.



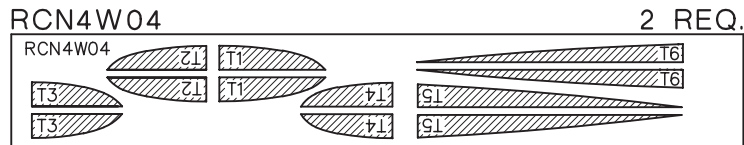
1/16" X 3" X 24" Balsa



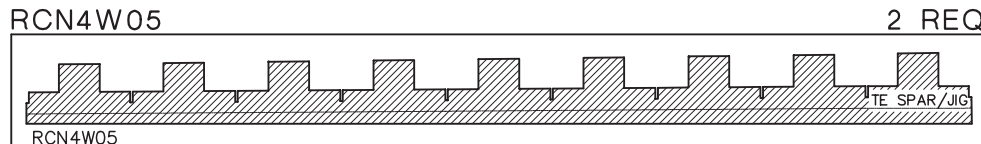
1/16" X 3" X 24" Balsa



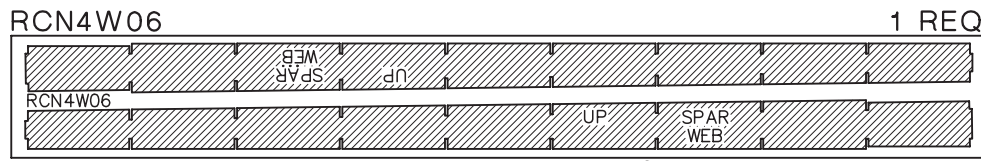
1/16" X 3" X 24" Balsa



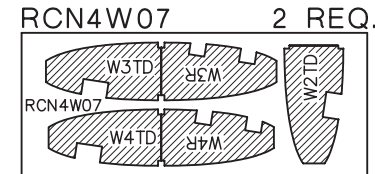
1/16" X 3" X 18" Balsa



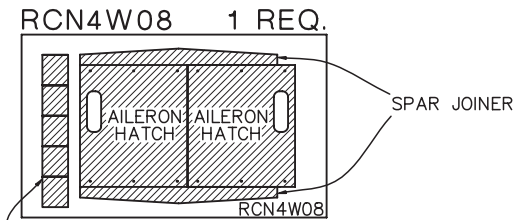
1/16" X 3" X 24" Balsa



3/32" X 3" X 24" Balsa



1/8" X 3-1/2" X 8-1/2" Lite Ply

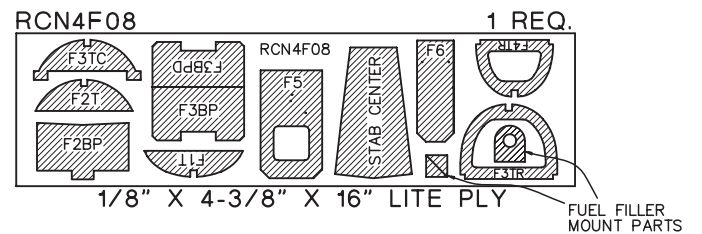
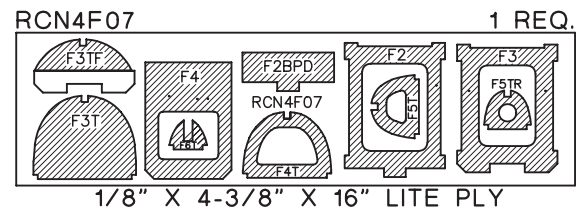
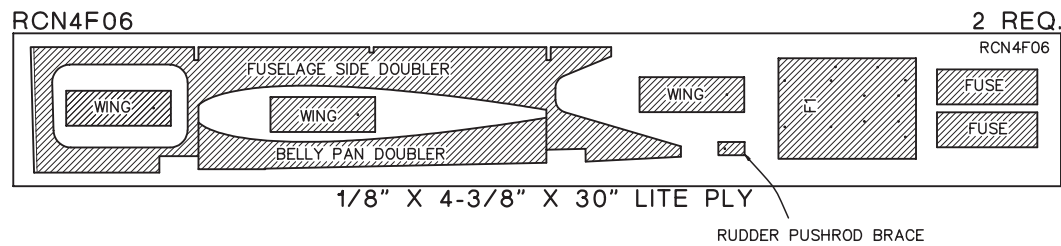
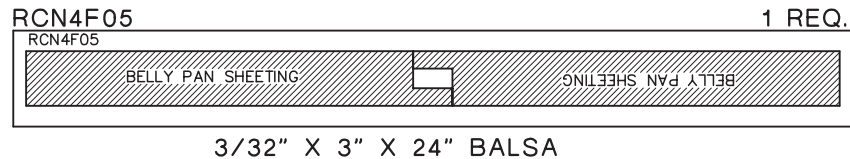
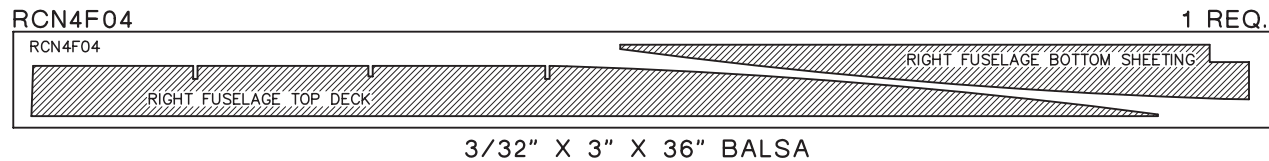
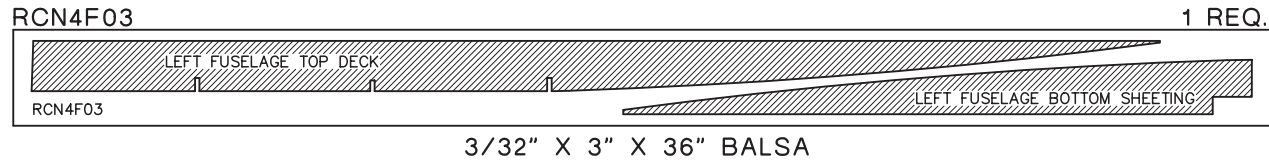
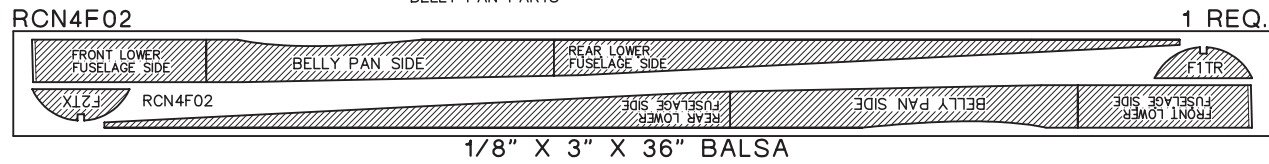
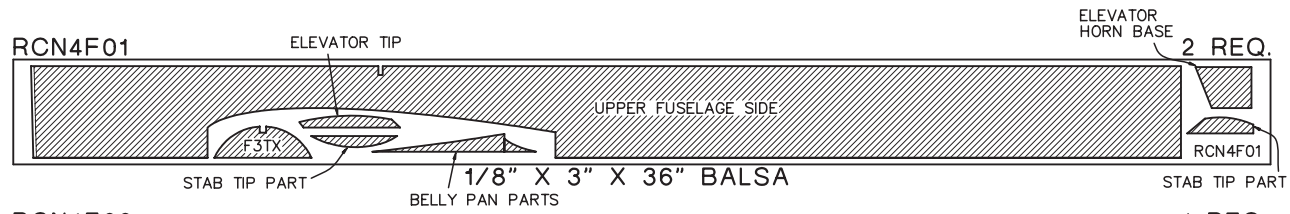


1/16" X 4-1/2" X 7-1/2" Ply

CONTROL HORN MOUNTS

SPAR JOINER

DIE-CUT PATTERNS



Tools

- #11 Blades (HCAR0311) -100 qty.
- Single Edge Razor Blades (HCAR0312) -100 qty.
- Razor Plane (MASR1510)
- Hobbico Builder's Triangle (HCAR0480)
- T-Pins (HCAR5100) small, (HCAR5150) medium, (HCAR5200) large
- Drill Bits: 1/16" [1.6mm], 3/32" [2.4mm], 1/8" [3.1mm], 5/64" [2mm], 7/64" [2.8mm], 9/64" [3.6mm], 5/32" [4mm], 11/64" [4.4mm], 3/16" [4.8mm], 7/32" [5.6mm], 1/4" [6.4mm]
- 1/4-20 Tap and drill (GPMR8105)
- 10-32 Tap and drill (GPMR8104)
- 6-32 Tap and drill (GPMR8102)
- Tap wrench (GPMR8120)
- Kyosho® curved plastic cutting scissors (KYOR1010)
- Great Planes Plan Protector (GPMR6167) or waxed paper
- Masking Tape
- Easy-Touch™ Bar Sanders*
- Precision Z-Bend pliers (GPMR8025)

Recommended Covering Tools/Accessories

- 21st Century Sealing Iron (COVR2700)
- 21st Century Cover Sock (COVR2702)
- or:
- Top Flite Sealing Iron (TOPR2100)
- Top Flite Hot Sock™ (TOPR2175)
- and
- Top Flite Heat Gun (TOPR2000)
- Top Flite Trim Seal Tool (TOPR2200)

EASY-TOUCH™ BAR SANDER



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** (patented) and replaceable **Easy-Touch Adhesive-backed Sandpaper**. While building the R/C Nobler we used two 5-1/2" Bar Sanders and two 11" Bar Sanders 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)
- 11" Contour Multi-Sander (GPMR6190)

12' roll of Adhesive-backed:

- 80-grit sandpaper (GPMR6180)
- 150-grit sandpaper (GPMR6183)
- 180-grit sandpaper (GPMR6184)
- 220-grit sandpaper (GPMR6185)

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

We also use Top Flite 320-grit (TOPR8030, 4 sheets) and 400-grit (TOPR8032, 4 sheets) wet-or-dry sandpaper for finish sanding.

IMPORTANT BUILDING NOTES

There are two types of screws used in this kit:

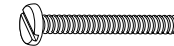
Sheet metal screws are designated by a number and a length.

For example #6 x 3/4" long [19.1mm]



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

For example 4-40 x 3/4" long [19.1mm]



- 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**, then slightly modify or *custom fit* the part as necessary for the best fit.
- Whenever the term **glue** is written you should rely upon your experience to decide what type of glue to use. When a specific type of adhesive works best for that step, the instructions will tell you what glue is recommended.
- 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 (or 45-minute) epoxy because you will need the working time and/or the additional strength.
- Occasionally we refer to the *top* or *bottom* of the model or *up* or *down*. To avoid confusion, the *top* or *bottom* of the model is as it would be when the airplane is right side up and will be referred to as the top even if the model is upside-down during that step, *i.e.* the top main spar is always the top

main spar even if the wing is upside-down when you are working on it. Similarly, *move the former up* means move the former toward the top of the fuselage even if the fuselage is upside-down when you are working on it.

- 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 **before** the step they refer to. Frequently you can study photos in following steps to get another view of the same parts.

GET READY TO BUILD

1. Unroll the plan sheets. Roll them inside out so they lie flat.

2. Remove all the parts from the box. Use a ballpoint pen (not a felt tip pen) to lightly write the **name** or **size** on each piece so you can identify it later. Use the **die-cut patterns** on pages 6 and 7 to identify and mark the die-cut parts **before** you remove them from their die sheets. Many of the parts already have numbers stamped on them, but in some cases the number is located alongside the parts or only on the die drawings in the manual. Do not remove the die-cut parts until instructed to do so. If a part is difficult to remove, don't force it out but cut around it with a hobby knife and a #11 blade. After you remove the parts from their die sheets, lightly sand the edges to remove slivers or die-cutting irregularities. Save some of the larger scraps of wood.

3. Separate the parts into groups such as **stab**, **fin**, **wing**, and **fuse**. Store smaller parts in zipper-top food storage bags.

BUILD THE TAIL SURFACES

Use the **Hot Tip** that follows to cut the 1/8" x 1/4" x 24" [3.2 x 6.4 x 610mm] sticks for the framework of the stab, elevators, fin and rudder. This framework will then be sheeted with 1/16" x 3" x 24" [1.6 x 76 x 610mm] balsa.



HOW TO CUT THE STICKS

There are ten 1/8" x 1/4" x 24" [3.2 x 6.4 x 610mm] sticks supplied for building the stab, elevators, fin and rudder. There are ample sticks supplied for building these parts. Do not use the 30" [762mm] sticks that are used for building the wing.

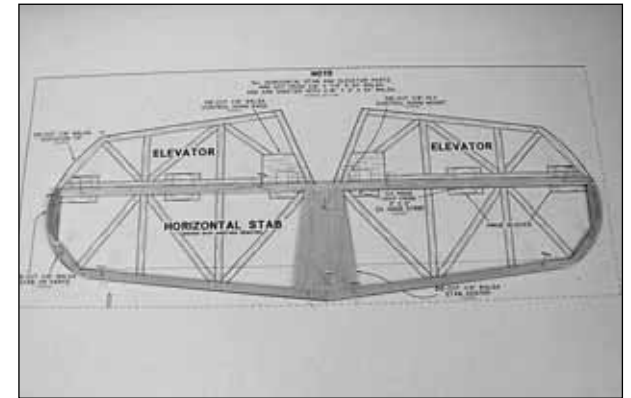
Use the hardest sticks for building the framework of the stab and fin. The softer sticks can be used for the ribs and diagonal pieces, and for the elevators and rudder.

Cut the longest parts from the sticks first, using the remainder for the shorter pieces. We have found that a new single edge razor blade makes the best cuts with a minimum of crushing.

We found it fastest to cut all of the required parts at one time. Others may prefer to cut each part as it is needed.

BUILD THE STABILIZER

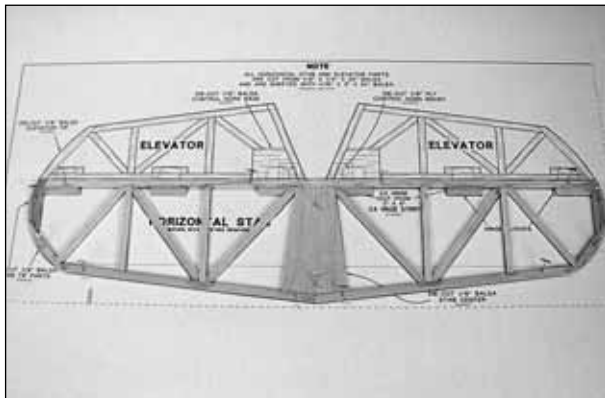
❑ 1. Cut the stab plan along the dashed line and tape it to your building board. Cover the plan with Plan Protector or wax paper.



❑ 2. Cut the **stab TE** from a hard 1/8" x 1/4" x 24" [3.2 x 6.4 x 610mm] balsa stick and pin it in position over the plan.

❑ 3. Pin the die-cut 1/8" [3.2mm] ply **stab center** in position. Similarly, pin the die-cut 1/8" [3.2mm] balsa **stab tip parts** in position. Do not glue until later.

❑ 4. Cut both **stab LE** pieces from another hard 1/8" x 1/4" x 24" [3.2 x 6.4 x 610mm] balsa stick and pin them in position. Do not glue until later.



□ 5. Cut the **stab ribs, diagonals and hinge blocks** from soft 1/8" x 1/4" x 24" [3.2 x 6.4 x 610mm] balsa sticks and place them into position. Glue all of the parts together with thin CA where they join each other - refer to the **Hot Tip** that follows.



It can be difficult to control the application of thin CA adhesives and get that one small drop that is needed to glue a part. We have found a CA applicator tip, available from Hobbico, to be very useful. Frankly, we wonder how we ever got along without them.

With these tips you will no longer have large blobs of CA that needs to be sanded away. Your supply of CA will also last much longer. As the tip clogs simply snip the clogged part off and keep using it.

Two of these tips are supplied with this kit. If you like them their part number is HCAR3780 (6) and are available in bulk BUKR0307 (200).

When you install the tip on the end of the CA bottle, cut the large end of the tip to a depth of about 1/4" [6.4mm]. Doing so will prevent the tip from splitting and leaking when it is pressed onto the bottle.

□ 6. After the CA has cured, remove the pins from the stab. Use a sanding block with 150-grit sandpaper to sand the stab flat.

□ 7. Use the **Hot Tip** that follows (or your own method) to glue two 1/16" x 3" x 24" [1.6 x 76 x 610mm] balsa sheets together to make a 1/16" x 6" x 24" [1.6 x 152 x 610mm] sheet for one of the **stab skins**. Use the two hardest sheets supplied in the kit.

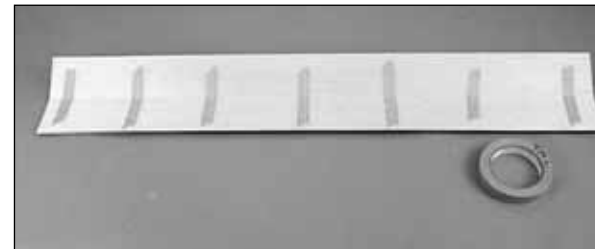
Top Flite selects balsa that is intended for sheeting. Occasionally, a few of these sheets may have a small nick or split near the ends. If your kit contains a few of these sheets, arrange them and glue them together so the defects will not interfere with the final shape of your skin.



HOW TO MAKE THE STAB SKINS



A. Use a straightedge to true one edge of two balsa sheets.



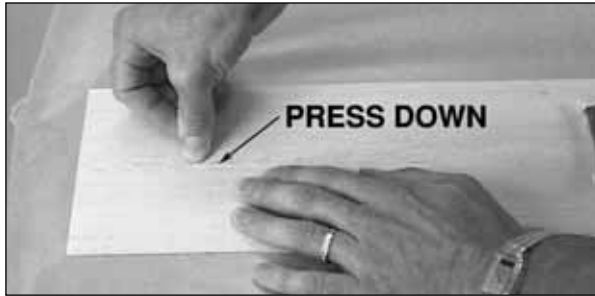
B. Use masking tape to tightly tape the trued edges of the sheets together.



C. Turn the sheets over and apply slow drying glue like Great Planes Pro aliphatic resin to the joining edges. Some prefer to use CA, but it is not recommended in this **Hot Tip** because CA does not allow enough working time to align the sheets and it is much harder than the balsa, making sanding difficult.

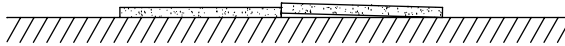


D. Lay the sheets on your workbench covered with wax paper. Use a credit card or something similar as a squeegee to simultaneously press the sheets flat as you wipe the glue from the seam.

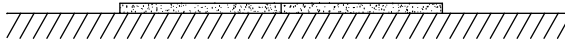


CROSS SECTION OF GLUE JOINT

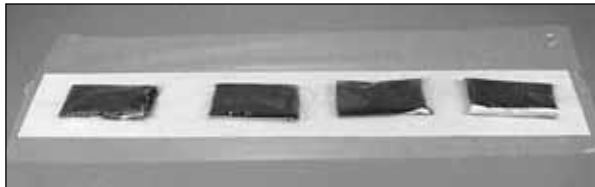
INCORRECT: SHEETS NOT FLAT AND EVEN



CORRECT: SHEETS ARE FLAT AND EVEN



E. Press the joining edges of the sheets down to make sure they are even. This is important. Little sanding will be required if the sheets are even.



F. Place weights on top of the sheet to hold it flat while the glue dries.

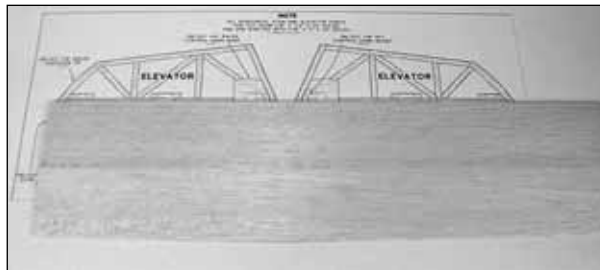
G. After the glue dries, sand the sheets flat and even.

Note: Some modelers tend to sand the sheeting too much after it is applied to the structure, making thin spots where fingers can easily go through. By following the procedure above (specifically, by aligning the joined edges of the sheets as shown in step E), little sanding should be required. Most of the sanding

that *is* required should be done **before** the sheeting is glued in place. The only sanding that should be required after the sheeting is glued to the structure is final sanding with 320 or 400-grit sandpaper.

Here are a few other things to keep in mind while sanding balsa sheeting:

1. Make sure you sand the sheets on a flat work surface that is free from hardened drops of glue or other imperfections that will damage your sheeting.
2. Sand the sheeting only as much as required. The inside of the sheeting needs to be sanded just enough to remove excess glue and doesn't have to be perfectly flat or smooth.
3. Though more material can be removed by sanding **across** the grain, this leaves scratches in the balsa. Balsa sheeting should be sanded **with** the grain—especially when finish-sanding.
4. If some of the glue joints are uneven, it may be best just to leave them that way, rather than to sand the sheets too thin. A slightly uneven glue joint is preferable to paper-thin balsa.



8. Use medium CA or aliphatic resin to glue the stab skin to the top of the stab. Align the skin even with the TE of the stab. Note that the sheeting is positioned so that it overhangs one end of the stab.

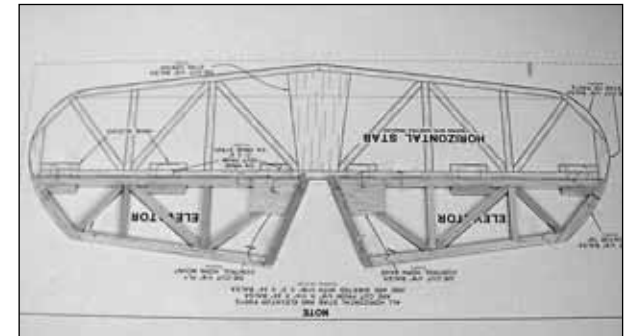
9. After the glue dries, remove the stab from the building board and trim the sheeting along the LE and both tips. Save the leftover sheeting for use in the next step.

10. Locate another hard sheet of 1/16" x 3" x 24" [1.6 x 76 x 610mm] balsa. Use this sheet and the leftover sheeting from the above step to make another stab skin.

11. Turn the stab over and use a sanding block to sand the un-sheeted side of the stab flat. Use medium CA or aliphatic resin to glue the stab skin to the stab. Align the skin even with the TE of the stab. The sheeting is positioned so that it overhangs one end of the stab.

12. After the glue dries, remove the stab from the building board and trim the sheeting along the LE and both tips. Save the leftover sheeting for use in a later step.

BUILD THE ELEVATORS



1. Pin the die-cut 1/8" balsa **control horn base** into position. Use 1/8" x 1/4" x 24" [3.2 x 6.4 x 610mm] soft balsa sticks to cut all of the parts for both elevators. Pin them into position and glue the parts together with thin CA where they join.

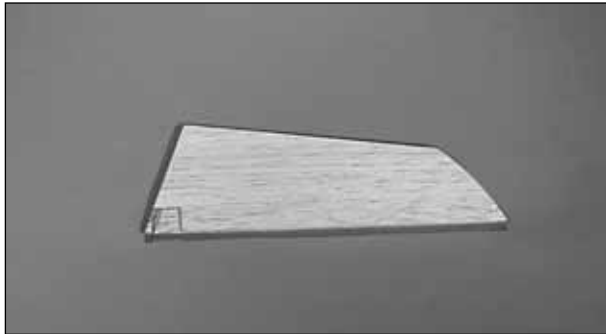
2. After the CA has cured, remove the pins from both elevators. Use a sanding block with 150-grit sandpaper to sand the elevators flat.

❑ 3. Use a soft 1/16" x 3" x 24" [1.6 x 76 x 610mm] sheet of balsa to sheet the top of both elevators. Cut a piece from the sheet for each elevator. Then, glue it in place with medium CA or aliphatic resin. Save the leftover sheeting for use later.

❑ 4. After the glue dries, remove both elevators from the building board and trim the sheeting along the TE, LE and tips.

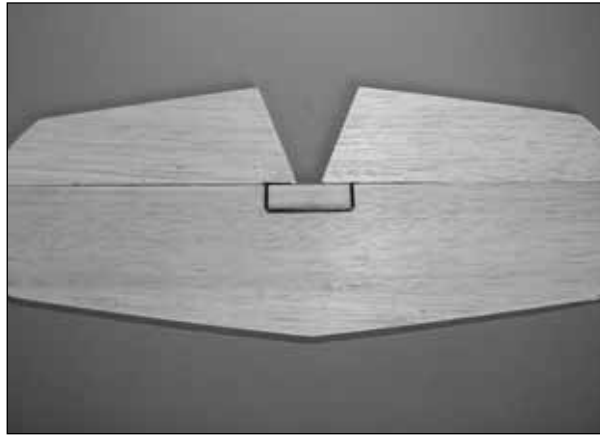
❑ 5. Turn the elevators over and use a sanding block to sand the un-sheeted side of them flat. Locate another soft sheet of 1/16" x 3" x 24" [1.6 x 76 x 610mm] balsa and cut a piece from the sheet for each elevator. Use medium CA or aliphatic resin to glue the sheet to the elevators.

❑ 6. After the glue dries, remove the elevators from the building board and trim the sheeting along the TE, LE and tips.



❑ 7. Locate a die-cut 1/16" [1.6mm] ply **control horn mount**. Using the plan as a reference, position the control horn mount on the bottom of the right elevator and mark its location. Cut along the lines you marked and remove the balsa to inset the mount. Glue the mount into the elevator.

NOTE: Be sure to make a right elevator as shown in the above photo.



❑ 8. Use a file or a rotary tool with a cut-off wheel to remove sharp edges or burrs on the ends of the **elevator joiner wire**. Position the elevator joiner wire on the top of the stab as shown in the photo. Align the elevators with the stab and mark the leading edge of the elevators where the *arm* portion of the joiner wire will enter the elevators. The joiner wire should be centered between the elevators as shown on the plan.

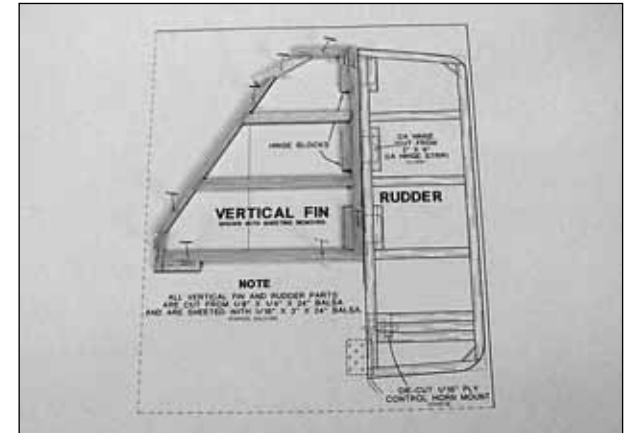


❑ 9. Drill a 3/32" [2.4mm] hole into the leading edge of both elevators at the marks you made. Be sure to drill the hole on the centerline of the leading edge. Cut a groove in the leading edge of both elevators to accommodate the joiner wire.

Hint: Use a 3/32" [2.4mm] brass tube sharpened at one end to cut the grooves.

BUILD THE VERTICAL FIN

❑ 1. Cut the vertical fin plan along the dashed line and tape it to your building board. Cover the fin plan with Plan Protector or wax paper.



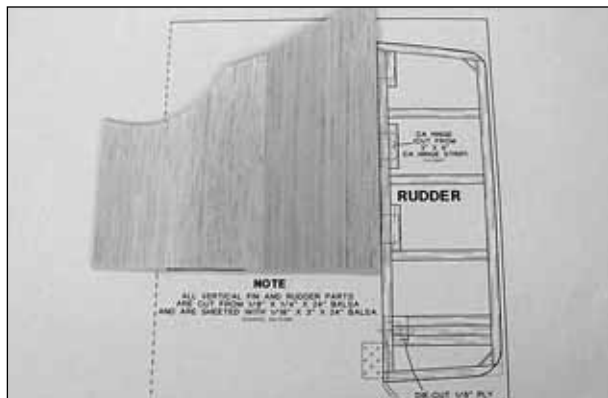
❑ 2. Cut the **fin TE** from a hard 1/8" x 1/4" x 24" [3.2 x 6.4 x 610mm] balsa stick and pin it in position over the plan.

❑ 3. Cut the **fin LE and the top and bottom parts** from the remainder of the balsa stick and pin them in position. Do not glue until later.

❑ 4. Cut the **fin ribs and hinge blocks** from soft 1/8" x 1/4" x 24" [3.2 x 6.4 x 610mm] balsa sticks and place them into position. Glue all of the parts together with thin CA where they join each other.

❑ 5. After the CA has cured, remove the pins from the fin. Use a sanding block with 150-grit sandpaper to sand the fin flat.

BUILD THE RUDDER



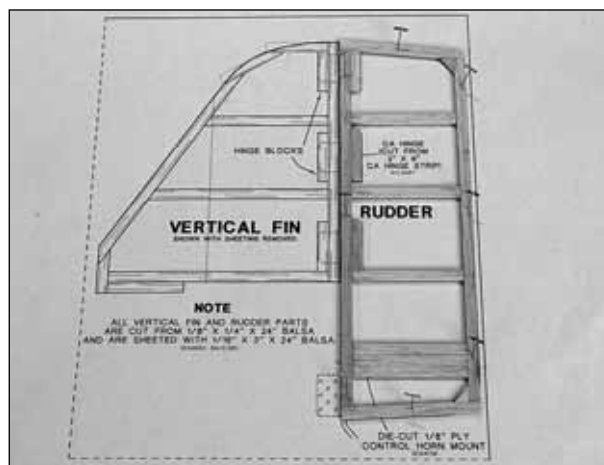
❑ 6. Locate the leftover 1/16" [1.6mm] balsa sheeting used to sheet the stab and elevators. Use this material to make two **fin skins** similar to the above photo.

❑ 7. Use medium CA or aliphatic resin to glue one of the fin skins to the left side of the fin. Align the skin even with the TE and bottom of the fin.

❑ 8. After the glue dries, remove the fin from the building board and trim the sheeting along the LE, TE, bottom and top.

❑ 9. Turn the fin over and use a sanding block to sand the un-sheeted side of the fin flat. Use medium CA or aliphatic resin to glue the second fin skin to the fin. Align the sheet even with the TE and bottom of the fin.

❑ 10. After the glue dries, remove the fin from the building board and trim the sheeting along the LE, TE, bottom and top.



❑ 1. Use 1/8" x 1/4" x 24" [3.2 x 6.4 x 610mm] soft balsa sticks to cut all of the parts for the rudder. Pin them into position and glue the parts together with thin CA where they join.

❑ 2. After the CA has cured, remove the pins from the rudder. Use a sanding block with 150-grit sandpaper to sand the rudder flat.

❑ 3. Use a soft 1/16" x 3" x 24" [1.6 x 76 x 610mm] sheet of balsa to cut a piece to sheet the left side of the rudder. Glue this sheet in place with medium CA or aliphatic resin. Save the leftover sheeting for use later.

❑ 4. After the glue dries, remove the rudder from the building board and trim the sheeting along the TE, LE and tips.

❑ 5. Turn the rudder over and use a sanding block to sand the un-sheeted side flat. Use the remainder of the sheeting to cut a piece for the other side of the rudder. Use medium CA or aliphatic resin to glue this sheet to the rudder.

❑ 6. After the glue dries, remove the rudder from the building board and trim the sheeting along the TE, LE and tips.

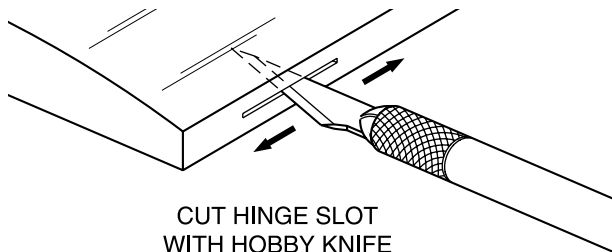
❑ 7. Locate a die-cut 1/16" [1.6mm] ply **control horn mount**. Using the plan as a reference, position the control horn mount on the left side of the rudder and mark its location. Cut along the lines you marked and remove the balsa to inset the mount. Glue the mount into the rudder.

HINGE THE ELEVATORS AND RUDDER

IMPORTANT NOTES ABOUT CA HINGES

This kit is supplied with a CA hinge material consisting of a 3-layer lamination of Mylar and polyester. It is specially made for hinging model airplane control surfaces. When properly installed, this type of CA hinge provides the best combination of strength, durability and easy installation. We trust all of our Gold Edition warbirds to these hinges, but **it is essential to install them correctly**. Carefully follow the hinging instructions in this manual for the best result.

The most common mistake made by modelers when installing CA hinges is making the hinge slots too tight, restricting the flow of CA to the back of the hinges; or not using enough glue to fully secure the hinge over its entire surface area. This results in hinges that are only *tack glued* into the hinge slots. The techniques for cutting the hinge slots and gluing in the CA hinges (near the end of the manual) have been developed to ensure thorough and secure attachment.



CUT HINGE SLOT
WITH HOBBY KNIFE
AND #11 BLADE

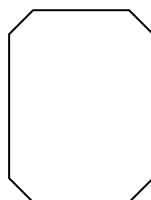
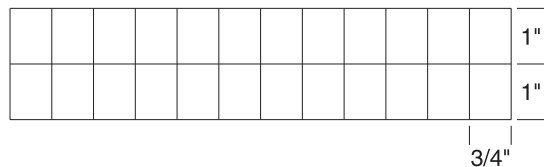
- ❑ 1. Use a straightedge to mark the centerline of both elevators and the stab with a ballpoint pen. Mark the location of the hinge slots on the elevators and stab where shown on the plan. Cut the hinge slots in the elevators and the stab along the centerlines with a #11 blade.



HOW TO MAKE THE HINGE SLOTS

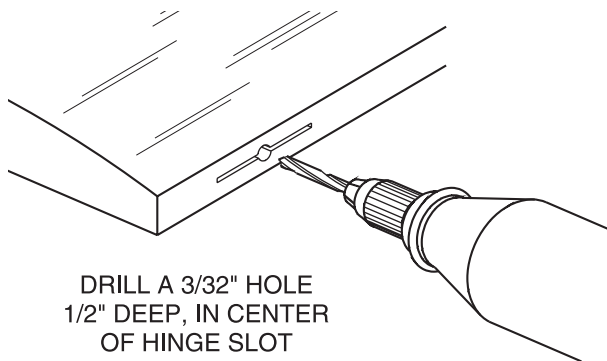


We **HIGHLY** recommend that you use the Great Plans Slot Machine™ for cutting your hinge slots. This motorized hinge slotting tool makes clean slots of the exact size needed for CA hinges. Once you use this tool, you will never cut your hinge slots any other way.



- ❑ 2. Using the sketch above, cut nine hinges to a size of 3/4" x 1" [19 x 25.4mm] from the **CA hinge strip** supplied with this kit. Snip the corners off so they go into the slots easier.

- ❑ 3. Test fit the hinges into the slots. If the hinges do not slide into the slots easily, work your knife blade back and forth in the slot a few times to provide more clearance (it is really the **back edge** of the blade that does the work here in widening the slot).



DRILL A 3/32" HOLE
1/2" DEEP, IN CENTER
OF HINGE SLOT

- ❑ 4. Drill a 3/32" [2.4mm] hole, 1/2" [12.7mm] deep in the center of the hinge slots. Use a rotary tool with a 3/32" [2.4mm] drill bit or a carbide cutter for the best results. Reinsert your knife blade to *clean out* the slot after you drill the holes.

- ❑ 5. Test fit the elevators to the stab with the hinges. If any hinge slots are not wide enough or are misaligned, make adjustments so the elevators accurately fit the stab.

- ❑ 6. Bevel the leading edges of the elevators to a "V" as shown on the cross section of the plan. Use the centerline on the elevator leading edges as a guide. Test fit the elevators to the stab with the joiner wire and the hinges. (If necessary, remove the joiner and *tweak* it so both elevators are in the same plane.)

Note: Make sure you can obtain the control throws indicated in the back of the manual. If you cannot, increase the "V" on the leading edge of the elevators.

- ❑ 7. Test hinge the vertical fin and rudder in the same manner.

DO NOT glue the hinges until the model has been covered.

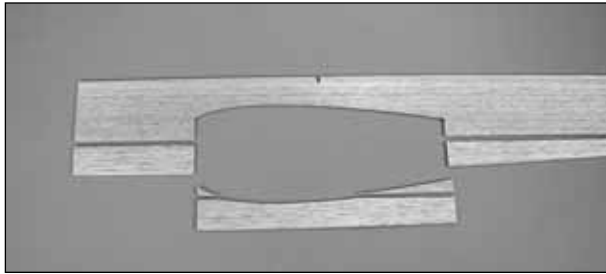
This completes the construction of the tail surfaces.

BUILD THE FUSELAGE

PREPARE THE FUSELAGE SIDES

Note: The fuselage parts interlock together, so you do not need to put the fuselage plan on your building board. You should, however, cover your building board with plan protector or wax paper.

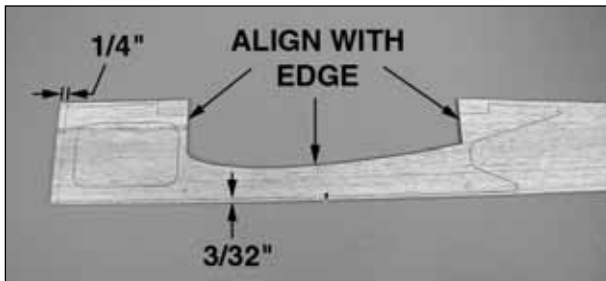
- ❑ 1. Locate the die-cut 1/8" [3.2mm] balsa **upper fuselage side**, **front lower fuselage side** and **rear lower fuselage side** parts. Also locate the **belly pan** parts. There are two sets of parts for the left and right sides.



□ □ 2. Use your bar sander to sand the edges flat and straight where the parts join. Using one set of parts, edge glue the upper fuselage side, front lower fuselage side and rear lower fuselage side parts together using either thin CA or aliphatic resin. Align the front lower fuselage side even with the front of the upper fuselage side. Align the rear lower fuselage side even with the wing saddle cutout. When the glue dries, use your bar sander with 150-grit sandpaper to sand the assembled fuselage side flat and smooth.

□ □ 3. Edge glue the three parts for the belly pan side together and sand the completed assembly flat and smooth.

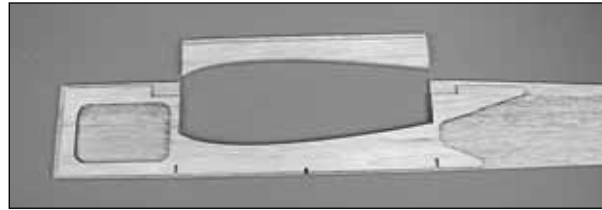
□ 4. Return to step 2 and make a second set of parts.



□ 5. Position one of the sides on your building board as shown in the photo. Position the die-cut 1/8" [3.2mm] ply **fuselage side doubler** on the fuselage side. Align the doubler with the wing saddle and trace the outline of the doubler onto the fuselage side with a ball point pen.

Note: It is important that the doubler be accurately positioned on the fuselage side. Check that the

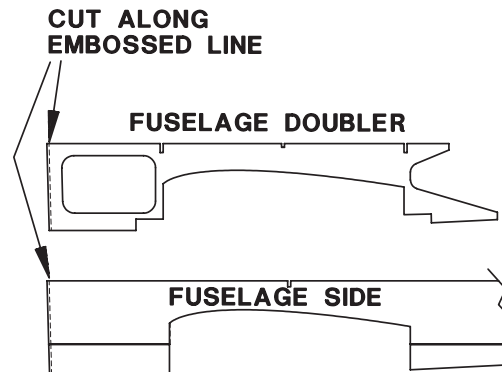
fuselage side extends 1/4" [6.4mm] beyond the doubler at the front end of the assembly. Also check that the fuselage side extends 3/32" [2.4mm] beyond the doubler along the edge of the assembly as shown in the photo.



□ 6. Glue the doubler to the fuselage side using aliphatic resin glue or epoxy, aligning it accurately in position. Do not use CA as it will not allow you to reposition the parts. Use weights to hold the parts together until the glue dries, making sure the parts remain accurately positioned.

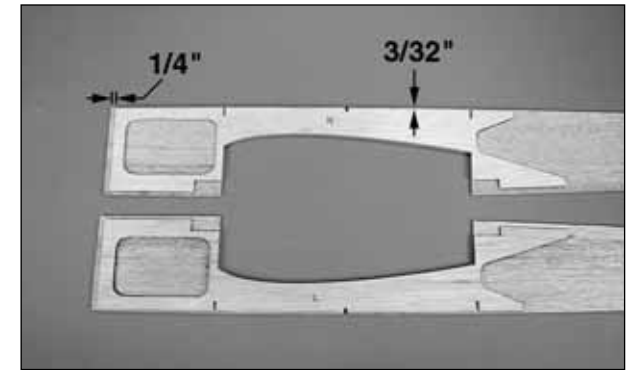
□ 7. When the glue has dried, remove the side from the building board. Label this side "L".

□ 8. Glue the **belly pan doubler** to the belly pan side. Align the doubler with the wing saddle and with the ends. The belly pan side should extend 1/4" [6.4mm] beyond the doubler along the straight edge. Label this assembly "L".



□ 9. Locate the remaining fuselage side assembly and fuselage side doubler. Note that the front edge of these parts have an embossed cut line that is about 3/32"

[2.4mm] from the edge. Use a straight edge and your knife with a sharp #11 blade to cut and remove the material along the embossed line. This will establish the proper right thrust for the engine.



□ 10. Position this side on your building board as shown in the photo. **BE SURE IT IS POSITIONED AS SHOWN** (unless you want two left sides)! Position the die-cut 1/8" [3.2mm] ply **fuselage side doubler** on the fuselage side. Align the doubler as you did in steps 5 and 6 and glue it in position with aliphatic resin or epoxy. Use weights to hold the parts together until the glue dries, making sure the parts remain accurately positioned.

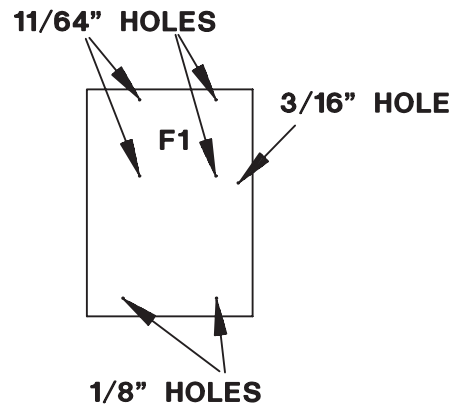
Note: It is important that the doubler be accurately positioned on the fuselage side. Check that the fuselage side extends 1/4" [6.4mm] beyond the doubler at the front end of the assembly. Also check that the fuselage side extends 3/32" [2.4mm] beyond the doubler along the edge of the assembly as shown in the photo.

□ 11. When the glue has dried, remove the side from the building board. Label this side "R".

□ 12. Glue the **belly pan doubler** to the belly pan side. Align the doubler with the wing saddle and with the ends. The belly pan side should extend 1/4" [6.4mm] beyond the doubler along the straight edge. Label this assembly "R".

Caution: Be sure you are building a right side, not another left.

FRAME THE FUSELAGE



- ❑ 1. Locate both die-cut 1/8" [3mm] ply **F1 firewalls**. Glue them together using 6-minute epoxy.

Note: Make sure the pin point punch marks are facing out on one side. Label this side F1.

- ❑ 2. When the epoxy has cured drill 1/8" [3.2mm] and 11/64" [4.4mm] holes where shown in the sketch above. The 3/16" [4.8mm] hole is for the throttle pushrod for an OS .46 FX.



- ❑ 3. Install four **6-32 blind nuts** in the 11/64" [4.4mm] holes. Put some epoxy on the blind nuts as you install

them to hold them in place. Be careful not to get any epoxy in the threaded holes in the blind nuts.

Note: The blind nuts are installed on the aft side of F1.



- ❑ 4. Referring to the former drawings on the fuselage plan, drill 3/16" [4.8mm] holes for the pushrods in formers **F2, F3, F4, F5 and F6** at the pin point punch marks. Label the front of each former.

- ❑ 5. Refer to the "pushrod exit locations" drawing on the plan and the **HOT TIP** below. Drill 3/16" [4.8mm] holes in the fuselage sides for the pushrods. The left side has one hole for the rudder pushrod. The right side has one hole for the elevator pushrod.

Note: The drawing shows where the holes should enter and exit the fuselage sides on the inside and outside. This allows you to judge the angle at which the holes should be drilled.



HOW TO DRILL ANGLED HOLES

A. Mark the fuselage side with pins where the hole enters and exits the fuselage side.

B. Start by drilling a 3/16" [4.8mm] hole at the exit point on the outside of the fuselage side.

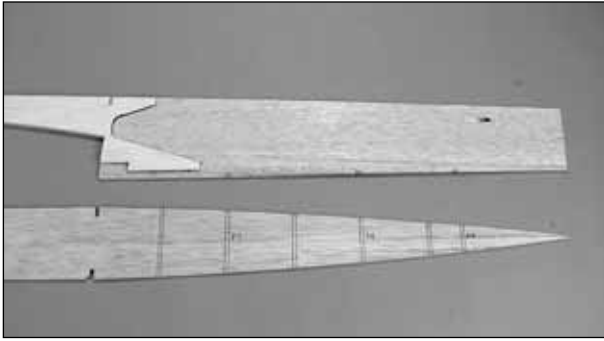
C. Turn the side over and use a rotary tool with a cutoff wheel to cut a trough in the interior of the fuselage side. The trough should extend from the pin mark at the entry point to the hole you drilled at the exit. **MAKE SURE** you are cutting the trough on the inside of the fuselage side.

D. Dress the angled hole up by using the 3/16" [4.8mm] drill at an angle and sliding it in and out of the hole to shave the hole clean. Any imperfections at the exit can be filled and sanded after the pushrod is installed.



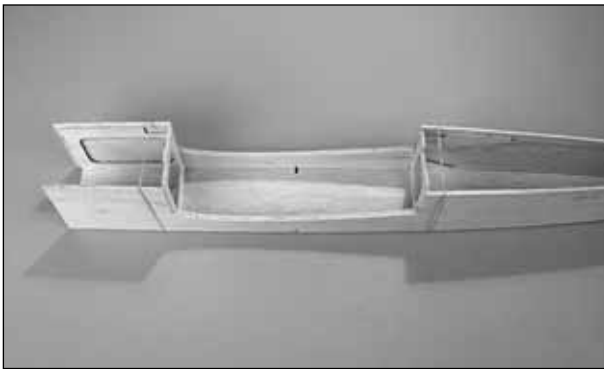
- ❑ 6. Locate the die-cut 3/32" [2.4mm] balsa **left and right fuselage top deck** parts. Use your bar sander to sand the edges flat and straight where the parts join. Edge glue the left and right fuselage top deck parts together using either thin CA or aliphatic resin. Align the parts even at the front edges. Use your bar sander with 150-grit sandpaper to sand the assembled fuselage top deck flat and smooth.

Note: The front edge is cut at a 2 degree angle to establish the engine right thrust angle.

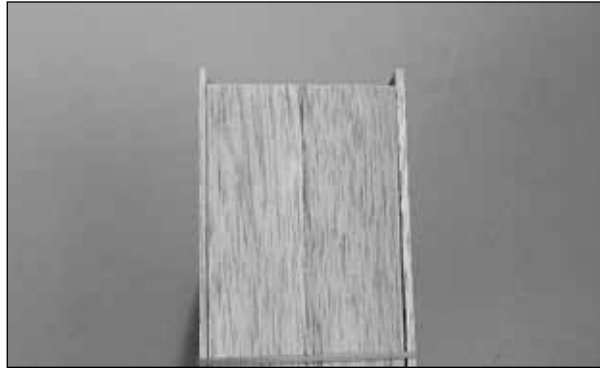


❑ 7. Place the fuselage top deck over the top view of the fuselage plan. Align the cutouts in the top deck with formers F2, F3TC and F3. Mark the location of former F1TR and all of the formers aft of F3. Transfer the marks for F4, F5 and F6 to the bottom of the top deck.

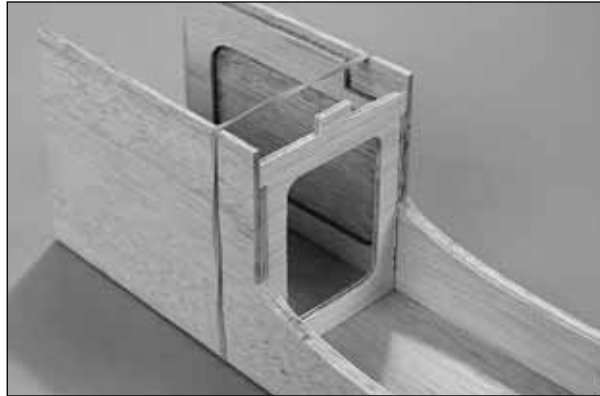
❑ 8. Place the right fuselage side over the side view of the fuselage plan. Align the fuselage side with the wing saddle. Mark the location of formers F4, F5 and F6 at the lower edge on the inside of the fuselage side. Align the left fuselage side with the right side and transfer these marks to the inside of the left fuselage side.



❑ 9. Without using any glue, assemble the fuselage top deck, left and right fuselage sides, F2 and F3. Use rubber bands to hold the assembly together. Align F2 even with the front of the wing saddle cutout and align F3 even with the rear of the wing saddle cutout. Be certain that the forward (marked) sides of F2 and F3 are facing the front of the fuselage.



IMPORTANT: Check that the front edge of the top deck is exactly aligned with the front edge of the ply fuselage doublers. View the fuselage assembly from the top and insure that the firewall will have RIGHT thrust.



❑ 10. Cover your building board with plan protector or wax paper. Place the fuselage assembly upside down on the building board. With the assembly properly aligned, glue F2 to the top deck and fuselage sides with thin CA. Be sure that the top deck is firmly seated against the ply fuse doublers and that F2 is aligned with the wing saddle cutout. Squeeze the fuselage sides together against F2 until the CA cures.

❑ 11. Glue F3 to the top deck and fuselage sides with thin CA. Be sure that the top deck is firmly seated against the ply fuse doublers and that F3 is aligned with the wing saddle cutout. Squeeze the fuselage sides together against F3 until the CA cures.

❑ 12. Glue the top deck to the fuselage sides between F2 and F3 with thin CA. Be sure the top deck is firmly seated against the ply fuse doublers.



❑ 13. Glue the **firewall F1** in place to the front of the fuselage using 30 minute epoxy. You will need to cut two notches in the top deck to clear the 6-32 blind nuts. Align F1 with the top of the top deck. F1 will extend below the bottom of the fuselage by about 3/32" [2.4mm]. Check that the sides and top deck are square.



❑ 14. Reinforce the joint between F1 and the fuselage sides and top deck with some balsa triangular sticks cut from a 1/4" x 1/4" tri x 30" [6.4 x 6.4 x 762mm] stick. Glue in place with epoxy. Do not let any epoxy get into the blind nuts.

Hint: Put some vaseline on the two blind nuts near the top deck.

- ❑ 15. Glue the top deck to the fuselage sides between F1 and F2 with thin CA.



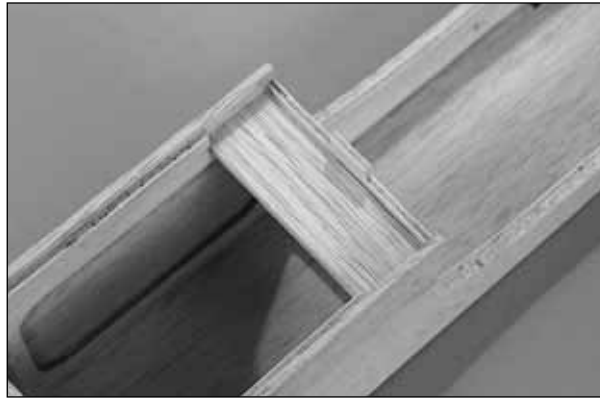
- ❑ 16. Fit former F4 into position. Note the curve of the sides. Then, remove F4 and sand the edges of F4 to match the curve. Glue F4 to the top deck and fuselage sides with thin CA. Be sure that the top deck is flush with the top edge of the fuselage sides. Align F4 with the marks you made earlier on the bottom of the top deck and on the fuselage sides. Squeeze the fuselage sides together against F4 until the CA cures.

Note: Be certain that the forward (marked) side of F4 is facing the front of the fuselage.

- ❑ 17. Glue the top deck to the fuselage sides between F3 and F4.

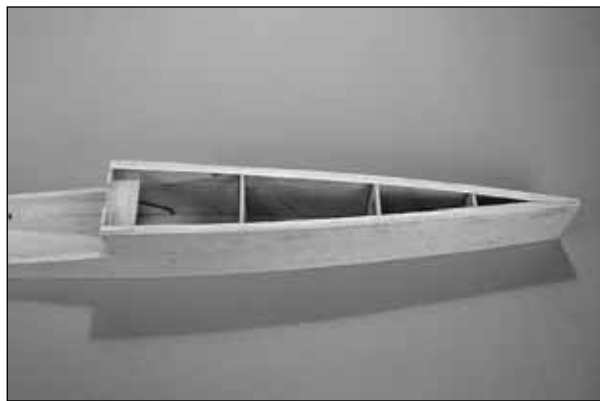
- ❑ 18. In similar fashion, glue F5 and F6 into position.

- ❑ 19. Glue the tail end of the fuselage sides together where they meet. Trim the top deck slightly if needed.



- ❑ 20. Locate two die-cut 1/8" [3.2mm] ply 1" x 2-7/8" [25.4 x 73mm] **fuse hold down blocks**. Glue these together with medium CA to form a 1/4" [6.4mm] thick block. Using 30-minute epoxy, glue this block to the front of F2, between the fuselage sides. Trim the block to fit as needed. Make sure the block fits into the cutout in the fuselage doublers.

- ❑ 21. Locate two more fuse hold down blocks and glue them together. Using 30-minute epoxy, glue this block to the rear of F3, between the fuselage sides. Make sure the block fits into the cutout in the fuselage doublers.



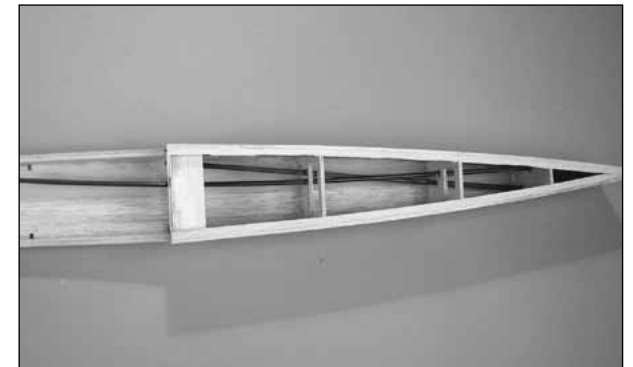
- ❑ 22. Locate two 1/4" x 1/4" x 36" [6.4 x 6.4 x 914mm] triangular balsa sticks. Trim them to fit along the bottom of the fuselage sides between F3 and the rear end of the fuselage. Glue them into position.

- ❑ 23. Sand the top of the fuselage lightly to remove any glue bumps. Sand the bottom of the fuselage flat and level. Sand the front and rear ends flat and smooth.

INSTALL THE PUSHRODS AND SERVOS

The elevator servo is installed on the left side of the fuselage and the pushrod for that servo exits from the right side of the fuselage.

- ❑ 1. Locate the two **36" [914mm] plastic pushrod tubes**. Cut one of these tubes to a length of 16" [406mm]. Cut the remaining tube to a length of 21" [533mm]. Save the remainder of the tubes for use later. Use some 150-grit sandpaper to lightly roughen the outside of the tubes.



- ❑ 2. Install the 16" [406mm] tube in the proper holes in the fuselage side and formers for the elevator pushrod, inserting it from the rear. The tube should extend 1/8" [3.2mm] beyond F3. Install the 21" [533mm] tube in the proper holes for the rudder pushrod. This tube should extend 4-1/2" [107mm] beyond F3. Glue the tubes in position with some medium CA at each former and the fuselage sides.



□ 3. Use a razor saw to trim the pushrods flush with the fuselage sides. Fill any irregularities with balsa filler.

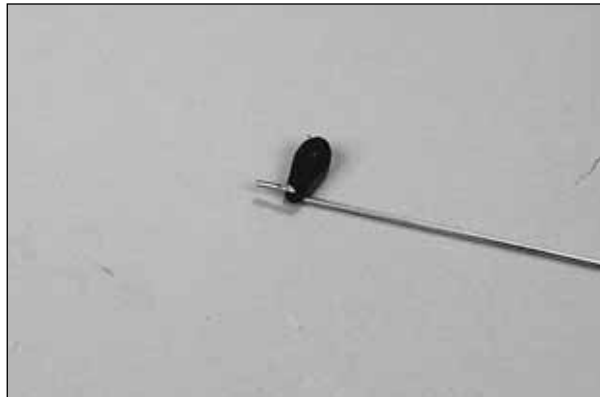
IMPORTANT NOTES ABOUT SERVOS

The following steps show the installation of three full size servos in the fuselage; one each for the elevator, rudder and throttle. The wing also has two aileron servos and one flap servo, plus a retract servo if you are installing retractable landing gear. If you have a computer radio and want to use some of its mixing capabilities, there is adequate room in the fuselage for a second elevator servo. The wing also has room for a second flap servo. If you do install additional servos it is recommended that you use mini servos for their smaller size and lighter weight.

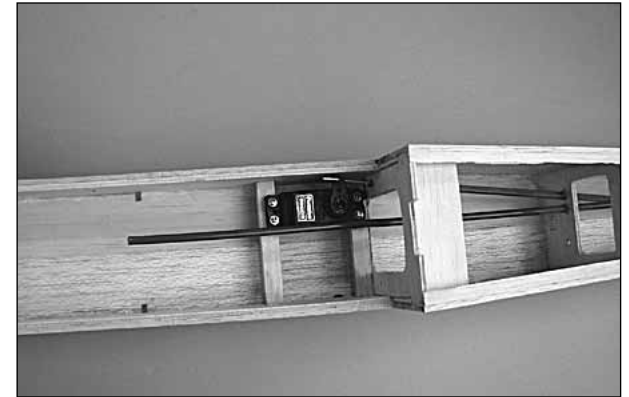
You **MUST** install your servos so that the servo arm is located in the position shown on the plan. Install the servo rails so that the servos you use will be in the proper location.

Servo output torque is a consideration when you select the servos that you will use. Standard size servos have adequate torque for any control function. If you are using mini servos you should use two servos for the elevators that have at least 35 oz in of torque each. The rudder servo should have at least 42 oz in of torque. This will insure that the control surfaces can reach full deflection at maximum flying airspeeds.

We recommend Z-bends be used for the pushrods where they connect to the servo arms. This results in the most compact installation possible and will reduce the possibility of a pushrod contacting something close to it. As an alternative you can use an L-bend with one of the supplied nylon Faslink keepers. For making Z-bends we highly recommend the Precision Z-bend Pliers from Great Planes (GPMR8025). This tool makes very precise Z-bends in tight areas and is one of those tools you wonder how you ever got along without.

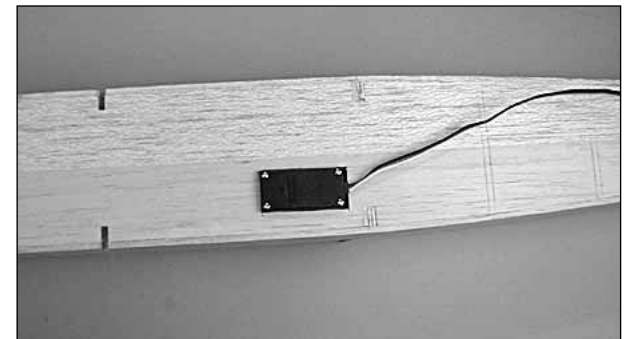


□ 4. Locate a **.074 x 36" [1.6 x 914mm] pushrod wire**. Bend a Z-bend (or L-bend) in the unthreaded end of the wire. Make this bend close to the end of the wire. Install a servo arm on the Z-bend. You may need to drill the servo arm with a 5/64" [2mm] drill. Insert this wire into the elevator pushrod tube where the tube exits F3. **DO NOT** cut off the excess wire where it exits the rear of the fuselage. This pushrod wire will be used as locating jig for the elevator servo.

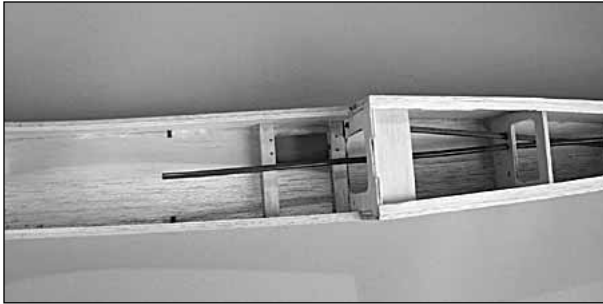


□ 5. From the 1/4" x 3/8" x 36" [6.4 x 9.5 x 914mm] basswood stick, cut two **servo mounting rails** to a length of 2-5/8" [66.7mm]. These rails should be a tight fit against the fuselage sides so that they can hold the servo in position during the following steps.

□ 6. Install one of the servo rails against F3. Place the elevator servo in position on the rail and install the second rail at the forward end of the servo. Install the servo arm, with the wire attached, on the servo. Refer to the note and photo below if you are using full size servos. **DO NOT** glue the rails at this time.

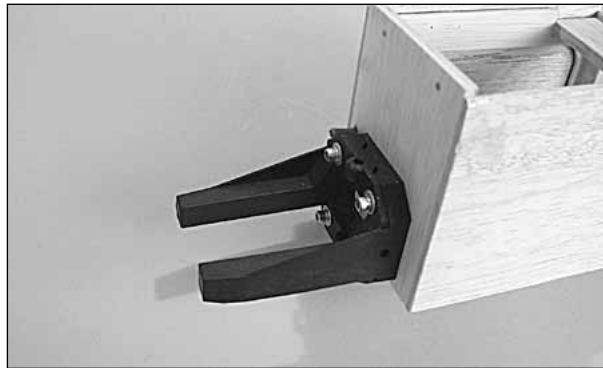


Note: If you are using a full size servo, you will need to cut a hole in the fuselage deck for the servo before you can install the servo arm. Mark the deck from inside the fuselage where you need to cut the hole. Then, remove the servo. Transfer the location of the hole to the top of the deck by pushing a pin through the deck at the corners of the hole. Cut out the hole from the top of the deck.



❑ 7. Position the servo and rails so that the pushrod wire lines up properly with the pushrod tube. Tack glue the rails to the fuselage sides. After the CA has cured, mark the location of the servo mounting holes. Then, remove the servo and pushrod wire. Securely glue the rails to the fuselage sides and the face of F3 with epoxy.

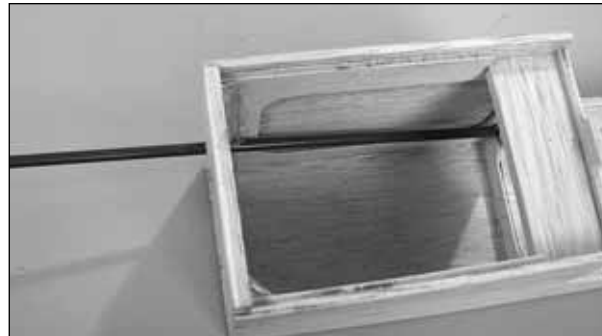
❑ 8. Drill pilot holes for the servo screws and mount the servo to the rails with the screws, grommets and eyelets that came with the servo. Remove the servo and harden the mounting holes with a drop of thin CA. After the CA has cured, remount the servo to the rails.



❑ 9. Cut the **spacer bar** off both **engine mount** halves and trim off any *flashing* so they fit together. Temporarily mount the engine mount to F1 using four 6-32 x 3/4" [19.1mm] socket head cap screws, #6 lock washers and #6 flat washers. Place your engine on the mount, adjusting it for the width of the engine. Mark the location of the hole for the throttle pushrod.

If you are using an O.S. .46 FX the location is already marked. Remove the engine but leave the engine mount in place.

Note: To allow as much room as possible for the fuel tank, the throttle pushrod should be placed as close to the fuselage side as possible. See the photo at step 10.



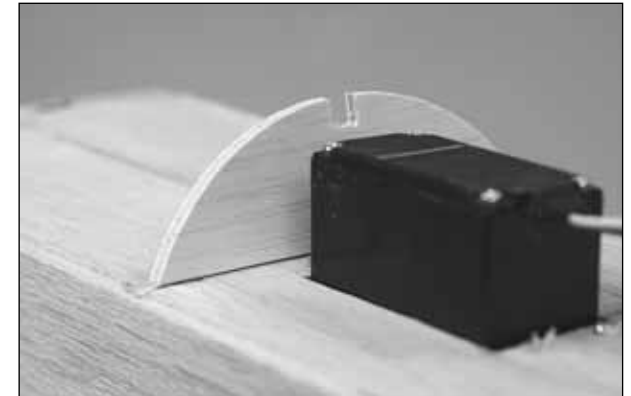
❑ 10. Drill a 3/16" [4.8mm] hole for the throttle pushrod at the location you marked. Using a piece of leftover plastic pushrod tube, install the **throttle pushrod tube** in the hole you just drilled in F1 and into the hole in F2. Trim the tube to length so that it extends about 1" [25.4mm] beyond F1. Remove the tube and roughen the ends where it will be glued in place later. Reinstall the tube.



❑ 11. Note the position of the throttle servo on the plan. You will need to cut a hole in the deck for the servo. If

you are using a full size servo, this hole must be close to the centerline of the model. A mini servo can be placed close to the side of the fuselage, allowing room for the switch mount on the other side. Cut a hole for the servo you will be using, using the plan as a reference. The photo shows a full size servo.

❑ 12. From the 1/8" x 1/4" x 24" [3.2 x 6.4 x 610mm] basswood stick, cut two servo mounting rails to a length of 2-5/8" [66.7mm]. Glue these rails to the top deck on the inside of the fuselage. Install the throttle servo, drill pilot holes for the mounting screws and install the screws, grommets and eyelets that came with the servo. Remove the servo, harden the mounting holes with a drop of thin CA and remount the servo when the CA has cured.



❑ 13. Turn the fuselage over and hold former F2T in position. Make sure the throttle servo will clear the sheeting that will be glued to F2T.

Note: You may need to trim some of the 3/16" [4.8mm] sq. stringer that will be glued to the notch in F2T.



❑ 14. Install a **Screw-Lock connector, nylon retainer** and **4-40 x 1/8" [3.2mm] socket head cap screw** on the outside hole of the servo arm. Install this arm on the throttle servo. Install a **.074 x 12" [1.6 x 305mm]** throttle **pushrod wire** into the throttle pushrod tube. If needed, adjust the location of the hole in F2 so that the pushrod lines up with the screw-lock connector.

Note: You may need to put a small bend in the wire as shown in the photo. Note also that there will be minimal clearance between the pushrod linkage and the wing when it is installed. It may be necessary to trim a small hole in the wing to clear the linkage.



❑ 15. Note the position of the rudder servo on the plan. It is mounted in the same manner as the throttle servo. You will need to cut a hole in the deck for the servo. This hole must be close to the centerline of the model for either a full size or mini servo. Cut a hole for the servo you will be using, using the plan as a reference.

❑ 16. From the **1/8" x 1/4" x 24" [3.2 x 6.4 x 610mm]** basswood stick, cut **FOUR** servo mounting rails to a length of **2-5/8" [66.7mm]**. Glue two of these rails to the top deck on the inside of the fuselage. Glue a second set of rails on top of these rails. This will space the rudder servo **1/8" [3.2mm]** further from the deck than the throttle servo. Install the rudder servo, drill pilot holes for the mounting screws and install the screws, grommets and eyelets that came with the servo. Remove the servo, harden the mounting holes with a drop of thin CA and remount the servo when the CA has cured.



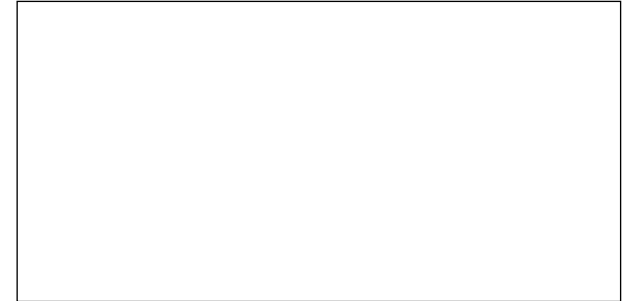
❑ 17. Locate the die-cut **1/8" [3.2mm]** ply **rudder pushrod brace**. Carefully drill a **3/16" [4.8mm]** hole in one end of this brace at the pin point punch mark. Slide the brace onto the rudder pushrod tube but do not glue it into place until after the receiver is installed.

❑ 18. Locate the **36" [914mm]** wire pushrod, with a Z-bend in the end, that you used earlier for the elevator servo installation. Temporarily install the wire pushrod in the rudder pushrod tube and install the rudder servo arm on the wire pushrod. Note the location of the ply rudder pushrod brace.

❑ 19. Remove all of the pushrods. Leave the engine mount in place.

INSTALL THE RECEIVER

The photos that follow show the installation of the large Futaba 7-channel FM receiver. There are several other 7, 8 and 9 channel receivers that are smaller.



❑ 1. Using the plan as a guide, cut a hole in the top deck for the receiver. Make sure the hole is large enough for the **1/4" [6.4mm]** foam that the receiver will be wrapped in. The receiver should fit firmly in this hole.

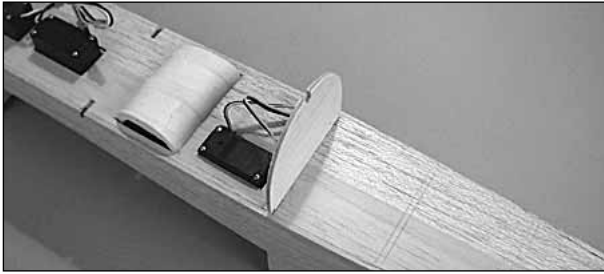
Note: A slot has been cut beside the servos to allow the servo wires to be neatly routed to the receiver. Note also the routing of the receiver antenna.



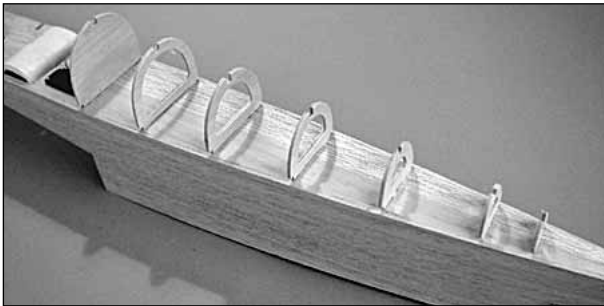
❑ 2. Turn the fuselage over. Note also how the servo wires have been routed and that tie wraps are used to keep the installation neat. The tie wraps are short lengths of fuel line.

Caution: Once the top of the fuselage has been sheeted, be careful not to push the receiver firmly into its cutout. This could cause the receiver to contact the top sheeting and cause it to split the sheeting.

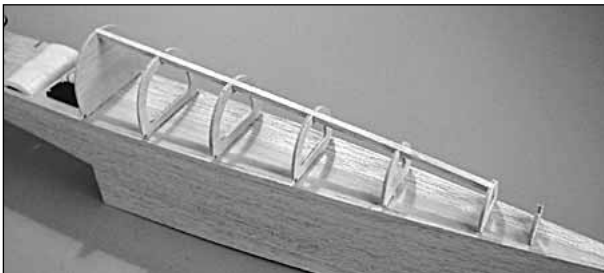
FINISH THE FUSELAGE



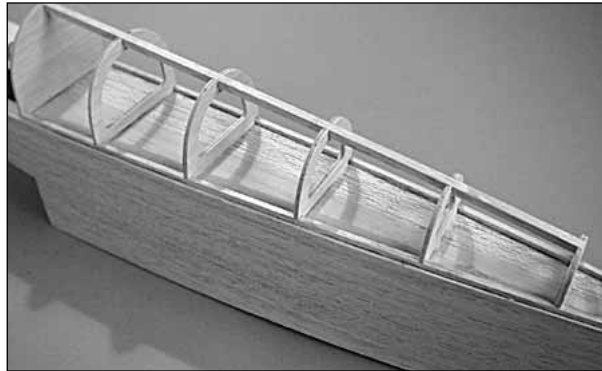
- ❑ 1. Glue the die-cut 1/8" [3.2mm] ply former **F3T** into place on the top deck using thin CA. Make sure that it is perpendicular to the top deck and that it is centered between the sides, directly on top of F3.



- ❑ 2. Glue die-cut 1/8" [3.2mm] ply formers **F3TR, F4T, F4TR, F5, F5TR and F6** into position using the marks you made earlier. Make sure the formers are perpendicular to the top deck and are centered between the sides.

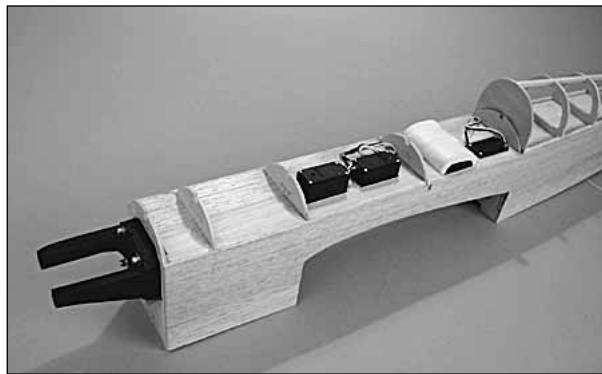


- ❑ 3. Glue a 3/16" x 3/16" x 24" [4.8 x 4.8 x 610mm] balsa stick from F3T to F5TR. As you glue the stick to each former make sure the former is perpendicular to the top deck. Trim the stick even with F3T and F5TR.



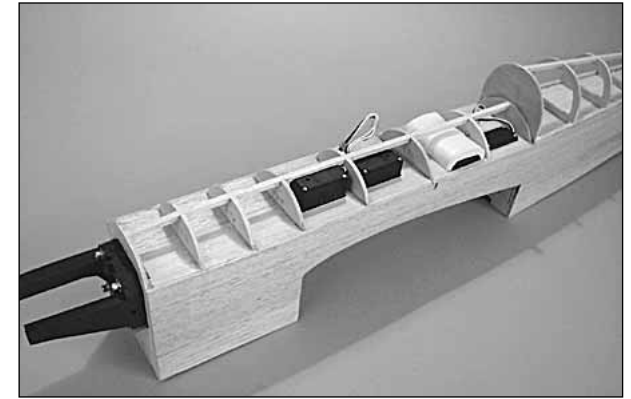
- ❑ 4. Glue two 1/8" x 1/8" x 24" [3.2 x 3.2 x 610mm] balsa sticks from F3T and F6T along the top of the top deck. Trim the sticks even with F3T and F6T.

- ❑ 5. Use a bar sander with 150-grit sandpaper to blend the sticks with the shape of the formers.



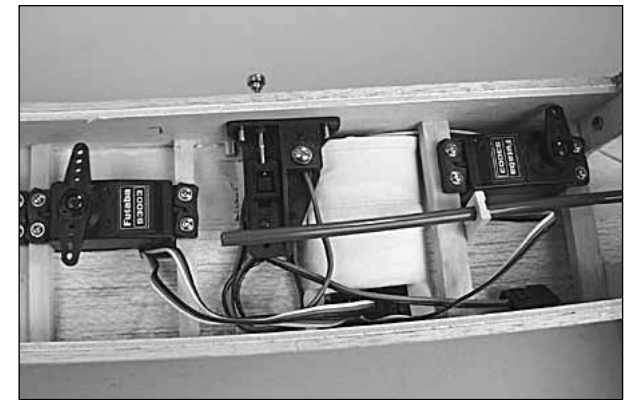
- ❑ 6. Glue die-cut 1/8" [3.2mm] ply formers **F1T, F1TR, F2T, F3TC and F3TF** in place to the top deck. Make sure the formers are perpendicular to the top deck and are centered between the sides.

- ❑ 7. There are three other formers that are supplied and are shown in the next photo. These are F2TX and two F3TX. These formers are shown on the side view of the fuselage plan. The location of these formers depends on the location of your servos and receiver. They are used to prevent the top sheeting from sagging between the other formers. Glue F2TX and both F3TX formers in place as desired.



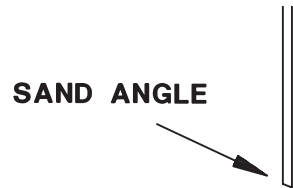
- ❑ 8. Glue a 3/16" x 3/16" x 24" [4.8 x 4.8 x 610mm] balsa stick from F1T to F3TF. As you glue the stick to each former make sure the former is perpendicular to the top deck. Trim the stick even with F1T. Use your bar sander to blend the stick with the shape of the formers.

Note: If you installed full size servos you will need to trim the stick where it crosses the servos.



- ❑ 9. Mount your switch to the side of the fuselage. We used a Great Planes Switch/Charge Mount (GPMM1000). You will need to cut a hole in the top deck for the switch. We installed the mount on the left side of the fuselage as it is easier for a right handed person to reach it. You may want to mount it on the left side to keep it away from the engine exhaust. Make sure the mount and switch will clear the wing when it is mounted to the fuselage.

- ❑ 10. Locate the four 3/32" x 3" x 24" [2.4 x 76 x 610mm] balsa sheets. Set the two softest sheets aside for use later. Use the remaining two to sheet the front of the fuselage in the following steps.



- ❑ 11. Cut both sheets to a length of 15-1/2" [394mm]. Sand an angle along one long edge of both sheets as shown in the sketch. Fit a piece of sheeting to the area to be covered between F1T and F3TF on the left side of the fuselage. See the photo at step 12 below.

Note: There will be a 1/32" [0.8mm] lip where the fuselage side overhangs the top sheeting. This will be sanded away later.



HOW TO FIT SHEETING

A. Mark the center of the 3/16" [4.8mm] stringer onto F3T.

B. At formers F2T and F3T, hold the angled edge of the sheeting in place along the top edge of the fuselage side. Carefully roll the sheeting along the former until it is resting on the stringer. Mark the location of the center of the stringer on the sheeting at F3T.

C. In the same manner, mark the sheeting at F1T.

D. The sheeting is straight from F3T to F2T and then slowly slopes to F1T. Mark the sheeting where it crosses F2T. Transfer the mark at F3T to F2T. Our F3T mark showed the sheeting needs to be 1-15/16" [49.2mm] wide at F3T. It should also be 1-15/16" [49.2mm] wide at F2T as well.

E. Cut the sheeting in a straight line between the marks from F3T to F2T. Cut the sheeting at an angle between the marks at F2T to F1T.



- ❑ 12. Using thin CA, glue the angled edge of the sheeting to the top of the fuselage side and the bottom of the formers.



- ❑ 13. Moisten the outside of the sheeting so that it will bend easier. Most modelers use a mixture of

water and ammonia. We prefer rubbing alcohol with a spray nozzle attached to the bottle. It soaks into the balsa easily and dries very fast.

- ❑ 14. Bend the sheeting against the formers, one at a time. While holding it in place, glue it to the former and stringer with thin CA. Do not become concerned if the sheeting splits at one end as ours did. Glue the split together and then glue it to the formers. It can be filled and sanded later.

- ❑ 15. Fit the second piece of sheeting to the other side of the fuselage. Be sure the angled edge is resting properly on the top of the fuselage side. Cut the sheeting 1/16" [1.6mm] oversize.

- ❑ 16. Carefully hold the sheeting in position along the top edge of the fuselage and then roll it along the former until it meets the sheeting on the other side. Note how much must be sanded off to get it to fit properly. Remove the sheeting and sand as needed. Do not sand off too much. Refit the sheeting and check it again. Go from former to former and sand a little off each time. You will quickly have a perfect fitting piece.



- ❑ 17. Glue this piece of sheeting in place in the same manner as you did the first piece. It is easier to use medium CA on the formers and thin CA on the stringer.

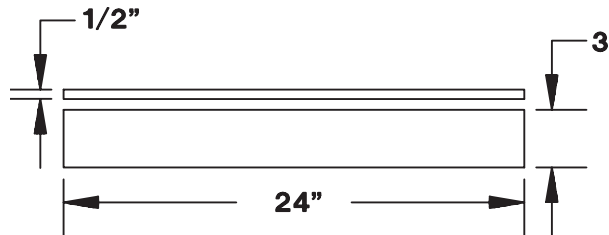
The rear turtle deck of the fuselage is sheeted in exactly the same manner as the top front. Fitting the balsa sheeting is a bit more difficult as the slope and curvature are greater.

BUILD THE WING

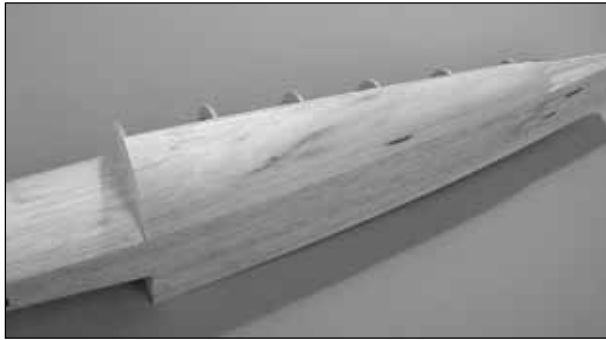
BUILD THE RIGHT PANEL

❑ 1. Remove all of the **ribs** from the die-cut 1/16" [1.6mm] balsa sheets. When doing so, do not remove any of the lightening hole cutouts in W2, W3 and W4. Remove the **spar webs** from the die-cut 3/32" [2.4mm] balsa sheet. Remove the **TE spar/jigs** from the die-cut 1/16" [1.6mm] balsa sheet. Be very careful not to let any of the jig tabs split off of the jig. If any do, glue them back on. Remove all of the ply wing parts from their die-cut sheets.

LEADING EDGE SKINS



❑ 2. Prepare four leading edge skins as shown in the sketch above. Locate five pieces of 1/16" x 3" x 24" [1.6 x 76 x 610mm] sheeting. From one sheet cut four strips that are 1/2" [12.7mm] wide. Glue a 1/2" [12.7mm] strip to each of the other four pieces of sheeting, making sheets that are 3-1/2" [89mm] wide. Sand each sheet flat and smooth on one side with your bar sander and 150-grit sandpaper. Sand any glue bumps from the other side of each sheet. **Caution:** Avoid over sanding the sheets, making them too thin.



❑ 18. Locate the two soft 3/32" x 3" x 24" [2.4 x 76 x 610mm] balsa sheets you set aside in step 10. Cut both sheets to a length of 14" [356mm]. Fit a piece of sheeting to the area to be covered between F3T and F6T on the left side of the fuselage. Glue the sheet into position with thin CA.

Note: There is a small area of the sheeting at the top near F3T that needs to be filled in. Use a corner of the piece you just cut off and glue it to the sheeting.



❑ 19. Fit the second piece of sheeting to the other side of the fuselage. Glue it into position with medium and thin CA.

❑ 20. Trim and sand all of the sheeting flush with F1T, F3T and F6T.

Note: A 1/4" [6.4mm] notch will be cut in the top of the sheeting between F5TR and F6T when the vertical fin is installed.

This completes the assembly of the fuselage. The bottom sheeting will be added when the wing is mounted to the fuselage.

Note: Portions of this manual that apply only to fixed landing gear begin with an "F". For example: Step F3 is for **fixed gear** only. Steps that apply to **retract landing gear** are shaded and begin with an "R", such as step R6. It is assumed that most modelers will be installing fixed tail dragger landing gear (with a tail wheel), so just skip the shaded steps that begin with an R. If you are building your model for retracts, make sure you read the steps that are shaded and skip steps that begin with an F.

Remember:

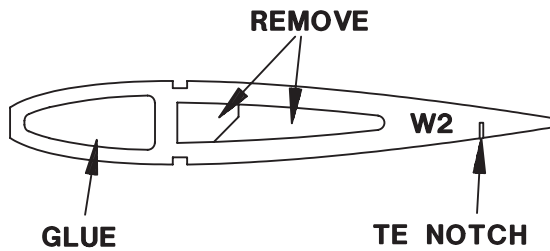
"R-steps" are for retracts only;

"F-steps" are for fixed gear;

Note: Use a colored marker to highlight the steps for your landing gear option.

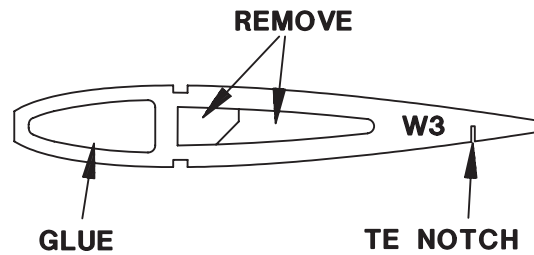
Retracts go to step R9.

FIXED GEAR



❑ F3. If you are installing fixed gear on your model, prepare both **W2 ribs** as shown in the above sketch. Glue the lightening hole forward of the spars back into the rib. Remove the two pieces from the lightening hole aft of the spars.

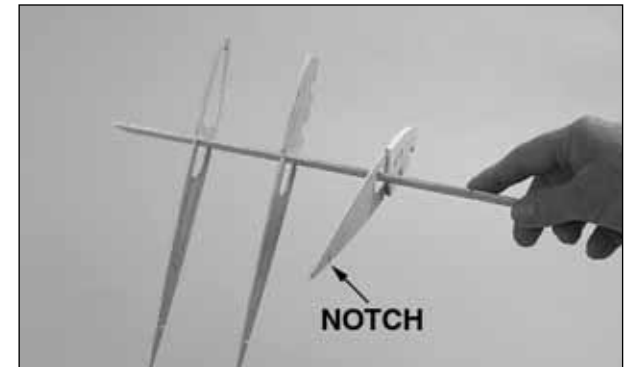
RETRACTABLE GEAR



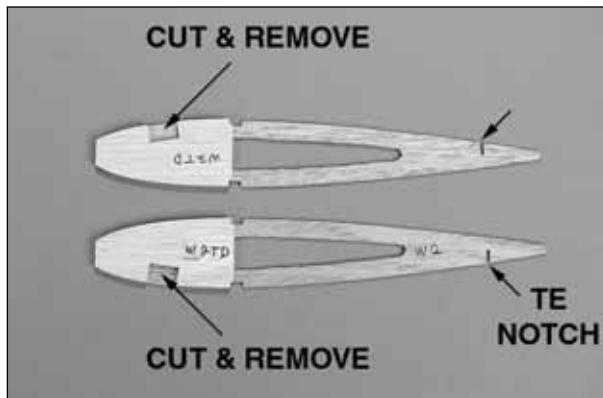
❑ R6. If you are installing retracts (retractable landing gear) on your model, prepare both **W3 ribs** as shown in the above sketch. Glue the lightening hole forward of the spars into the rib. Remove the two pieces from the lightening hole aft of the spars.

❑ R8. In the same manner, prepare both **W4 ribs**. Remove the lightening holes from both **W2 ribs**.

❑ 9. Cut the **right wing plan** along the dashed line and tape it to your building board. Cover the plan with Plan Protector or wax paper.



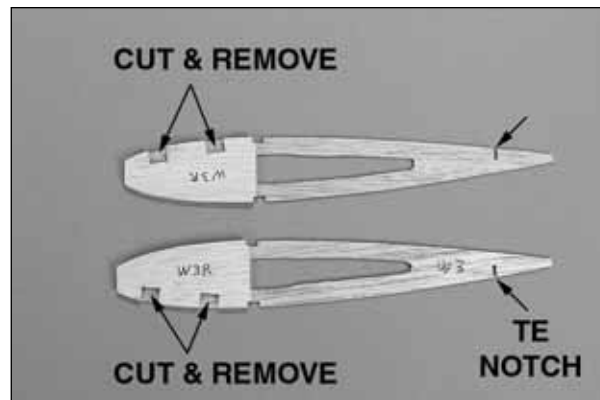
❑ 10. Locate a die-cut 3/32" [2.4mm] balsa **spar web**. Working from the narrow end of the web, slide ribs **W2** thru **W9** into position on the web. Twist each rib so that it seats properly in the web. Be sure that the ply doublers on **W2**, **W3** and **W4** are on the correct side. Also be sure that the notch for the TE web/jig is facing down when each rib is twisted into position.



❑ F4. Glue a die-cut 1/8" [3.2mm] ply **W2TD doubler** to each **W2** with 6-minute epoxy. Make sure to make a left and right assembly. Cut and remove the balsa from the rib where there is a notch in **W2TD** for the landing gear rail.

Important: Notice the orientation of the **TE notch** in relation to the **W2TD notch**.

❑ F5. In the same manner, prepare the **W3** and **W4** ribs. Continue with step 9.



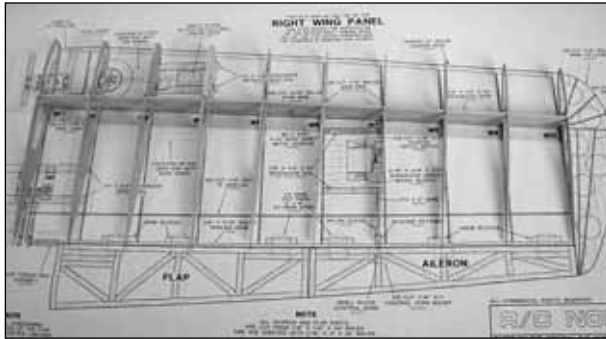
❑ R7. Glue a die-cut 1/8" [3.2mm] ply **W3R doubler** to each **W3** using 6-minute epoxy. Make sure to make a left and right assembly. Cut and remove the balsa from the rib where the notches are in **W3R** for the landing gear rails.

Important: Notice the orientation of the **TE notch** in relation to the **W3R notches**.



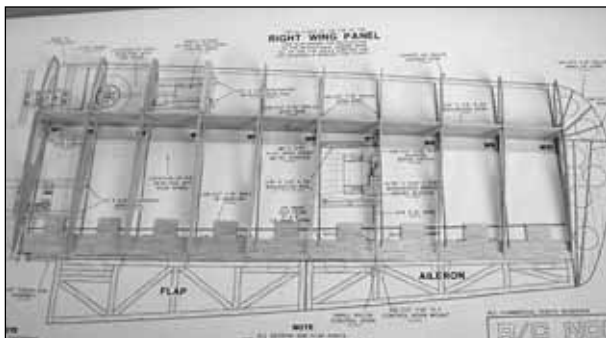
❑ 11. Position a 1/8" x 1/4" x 24" [3.2 x 6.4 x 610mm] basswood **bottom spar** over its location on the plan, aligning the spar so that a little overhangs each end. Pin the spar to the plan at the ends. Don't stick your pins through the spar as it will split the spar. Instead, stick them into your building board over the spar in a

crisscross fashion. Place an additional pair of pins beside the spar between ribs W5 and W6. Do not crisscross these as it would interfere with the spar web. Stick them into your building board vertically so that they keep the spar in position.

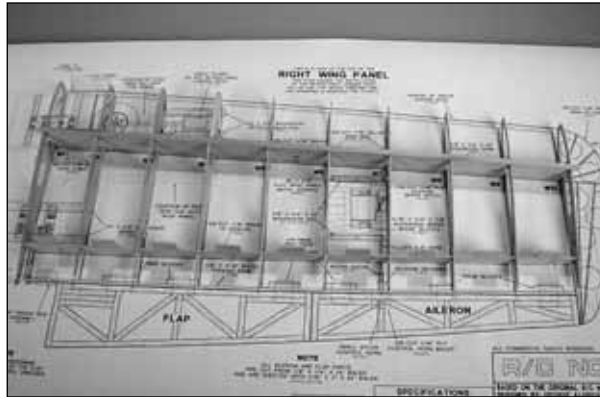


□ □ 12. Position the spar web, with ribs, onto the bottom spar. Align the ribs over their locations on the plan. Install W1 and W10 on the spar and spar web. Make sure each rib is seated onto the bottom spar and that the spar web is against the forward part of the cutout in each rib. DO NOT apply glue until instructed to do so.

Note: Do not be concerned if the ribs do not exactly align spanwise with the plans. Paper plans can expand and contract as much as 1/8" [3.2mm] due to moisture.



□ □ 13. Position the **TE spar/jig** flat on the building board, under the TE notches in the ribs. **The jig tabs must be facing the bottom spar and the widest part of the TE spar/jig must be at W1.**



□ □ 14. Carefully rotate the TE spar/jig so that the jig tabs are facing up, while also sliding each rib into the slot in the TE spar/jig. Make sure that each rib is seated in the notch in the TE spar/jig and that the TE spar/jig is seated in the notches in the ribs. Pin the TE spar/jig in location over the plan. DO NOT glue yet.

□ □ 15. Put the 1/8" x 1/4" x 24" [3.2 x 6.4 x 610mm] basswood **top spar** into position on the spar web, seating it in each rib. DO NOT glue yet.

□ □ 16. Time to get the thin CA. Starting with W3 and working towards W10, glue each rib to the bottom spar and the spar web. While doing so, press the rib and spar web firmly onto the bottom spar until the CA cures. Make sure the rib is firmly seated against the front face of the spar web and also that the TE spar/jig and rib remain in place.

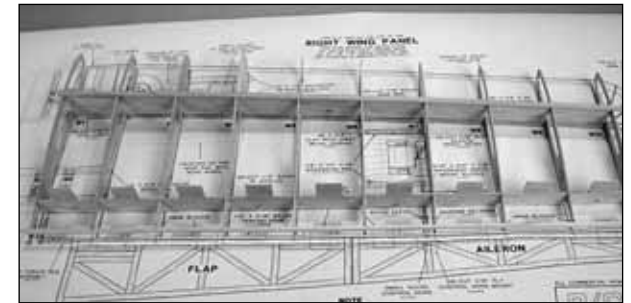
Important: For maximum wing strength it is essential that the joint between the spar web and the top and bottom spars, as well as the joint between the spar web and each rib, be securely glued with no gaps. When you remove the wing panel from the building board in a later step, be sure to touch up any joints that need additional glue.

□ □ 17. Tack glue W1 and W2 in place to the spar web. There is a 1/16" [1.6mm] gap between the spar web and the top and bottom spars. Do not get any excess glue into this gap as the 1/16" [1.6mm] ply spar joiners fit into the gap.

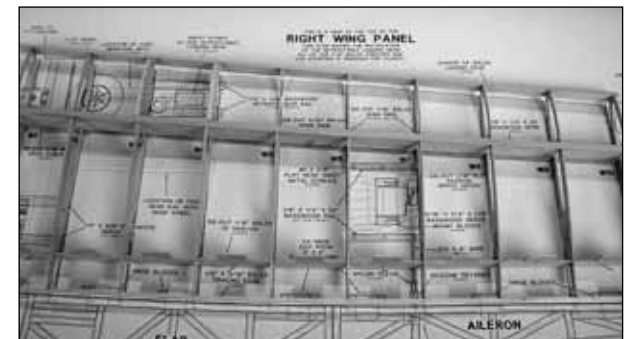
□ □ 18. Remove the top basswood spar. Spread a bead of medium CA along the top of the spar web between W2 to W10 and on each rib where the top spar will contact them. Re-install the top spar and hold it firmly in place against the spar web until the CA cures.

□ □ 19. Glue each rib to the TE spar/jig with thin CA. Make sure each rib is properly seated in the TE spar/jig. The top of each rib should be even with the top of the TE spar.

Note: Use the CA sparingly. If you apply an excessive amount of CA it will be difficult to remove the bottom of the jig under the ribs. Use the included CA applicator tip.



□ □ 20. Glue the 1/8" x 3/16" x 24" [3.2 x 4.8 x 610mm] balsa **trailing edge** to the rear of the ribs with thin CA. The top of the trailing edge should be even with the tops of the ribs.

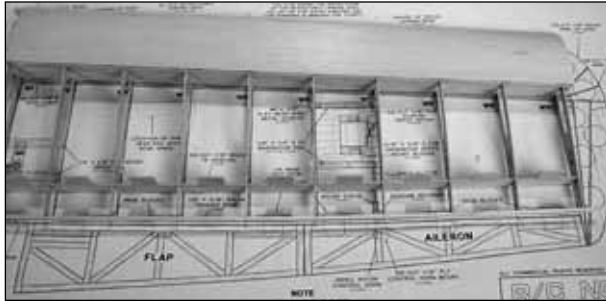


□ □ 21. Glue the tapered 5/32" to 1/2" x 1/4" x 24" [4 to 12.7 x 6.4 x 610mm] balsa **leading edge** to the

front of each rib with thin CA. The top of the leading edge should be even with the tops of the ribs. Use a straight edge along the sides of W1 and W10 to insure that they are straight.

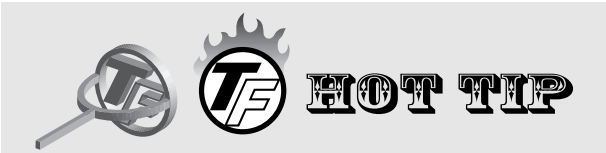
Note: You will need to carefully sand the front of W2, W3 and W4 at an angle to match the sweep of the LE if those ribs have a ply doubler installed.

□ □ 22. Use your bar sander with 150-grit sandpaper to lightly sand the top of the leading edge to blend it evenly with the tops of the ribs.



□ □ 23. Using medium CA, glue one of the leading edge skins that you prepared in step 2 into place on the ribs and the top spar. The skin should extend forward from the center of the spar. Refer to the **HOT TIP** that follows.

Note: Make sure you glue the skin in place with the smooth side facing out. Position the 1/2" [12.7mm] strip that was glued to the sheeting at the spar.



It can be difficult to get a tight glue joint between the leading edge skin and the tapered balsa leading edge while the wing panel is still on the building board. Do not apply any CA to the tapered leading edge until after you remove the wing from the building board in the next step.

After you remove the wing from the building board, use thin CA to glue the skin to the tapered leading edge. Working one section at a time between two ribs, hold the skin to the tapered leading edge and wick in some thin CA. Firmly hold the skin in place until the CA cures.

□ □ 24. Remove the wing panel from the building board. Glue the wing skin to the tapered leading edge with thin CA. Checking from the bottom of the wing panel, insure that the leading edge skin is securely glued to the tops of all the ribs.

□ □ 25. Carefully check all of the glue joints between the spar web, top and bottom spars and the wing ribs. Fill in any glue joints that don't look solid with thin CA.

□ □ 26. Trim the leading edge, leading edge sheeting, spars and trailing edge even with W1 and W10. Trim the leading edge sheeting even with the front of the tapered leading edge.

□ □ 27. Snap the bottom of the TE spar/jig off even with the bottom of the ribs. The TE spar/jig has an embossed cut line where it is to be snapped off. OK, so you got too much CA on the TE spar/jig when you glued the ribs in place. Use a razor saw to cut along the embossed line.

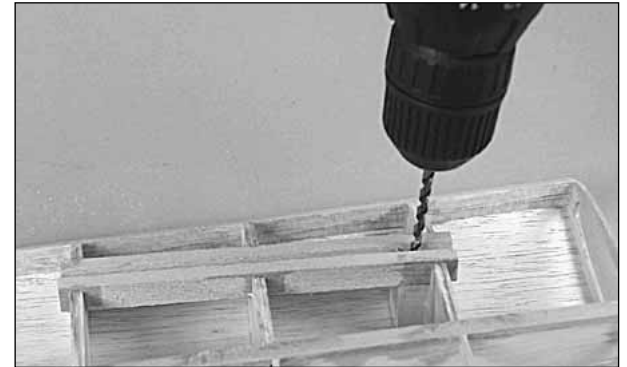
Important: Use caution not to break any of the short jig tabs off of the top of the TE spar/jig.

□ □ 28. Use your sanding bar to sand the bottom of the tapered leading edge even with the bottom of the ribs, following the contour of the ribs. Do not change the shape of the ribs. Also sand the trailing edge, TE spar/jig and bottom spar even with the ribs.

□ □ 29. Turn the wing panel upside down and place it on your building board. Pin the TE spar/jig to the board and use weights to hold the front of the wing panel on the building board.

Retracts go to step R33.

Use the following photo for the next two steps.



□ □ F30. If you are installing fixed landing gear on your model, glue the 7/16" x 5/8" x 5-5/8" [11.1 x 15.9 x 142.9mm] basswood **grooved landing gear rail** into the notches in W2, W3 and W4 using 6-minute epoxy. The groove in the rail should face the bottom surface of the wing. Glue the 7/16" x 5/8" x 7/8" [11.1 x 15.9 x 22.2mm] maple **torque block** to the top surface of the rail against W2, as shown on the plan.

Note: Before gluing the rail in place check the fit of the rail in the notches. The rail should protrude 1/16" [1.6mm] from the bottom of the ribs so as to be level with the 1/16" [1.6mm] balsa sheeting when the wing is sheeted.

□ □ F31. Mark the bottom of the groove in the landing gear rail 3/16" [4.8mm] from the edge of W2. Drill a 5/32" [4mm] hole through the landing gear rail and the torque block at the mark. As you drill, make sure you hold your drill at a 90 degree angle to the landing gear rail.

Note: The hole should go into the middle of the torque block. Be careful not to drill through the top skin.

□ □ F32. Chamfer the inside edge of the hole in the landing gear rail to accommodate the bend of the landing gear wire. This will allow it to fully *seat* in the groove. Test fit the 5/32" [4mm] **landing gear wire** in the landing gear rail. Make adjustments where necessary for a good fit. Continue with step 36.



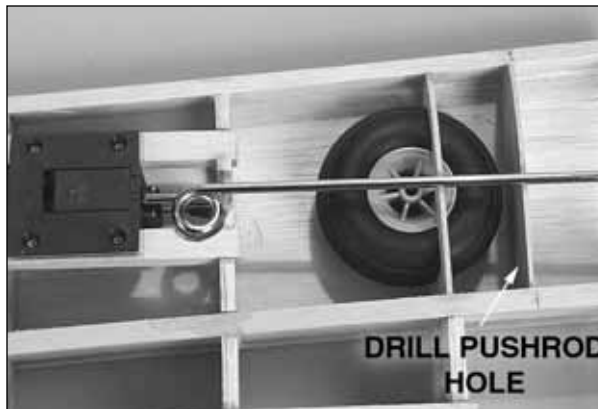
□ □ R33. If you are installing retracts (retractable landing gear) on your model, cut two 3" [76mm] rails from the leftover 1/4" x 3/8" [6.4 x 9.5mm] basswood stick. Glue these rails into the notches in W3 and W4 using 6-minute epoxy.



□ □ R34. Fit and temporarily install the **right retract landing gear** to the rails. You will need to trim W3

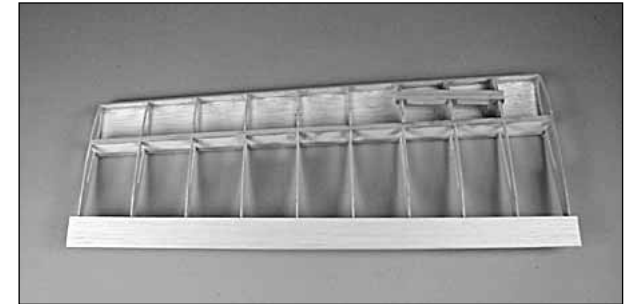
and the retract mounting rail(s) to fit the retract unit. The best tool for this is a rotary tool with a 1/2" [12.7mm] sanding drum. Do not trim W2 for the wheel. The wheel will be fitted after the sheeting is installed. Drill pilot holes for the #4 x 3/8" flat head sheet metal screws. You will note from the photo that we have marked the position of the retract unit on the rails. This will be useful later when the sheeting is trimmed to fit the retract unit.

Note: This model was specifically designed for the .40 size retracts from Great Planes (GPMQ2905). These units are strong, compact and inexpensive. They are relatively easy to fit and install.

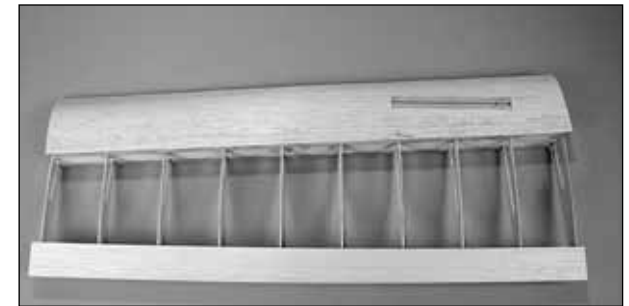


□ □ R35. Glue the die-cut 1/16" [1.6mm] balsa **partial rib W1R** into position. Make sure that it is positioned so that the wheel will clear W1R by 1/16" [1.6mm] when it is retracted. Less clearance will cause the wheel to jam while more clearance will make the retract servo hard to fit. On our prototype model W1R is 1-9/16" [39.7mm] from W1. This is also a good time to drill a hole for the pushrod to the servo in W1R. Ours was 7/8" [22.2mm] (1-7/8" [47.6mm] left panel) forward of the spar web and close to the top sheeting.

Note: In the photo, W2 was trimmed slightly to put the wheel into position.



□ □ 36. Glue the bottom 1/16" x 1-7/16" x 24" [1.6 x 36.5 x 610mm] balsa **trailing edge sheet** into place with medium CA.



□ □ 37. Using medium CA or aliphatic resin, glue one of the leading edge skins that you prepared in step 2 into place on the ribs and the bottom spar. The skin should extend forward from the center of the spar. Refer to the **HOT TIP** that follows.

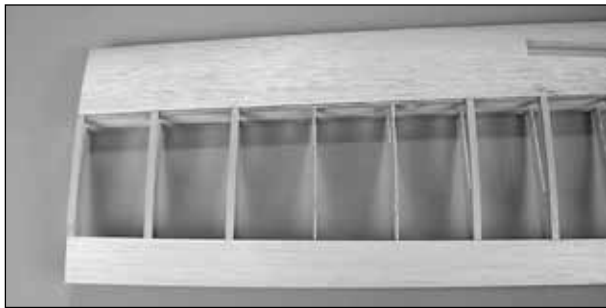
Note: If you are installing retracts, do not glue the skin to the rails until later.

Note: Make sure you glue the skin in place with the smooth side facing out. Position the 1/2" [12.7mm] strip that was glued to the sheeting at the spar.

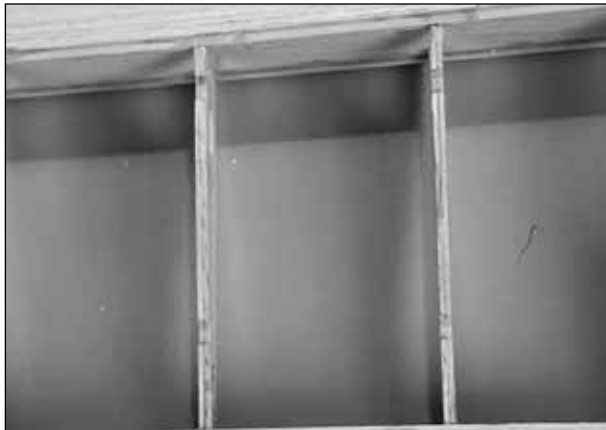
Note: If you are installing fixed landing gear, cut the *Fixed Gear Rail Template* from the wing plan and use it as a guide to cut the sheeting for the landing gear rail.



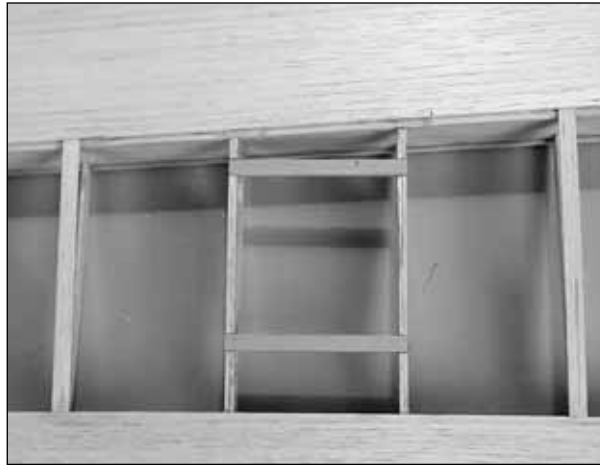
If some of the glue joints were loose when you glued the first leading edge skin on, you may want to use aliphatic resin glue for this skin. Most aliphatic resin glues can be heat activated after the glue has dried, allowing a loose skin joint to be ironed back into place.



□ □ 38. Cut, fit and glue **cap strips** for the bottom of ribs W4, W5, W8, W9 and W10 from a 1/16" x 1/4" x 30" [1.6 x 6.4 x 762mm] balsa stick.



□ □ 39. Glue die-cut 1/16" [1.6mm] balsa **W6D** and **W7D** into position on ribs W6 and W7. W6D is glued to the root side of W6 and W7D is glued to the tip side of W7.

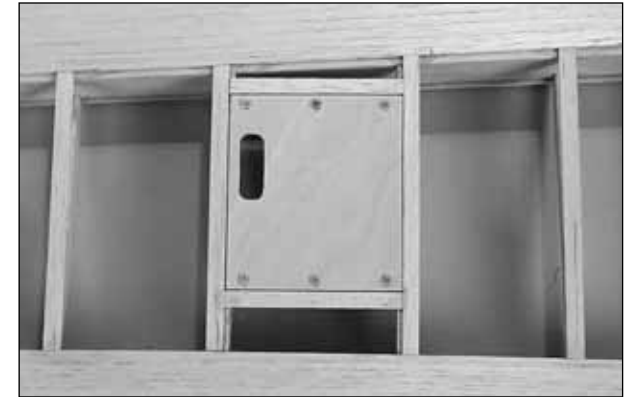


□ □ 40. Cut two 2-3/4" [70mm] **servo hatch mounting rails** from a leftover 1/8" x 1/4" [3.2 x 6.4mm] basswood stick. Glue them to the notches in W6 and W7 with 6-minute epoxy. Do not use the two 1/8" x 1/4" x 24" [3.2 x 6.4 x 610mm] basswood spars left for the other wing panel.



□ □ 41. Center the die-cut 1/16" [1.6mm] ply **aileron servo hatch** on the servo rails. Make sure the hatch is centered on W6 and W7 and that the cutout in the hatch is closest to the tip. Drill 1/16" [1.6mm] holes through the hatch and servo rails at the six punch marks. Remove the hatch and enlarge the holes *in the hatch only* with a 3/32" [2.4mm] drill. Use a countersink, or a 3/16" [4.8mm] drill, to countersink the holes in the hatch, for the #2 x 3/8" [9.5mm] flat

head sheet metal screws. Mount the hatch to the rails with six #2 x 3/8" [9.5mm] screws. Remove the hatch and harden the holes with a couple of drops of thin CA. After the CA has cured mount the hatch to the rails.



□ □ 42. Cut, fit and glue **cap strips** to W6D and W7D using a 1/16" x 1/4" [1.6 x 6.4mm] balsa stick. Be careful not to get any glue on the hatch. Fit and glue cap strips at the front and rear of the hatch as well.

□ □ 43. Remove the aileron servo hatch. Remove the wing panel from the building board. Securely glue any of the cap strips to the ribs if any require it. Trim the sheeting even with W1 and W10.

□ □ 44. Turn the wing panel over. Snap the jig tabs off of the TE spar/jig. Use your sanding bar to sand the trailing edge and TE spar even with the ribs. Be careful not to alter the shape of the ribs.

□ □ 45. Using the plan as a guide, cut seven TE hinge blocks for the aileron and flap hinges from a 1/8" x 1/4" x 24" [3.2 x 6.4 x 610mm] balsa stick. Glue the hinge blocks into place with thin CA.



□ □ 46. Glue the top 1/16" x 1-7/16" x 24" [1.6 x 36.5 x 610mm] balsa **trailing edge sheet** into place with medium CA or aliphatic resin glue. Trim the sheet even with W1 and W10.

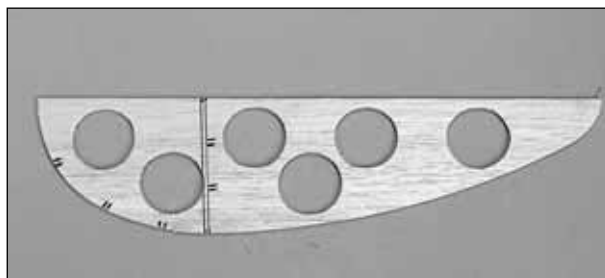
□ □ 47. Cut, fit and glue **cap strips** for the top of ribs W4 thru W10 from 1/16" x 1/4" x 30" [1.6 x 6.4 x 762mm] balsa sticks.

□ □ 48. Cut the **left wing plan** along the dashed line and tape it to your building board. Cover the plan with Plan Protector or wax paper. Build the left wing panel starting with step 10.

That completes the construction of the wing panels. You can rough sand them now or wait until they are joined and the center sheeting is installed.

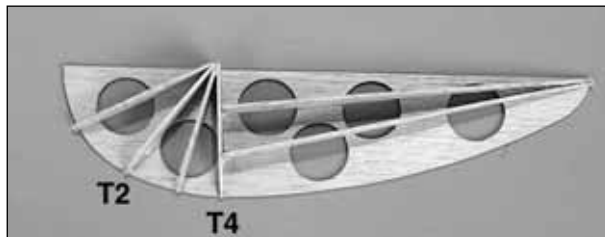
BUILD THE WING TIPS

It is easiest to build the wing tip as a separate assembly and then glue it to the wing. All of the tip ribs are slightly oversize in length to allow them to be blended and rounded at the tip. T5 and T6 are slightly tall as well.



□ □ 1. Locate a die-cut 1/16" [1.6mm] balsa **wing tip core** and two each of tip ribs **T1** thru **T6**. Place the tip core over the plan and mark the location of all the tip ribs.

Use the following photo for the next four steps.



□ □ 2. Use thin CA to glue the parts together. Work on one side of the tip at a time. Start by gluing T4 in position, making sure that it is perpendicular to the wing tip core.

□ □ 3. Next, glue T2 in position, making sure T4 is perpendicular. Refer to the plan to see how angles are sanded onto T2 where it joins T4.

□ □ 4. Glue T1 and T3 into position.

□ □ 5. Glue T5 and T6 into position.

□ □ 6. Turn the tip over and glue a second set of tip ribs into position.

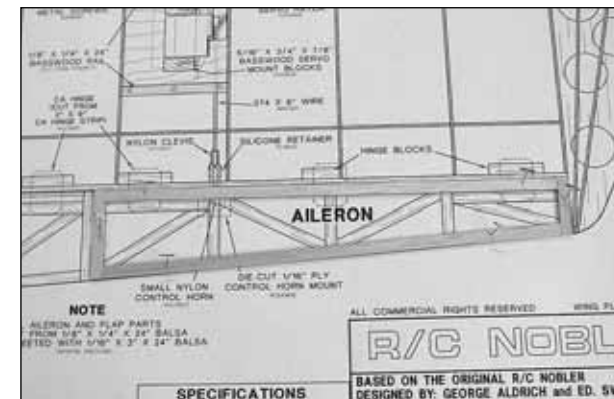
□ □ 7. Return to step 1 and build a second wing tip.

The wing tips will be glued into place during final assembly.

BUILD THE AILERONS

□ □ 1. Place the right aileron plan on your building board. Cover the plan with Plan Protector or wax paper.

Note: All aileron parts are cut from 1/8" x 1/4" x 30" [3.2 x 6.4 x 762mm] balsa sticks.



□ □ 2. Cut the **aileron TE and LE** from a 1/8" x 1/4" x 30" [3.2 x 6.4 x 762mm] balsa stick and pin them in position over the plan.

□ □ 3. Cut the aileron ends from the remainder of the stick and pin them in position. **DO NOT** glue until later.