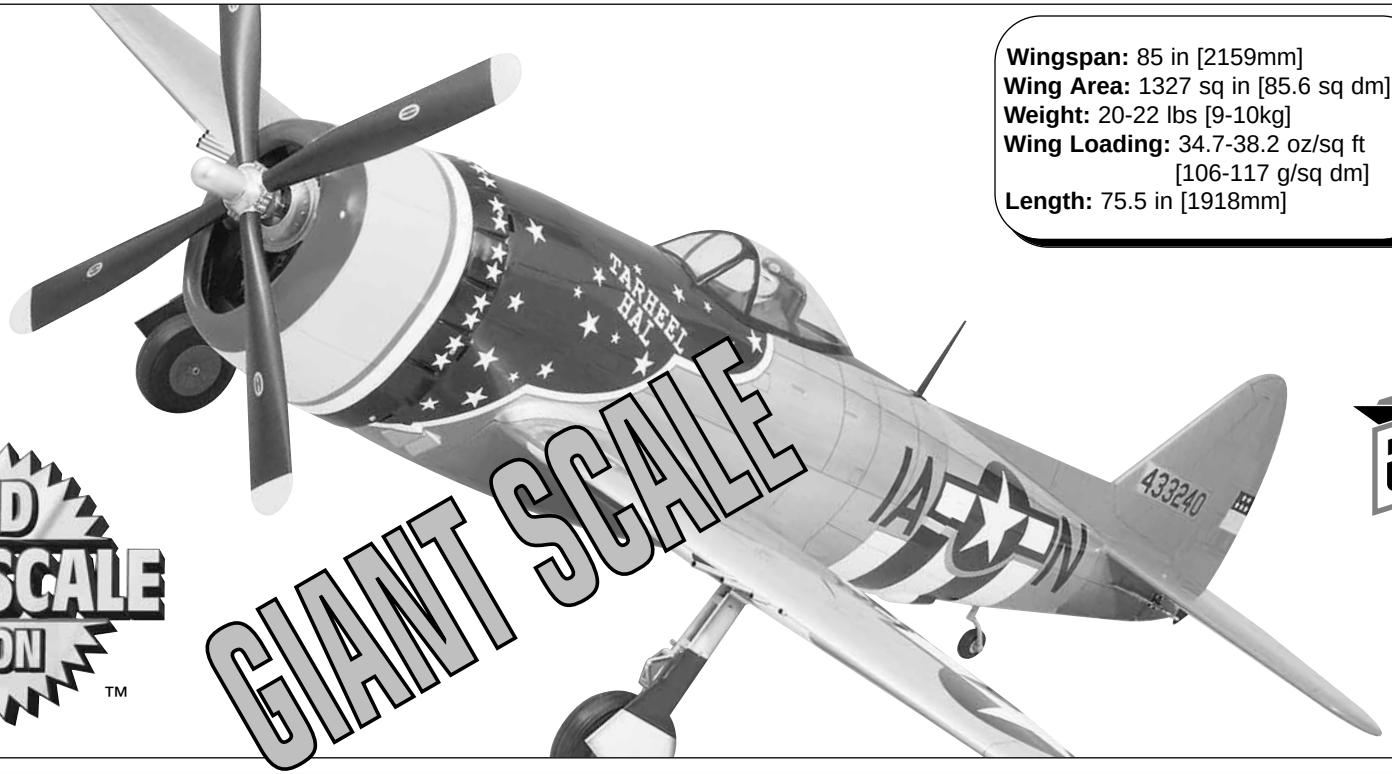
TOP FLITE® P-47D THUNDERBOLT



Wingspan: 85 in [2159mm]
Wing Area: 1327 sq in [85.6 sq dm]
Weight: 20-22 lbs [9-10kg]
Wing Loading: 34.7-38.2 oz/sq ft [106-117 g/sq dm]
Length: 75.5 in [1918mm]

GOLD GIANT SCALE EDITION™

MADE IN USA

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 3002 N. Apollo Dr., Suite 1, Champaign, IL 61822 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.

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INTRODUCTION

Congratulations and thank you for purchasing the **Top Flite Giant Scale Gold Edition P-47 *Thunderbolt***. We are pleased to bring you this 1/6th scale P-47, an enlarged version of our highly successful 1/8th scale P-47. Due to the popularity and success of the smaller P-47, this may be our most anticipated project yet. The P-47 has long been recognized as an excellent modeling subject. The large wing and tail area and long tail moment make it an ideal flying airplane–especially for a warbird! In addition to the favorable proportions of the P-47, the kit's custom airfoils, built-in washout and right engine thrust make this model a sweet flying plane. Advanced 3-D computer engineering and interlocking construction techniques combined with wing sheeting jigs help you build a straight, lightweight model.

With this kit you can achieve whatever level of detail you like. Just by following the instructions and finishing the plane in a scale-looking trim scheme, beginning scale modelers will end up with a model that very much represents a full-size P-47. Experienced builders will find ways to add even more detail, making the Top Flite Giant Scale *Gold Edition* P-47 competitive in scale contests.

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

Your P-47 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 P-47 correctly, you could possibly injure yourself or spectators and damage property.

If this is your first giant scale project, get assistance with assembly and your first flights from an experienced, knowledgeable modeler. You'll avoid risking your model before you're ready to fly it for the first time. 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

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.

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@top-flite.com

If you are calling for replacement parts, please look up the part numbers and the kit identification number (stamped on the end of the carton) and have them ready when you call.

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.

DECISIONS YOU MUST MAKE

ENGINE SELECTION

Recommended engine size:

34.5 - 45cc (2.1 - 2.8 cu. in.) displacement
Glow Engine

41 - 70cc (2.5 - 4.2 cu. in.) displacement
Gasoline Engine

We strongly recommend the use of a soft engine mount to relieve the stresses on the airframe and radio system and to make your aircraft quieter. The instructions show a Great Planes® Isolation Mount (GPMG2000) with the U.S. Engines™ 41cc engine. J-Tec, Soundmaster and others produce soft mounts for large engines as well.

RADIO SYSTEM REQUIREMENTS

For operations other than flight-critical control surfaces (such as the tail wheel steering, throttle, air control valve, flaps and optional onboard ignition kill switch for gas engines), you may use standard servos. Frequently, we even use a micro servo for the air control valve. For flight-critical control surfaces (ailerons, elevators, rudder), this model requires five "high-torque" servos. IMAA recommendations specify servos with a minimum of 45 inch-ounces of torque. However, some standard servos supply nearly that much, so for the giant P-47 we suggest servos with at least 50 inch-ounces of torque. Another reason to use servos with a higher torque rating is that they have stronger centering capabilities with less free-play. A servo that holds strongly when centered is necessary to prevent flutter on giant models. Futaba 9001's are shown in the model in this manual. We use them in our giant warbird flying prototypes. 9001's put out approximately 54 inch-ounces of torque and are suitable for your P-47 if it is powered by most of the engines within the recommended range (such as the US Engines 41cc). If you are using a more powerful engine and plan to fly your model at high speeds, servos closer to 70 inch-ounces of torque are recommended. There are many high torque, standard size servos available, but larger 1/4-scale servos may be used in this model too. The servo tray in the fuselage and the servo hatches in the wing are designed to fit standard size servos. If you choose to use large 1/4-scale servos, you will have to modify the servo trays or make your own to accommodate the servos.

The minimum capacity of a receiver battery pack required for this model is 1000 mAh. Receiver packs having 1200 to 1400 mAh are preferable. Some modelers use 6-volt (five cell) 1200 to 1500 mAh packs.

Be certain your servos, receiver, on/off switch and charging system are compatible with your battery pack. Use servo extension cords and Y-connectors where required. It is likely that you will need these for flaps and ailerons. Connections between servo cords and extension cords or Y-connectors should be secured with heat shrink tubing, vinyl tape or special clips intended for this purpose.

LANDING GEAR

The Top Flite *Giant* P-47 uses Robart #622 retractable main landing gear which are designed specifically for this model and a #160LWC retractable tail gear. Other systems may work, but it will be up to you to make the modifications required to fit them. Following is a list of items required for the retracts.

Robart # 622 Top Flite Giant P-47 main landing gear retracts (ROBQ1636)
Robart #160LWC Retractable tail gear (Robart direct)
Robart #157VR Air Control Kit w/ variable rate valve (ROBQ2301)
Robart #192 Large Pressure Tank (ROBQ2392)
Robart #164G 100 PSI Pump w/gauge (ROBQ2363)
Robart # 190 Quick disconnects (ROBQ2395)
Pull-Pull cable kit for tail wheel steering (SULQ3120)
(16) #6 x 1/2" screws for mounting main and tail gear (GPMQ3160, 4 per pack)

COCKPIT & PILOT

Your *Thunderbolt* won't be complete without the Top Flite Giant P-47 Cockpit Kit (TOPQ8410). It includes the floor, side panels, instrument panel, seat, headrest and hardware. The cockpit kit can be installed after the fuselage is completed, but is easier to install if you have it on hand during construction.

Top Flite offers two 1/5 scale WW II Military Pilots specially made for the Giant Scale Gold Edition kits. One is a full body pilot (TOPQ9030) and the other is a bust only (TOPQ9032).

TRIM SCHEME

The colorful "Tarheel Hal" trim scheme on the kit box cover is rather bold and ambitious, but can be accomplished by modelers who have experience with iron-on coverings. Top Flite MonoKote® was used for the covering and LustreKote® was used for the paint. Refer to the back of this manual for more information about painting and covering (and for more details that may help you to decide whether or not to attempt this scheme).

The primary colors of MonoKote film required for "Tarheel Hal" are aluminum (main portions of fuse and wing), orange (tail) and royal blue (front of fuse). Additionally, you will need small amounts of insignia blue, cub yellow and missile red (for the flag on the rudder), black and jet white (for the invasion stripes) and flat black (for the anti-glare panels on the top of the fuse).

The colors of LustreKote paint required are two cans of white primer and one can each of aluminum, royal blue, missile red, cub yellow, flat black, crystal clear and gloss black. If you'll be painting the intercooler doors to match the stars and bars on the side of the fuse, you'll also need a small amount of insignia blue.

RAZORBACK OR BUBBLE CANOPY

The Giant P-47 may be constructed as either a D-23 *Razorback* or a D-25 *Bubble Canopy* (it should be noted that not all bubble canopy P-47's featured a dorsal fin). This kit includes all the wood parts and complete instructions to build either version, but includes the bubble canopy only. The razor back canopy is available separately if you wish to build the D-23 version (order number TOPQ8042). You don't have to decide which one to build until you get to the turtle deck when you're building the fuse.

COMPETITION-MINDED MODELERS

The outline of the Top Flite *Gold Edition* P-47 was derived from three-view drawings and photos. The elevator and rudder hinge lines have been modified to simplify assembly and to use standard model hinging techniques. The landing gear has been slightly relocated to improve handling and durability and the wheels are smaller than scale to fit in the space available. The landing gear does not retract fully into the wheel wells, but protrudes below the wing by approximately 3/16".

The approximate scale of this model is 1:5.6.

If you plan to enter your P-47 in scale competition (it's lots of fun and the runways are usually paved!), this kit may be entered in Fun Scale, Sportsman Scale and Expert Scale classes in AMA competition. All classes have the same flight requirements in which you must perform ten maneuvers, five of which are mandatory. The other five are up to you–"easy" stuff like a slow, low "inspection pass" with flaps extended, or maybe a touch-and-go. If you have never competed in a scale contest, you could start out in Fun Scale. In Fun Scale, the only documentation required for static judging is any proof that a full-size aircraft of this type, in the paint/markings scheme on your model, did exist. A single photo, a kit box cover from a plastic model, or even a painting is sufficient proof! If you're interested, contact the AMA for a rule book that will tell you everything you need to know. You can find a contest schedule in the back of the AMA magazine (Model Aviation).

One last note for those who are interested in scale competition: Strive to build your model to reflect your documentation. Whatever lines and features appear on the full size plane should also appear on your model. Refer to the photos and documentation of the P-47 you are using for your model.

Your Top Flite Gold Edition Giant P-47 is intended for scale and general sport flying, including mild aerobatics such as loops, stall turns, rolls, etc. Its structure is designed to withstand such stresses. If you intend to use your P-47 for more rigorous types of flying such as aggressive aerobatics or racing, it is **your responsibility** to reinforce areas of the model that will be subjected to the resulting unusually high stresses.

SCALE DOCUMENTATION

Three-view drawings and photo packs of full size P-47's are available from:

Scale Model Research
3114 Yukon Ave, Costa Mesa, CA 92626
(714) 979-8058
Fax: (714) 979-7279

Even if you're not intending to build your P-47 for competition, photos and color drawings of P-47s are **extremely useful** for completing much of the detail work such as the intercooler doors, turbo-supercharger exhaust, oil cooler shutters, antenna mast, panel lines, etc. Squadron/Signal Publications has a series of books with dozens of close-up photos and highly accurate color drawings featuring trim schemes that may help you decide how to finish your model. Two of the P-47 books are listed below and are available from most hobby shops.

P-47 Thunderbolt in action, No.1067 (order number SSPZ1067)

-and-

Thunderbolt, The Republic P-47 Thunderbolt in the European Theater, No. 6076 (order number SSPZ6076)

OTHER ITEMS REQUIRED

These are the additional items you will need to complete your P-47 that have not already been mentioned and are not included with the kit. Order numbers are in parentheses (HCAM2200). **TOP** is the Top Flite brand, **GPM** is the Great Planes brand and **HCA** is the Hobbico® brand.

- ❏ 6 - 7 Channel radio with 10 servos and a high capacity receiver battery pack, *see* RADIO SYSTEM REQUIREMENTS
- ❏ (2) 24" Aileron servo extension cords (HCAM2200 - Futaba J)
- ❏ Y-Connector harness for flap servos (HCAM2500 - Futaba J)
- ❏ Switch/charging jack mount kit (GPMM1000)
- ❏ Gasoline or glow engine (*see* Engine Selection)
- ❏ Propellers (refer to the instructions that come with your engine)
- ❏ Great Planes 32 oz. fuel tank (this tank is suitable for gas and glow fuel, GPMQ4115)
- ❏ Fuel line for gas engines (Du-Bro Tygon, 1/8" ID, 3' DUBQ0493)
  -or-
  Fuel line for glow engines (Large silicone tubing, 2' GPMQ4133)
- ❏ Fuel filler valve for glow fuel (GPMQ4160)
  -or-
  Fuel filler valve for gas (GPMQ4161)
- ❏ (2) 5" dia. Main wheels (DUBQ0847)
- ❏ 1-3/4" Tailwheel (GPMQ4220)
- ❏ 2 pkgs #310 Robart Super Hinge Points (ROBQ2510)
- ❏ R/C Foam padding (1/4", HCAQ1000, or 1/2", HCAQ1050)
- ❏ Top Flite 1/5th Scale Replica Radial Engine (TOPQ7903)
- ❏ Top Flite MonoKote covering (*see* Finishing section)
- ❏ Paint (*see* Finishing section)
- ❏ 3 pkgs #366 Du-Bro Large Control Horns (DUBQ1985)
- ❏ 4 pkgs #4 x 1/2" Screws (GPMQ3154)

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.

ADHESIVES

- ❏ 4 oz. Thin CA (GPMR6004)
- ❏ 4 oz. Medium CA+ (GPMR6010)
- ❏ 2 oz. Thick CA- (GPMR6015)
- ❏ CA Accelerator (GPMR6035)
- ❏ CA Debonder (GMPR6039)
- ❏ CA Applicator Tips (HCAR3780)
- ❏ 30-minute Epoxy (GPMR6047)
  or
  45-minute Epoxy (GPMR6048)
- ❏ 6-minute Epoxy (GPMR6045)
- ❏ Pro Wood Glue (GPMR6161)
- ❏ J & Z Products Z RC/56 canopy glue (JOZR5007)
- ❏ Microballoons (TOPR1090)
- ❏ Milled Fiberglass (GPMR6165)
- ❏ Lightweight Hobby Filler (Balsa Color, HCAR3401)
- ❏ Auto body filler (Bondo® or similar)
- ❏ Isopropyl Alcohol (to clean up excess epoxy)
- ❏ 3M 75 Repositionable spray adhesive (MMMR1900)

TOOLS

- ❏ #11 Blades (HCAR0311, 100 qty.)
- ❏ Single-Edge Razor Blades (HCAR0312, 100 qty.)
- ❏ Razor Plane (MASR1510)
- ❏ 1/4-20 Tap & drill (GPMR8105)
- ❏ Hobbico Builder's Triangle (HCAR0480)
- ❏ T-Pins (HCAR5100 (S), HCAR5150 (M), HCAR5200 (L)
- ❏ Drill Bits: 1/16", 3/32", 7/64", 5/32", 3/16", #7 or 13/64" (not required if you have a 1/4-20 tap

and drill set), #9 or 13/64" (for enlarging hole in tail wheel to fit on tail axle), 17/64", 19/64" (or 5/16"), 1/4", size “F” (or 1/4"— for enlarging hole in main wheels to fit landing gear axles), 1/2" (optional for landing gear cover mounts—see page 44),

- ❏ Curved-Tip Scissors (HCAR0667)
- ❏ Long handle 7/64" ball end hex wrench (GPMR8003)
- ❏ Silver Solder w/flux (GPMR8070)
- ❏ Great Planes Plan Protector (GPMR6167) or wax paper
- ❏ Masking Tape (TOPR8018)
- ❏ Dremel® #178 cutting bit (for countersinking screws in the servo hatch covers)
- ❏ Robart® Super Stand II (ROBP1402)

Note: In several instances the manual suggests using K & S brass tubing sharpened at one end to cut accurate, clean holes in balsa. Use a rotary tool with a cut-off wheel to sharpen the outside edge of the tube and a hobby knife to sharpen the inside edge of the tube. The sizes of tubing used are 5/32", 3/16", 7/32", 1/4" and 9/32".

COVERING TOOLS AND ACCESSORIES

- ❏ Top Flite Heat Gun (TOPR2000)
- ❏ Top Flite Trim Seal Tool (TOPR2200)

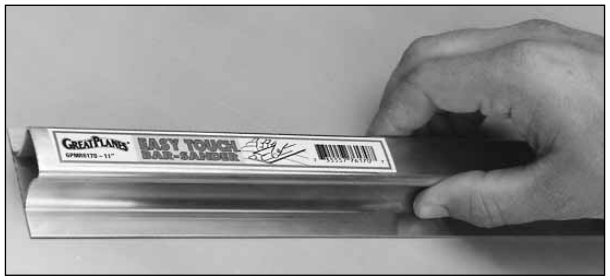
-and-

- ❏ Top Flite Sealing Iron (TOPR2100)
- ❏ Top Flite Hot Sock (TOPR2175)

-or-

- ❏ 21st Century® Sealing Iron (COVR2700)
- ❏ 21st Century Cover Sock (COVR2702)

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 patented **Easy-Touch Bar Sanders** and replaceable **Easy-Touch Adhesive-backed Sandpaper**. While building the Thunderbolt 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)
22" Contour Multi-Sander (GPMR6191)

12' roll of Adhesive-backed sandpaper

80-grit (GPMR6180)
150-grit (GPMR6183)
180-grit (GPMR6184)
220-grit (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.

HOT TIP

We recommend using plastic bags filled with lead shot for building weights. They assume the shape of the curved surfaces to apply uniform pressure without making dents in the balsa. You can purchase shot at sporting goods stores where hunting supplies are sold. We use #6 lead shot. One 25 lb. bag costs about fifteen to twenty dollars. You can use small sealable food storage bags to hold the shot. Tape them shut for security. Each bag holds about two to three pounds. Fifteen to twenty bags may be required for a giant scale project.

METRIC CONVERSION

1" = 25.4mm (conversion factor)

1/64" = .4mm	1" = 25.4mm
1/32" = .8mm	2" = 50.8mm
1/16" = 1.6mm	3" = 76.2mm
3/32" = 2.4mm	6" = 152.4mm
1/8" = 3.2mm	12" = 304.8mm
5/32" = 4mm	15" = 381mm
3/16" = 4.8mm	18" = 457.2mm
1/4" = 6.4mm	21" = 533.4mm
3/8" = 9.5mm	24" = 609.6mm
1/2" = 12.7mm	30" = 762mm
5/8" = 15.9mm	36" = 914.4mm
3/4" = 19mm	

IMPORTANT BUILDING NOTES

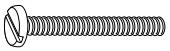
There are two types of screws used in this kit:

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

For example #6 x 3/4" [1.91mm]

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

For example 4-40 x 3/4" [1.91mm]



- 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 used 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 we will tell you what type of glue to use.

- 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.

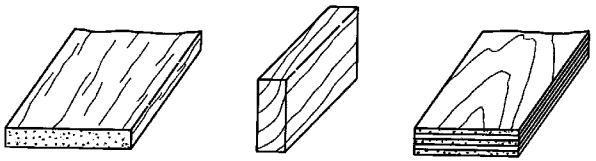
- **Photos** and **sketches** are placed **before** the step they refer to. Frequently you can study photos in following steps to get another view of the same parts.

- Note that there are four plan sheets. Two of them must be cut along the dashed lines and joined with tape. The other two plans are used separately.

COMMON ABBREVIATIONS

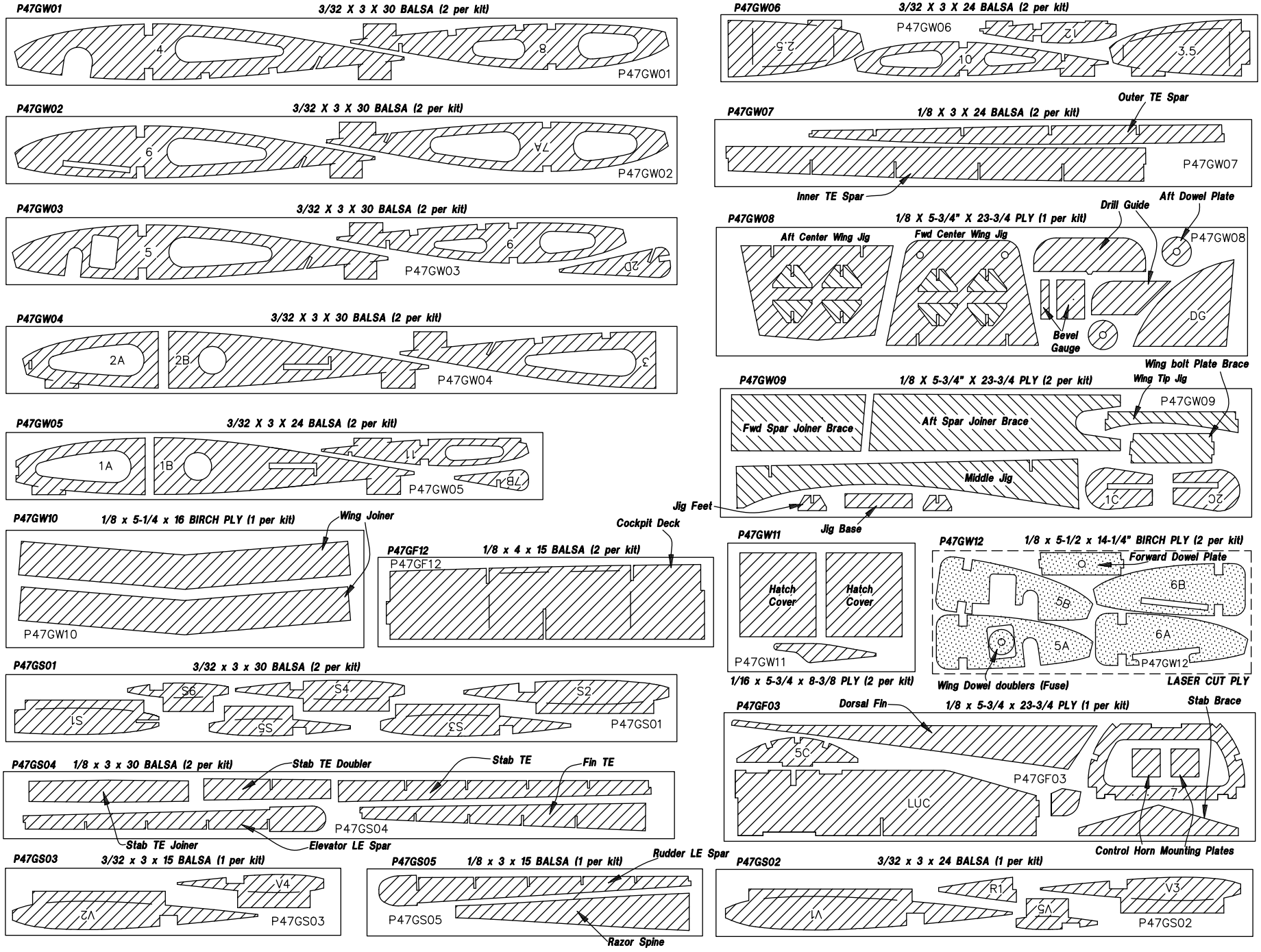
Deg = degrees	Elev = elevator
Fuse = fuselage	" = inches
LE = leading edge	Ply = plywood
Stab = stabilizer	TE = trailing edge
LG = landing gear	mm = millimeters

TYPES OF WOOD



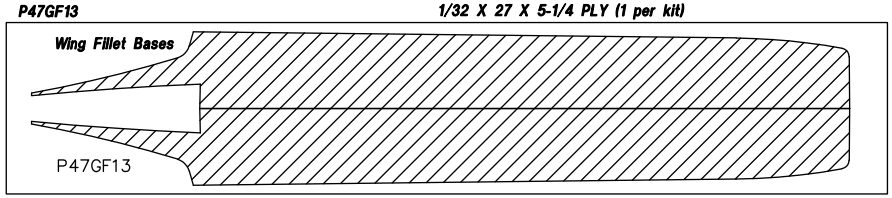
BALSA **BASSWOOD** **PLYWOOD**

DIE-CUT PATTERNS

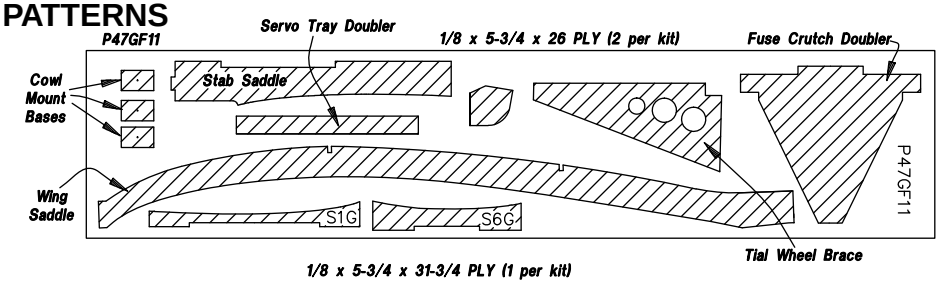


DIE-CUT PATTERNS

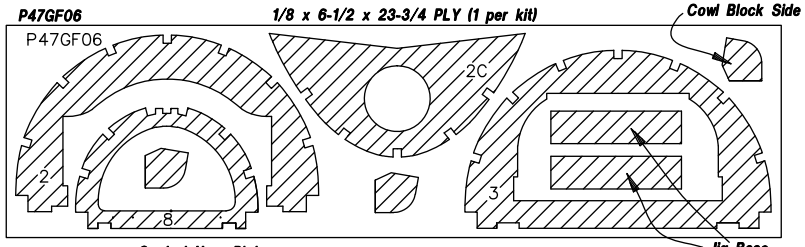
P47GF13 — 1/32 X 27 X 5-1/4 PLY (1 per kit)



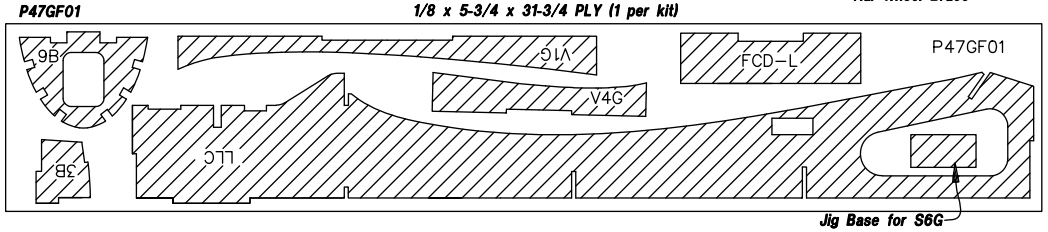
P47GF11 — 1/8 x 5-3/4 x 26 PLY (2 per kit)



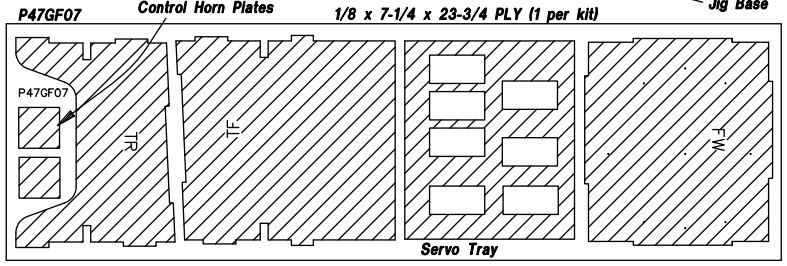
P47GF06 — 1/8 x 6-1/2 x 23-3/4 PLY (1 per kit)



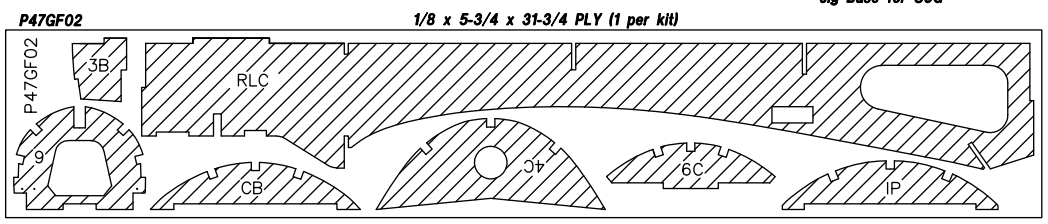
P47GF01 — 1/8 x 5-3/4 x 31-3/4 PLY (1 per kit)



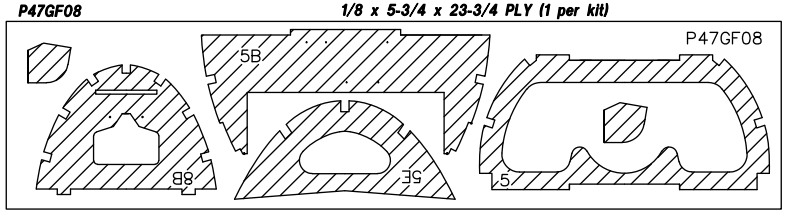
P47GF07 — Control Horn Plates — 1/8 x 7-1/4 x 23-3/4 PLY (1 per kit)



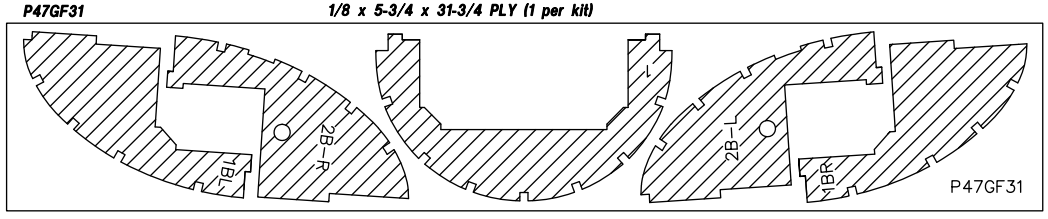
P47GF02 — 1/8 x 5-3/4 x 31-3/4 PLY (1 per kit)



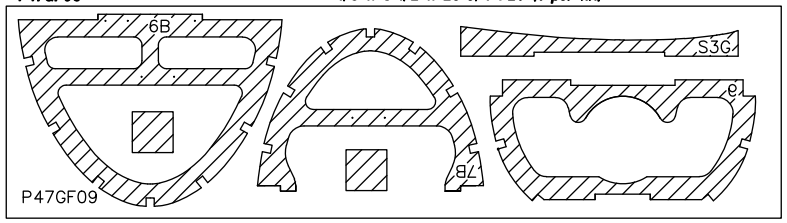
P47GF08 — 1/8 x 5-3/4 x 23-3/4 PLY (1 per kit)



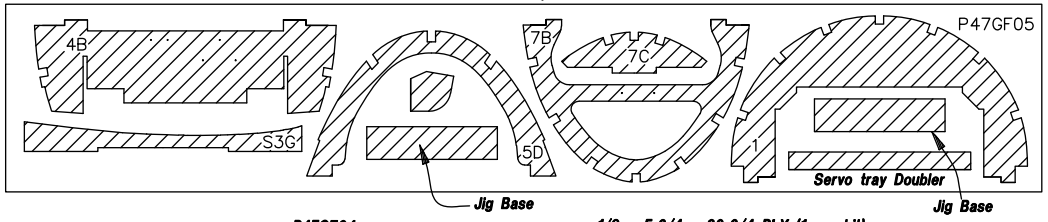
P47GF31 — 1/8 x 5-3/4 x 31-3/4 PLY (1 per kit)



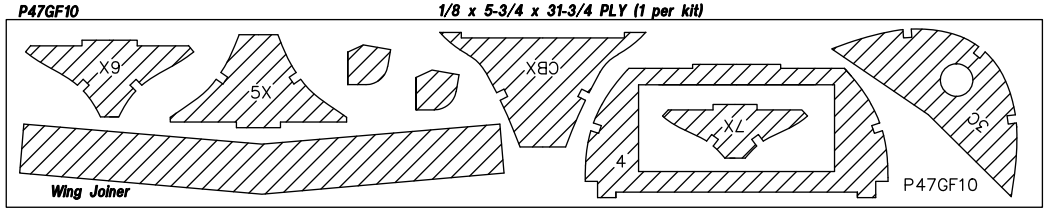
P47GF09 — 1/8 x 6-1/2 x 23-3/4 PLY (1 per kit)



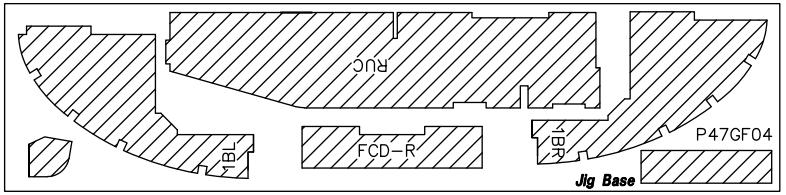
P47GF05 — 1/8 x 5-3/4 x 31-3/4 PLY (1 per kit)



P47GF10 — 1/8 x 5-3/4 x 31-3/4 PLY (1 per kit)



P47GF04 — 1/8 x 5-3/4 x 23-3/4 PLY (1 per kit)



GET READY TO BUILD

1. If you've already purchased your retractable landing gear, or as soon as you do, take the air lines out of the package, unravel them and hang them somewhere in your shop. By the time you are ready to install the air lines, all the kinks will be out and they'll be easier to work with.

2. Unroll the plan sheets. Roll them inside out so they lie flat. Cut one of the fuse plan sheets along the dashed lines. Align the plan that you cut with the dashed lines on the other fuse plan and tape them together. Do the same thing with the wing plan when you are ready to build the wing.

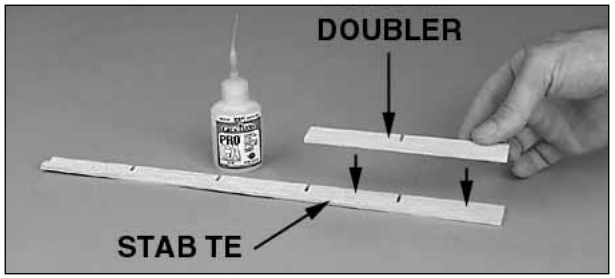
3. Remove all the parts from the box. **IMPORTANT**: Use a ballpoint pen (not a felt tip pen) to write the **name** or **size** on each piece so you can identify it later. Use the ***die-cut patterns*** on pages 8 & 9 to identify and mark the die-cut and laser-cut parts **before** you remove them from their die sheets. Many of the parts already have numbers stamped on them, but in some cases the numbers are located alongside the parts or **only on the die drawings in the manual**. You may remove all the die-cut parts from their die sheets now, or wait until you need them. 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 pieces of wood.

4. 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

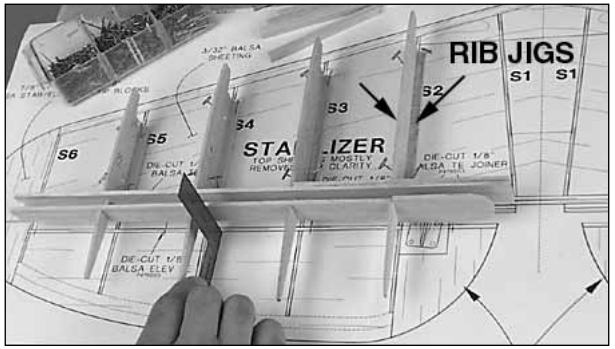
Build the stabilizer and elevators

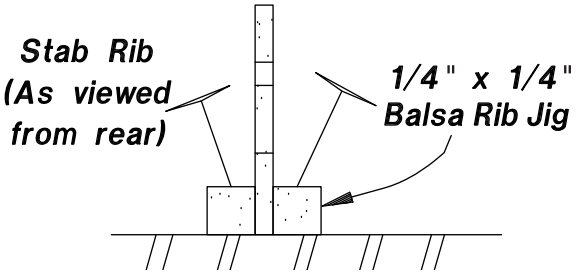
❏ 1. Place the stab plan over your building board (you may cut it from the fuse plan). If you wish to protect the plan from glue (though this is not absolutely necessary because the ribs rest on jig tabs and do not contact the building board), cover the plan with film such as wax paper or Great Planes Plan Protector.



❏ 2. Make a **left** (as shown in the photo), then a **right stab TE** by gluing a die-cut 1/8" balsa **stab TE doubler** to the **front** of a die-cut 1/8" balsa **stab TE** so the notches align.

❏ 3. Fit both sets of die-cut 3/32" balsa **stab ribs S2** through **S5** to the left and right stab TE's, then fit both die-cut 1/8" balsa **elevator LE spars** to the stab halves. Position the assemblies over the plan.





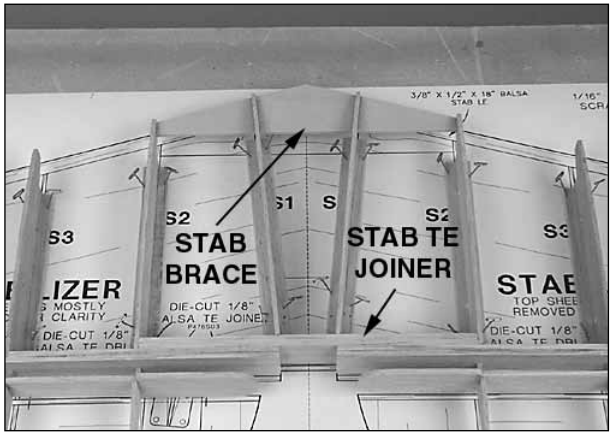
❏ 4. Cut **rib jigs** for ribs 2 through 5 on the left stab half from two 1/4" x 1/4" x 30" balsa sticks. The rib jigs should be the same length as the jig tab on each rib. Hold the ribs down using the rib jigs pinned to the plan on both sides of each rib.

❏ 5. After all the ribs are in position, use a small builder's square to align the stab TE and the elevator LE spar over their locations on the plan by sliding the ribs forward or aft between the rib jigs.

❏ 6. Cut rib jigs from the 1/4" x 1/4" stick leftover from the previous step and a second 1/4" x 1/4" x 30" balsa stick, then pin the right side of the stab to the plan the same way.

❏ 7. Glue together both die-cut 1/8" balsa **stab TE joiners**.

Refer to this photo for the following three steps.

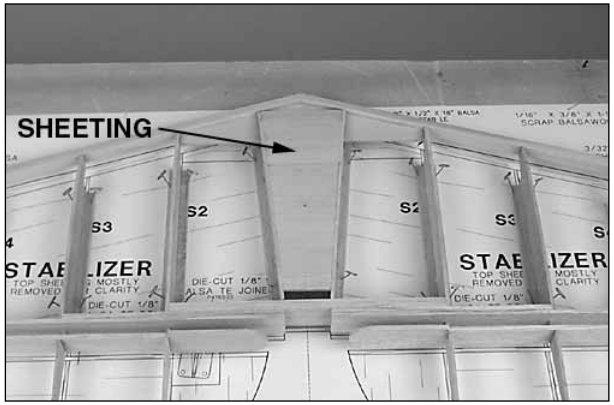


❏ 8. Make certain the jig tabs of all the ribs are contacting the building board, that the stab TE's are all the way down in the notches of the ribs and that the ribs are accurately aligned over their locations on the plan. Glue the stab TE joiner to both stab TE's.

❏ 9. Join both sets of die-cut 3/32" balsa ribs **S6** and **S1** to the assembly using rib jigs cut from another 1/4" x 1/4" x 30" balsa stick to hold them in place.

❏ 10. Glue all the ribs to the TE and both elevator LE spars to the ribs. Join the die-cut 1/8" plywood **stab brace** to the assembly and glue it into position.

Refer to this photo for the following four steps.



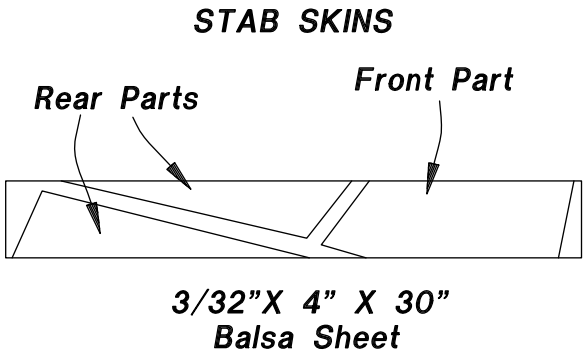
❏ 11. Use a bar sander and 80-grit sandpaper to bevel the LE of the ribs to match the aft sweeping angle of the LE.

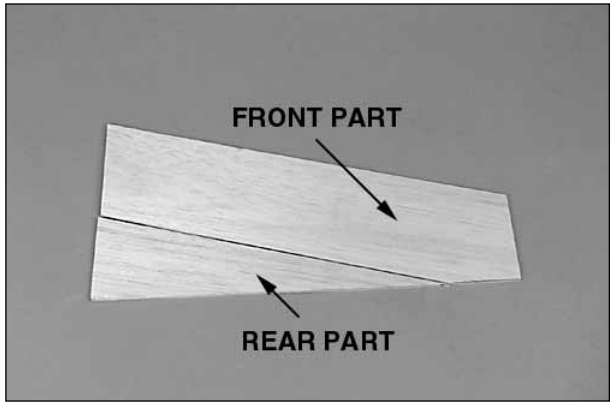
❏ 12. Bevel the ends of both 3/8" x 1/2" x 18" **stab LE's** where they meet in the center of the stab, then cut them to the correct length (slightly oversize is okay so the ends extend past ribs S6) and glue them, centered height-wise, to the front of the ribs.

❏ 13. Sheet the center of the stab **between** both S1 ribs using a 3/32" x 4" x 30" balsa sheet. Note that the sheeting is **between** the ribs, not on top of the ribs. This has the same reinforcing effect as wrapping the center section with glass cloth and epoxy, but is easier, neater and faster!

❏ 14. Use a razor plane followed by sanding to trim the top of the LE and TE even with and at the same angle as the top of the ribs.

Top Flite selects balsa that is intended for sheeting, though 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 the skin.





❏ 15. From the 3/32" sheet you used for the center section and three more 3/32" x 4" x 30" balsa sheets, cut the eight pieces that make up the four stab skins as shown in the sketch. Note that one sheet of balsa yields two smaller "aft parts" and one "front part." Save the leftover balsa sheeting for use later.

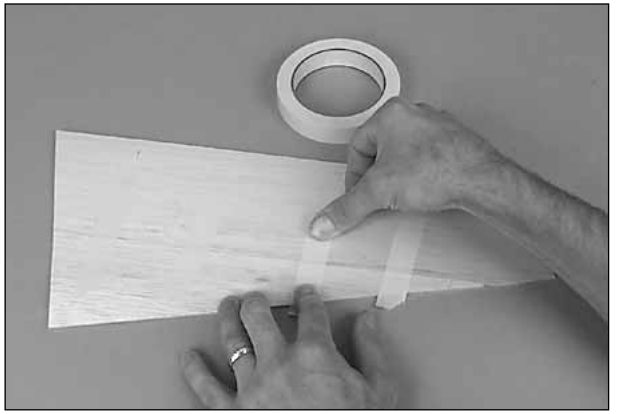
Note: The sketch is used to show the positioning and shape of the parts only. Determine the actual sizes of the parts by positioning the sheets over the stab and making marks with a ballpoint pen. Make the parts oversize to allow for trimming and positioning.

❏ 16. Refer to the Hot Tip that follows, then glue the sheets together to make four stab skins.

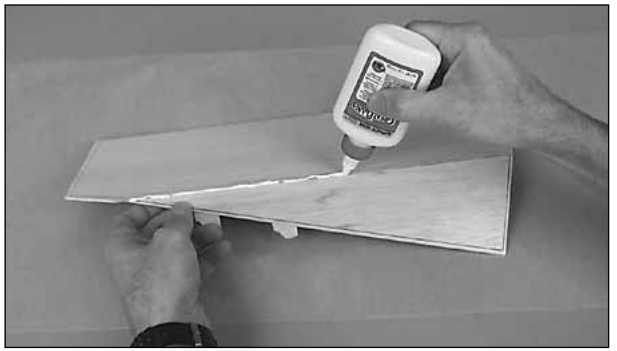
HOT TIP

HOW TO GLUE BALSA SHEETING TOGETHER TO MAKE SKINS

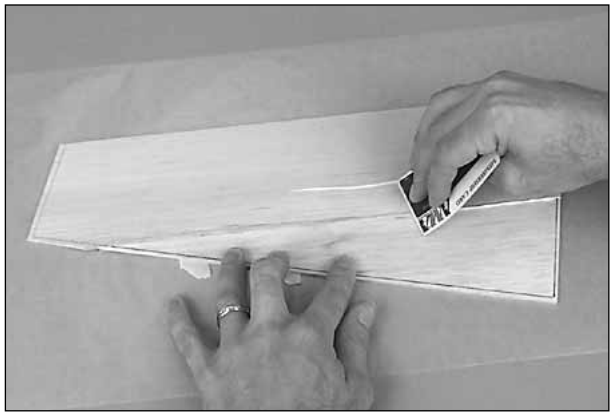
A. Use a straightedge to true the joining edges of the balsa sheets.



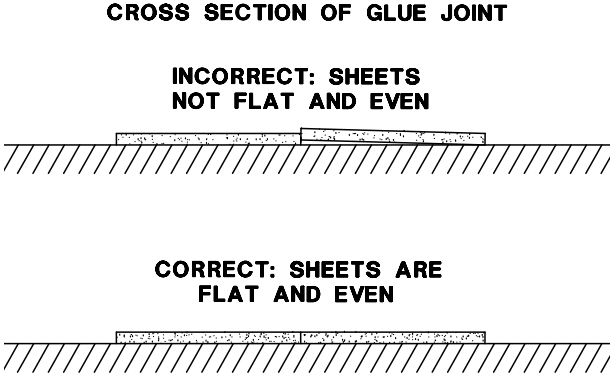
B. Tightly tape one side of the pieces together with masking tape.



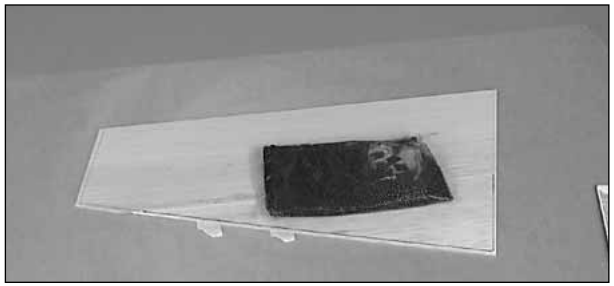
C. Turn the sheets over and apply glue to the joining edges. Slow drying glue like Great Planes Pro Aliphatic resin is recommended because this provides working time for alignment, because the excess can easily be wiped away and because it sands well. You may use CA if you prefer.



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



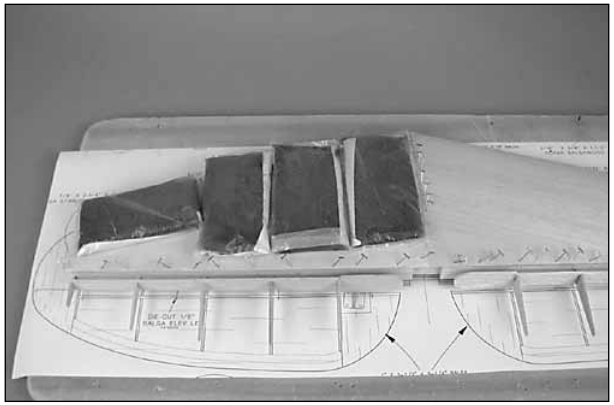
E. Press the edges down so they are even.



F. Place a weight on top of the skin to hold it flat while the glue dries.

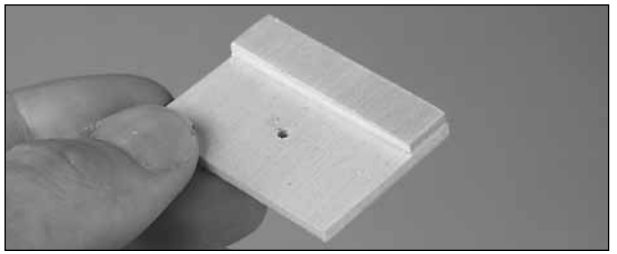
G. After the glue dries, sand the skins flat and even. Little sanding should be required.

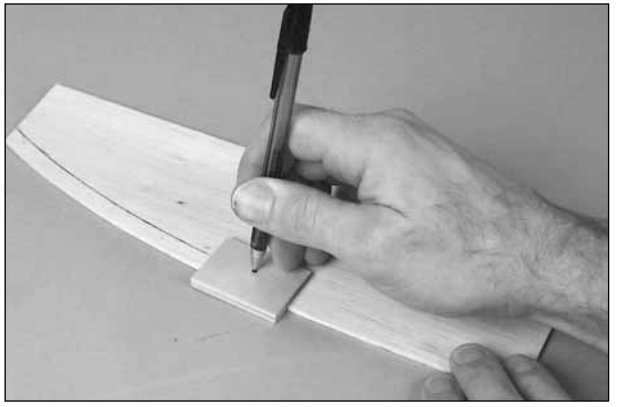
Note: Some modelers tend to sand the sheeting too much after it is applied to the structure, making thin spots where fingers can easily go through. By following the procedure above (specifically, by aligning the skins as shown in step E), little sanding should be required. Most of the sanding that ***is*** required should be done **before** the sheeting is glued in place. The only sanding that should be required after the skin is glued to the structure is final sanding with 320- or 400-grit sandpaper.



❏ 17. Glue two stab skins to the top of the stab using aliphatic resin or medium or thick CA. Our preferred method is to apply aliphatic resin to the tops of the ribs and the TE, then position the skin and hold it down with weights and T-pins where necessary. Before the glue dries, use thin or medium CA to glue the front of the skin to the LE.

❏ 18. Use the template on the plan to make the **elevator skins** from two 3/32" x 4" x 24" balsa sheets. **Hint:** Use 3M 75 Repositionable Spray Adhesive to stick the paper template to the balsa sheet, then cut it out. If you have a band saw or a scroll saw, stack all four sheets together with 3M 75 and cut them out all at once.

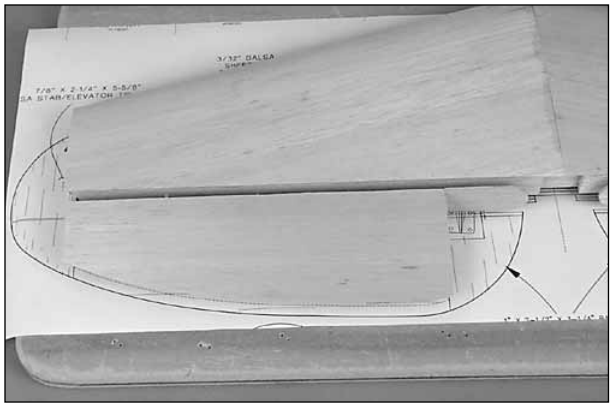




❏ 19. Make the **bevel gauge** from the die-cut 1/8" plywood pieces, then drill a hole at the punch mark just large enough to fit the tip of a ballpoint pen. Use the bevel gauge to mark the bevel lines on the **inside** of the TE of all four elevator skins with a ball-point pen.

❏ 20. Using the line as a guide, bevel the elevator skins down to approximately 1/32" at the trailing edge.

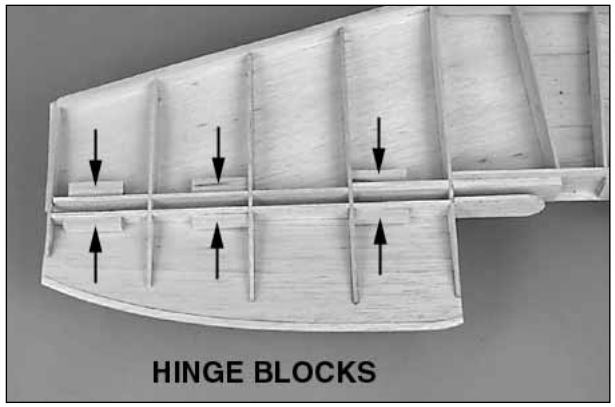
The P-47 had many attributes that led to its reputation. One of the most important was its durability in combat. Oftentimes the P-47 would bring pilots home with missing cylinders, blown-off wing tips and large portions of tail surfaces missing. The P-47's internal systems were also durable and well protected.



❏ 21. If you haven't done so already, trim the top edge of the elevator LE spars even with the top of the ribs. Glue the top elevator skins to the top of the elevators. As shown on the cross section on the plan, the beveled edges are on the inside.

❏ 22. Remove the stab and elevators from your building board. Save the jig sticks for use on the fin.

❏ 23. Use a hobby knife to trim the jig tabs from the bottom of the ribs, finishing with a bar sander and 80-grit sandpaper so the ribs appear as though the jig tabs were never there. While you're at it, trim the bottom of the LE so it matches the ribs.

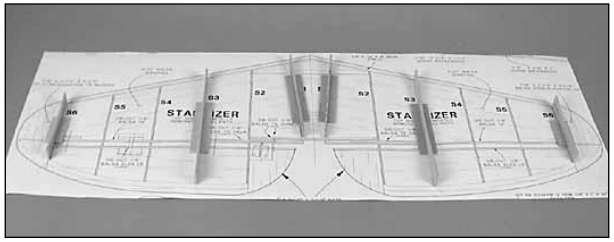


❏ 24. Cut eighteen 1-1/2" long **hinge blocks** from a 1/4" x 1/2" x 30" balsa stick. Glue the hinge blocks to the stab TE and elevator LE spar where shown on the plan. **NOTE:** The hinge block sizes shown on the plan are intended to accommodate Robart large hinge points. If you plan to use flat hinges, the hinge blocks may need to be longer.

❏ 25. If necessary, trim the bottom of the elevator LE spar even with the bottom of the ribs. Glue the bottom elevator skins to the elevators. Be certain the TE of the top and bottom skins align and are thoroughly bonded together.

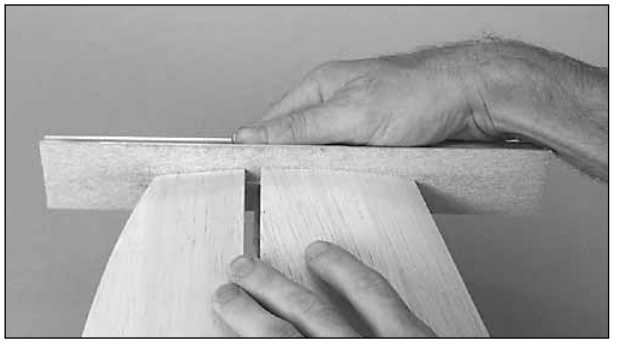
❏ 26. Use leftover 3/32" sheeting to sheet the bottom of the stab **between** ribs S1 just the same as you did on the top of the stab.

❏ 27. Build the six **stab cradles** (three for each side of the stab) from the die-cut 1/8" plywood pieces as shown.



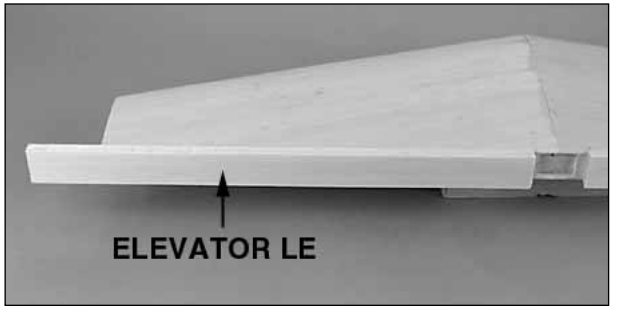
❏ 28. With the stab plan positioned over your flat building board, place the stab cradles over their respective locations on the plan. Note that the **front** of the cradles is the end with the embossed lettering. **Hint:** Hold the cradles to the plan with 3M 75 Repositionable Spray Adhesive.

❏ 29. Place the stab on the cradles aligned with the plan. Glue the bottom skins into position. A slow drying glue such as aliphatic resin is preferred. Place weights on top of the stab to hold the skins down.



❏ 30. After the glue from the previous step has dried, remove the stab from the cradles. Use a bar sander with 80-grit sandpaper to remove excessive glue. Sand the ends of the stab and elevator sheeting even with the tips.

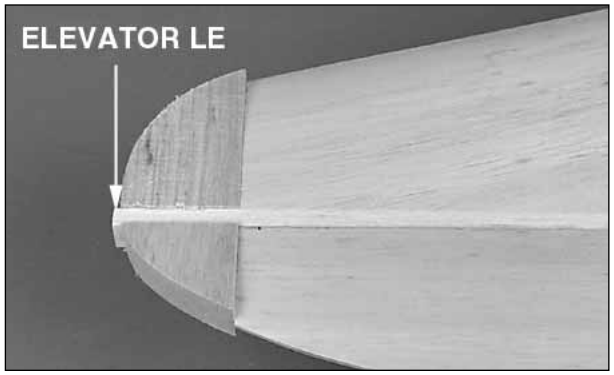
❏ 31. Cut both elevators from the stab. Sand the LE of the elevators and the TE of the stab to remove the protruding portions of the ribs.



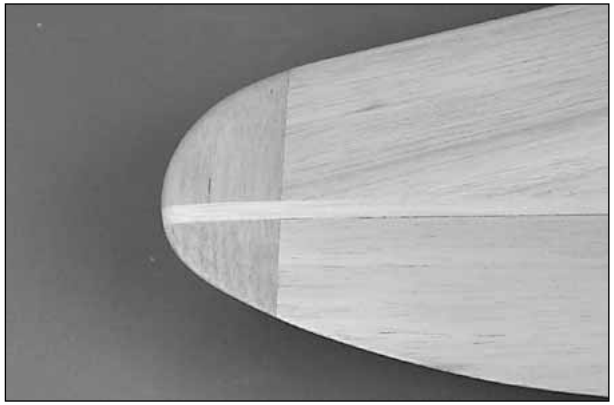
❏ 32. From the 3/8" x 1-1/4" x 36" balsa stick, cut two **elevator LE's** to the length shown on the plan. Use a couple drops of thick or medium CA to **temporarily** tack glue the elevator LE's to the stab.

❏ 33. Use a razor plane followed by a bar sander to trim the elevator LE's to match the top and bottom of the stab. Permanently glue the elevators to the elevator LE's. Be certain the tip of the elevators align with the tip of the stab.

❏ 34. Cut the stab and elevator tips from the plan and use them as patterns to make both **stab** and **elevator tips** from two 7/8" x 2-1/4" x 5-5/8" balsa blocks.



❏ 35. Glue the stab and elevator tips to the stab and elevator. Don't accidentally glue the stab tip to the elevator LE.



❏ 36. Use a razor plane and a sanding block to shape and round the tips. Refer to the cross section on the plans frequently during this process.

❏ 37. The same way you did for the stab and elevator tips, make the **elevator root blocks** from two 1" x 2-1/2" x 3/4" balsa blocks and glue them to the root of both elevators.

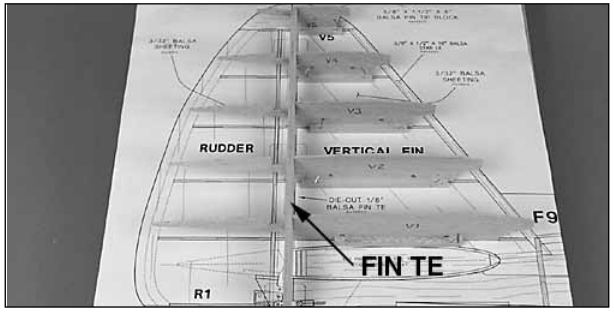
❏ 38. Break both elevators free from the stab. Round the elevator root blocks by sanding.

That was fun, wasn't it! Clean off your workbench, set the stab aside (but not too far away, so your friends can give you compliments when they see it) and move on to the fin and rudder.

Build the fin and rudder

❏ 1. Place the fin and rudder plan over your building board. You may cut them from the fuse plan if you prefer.

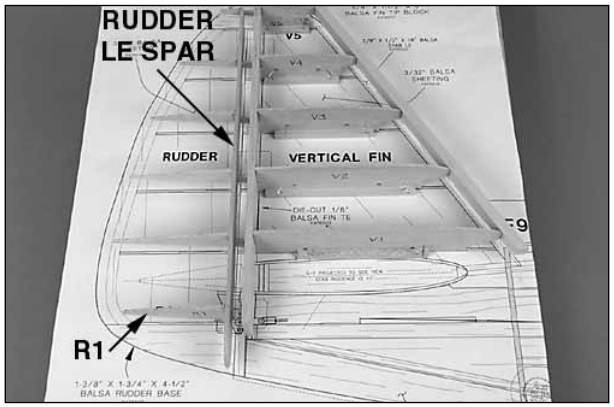
❏ 2. Glue together both die-cut 1/8" balsa **fin TE's** with the notches in alignment.



❏ 3. Fit the die-cut 3/32" balsa **fin ribs V1** through **V4** on the fin TE. Hold the ribs over the plan using the 1/4" x 1/4" jig sticks left over from building the stab. Add rib V5 to the assembly and hold it in place with jig sticks.

❏ 4. Use a small builder's square to align the fin TE over the plan. Make sure the jig tabs of the ribs are contacting the plan, then glue the ribs to the TE.

Refer to this photo for the following two steps.



❏ 5. Bevel the front of the ribs to match the angle of the LE. Cut the 3/8" x 1/2" x 18" balsa **fin LE** to the length shown on the plan, then glue it into position on the front of the ribs.

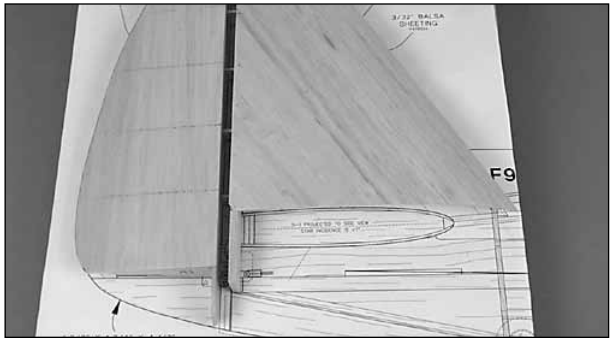
❏ 6. Join the die-cut 1/8" balsa **rudder LE spar** to the assembly and glue it into position. Fit the die-cut 3/32" balsa fin rib **R1** to the rudder LE spar. Make sure the tip of R1 is in horizontal alignment with the tips of the other ribs, then glue R1 to the rudder LE spar.

❏ 7. Bevel the upward facing edge of the fin LE to match the ribs. Sand the upward facing surfaces of all the parts, blending them together.

❏ 8. Make the **fin skins** for both sides of the fin from two 3/32" x 4" x 30" balsa sheets. Be certain the skins extend below rib V1 by at least 5/8" for trimming later to fit the stab.

❏ 9. Use the rudder skin template on the plan to make two **rudder skins** from two 3/32" x 3" x 24" balsa sheets.

❏ 10. Glue one of the fin skins to the right side of the fin.



❏ 11. The same as you did for the elevator skins, use the bevel gauge to mark the bevel line on the **inside** of the rudder skins. Sand the bevel, then glue the right rudder skin into position.

❏ 12. Remove the fin and rudder assembly from the plan. Use a hobby knife to trim the jig tabs from the left side of the fin, finishing with a bar sander and 80-grit sandpaper. Trim the left side of the LE so it matches the ribs.

❏ 13. Cut eight 1-1/2" long **hinge blocks** from a 1/4" x 1/2" x 30" balsa stick. Glue the hinge blocks to the fin TE and rudder LE spar where shown on the plan. If you plan to use flat hinges, you may wish to make the hinge blocks longer.

❏ 14. If necessary, trim the left side of the rudder LE spar so it is even with the left side of the ribs.

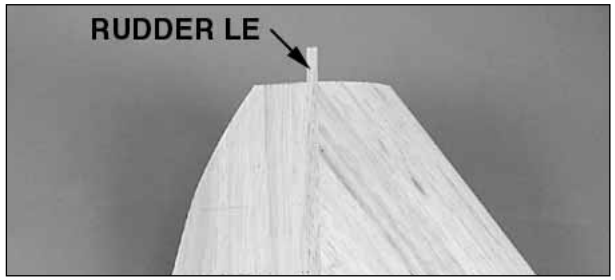
❏ 15. Build the two **fin jigs**, similar to the stab jigs, from the die-cut 1/8" plywood parts.

❏ 16. Position the fin on top of the jigs and align them with ribs 1 and 4. Glue the left fin and rudder skins into position.

❏ 17. After the glue from the previous step has dried, remove the fin from the jigs. Use a bar sander with 80-grit sandpaper to roughly sand the leading edge to remove excessive glue. Sand the ends of the sheeting even with the tip of the fin and rudder.

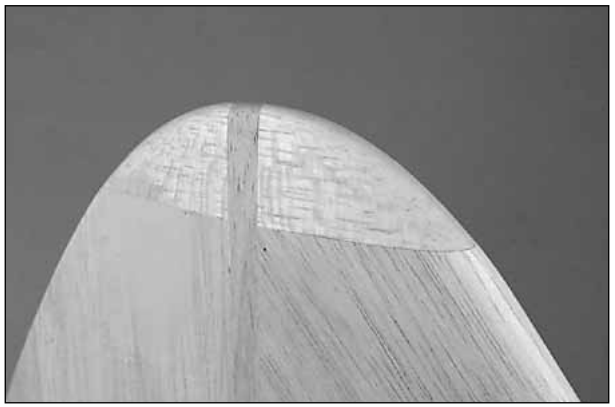
❏ 18. Cut the rudder from the fin. Sand the LE of the rudder and the TE of the fin to remove the remaining unwanted portions of the ribs.

❏ 19. Cut the **rudder LE** to the length shown on the plan from the 3/8" x 1-1/2" x 18" balsa stick. Use thick or medium CA to securely, but temporarily, tack glue the rudder LE to the fin.



❏ 20. Use a razor plane followed by a bar sander to trim the rudder LE to match the fin. Glue the rudder to the rudder LE. Be certain the tip of the rudder aligns with the tip of the fin.

❏ 21. Cut the **fin tip** and the **rudder tip** from the 3/4" x 1-1/2" x 5" balsa block and glue them to the fin and rudder. Be certain you don't accidentally glue the fin tip to the rudder LE. **Hint:** Use the drawings of the fin and rudder tip as patterns to shape them.



❏ 22. Use a razor plane and a sanding block to shape and round the tips. Refer to the cross section on the plans frequently during this process.

❏ 23. Glue the 1-3/8" x 1-3/4" x 4-1/2" balsa **rudder base block** to the bottom of the rudder. Shape the bottom of the block to match the rudder. Break the rudder free from the fin.

P-47 Fact

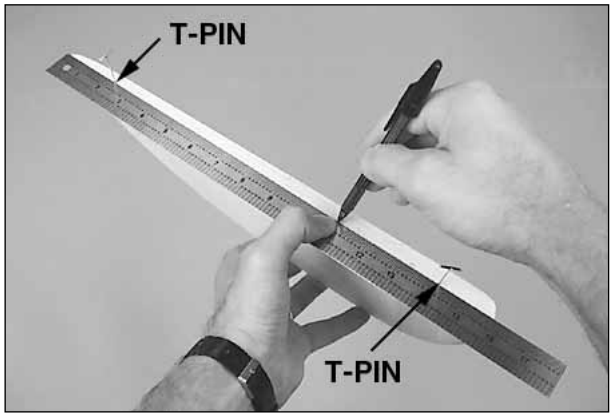
The P-47 was manufactured by Republic Aircraft Corporation, which at one time was named Seversky Aircraft Corporation, started by two fellow Russians, Alexander De Seversky and Alexander Kartveli. For a great history of the early development of the P-47, see:
home.att.net/-Historyzone/Seversky-Republic.html.

Hinge the elevators and rudder

❏ 1. Refer to the **Hot Tip** that follows, then mark the locations of the hinges on the elevators and stab.

HOT TIP

HOW TO ACCURATELY MARK THE CENTERLINES OF THE CONTROL SURFACES FOR HINGING.



A. Insert T-pins through the **center** of the elevator LE near both ends. Position a straightedge along the T-pins and mark a centerline with a fine point ballpoint pen.

B. Do the same for the other elevator and the TE of the stab.

C. Mark the locations of the hinges along the centerlines you drew.

❏ 2. Use a 3/16" brass tube sharpened on the end or a 3/16" drill bit to drill holes for your hinges (not supplied) at the marks you made. We prefer Robart Super Hinge Points.

❏ 3. Test fit the elevators to the stab with the hinges. Adjust or relocate hinge slots or holes that don't align.

❏ 4. Bevel the LE of the elevators for control throw. A razor plane makes this job fast and easy and yields a clean, sharp bevel. Use the centerline on the elevators as a guide to keep the bevel centered. Be certain you can achieve 3/4" of up and 3/4" of down throw as measured at the widest part of the elevators.

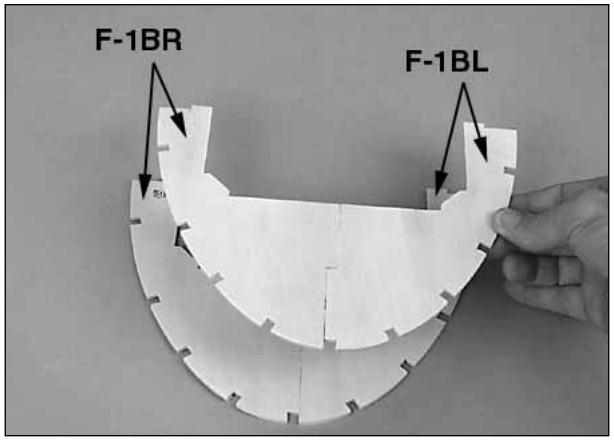
❏ 5. Hinge the rudder and fin, then bevel the LE of the rudder to achieve 1-3/4" of right and 1-3/4" of left control throw as measured at the widest part of the rudder.

The Thunderbolt was a massive airplane, the biggest and heaviest single engine, single-placed fighter ever built. The engine, the Pratt & Whitney 18 cylinder twin-row radial, developed 2,000 H.P. and was the most powerful engine at the time. However, in turn, it needed a highly efficient duct system for its super-charger. The designer, Alexander Kartveli designed the duct system first, then built the fuselage around it.

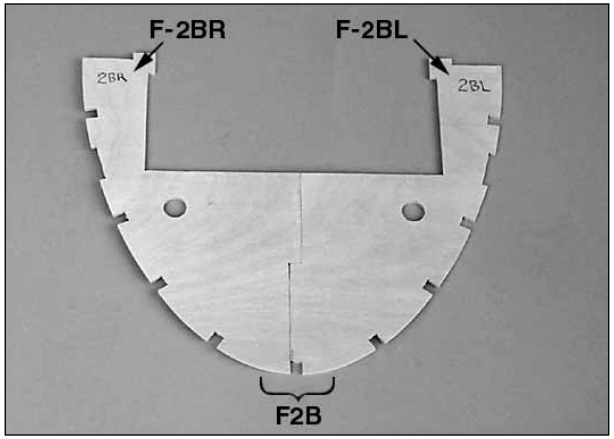
BUILD THE FUSELAGE

Preparation

Note: The die-cut 1/8" plywood formers are embossed only with the abbreviated portion of their name. For example, former F-2B is embossed 2B. All the formers are die-cut 1/8" plywood unless otherwise noted.



❏ 1. Glue together a former **F-1BR** and **F-1BL**. Sand them flat and even. Make another assembly the same way. Glue together both assemblies to make what will now be called **F-1B**.



❏ 2. Glue together former bottoms **F-2BR** and **F-2BL** to make up the bottom half of former **F-2**. From now on this assembly will be referred to as **F-2B**. Sand **F-2B** flat and even.

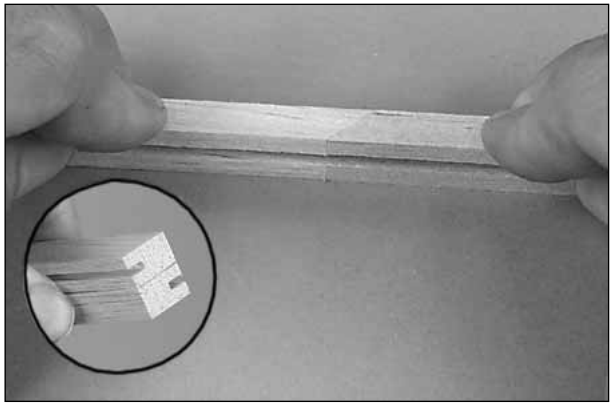
❏ 3. Glue together both former tops **F-1**.

❏ 4. Drill 3/16" holes through the punch marks in all the formers to accommodate the outer pushrod guide tubes. As you drill the holes, push down on the formers to keep the wood from splitting when the drill bit goes through.

In some of the following photos you will see additional holes in a few of the formers. We've simply estimated the locations and drilled holes for routing the air lines and various wiring for the radio system (servo cords, battery cords, etc.) that will run through the fuse. If you can partially visualize your radio installation and wire routing at this time, it will be easier to drill these holes now.

Build the fuse top

❏ 1. Cut the top view of the fuselage plan from the rest of the plan, then place it over your building board. Cover the top view of the fuse plan with wax paper or Great Planes Plan Protector.



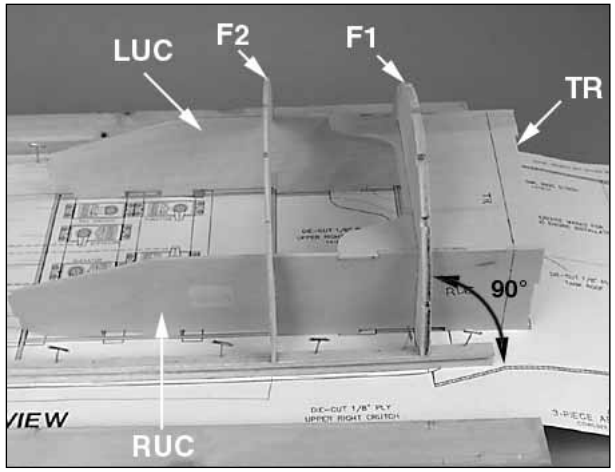
❏ 2. Bevel one end of two 3/8" x 1/2" x 30" grooved balsa **main stringers** so you can splice them together

over the plan. An accurate way to do this is to place one on top of the other with the grooves opposed, then use a razor saw and a miter box (or a table belt sander) to make the bevel.

❑ 3. Pin the main stringers over the plan, gluing the two pieces together at the splice. The aft end of the stringer should be even with the plan, but the front of the stringer may extend beyond the plan by approximately 1/4" or so.

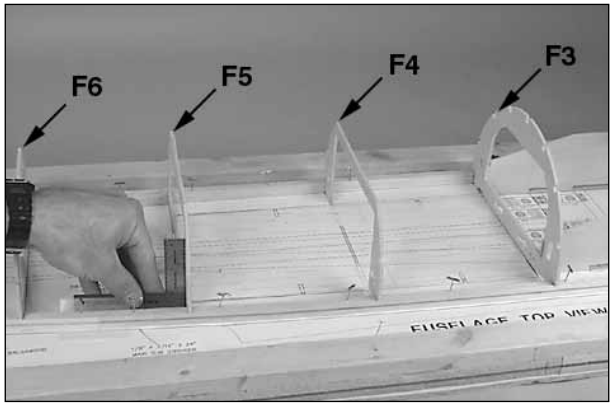
❑ 4. Splice and pin the main stringers over the other side of the plan the same way.

Note: As you proceed, be certain the embossed names of the formers are facing the **front** of the fuselage.

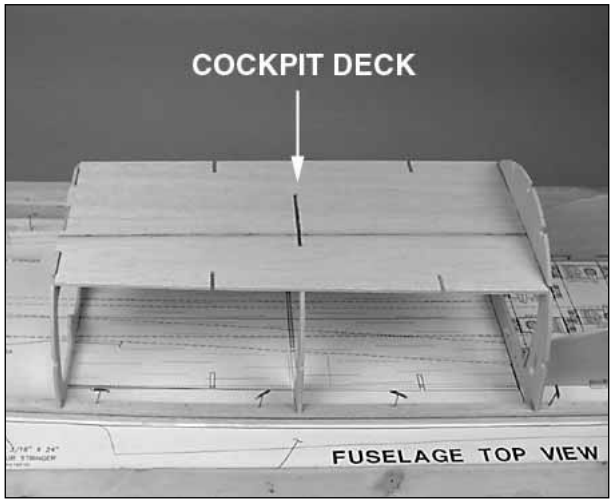


❑ 5. **Do not** use any glue in this step. Fit the **tank roof (TR)** followed by the **right upper crutch (RUC)** and **left upper crutch (LUC)** into former F-1. Don't forget to make sure the embossed part names on the formers are facing forward. Add **former F-2** to the crutches. Position the assembly over its location on the plan between the main stringers. **Note:** The left crutch is slightly longer than the right crutch to set the right thrust angle.

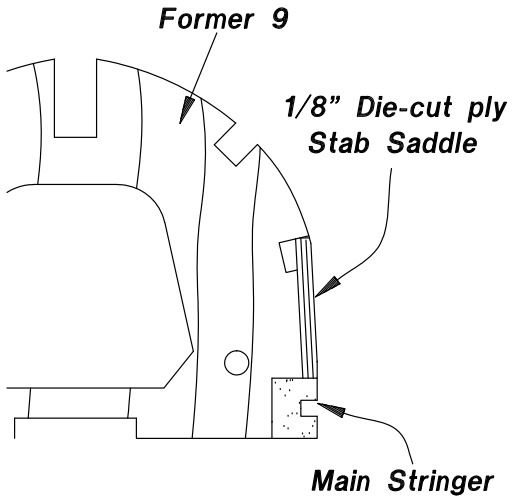
❑ 6. Use medium CA to glue TR, RUC and LUC to F-1 making **certain** F-1 is perpendicular to the building board. Do not glue TR to the upper crutches forward of F-1. Glue F-1 and F-2 to the side stringers and glue F-2 to the crutches.

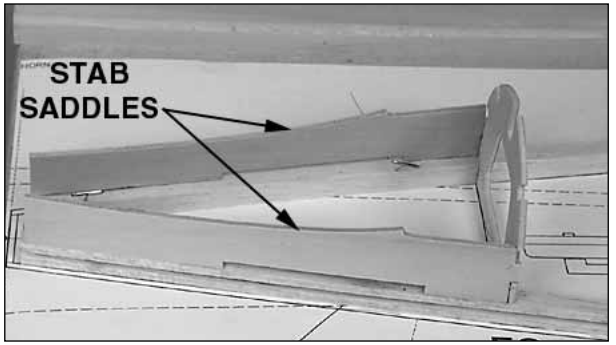


❑ 7. Join **former F-3** to the upper crutches and main stringers, followed by **formers 4 through 9**, gluing them into position as you proceed. Use a small builder's square to hold the formers vertical as you glue them into position. Twisted formers will be straightened when the stringers are added later.

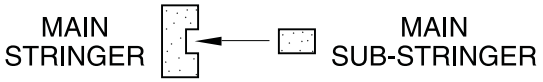


❑ 8. Edge glue both halves of the die-cut 1/8" balsa **cockpit deck** together, then glue it to formers F-3 and F-5.



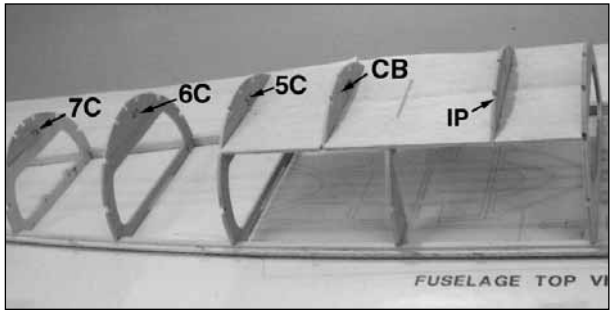


❑ 9. Test fit both die-cut 1/8" plywood **stab saddles** to F-9 and the main stringers as shown in the sketch. Sand a slight bevel on the bottom edge of the saddles to match the angle at which they contact the main stringers. Use 30-minute epoxy to thoroughly glue the stab saddles into position.

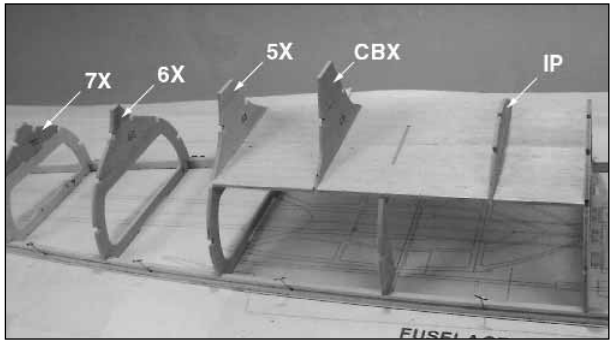


❑ 10. Glue the four 1/8" x 1/4" x 30" balsa **main sub stringers** into the groove in the main stringer on both sides of the fuselage. Make certain none of the T-pins already inserted into the main stringer interfere with allowing the sub stringers to fit all the way into the grooves.

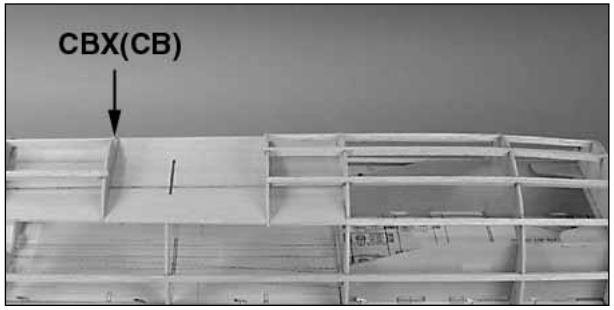
Now is the time to decide whether you are going to build the razorback or the bubble canopy version. Steps beginning with a “B” are for the “bubble canopy” and steps beginning with an “**R**” are for the razorback. Steps with neither “B” nor “**R**” apply to both versions.



❏ B11. Glue **formers IP**, **CB** and **5C** to the cockpit deck and **former tops 6C** and **7C** to formers 6 & 7.



❏ **R12**. Glue **formers IP**, **CBX** and **5X** to the cockpit deck and **former tops 6X** and **7X** to formers 6 & 7.

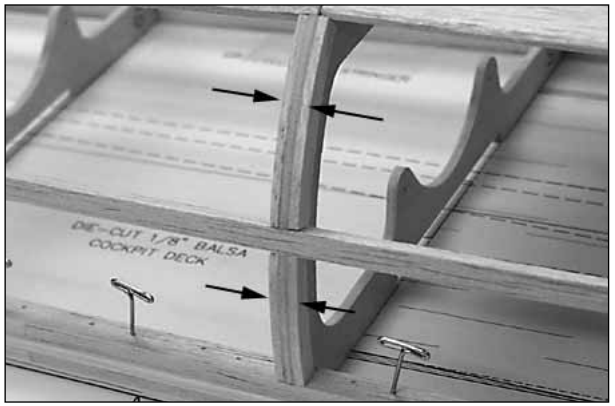


❏ 13. Fit eleven 1/4" x 1/4" x 30" balsa stringers into the notches in the formers (if you’re building the bubble canopy version, do not fit the top, middle stringer into formers CB through 9 until instructed to do so). Some of the stringers are not long enough and will have to be spliced together. Note that the middle stringer extends past former 9 by approximately 2".

❏ 14. Do not glue the top two stringers to former 9, but glue the rest of the stringers to the formers. As you glue the stringers into the notches, use a builder’s square to align the tops of the formers with the plan, thereby removing twists as you proceed.

P-47 Fact

Various prototypes and incarnations of the P-47 began to materialize at Republic Aircraft around 1940. One of the first designs recognizable as a P-47 was the XP-44 *Rocket*. One of the engine performance features carried over from Seversky was the gear-driven supercharger and later a turbo-supercharger.



❏ 15. Glue leftover 3/32" balsa to both sides of former 5 between the bottom two stringers to support the sheeting where it will be spliced together.

❏ 16. Lightly sand all joints, blending the stringers to the formers; and bevel the edges of the cockpit deck to accommodate the sheeting.

Sheet the fuse top

❏ 1. Of the five 3/32" x 4" x 36" balsa sheets supplied with this kit, select the hardest sheet, label it as “shear webs,” and set it aside for use when building the wing.

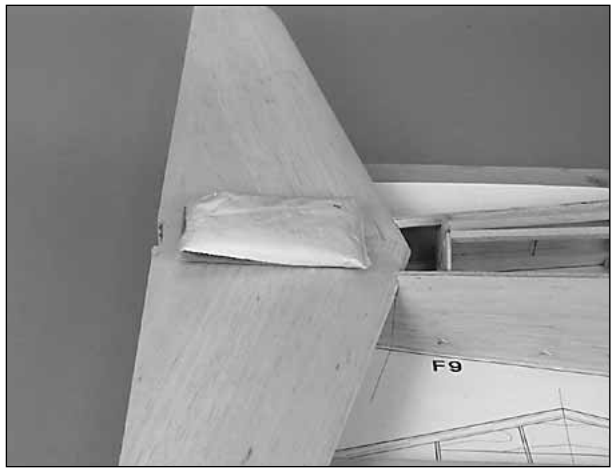
❏ 2. Refer to the following photo. Trim a 3/32" x 4" x 36" balsa sheet to fit the right side of the fuse top from the center of former 5 aft (you’ll have to glue a piece of leftover 3/32" sheeting to the top of the sheet near the front so it will extend to the second stringer).

❏ 3. Once you’ve trimmed the sheet to fit the right side, use it as a pattern to make another sheet from

an additional 3/32" x 4" x 36" balsa sheet for the left side. Glue the first sheet to the right side of the fuse. Do not glue the sheeting to the stab saddle. If necessary, wet the sheeting with water or window cleaner to help it bend around the formers. Glue the other sheet to the left side of the fuse.

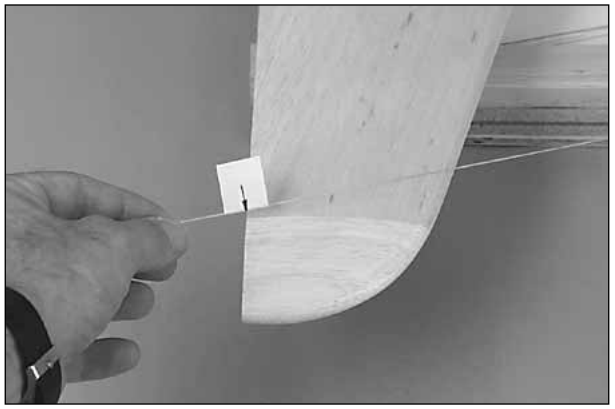
❏ 4. Trim the sheeting even with the stab saddles. Use caution not to trim the ply stab saddles. Otherwise, you may change the incidence of the stab which will greatly affect the flying characteristics.

Before we can sheet the rest of the fuse, we have to glue the stab and fin into position.



❏ 5. Fit the stab into the stab saddle. Trim the fuse sheeting and the stringers as necessary until the TE of the stab aligns with the dotted line on the plan depicting the TE. Place a weight on top of the stab to temporarily hold it down.

❏ 6. With the stab in position, measure the distance from the centerline on the TE of both ends of the stab down to your workbench. If necessary, **lightly** trim the stab saddles until you can get the stab level. If the stab is not exactly level, but it's close, sometimes all it takes is shifting the weight slightly to even it up. If you do have to sand the saddle to level the stab, **use caution not to change the incidence angle of the stab.**



❏ 7. Stick a T-pin into the center fuse stringer above former 1. Tie a small loop in one end of a 60" piece of string and slip it over the T-pin. Fold a piece of masking tape over the string near the other end and draw an arrow on it. Sliding the tape along the string, align the arrow with one end of the stab as shown in the photo. Swing the string over to the same position on the other side of the stab. Shift the stab and slide the tape along the string until the arrow aligns with both sides of the stab. The stab must remain centered on the fuse during this process.

❏ 8. Mark the stab where it aligns with the fuse so it can be realigned after you take it off.

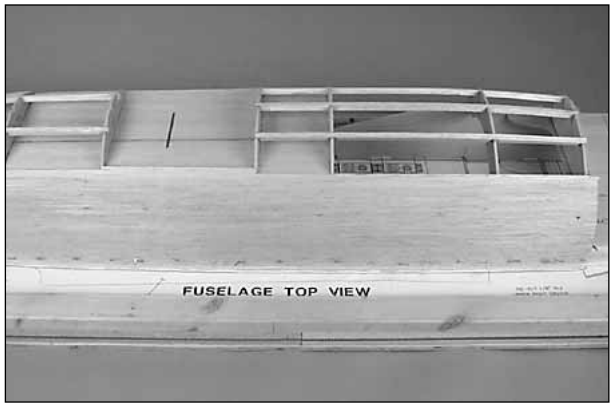
❏ 9. Remove the stab. Trim the sheeting on the LE of the fin until you can get it to fit into the notch in former 9. Use a builder's square to make sure the fin TE will be perpendicular to the building board in both axes.

❏ 10. Remove the fin. Mix up a batch of 30-minute epoxy. For additional strength, add Great Planes Milled Fiberglass (GMR6165). Apply a small fillet of epoxy to strengthen the bond between the insides of the stab saddles and the main stringers and former 9. Apply epoxy to the stab saddles and fuse sheeting and to the bottom of the stab where it contacts the saddles. Position the stab and place weights on top of it to hold it down. Confirm stab alignment by repeating steps 5 and 6. Wipe away excess epoxy and do not disturb the model until the epoxy fully cures.

❏ 11. After the epoxy from the previous step has fully cured, fit the fin to the stab by trimming the bottom of the sheeting until it fits the stab and can be positioned as described in step 9 (with the TE vertical and contacting the stab saddles). The TE of the fin must be even with the TE of the stab.

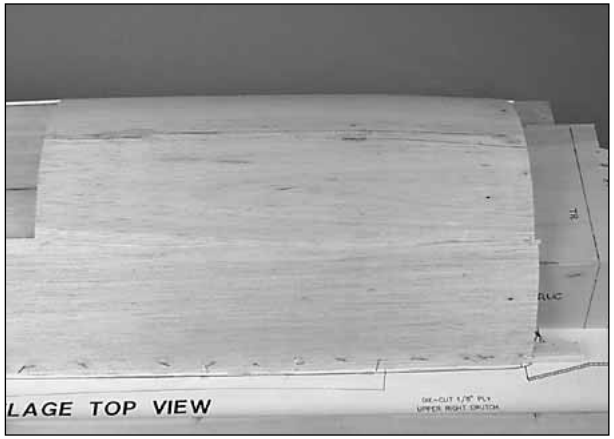
❏ 12. Mix up another batch of 30-minute epoxy and securely glue the fin to the top of the stab and fuse. Be certain the fin sheeting is thoroughly bonded to the stab, but don't build up a large fillet. Now glue the top two stringers to former 9.

Now that the stab and fin are glued to the fuse, we can finish sheeting the fuse.



❑ 13. Trim a 1/2" x 30" strip from a 3/32" x 4" x 30" balsa sheet. Glue the 1/2" x 30" strip to the edge of another 3/32" x 4" x 30" balsa sheet. Sheet the forward side of the fuse as shown using the 3/32" x 4-1/2" x 30" sheet.

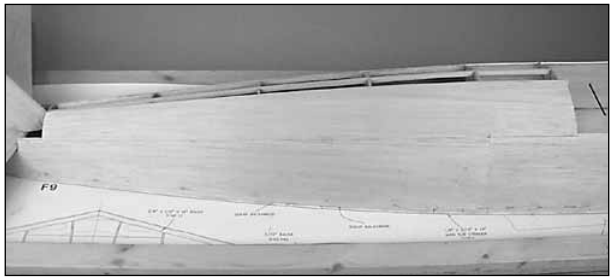
❑ 14. Trim a 1/2" strip from another 3/32" x 4" x 30" balsa sheet and glue it to a 3/32" x 4" x 30" sheet (you should now have two 3/32" x 3-1/2" x 30" balsa sheets leftover, which will be used to sheet the top of the fuse aft of the cockpit). Sheet the left side of the fuse with the 4-1/2" sheet the same way.



❑ 15. Use a 3/32" x 4" x 30" balsa sheet to finish sheeting the forward deck of the fuse top.

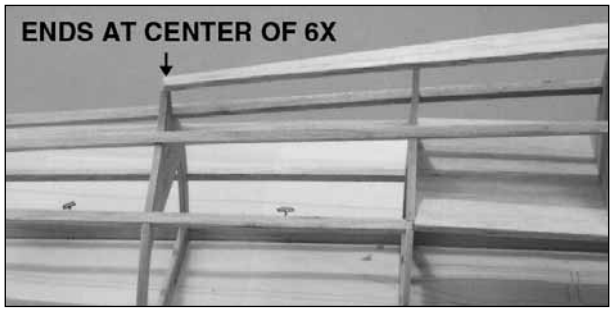
Don't forget, step numbers that are preceded with a "B" are for the bubble canopy version only.

❑ B16. Glue a 1/4" x 1/4" x 30" balsa stringer into the notches in the tops of the turtledeck.

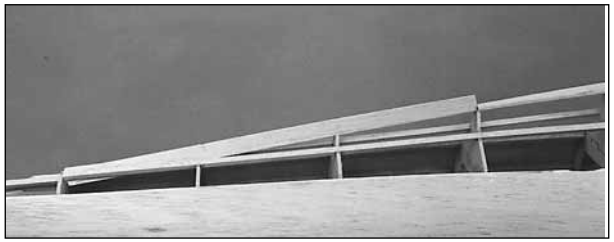


❑ B17. Sheet both sides of the turtle deck from the cockpit back (CB) to former 9 using the two 3/32" x 3-1/2" x 30" balsa sheets leftover from step 13 and step 14.

Perform steps R18 through R21 only if building the razorback version.

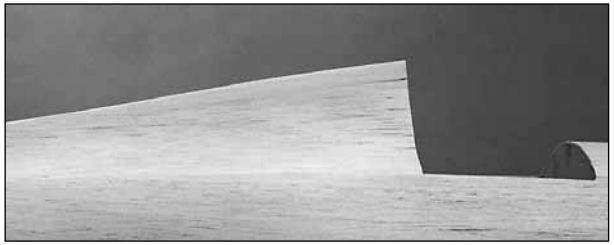


❑ **R18**. Glue the die-cut 1/8" plywood **razor spine** to the top of CBX, 5X and 6X. Note that the aft edge of the razor spine ends in the middle of 6X.

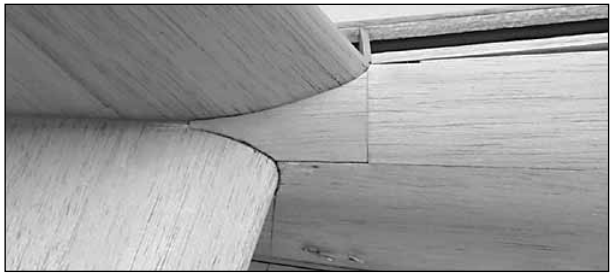


❑ **R19**. Trim the tapered 18" balsa **fuselage spine** to fit between the fin and the razor spine, then glue it into position. Bevel the sides of the razor spine so it blends with the curvature of the formers (refer to the cross section on the plan).

❑ **R20**. Sheet both sides of the turtle deck from the cockpit back (CBX) to former 9 using the two 3/32" x 3-1/2" x 30" balsa sheets leftover from step 13 and step 14 and additional leftover 3/32" balsa. If the sheeting is difficult to bend, wet it with water or window cleaner.

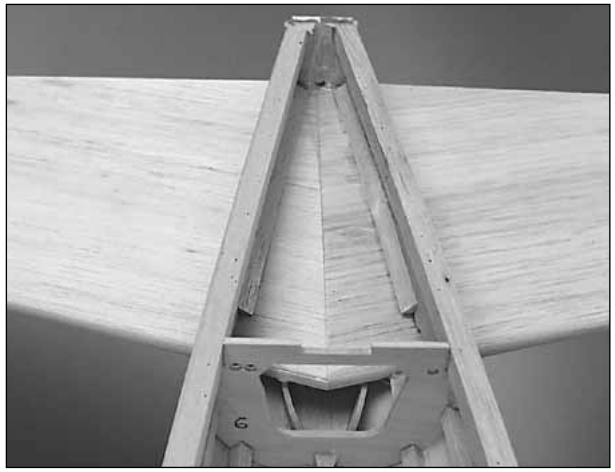


❑ **R21**. Position the 5/8" x 1-3/8" x 10-1/2" **aft deck top block** on the razor spine and trace its outline. Carve the top block to the approximate shape, then glue it into position. Shape the block to match the rest of the turtle deck, but don't final shape until instructed to do so.



❑ 22. Use the stab/fin fillet pattern on the plan to make two stab/fin fillets from leftover 3/32" balsa, then test fit and glue them into position.

❏ 23. Take out all the T-pins and remove the fuse top from your building board. Place the fuselage upside-down in a suitable building stand (such as a Robart® Super Stand II, ROBP1402, seen in following photos). Reinforce glue joints you couldn't reach earlier.

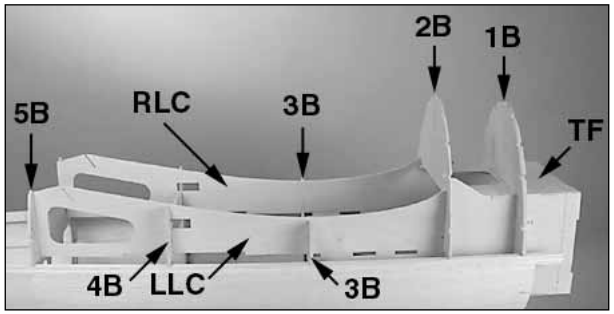


❏ 24. Use leftover 1/4" x 1/4" balsa (shaped into triangle stock) to reinforce the glue joint between the bottom of the stab and the inside of the stab saddles.

One of the later P-47 prototypes was the XP-47B. Believe it or not, one of its predecessors, the XP-47, featured an Allison "V" engine. However, the "V" configuration was still under development and had not yet proven itself. With the increasing demands for a fighter that could carry more armament, it was realized that a much bigger airframe than that of the XP-47 would be required. Thus emerged the larger, radial engine powered XP-47B.

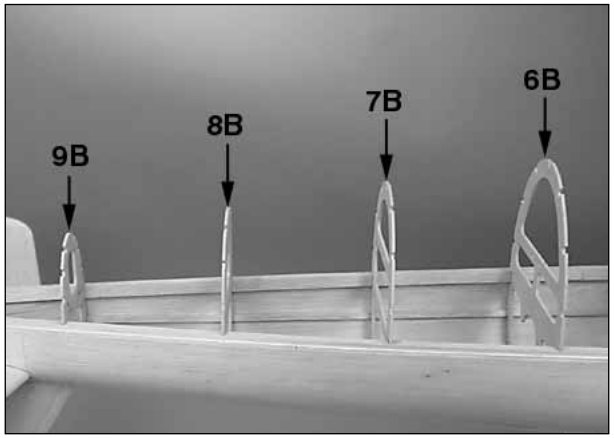
Build the fuse bottom

Before you proceed, remember that the embossed name on the die-cut 1/8" plywood formers face forward.

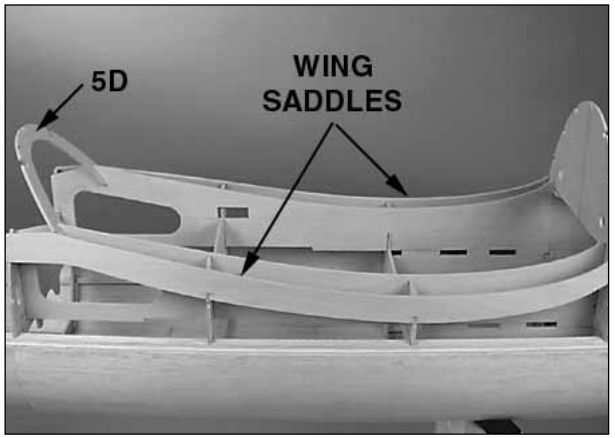


❏ 1. Without using any glue, join **former 2B** and **former 4B** to the **right** and **left lower crutches (RLC & LLC)**. Join the assembly to the fuse top, fitting the parts into their corresponding notches. Then, add the **tank floor (TF)**, **former 1B**, both **3Bs** and **5B**. Inspect all joints and make sure the bottom formers align with the top formers. Make adjustments to any notches where necessary so all the parts align.

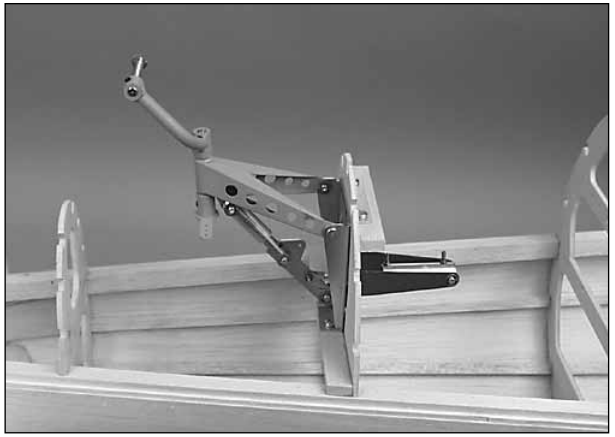
❏ 2. After you have checked the fit of the parts above and made any adjustments necessary, use medium or thick CA to glue them into position.



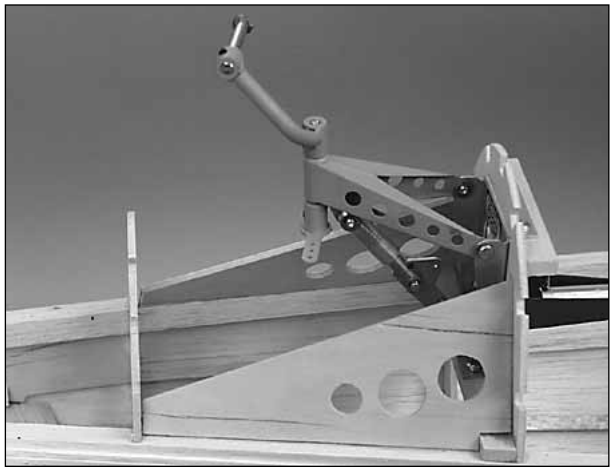
❏ 3. Glue formers 6B through 9B into the notches of their respective formers.



❏ 4. Glue **former 5D** and both **wing saddles** into position.

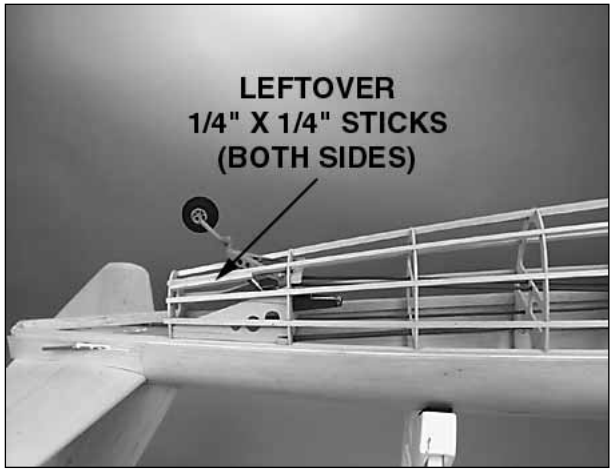


❏ 5. Cut the **top** and **bottom tail gear mounting rails** from the 1/4" x 1/2" x 30" basswood stick (save the remainder of this stick for the servo tray rails). Drill 3/32" holes in the rails for the mounting screws. Add a few drops of thin CA to the holes and allow to harden. Glue the rails to former 8 where shown on the plan. Temporarily mount the tail gear to the rails with four #6 x 1/2" screws (not included).



❏ 6. Test fit, then glue both die-cut 1/8" plywood **tail gear braces** to formers 7 & 8 and the main stringer as shown.

Refer to this photo for the following seven steps.



❏ 7. Use coarse sandpaper to scuff three 3/16" x 48" **pushrod guide tubes** and two 3/16" x 36" pushrod guide tubes so glue will adhere. The longer tubes are for the elevator and rudder and the shorter tubes are for the tail gear pull-pull steering cable.

❏ 8. Use the precut notches in the ply stab saddles as a guide to cut the pushrod exit slots in the sheeting on both sides of the fuse.

❏ 9. Slide the 48" long guide tubes through the holes in the formers and out the exit slots you just cut in the back of the fuse. Note that there are two tubes on the left side of the fuse (for the elevator and rudder) and one tube on the right side of the fuse (for the elevator only). Slide the 36" long tubes through the holes in the formers for the tail wheel steering cables. **Do not** glue the guide tubes in place until instructed to do so.

❏ 10. Glue eight 1/4" x 1/4" x 30" balsa sticks into the notches of formers 4 through 9 for the bottom stringers. The stringers nearest the main stringer on both sides of the fuselage aren't long enough, so they'll have to be spliced together from two stringers. As you proceed, straighten any twists in the formers by holding them in position while you glue the stringers into the notches.

❏ 11. Glue the pushrod guide tubes into the exit slots in the back of the fuse with 30-minute epoxy mixed with microballoons. Glue the guide tubes to the formers with CA.

❏ 12. After the epoxy has fully hardened, sand the pushrod guide tubes flush with the fuse sides.

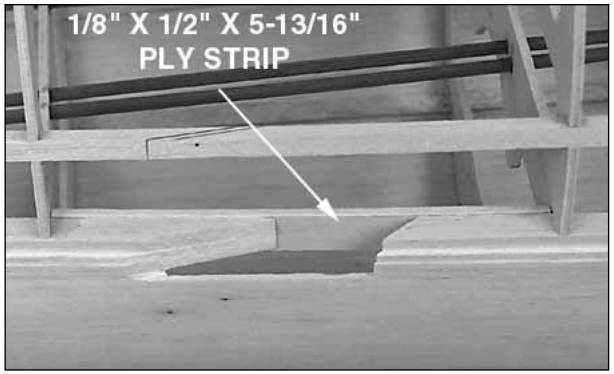
❏ 13. Glue a leftover 1/4" x 1/4" stick to former 9 and the stringers as shown. This will help support the sheeting when the opening for the tail wheel is cut.

❏ 14. Mount a 1-3/4" tail wheel to the tail gear axle. If necessary, enlarge the hole in the tail wheel with a #9 drill (a 13/64" drill would work okay). Use a cutoff wheel to cut the axle to the correct length. File a flat spot on the axle for the set screw, then temporarily mount the tail wheel to the tail gear.

Before you continue, decide whether you will feature the intercooler doors on the fuselage sides open or closed. If you decide to show the doors closed, skip the next two steps. All you'll need to do is add panel lines depicting the doors after the model is finished. If you wish to feature the intercooler doors open, you will have to cut through the main side stringers to accommodate the inner doors, construct the doors, then paint them to match the trim scheme. Often, the stars and bars on the fuse sides cross over the doors, making for an intricate and time-consuming paint job (see the photos on the kit box).

Perform steps 15 and 16 only if the intercooler doors will be open.

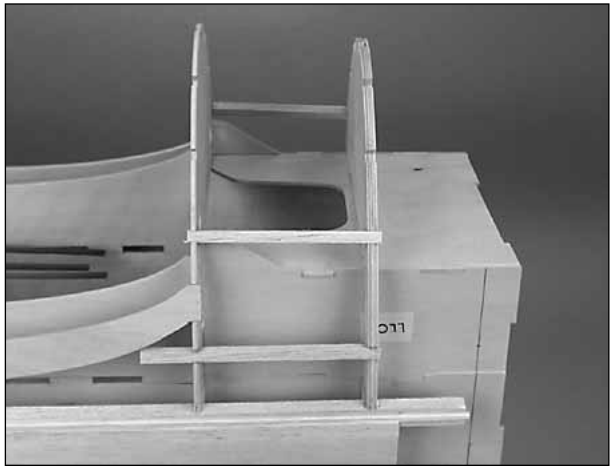
❏ 15. Cut two 1/2" x 5-13/16" strips from leftover 1/8" plywood.



❏ 16. Cut out the main stringers as shown on the plan and in the photo. Glue the strips of plywood across the inside of the main stringers.

That's all we need to do on the intercooler doors for now. The rest will be done after the fuse is sheeted.

❏ 17. Cut the aft fuse stringers that run from former 9 to the end of the fuse from a 1/4" x 1/4" x 30" balsa stick and glue them into position as shown. Notice that top edge of the 1/4" x 1/4" stringers that contact the main stringers should taper to a sharp edge at the end as shown on the plan (not as they are in the photo).



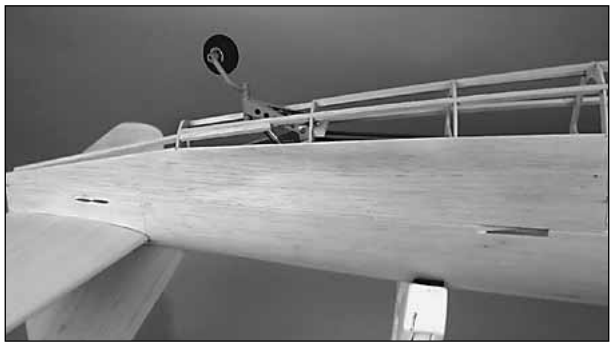
❏ 18. From the remainder of the 1/4" x 1/4" balsa stick used in the previous step, cut the first two stringers that run between former 1 and 2 below the main stringer and glue them into position.

❏ 19. Now would be a good time to install the retract air tank. You may wait until later if you prefer, but it's easiest to do now. Use RTV silicone or epoxy to glue the air tank to the formers as shown on the plan.

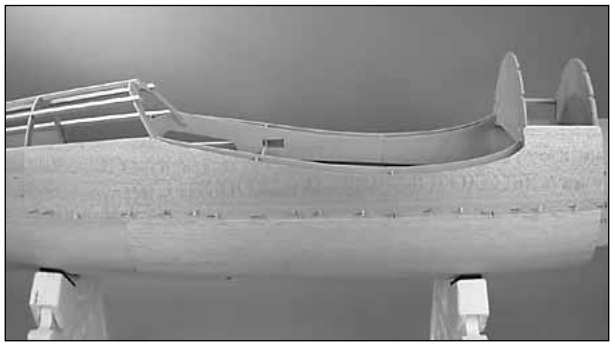
Sheet the fuse bottom

❏ 1. The same as you did before sheeting the top of the fuse, glue leftover 3/32" balsa to both sides of former 6 to support the sheeting where it will be spliced together.

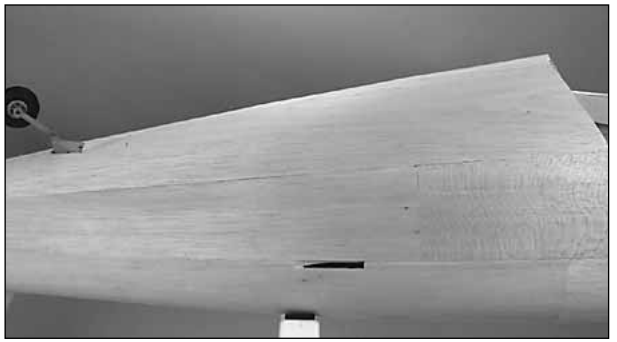
❏ 2. You can wait until later, but now would be a good time to connect air lines to the air cylinder on the tail gear while it's still accessible.



❏ 3. Use two 3/32" x 4" x 30" balsa sheets to sheet both sides of the bottom of the fuse from the middle of former 6 aft. Save leftover sheeting for the dorsal fin.



❏ 4. Use two 3/32" x 4" x 36" balsa sheets to sheet both sides of the bottom of the fuse from F6 to F1.

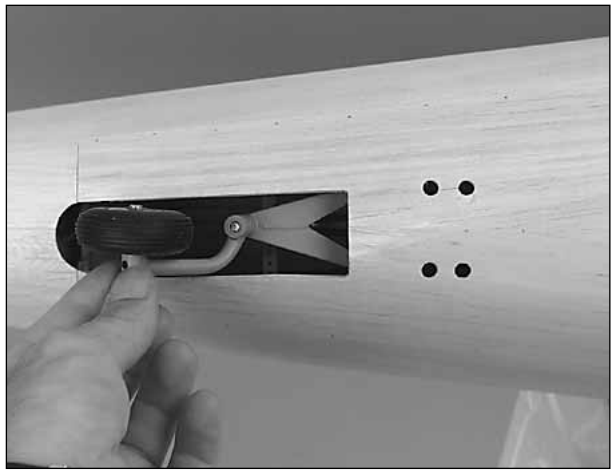


❏ 5. Sheet the bottom of the fuse from former 5D aft using two more 3/32" x 4" x 30" balsa sheets. For now, trim an opening in the sheets just large enough to clear the tail gear. Later, we'll instruct you to cut a nice, neat opening. Gear doors are not featured with this kit, but may be installed if you wish to fashion them.

❏ 6. True the edges of the fuse sheeting at the back end to accommodate the 1-3/8" x 3" x 9-1/2" balsa **aft fuse block**.

❏ 7. Bevel one end of the aft fuse block to fit former 9 and bevel the other end of the block to match the fin TE. Without gluing it into position, roughly shape the block to match the fuse and rudder. If you prefer, hollow the inside of the block with an appropriate carving gouge or a rotary tool. Look at the following photo to see what the aft fuse block looks like after it's glued into position and sanded to match the fuse.

❏ 8. Glue the aft fuse block into position. Temporarily join the rudder to the fin with the hinges and use masking tape to hold it, centered, in place. Use a bar sander with 80-grit sandpaper to blend the fuse, the aft fuse block and the rudder.



❏ 9. Trim the bottom sheeting, former 9 and a portion of the aft fuse block to allow the tail gear to retract. Use a 1/4" brass tube sharpened at the end to cut four holes through the sheeting so you can reach the tail gear mounting screws with a screwdriver (*you thought we were going to forget didn't you?*).

Note: The opening shown in the photo is not large enough to completely remove the tail gear from the fuselage. However, the gear can be dismounted and maneuvered enough to attach the air lines and pull-pull cables while it is still partially inside the fuse. If you prefer to be able to completely remove the landing gear from the fuselage, enlarge the opening.

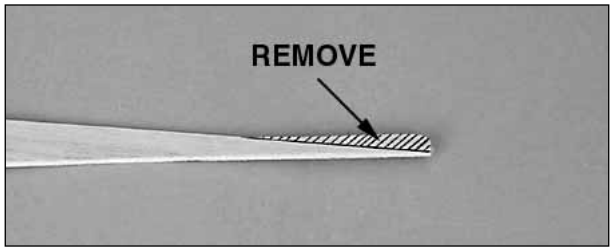
❏ 10. Use lightweight hobby filler such as Hobbico HobbyLite™ to fill gaps between the sheeting where needed. After the filler dries, *rough-sand* the fuse, eliminating uneven sheeting and high spots. Save final sanding for later.

P-47 Fact

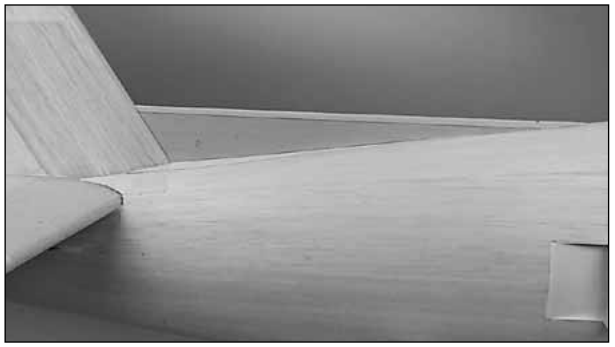
After the British policy of giving names to aircraft had caught on in the U.S., the XP-47B was dubbed "Thunderbolt" by C. Hart Miller, Republic's Director of Military Contracts. Republic officially approved the name.

Build the dorsal fin

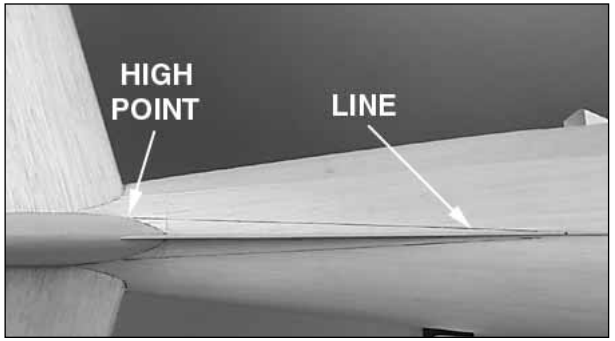
Skip this section if you are building the razorback version (or if you're building one of the bubble canopy versions that doesn't have a dorsal fin).



❏ 1. Cut or sand off the "hump" on the front of the die-cut 1/8" plywood **dorsal fin**.



❏ 2. Bevel the top edge of both sides of the dorsal fin to accommodate the 3/32" sheeting. Glue the dorsal fin to the fuse and the vertical fin. Be certain the dorsal fin is centered and vertical.



❏ 3. Use a straightedge as a guide to draw a line on the fuse sheeting from the "high point" on both sides of the vertical fin to the front of the dorsal fin.

❏ 4. Use the 3/32" sheeting leftover from the aft fuse bottom to make the dorsal fin sheeting. Note how the

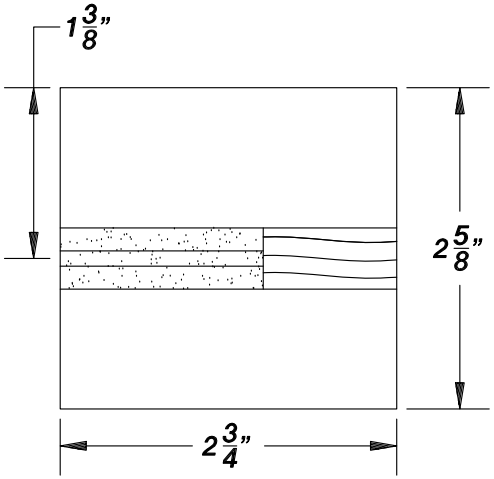
sheeting blends the fin to the dorsal fin in a nearly seamless transition. Glue the dorsal fin sheeting into position on both sides.

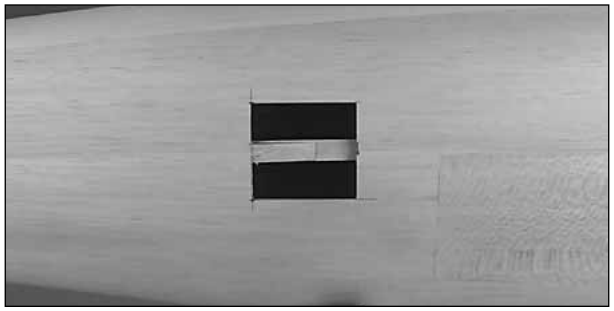
❏ 5. Use balsa filler to blend the dorsal fin to the fin and to the fuselage. While you're at it, make a small fillet around the fin and stab, blending them to each other and to the fuse. Sand the filler after it dries. It shouldn't take much filler to do the job (you can see how the stab and fin are blended in photos later in the manual).

Hint: Some modelers apply lots of filler, taking the approach that "you can always sand off what you don't need." However, since balsa filler is harder than balsa, you usually end up sanding the balsa around the filler more than the filler itself. For this reason, you should take your time applying filler and only use what is needed.

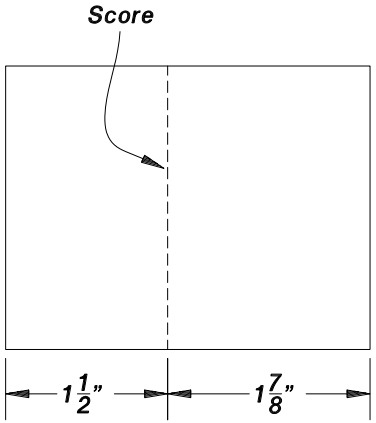
Intercooler doors

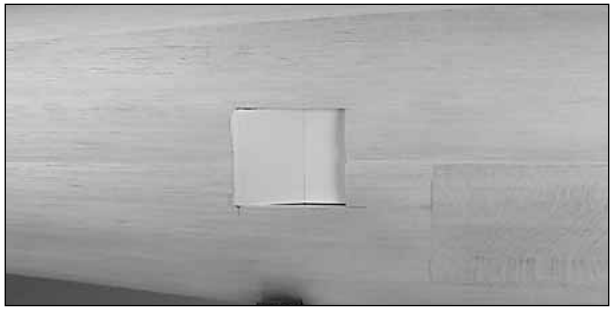
Skip this section if you've decided not to build the intercooler doors in the open position.



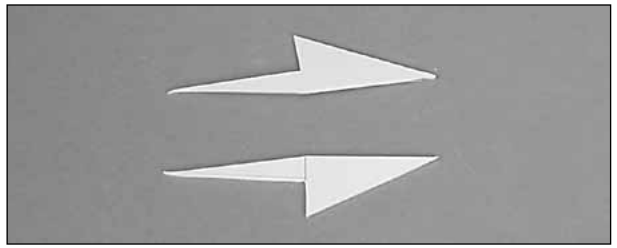


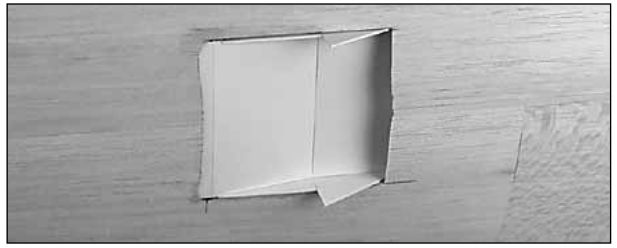
❏ ❏ 1. Cut a 2-5/8" high x 2-3/4" wide opening in the fuse sheeting for the intercooler air exit as shown in the preceding sketch. The top of the opening is 1-3/8" from the center of the sub stringer.



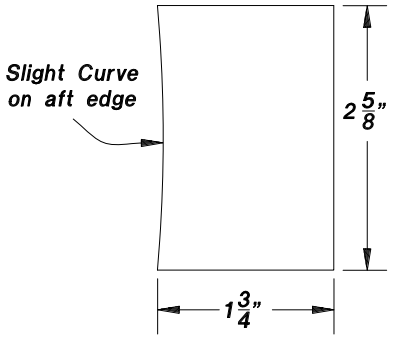


❏ ❏ 2. Make an **inner door** to the dimensions shown in the sketch from the 2-5/8" x 12" ABS sheet provided. Scribe one side of the door where shown, then bend, but do not break it at the line. Glue the inner door into position and sand the aft edge even with the fuse.





❏ ❏ 3. Use the pattern on the plan to make the **top** and **bottom** of the intercooler door from the ABS sheet, then glue them to the inner door and the fuse sheeting.

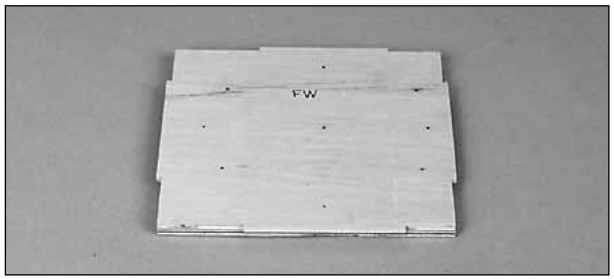


❏ ❏ 4. Make the outer door from the ABS sheet as shown in the sketch. Sand a slight curve to the aft edge of the door, then test fit it into position over the door sides and under the fuse sheeting. Trim where necessary, then glue the outer door into position.

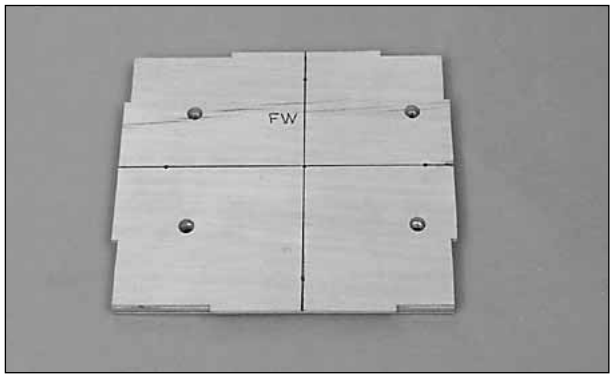
❏ 5. Build the intercooler air exit for the other side of the fuse the same way.

Mount the engine

The instructions show a U.S. Engines 41cc engine and a Great Planes Isolation Mount. Other engines are suitable, provided they are within the recommended range, but may require a different engine mount. Keep in mind that you can rotate the engine to conceal the muffler inside the cowl and to aim the engine exhaust where you want (the engine doesn't have to be mounted exactly inverted). Just make sure the mount is centered on the reference lines on the firewall and that the orientation you have chosen will allow sufficient air flow over the head and cylinder.



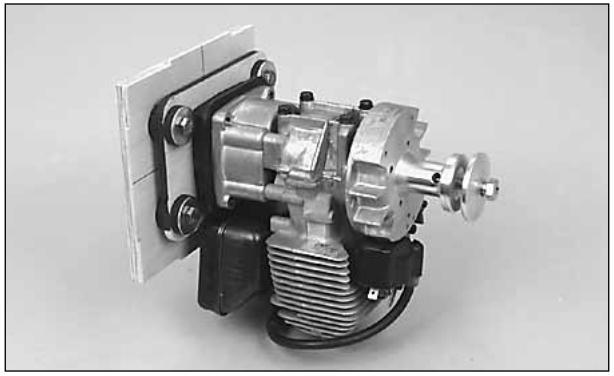
❏ 1. Use 30-minute epoxy to glue the die-cut 1/8" plywood **forward firewall (FW)** to the 1/4" x 6-1/8" x 5-1/2" plywood **aft firewall**. From now on this assembly will be referred to as the **firewall**.



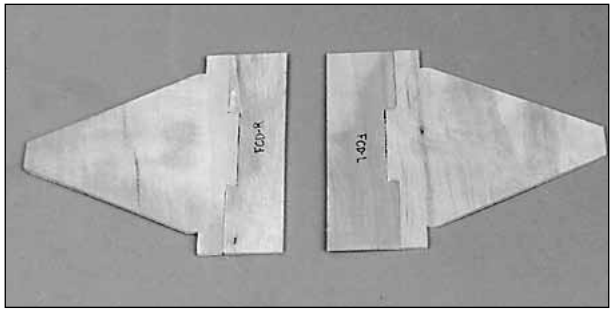
❏ 2. Drill four 19/64" (or 5/16") holes through the **outer** punch marks in the firewall **only** if you are using a Great Planes Isolation Mount. If you are using another engine mount, use a ballpoint pen and a straightedge to draw lines connecting the four **inner** punch marks. Center the engine mount on the cross marks, then mark and drill the appropriate size holes for the engine mount.

❏ 3. Tap blind nuts into the back of the firewall through the holes you drilled. Secure the blind nuts to the back of the firewall with CA.

❏ 4. Use the drawing of the Isolation Mount on the fuse plan to mark the location of the mounting holes for mounting your engine. Trim the bottom of the mount along the lines. Drill 1/4" holes through the iso plate and temporarily mount your engine with 1/4-20 x 1-1/4" bolts and flat washers (not included with this kit).



❏ 5. Temporarily mount the iso plate with the engine to the firewall to confirm that the mounting holes align. Make adjustments if necessary.



❏ 6. Glue together both sets of die-cut 1/8" plywood parts that make up the **right** and **left fuse crutch doublers**.

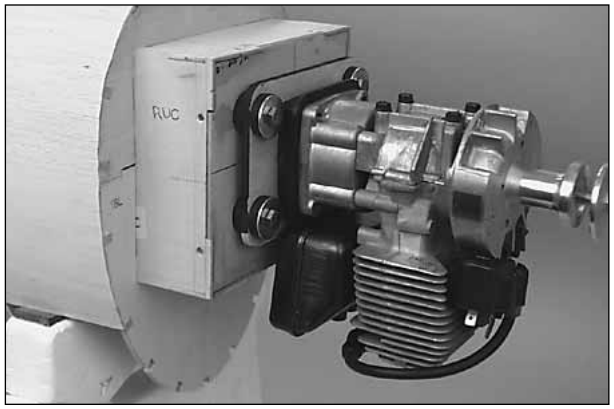
❏ 7. Test fit the doublers to the crutches in the fuse, then test fit the firewall. Be certain the firewall will fit all the way into the notches of the crutches. If it doesn't, trim the forward edges of the crutch doublers as necessary.

❏ 8. After adjustments have been made, glue the crutch doublers to the crutches with 30-minute epoxy.

❏ 9. Remove the iso plate from the firewall. Glue the firewall into position with 30-minute epoxy. Use masking tape or clamps to hold the firewall in place until the epoxy cures. If you don't have clamps that are big enough, use #2 x 1/2" or 3/8" screws to hold the crutches to the firewall. We used flat head screws on our prototype and countersunk them into the crutches. Work neatly and don't build up a large fillet of epoxy behind the firewall because we're going to add reinforcing triangle stock in the next step.

❏ 10. Use the 1/2" x 24" basswood triangle stick to reinforce the glue joint between the four sides of the firewall and the inside of the fuse crutches and the tank roof and floor. Glue the sticks into position with epoxy.

❏ 11. Further reinforce the glue joint by drilling 3/32" holes through the crutches, tank floor and tank roof into the edges of the firewall. "Pin" it all together with round toothpicks glued in place with epoxy.

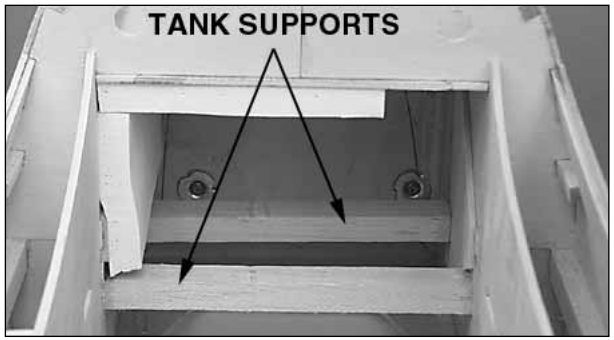


❏ 12. Temporarily mount the engine to the firewall. Step back for a moment and think about where you are going to mount the fuel tank and where you are going to route your throttle pushrod and fuel lines.

While we're working on the front end, let's go ahead and mount the fuel tank.

❏ 13. Coat the inside of the fuel tank area with fuelproof paint or epoxy. Allow to dry before proceeding.

There are many ways to position and secure the fuel tank. The instructions that follow show the installation of a Great Planes 32 oz. fuel tank positioned for the U.S. Engines 41cc. Follow these instructions to mount your tank, or use the instructions as a basic guideline for a different installation.



❏ 14. Cut **fuel tank supports** from the 1/2" x 3/4" x 30" balsa stick and glue them between the crutches so they will hold your tank in place (note the 1/2" foam rubber). Be certain to position the tank so it will not interfere with your throttle pushrod. As you can see in the photo, we mounted our tank off to the right side of the fuse to accommodate the throttle pushrod. The tank should be mounted securely, yet be removable for inspection and servicing after the model is completed and you've been flying it for a while.

❏ 15. Drill holes in the firewall or fuse crutches for the fuel lines, then temporarily mount your tank. Be certain you are using the correct fuel lines and rubber stopper for gas or glow fuel.

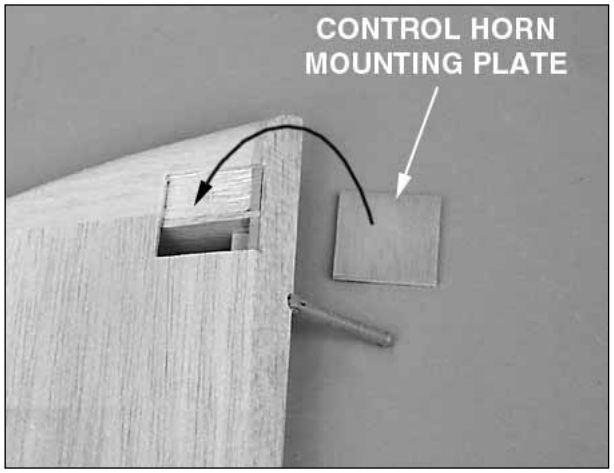
P-47 Fact

The *XP-47B* made its first flight on May 6, 1941. One of the first modifications to that design was to replace fabric covered control surfaces with those covered with a metal skin. Unfortunately, this improvement was not a feature of the first 773 Thunderbolts (P-47B) produced and sent into service, thus resulting in many failures and crashes.

Hook up the controls

❏ 1. Thread a 4-40 nut onto a .095" x 48" wire pushrod, followed by a 4-40 metal clevis. Fit the clevis into the second from the outer hole of a nylon control horn.

❏ 2. Fit the pushrod through the aft guide tube in the left side of the fuse. Position the control horn on the rudder, then mark the location with a ballpoint pen.

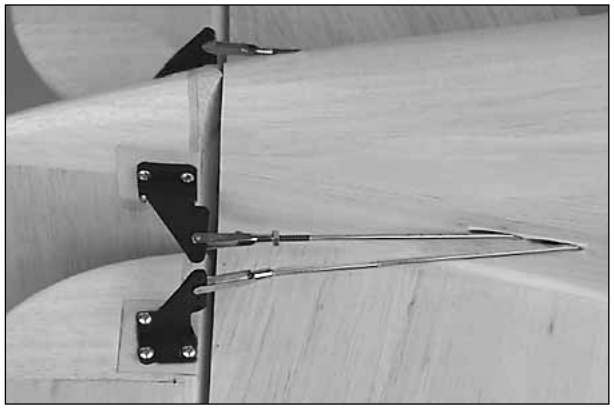


❏ 3. Remove the rudder from the fin. Cut out the rudder skin and the rudder base to accommodate the die-cut 1/8" plywood **control horn mounting plate**.

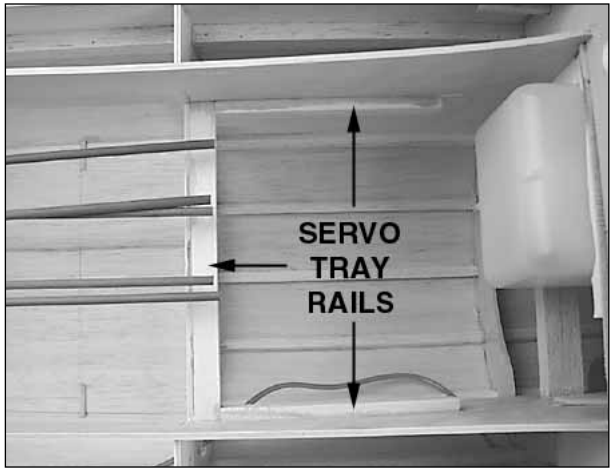
❏ 4. Securely glue the control horn mounting plate into position, then sand it flush with the rudder.

❏ 5. Reposition the rudder on the fin, mark the location of the holes in the control horn on the mounting plate, then drill 3/32" holes at the marks and temporarily mount a heavy duty control horn (not included) with four #4 x 1/2" screws.

❏ 6. Prepare another pushrod with a 4-40 nut, clevis and control horn. Slide the pushrod into the forward guide tube on the left side of the fuse. If necessary, make a slight bend in the pushrod so the elevator control horn can be positioned where it will not interfere with the rudder control horn. Mark the location of the horn on the elevator and install another 1/8" ply control horn mounting plate the same as you did the rudder.

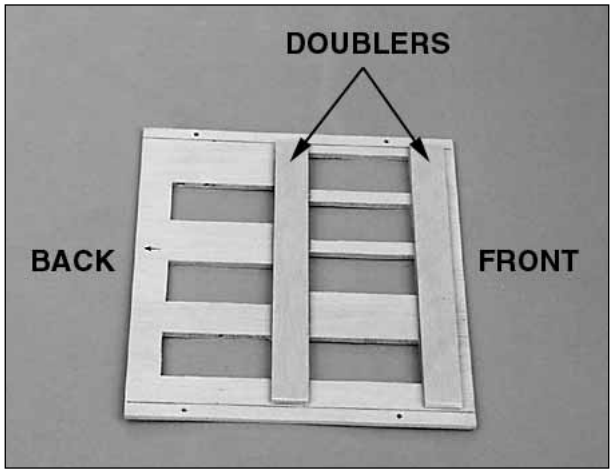


❏ 7. Mount the elevator control horn to the elevator with four #4 x 3/8" screws. Mount the other control horn and pushrod to the other elevator the same way.



❏ 8. Cut the **servo tray mounting rails** from the remainder of the 1/4" x 1/2" basswood stick you used for the tail gear mounting rails. Use epoxy to glue the aft rail to former 4 in the notches of the crutches and glue the side rails to the crutches. Note that the *wide side* of the side rails is glued to the crutch.

❏ 9. Test fit the rudder and elevator servos in the die-cut 1/8" plywood **servo tray**. The servo tray is designed to accommodate most standard size servos. If your servos do not fit, modify the tray as necessary, or make another tray from 1/8" plywood (not supplied).

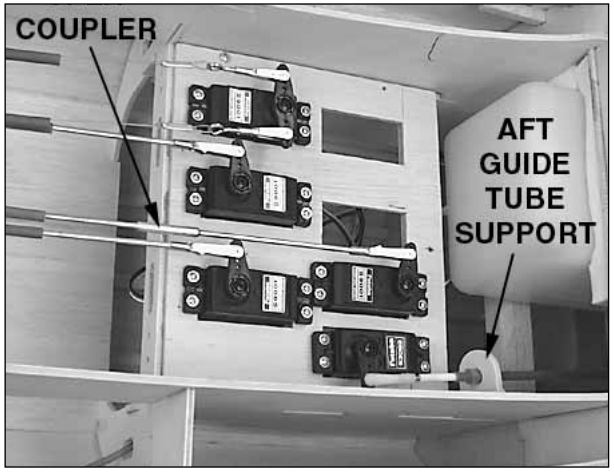


❏ 10. Glue both die-cut 1/8" plywood **servo tray doublers** between the front servo cutouts across the top of the servo tray *(remember, the servos are mounted to the **bottom** of the tray)*.

❏ 11. Position the servo tray in the fuse, then drill six 1/16" holes through the tray (two through both sides and two more through the aft edge) and the servo tray mounting rails. Remove the servo tray. Add a drop of thin CA to the holes in the rails. Enlarge the holes **in the servo tray only** with a 3/32" drill bit, then test mount the tray to the rails with six #2 x 1/2" screws and #2 washers.

Let's hook up the throttle first. A 3/16" x 11-3/4" pushrod guide tube and flexible plastic pushrod are supplied in this kit for the throttle. This is the recommended setup for ignition engines as metal pushrods should not be used due to the possibility of RF (radio frequency) noise. If you are using a glow engine, you may substitute a metal pushrod or cable (not supplied) if you prefer.

Refer to this photo to hook up the servos.

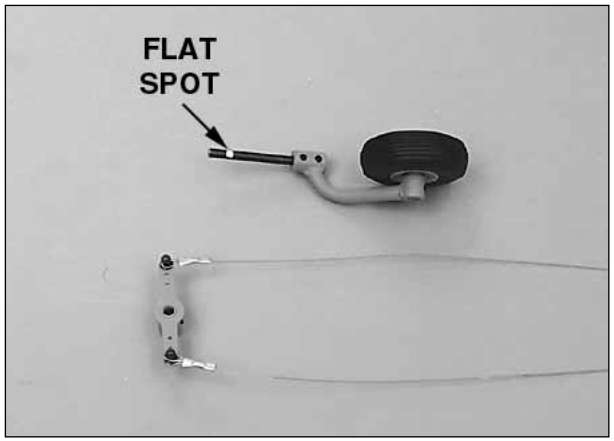


❏ 12. Mark the firewall (or the isolation mount if you are using one) where the throttle pushrod will align with the arm on your carburetor. Drill a 3/16" hole through the firewall and the iso plate at the mark you made. If you are using the iso plate, enlarge the hole in the plate with a 1/4" drill bit.

❏ 13. Mount your throttle servo to the servo tray using the screws that came with your radio. Hook up the throttle using the 3/16" x 11-3/4" outer pushrod guide tube, the 11-3/4" flexible plastic pushrod, a ball link and a nylon clevis as shown on the plan. Glue the outer guide tube to the firewall. Make an **aft guide tube support** from leftover plywood and glue it in position so the throttle pushrod aligns with the throttle servo.

❏ 14. Mount the two elevator servos in the servo tray. Cut the pushrods to the correct length, then silver solder them to the clevises and connect them to the servos. **Hint:** Wipe away residual soldering flux immediately after the solder has solidified. After the joint cools, coat the clevis and the solder joint with oil to prevent rusting. **Note:** If you would rather connect the pushrods after the model is covered (so they won't be sticking out of the rear end of the fuselage when you are covering), skip this step for now and return after covering.

❏ 15. Mount the rudder servo in the servo tray. Connect the rudder pushrod to the rudder servo with a split coupler, an additional piece of wire cut from a .095” x 12” pushrod and a solder-on metal clevis. The leftover piece of the wire you just cut from the 12” pushrod (that has a threaded end) will be used for an aileron pushrod.

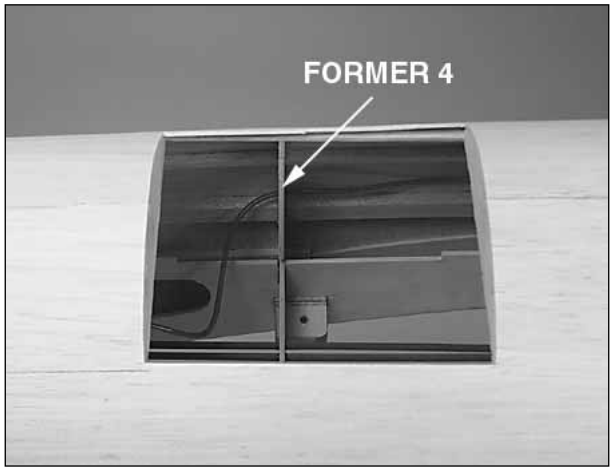


❏ 16. Connect one end of the pull/pull cables to the tail gear steering arm (we used a Sullivan #520 Pull-Pull Cable kit, not included with this kit). While you have the tail gear apart, file a flat spot near the top of the shaft as indicated in the photo. Be certain the flat spot is positioned so that the steering arm is perpendicular to the wheel when the set screw is tightened. It wouldn’t be a bad idea to file a flat spot near the bottom of the shaft for one of the other set screws too.

❏ 17. Reassemble the tail gear and thread the cables through the guide tubes. Mount the tail wheel steering servo in the servo tray, then connect the other end of the cables to the servo arm.

Finish the cockpit

Skip the first two steps if you are not going to install the optional scale cockpit kit.



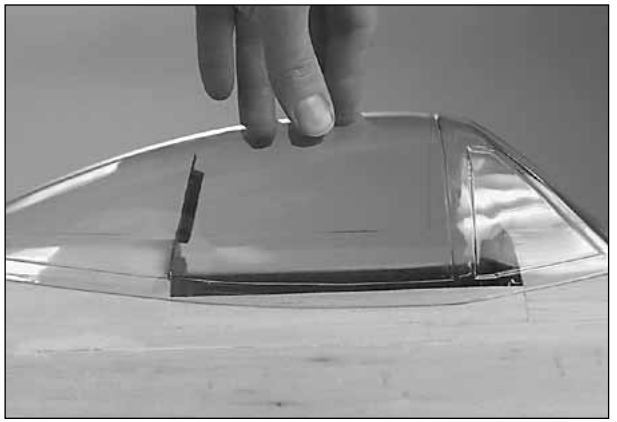
❏ 1. Finish cutting the rest of the way through the partially die-cut lines on the 1/8" balsa cockpit deck. Remove that section of balsa to accommodate the cockpit kit. Cut through former 4 and remove the cross-member portion.

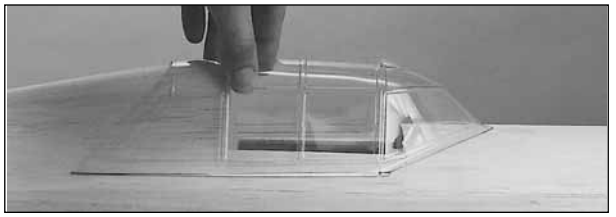
❏ 2. Cut out the cockpit kit according to its instructions, then test fit the parts into the fuse.

❏ 3. Use curved-tip scissors to cut out the molded canopy along the framing. True the edges with a bar sander and 150-grit sandpaper.

P-47 Fact

Early production Thunderbolts were not without teething pains typical of any new aircraft. Takeoff runs were long (nearly a half-mile to clear a fifty foot obstacle) and there were several electrical and hydraulic glitches, not to mention the unfamiliarity of a totally new design. One fighter group damaged or wrecked half of the P-47s received.



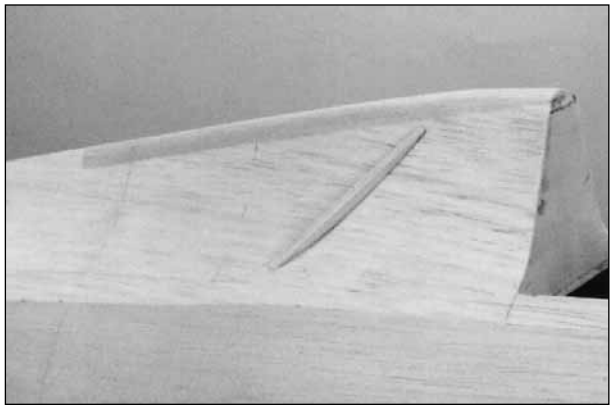


❏ 4. Use leftover 3/32" balsa to sheet the open space on both sides of the fuse between the cockpit deck and the canopy.

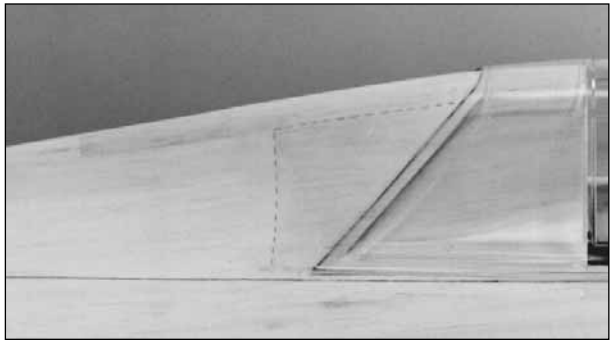
The rest of the steps in this section are for the razorback version only.

❏ R5. Finish shaping the top of the turtle deck to fit the canopy and to match the cross section on the plan.

❏ R6. Use the templates on the fuse plan to make the **canopy fairing supports** from 1/8" balsa and the **canopy fairings** from leftover 3/32" balsa.



❏ R7. Glue the canopy fairing supports to the fuse under the aft edge of the canopy.



❏ R8. Bevel the inside edges of the canopy fairings as shown on the plan. With the canopy in position, test fit, then glue the canopy fairings to the fuse. Use balsa filler to blend the fairings to the fuse. Sand when dry. The dashed lines in the photo indicate the edges of the fairings under the balsa filler.

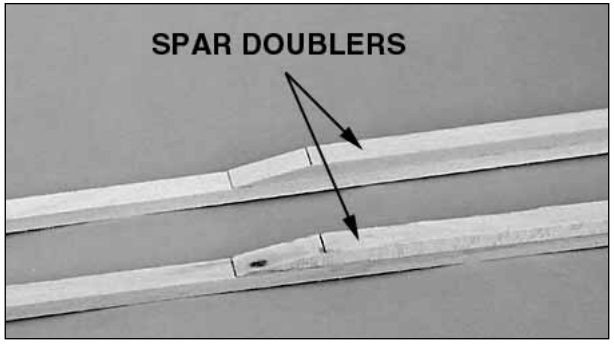
The fuse and cowl can't be completed until the wing and the belly pan are built, so clean off your workbench, take a break, then build the wing!

BUILD THE WING

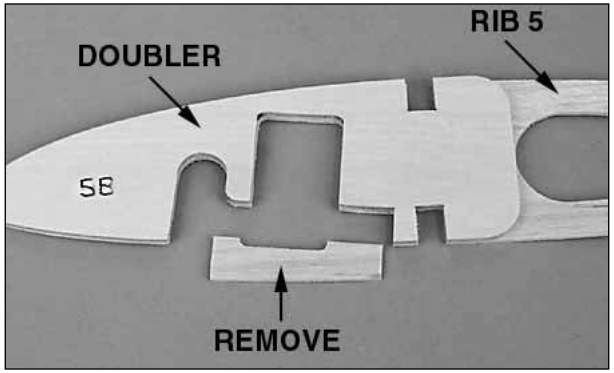
Preparation

❏ 1. Cut the right wing panel plan from the rest of the plan and lay it on your flat building board. Cover the plan with Great Planes Plan Protector or wax paper.

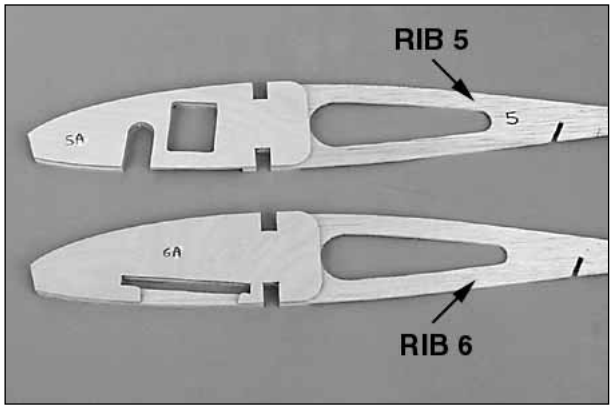
❏ 2. Make two **spar doublers** by cutting a 1/4" x 3/8" x 42" basswood stick into two 21" long pieces. Bevel one end of both spar doublers as shown on the plan. Make two more spar doublers the same way (the spar doublers are pointed out in the following photo).



❏ 3. Make four **main spars** by gluing each spar doubler to a 1/4" x 3/8" x 42" basswood stick.

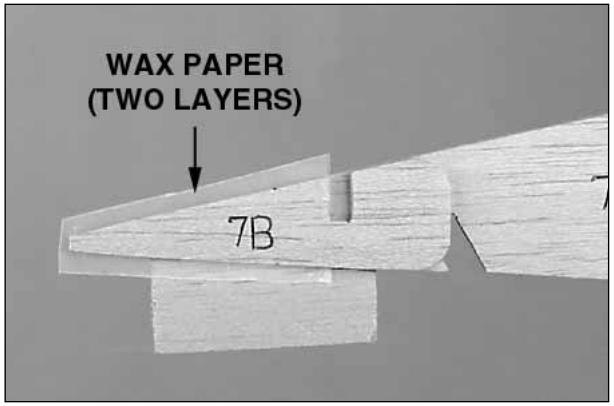


❏ 4. Position, but **do not glue** a laser-cut 1/8" plywood **wing rib doubler 5B** over a die-cut 1/8" plywood **wing rib 5**. Cut away the balsa portion of the rib that is not covered by the doubler. Repeat for the other rib 5.



❏ 5. Refer to the wing panel plan for the wing you are building, then glue the laser-cut 1/8" plywood rib doublers 5A and **5B** to both sides of the die-cut 3/32" balsa rib, making certain you glue the doublers to the **correct sides** of the rib.

❏ 6. The same as you did in the previous step, refer to the wing plan for the wing you are building, then glue the laser-cut 1/8" plywood rib **doublers 6A** and **6B** to both sides of the die-cut 3/32" balsa **rib 6**, making certain you glue the doublers to the **correct sides** of the rib.



❏ 7. Glue the die-cut 3/32" balsa **aileron root rib 7B** to **rib 7A**. Note the two layers of wax paper between the two ribs aft of the notch. Glue the **flap root rib 2D** to the side of **rib 2B** the same way.

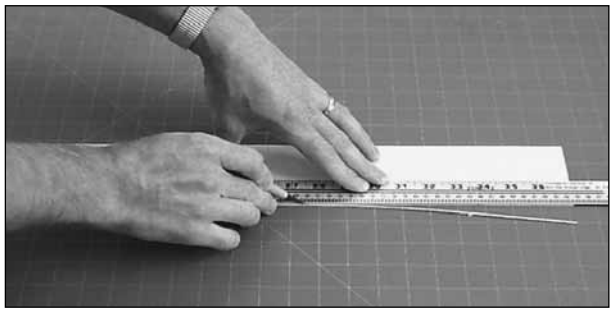
❏ 8. Drill a 1/16" hole through the punch mark in both die-cut 1/8" plywood **forward spar joiner braces** (refer to the die drawings on pages 8 & 9 to locate the forward spar joiner brace).

❏ 9. If you wish to plan ahead a little, you can use a 5/32" brass tube sharpened at the end to cut holes in the ribs to accommodate the retract air lines so they can neatly pass through the ribs.

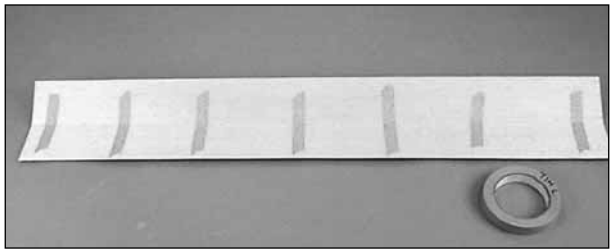
Make the wing skins

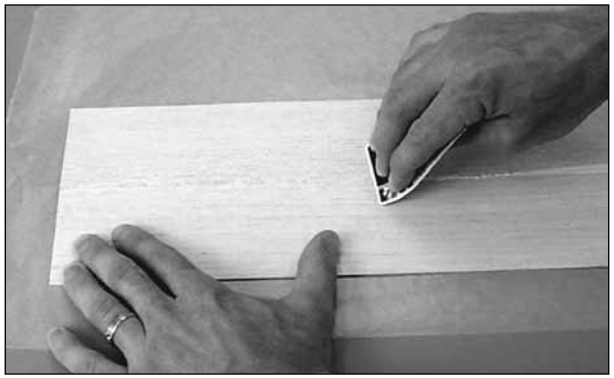
If you would rather get started framing up the wing panel right away, you can make the wing skins later. Just return to this section when you need to make the wing skins.

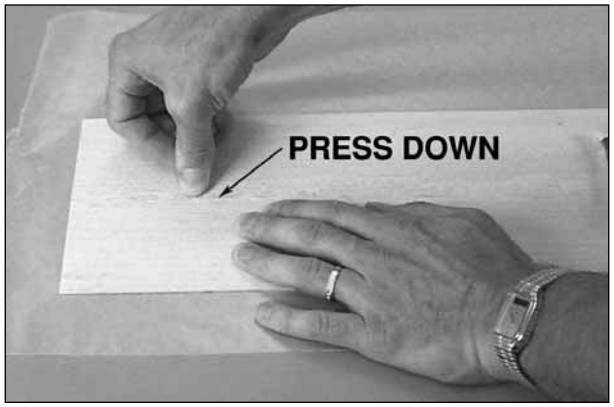
We recommend gluing the wing skins together the same as we showed you for the stab and fin skins (using the "masking tape, wood glue and squeegee" technique). The wing skins are glued to the wing in two sections; a forward and an aft section with the seam between the two over the main spars. This requires eight wing skins; four forward skins and four aft skins. Each forward skin is made by joining two 3/32" x 3" x 42" balsa sheets and each aft skin is made by joining three 3/32" x 3" x 42" balsa sheets.

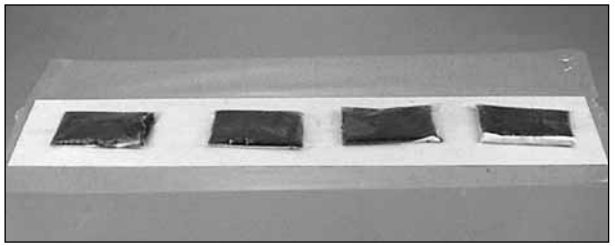


❏ 1. Gather twenty 3/32" x 3" x 42" balsa sheets to make the wing skins. Use a straightedge and a sharp #11 blade to true one edge of sixteen sheets and true both edges of four sheets. As you proceed, use a ballpoint pen to mark the trued edge(s) of each sheet, so you will know which edges are trued when it's time to glue them together.









❏ 2. The same way you did the stab skins, tape the sheets together, apply glue, then wipe the excess away as you press the edges down. Place weights on top of the sheets to hold them flat until the glue dries. Remember, the better job you do of joining the skins, the less sanding that will be required and the less you will end up thinning the balsa. The only sanding that should be required *after* you glue the skins to the wing is final sanding with 400-grit sandpaper.

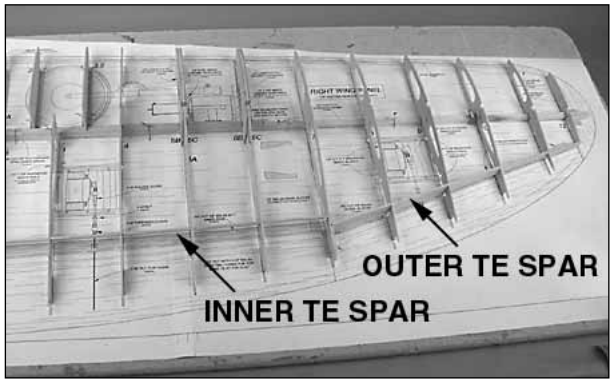
❏ 3. Make three more forward skins the same way. Make four aft skins, each one consisting of three 3/32" x 4" x 42" balsa sheets.

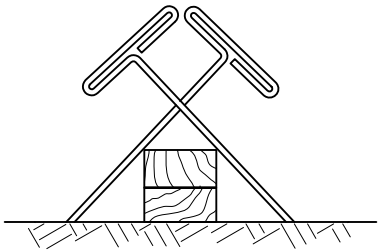
❏ 4. Sand the skins flat and even.

Build the wing panels

We'll start with the right wing panel first.

Refer to this photo for the following six steps.





❏ ❏ 1. Use large T-pins to securely hold one of the main spars to your building board over its location on the plan. The root end of the spar should extend beyond the wing centerline approximately 1/16". Do not use any T-pins outward of rib 10 as the spar is going to be raised.

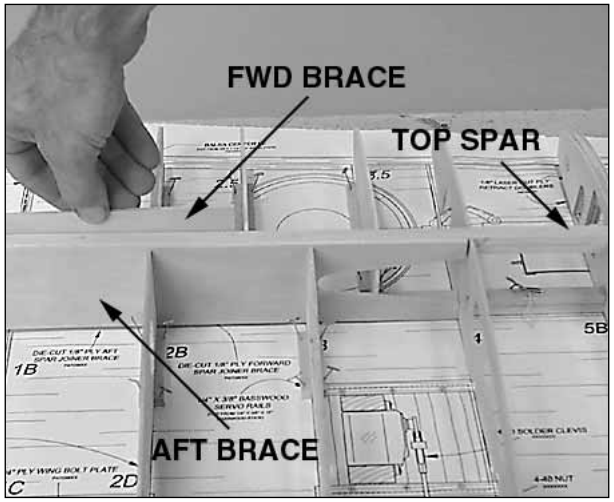
❏ ❏ 2. Fit, but do not glue, the die-cut 1/8" balsa **inner TE spar** into ribs 3 through 6, then join the assembly to the bottom main spar on the plan.

❏ ❏ 3. Join ribs 7 through 12 to the assembly, then join the die-cut 1/8" balsa **outer TE spar** to ribs 8 through 12.

❏ ❏ 4. Use some of the 1/4" x 1/4" rib jigs leftover from building the tail surfaces to hold ribs 2A, 2B, 2.5, 3 and 3.5 over their position on the plan. Use rib jigs on other ribs as necessary to help hold the wing panel firmly to your building board.

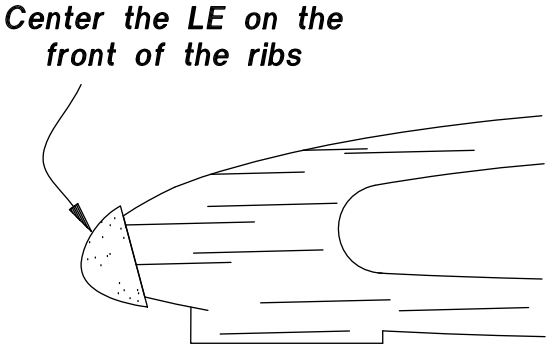
❏ ❏ 5. Place a shim made from leftover 1/8" balsa under the bottom spar at rib 12. Rib 12 should have rib jigs to hold it down.

❏ ❏ 6. Be certain the jig tabs of all the ribs are contacting the building board, then glue ribs 3.5 through 12 to the bottom main spar using a small builder's square to hold the ribs vertical as you proceed.



❏ ❏ 7. Fit, but do not glue the top spar and the die-cut 1/8" plywood **forward** and **aft spar joiner braces** to the panel. Make sure you have installed the braces right side up (the root ends are cut at an angle for dihedral). Be certain the top spar extends past the joiner braces by 1/16", then glue the top spar to ribs 4 through 12, but **not** to the joiner braces.

❏ ❏ 8. Making certain the jig tabs of the ribs are contacting the building board as you proceed, glue the outer TE spar to ribs 8 through 12 and glue the inner TE spar to ribs 3 through 7.

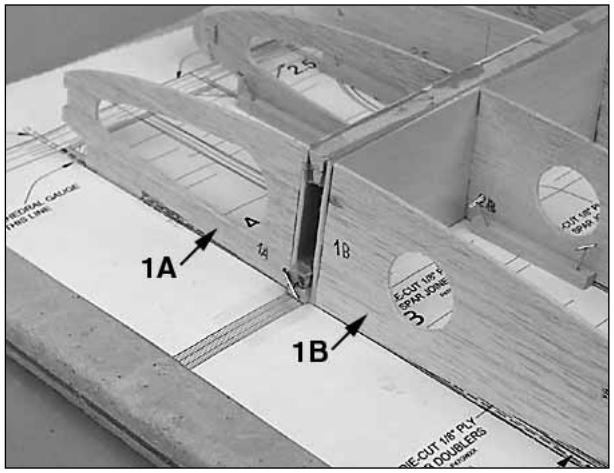


❏ ❏ 9. Cut a shaped 36" balsa **leading edge** to the length shown on the plan. Glue the LE, centered height-wise, to ribs 2A through 12 **except for rib 2.5**. Note that the bottom of the LE near the tip will have to be trimmed where it interferes with the building surface.

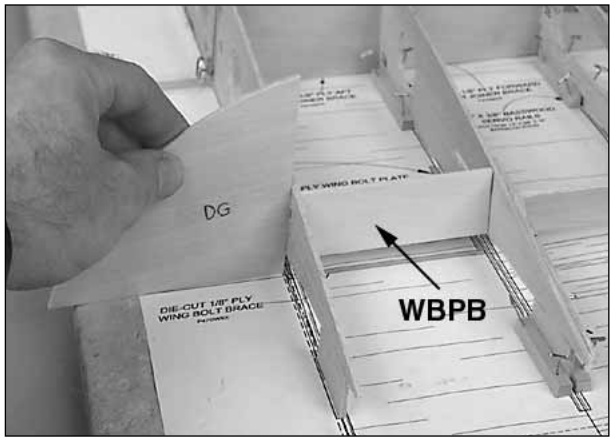
❏ ❏ 10. Temporarily remove the aft spar joiner brace and rib 2.5 from the assembly (the absence of rib 2.5 will allow positioning of a C-clamp on the bottom spar and the spar joiner). Use 30-minute epoxy to glue the forward spar joiner brace to the front of the top and bottom main spars. Wipe away excess epoxy before it hardens–especially from **inside** the spar joiner to accommodate the wing joiner later on.

❏ ❏ 11. Glue ribs 2A and 2.5 to the forward spar joiner brace.

❏ ❏ 12. Use 30-minute epoxy to glue the aft spar joiner brace to the spars. Immediately after you position your clamps, use a leftover piece of 1/4" x 3/8" basswood to scrape away excess epoxy from inside the spars. Any epoxy left inside the cavity made by the spars and spar braces will make it difficult when inserting the spar joiner later on.



❏ ❏ 13. Align the front of rib 1B with the aft joiner brace, using it to set the angle of the rib. Glue 1B to the aft joiner brace. Glue rib 1A to the forward joiner brace the same way.

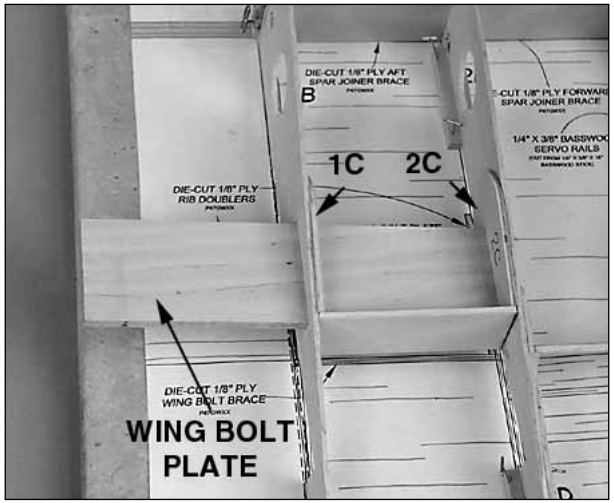


❏ ❏ 14. Test fit the die-cut 1/8" plywood **wing bolt plate brace (WBPB)** between the ribs 1B and 2B. Use the die-cut 1/8" plywood **dihedral gauge (DG)** to align 1B over the plan and to set it at the correct angle. Adjust the wing bolt plate brace if necessary, then glue it into position.

❏ ❏ 15. Test fit, then glue the laser-cut 1/8" plywood **forward dowel plate** between ribs 1A and 2A the same as you did the wing bolt plate brace using the dihedral gauge to align rib 1A with the plan.

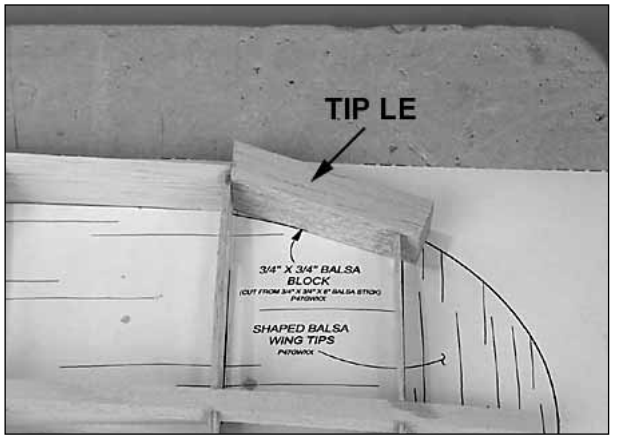
❏ ❏ 16. Make **gussets** from leftover 1/8" balsa and glue them to the forward dowel plate as shown on the plan.

❏ ❏ 17. Drill 1/4" holes through the 1/4" x 2" x 7-3/4" plywood **wing bolt plate** where shown on the plan. **Note:** Though the holes are not shown in the wing bolt plate in the following photos, yours should now be drilled.



❏ ❏ 18. Test fit the wing bolt plate in ribs 1 & 2 and the die-cut 1/8" plywood **rib doublers 1C** and **2C**. Use 30-minute epoxy to glue the rib doublers to the ribs, then remove the wing bolt plate before the epoxy hardens.

❏ ❏ 19. Glue the die-cut 1/8" plywood **aft dowel plate** (it's the 1-1/4" disk with a 5/16" hole in the middle) to the forward spar joiner brace centered on the 1/16" hole you drilled during preparation.



❏ ❏ 20. Make the **tip LE** from the 3/4" x 3/4" x 8" balsa stick, then glue it into position on ribs 11 & 12 and the LE.

❏ ❏ 21. Use the 3/32" x 4" x 36" balsa sheet you set aside earlier (and marked "shear web") to make the **shear webs** that fit between ribs 4 through 12 as shown on the plan. Glue the shear webs into position.

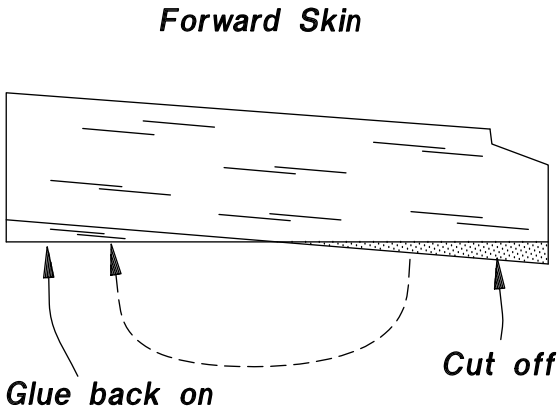
During speed run testing of early production P-47s, test pilots attained a level flight speed of over 400 mph.

Sheet the top of the wing panels

❏ ❏ 1. Use a bar sander with 80-grit sandpaper to sand the top of the ribs, shear webs and spars even to accommodate the wing sheeting.

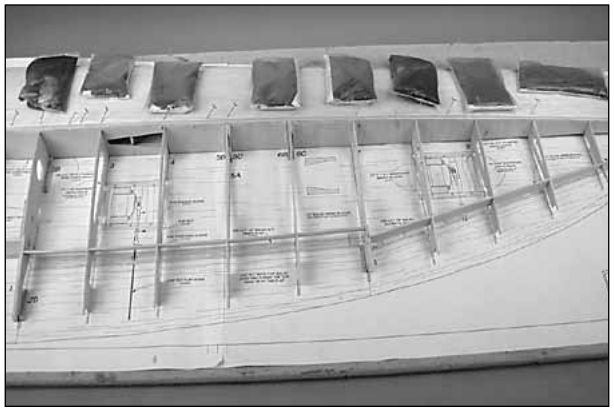
❏ ❏ 2. If you haven't already done so, return to page 31 and make the wing skins.

❏ ❏ 3. Trim one edge of a forward skin to fit the LE. You'll have to cut a little "step" at the end to accommodate the 3/4" x 3/4" balsa tip LE.



❏ ❏ 4. Trim the aft edge of the skin even with the middle of the top main spar. Since the forward skin isn't wide enough to reach the LE near the root end, glue the piece you just cut off back onto the aft edge of the skin.

❏ ❏ 5. Sand the skin flat and smooth. Remember, if you sand the skins *before* gluing them to the wing, the only sanding you should have to do *after* you glue them to the wing is final sanding. This avoids sanding the skin too thin.



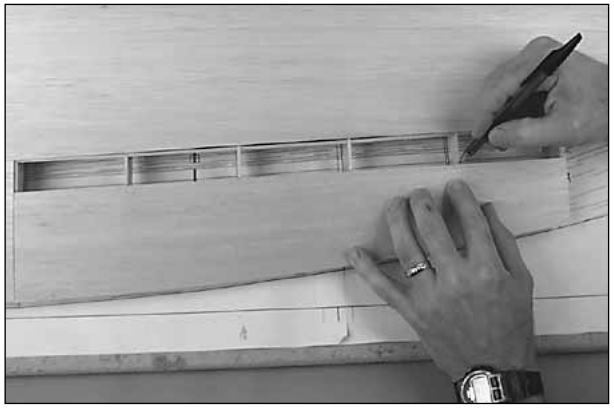
❏ 6. Glue the forward skin to the wing. The way we prefer is to apply aliphatic resin to all the ribs and to the top main spar, then glue the front of the skin to the LE with CA. If you find it necessary, wet the skin with window cleaner or water, then bend it into position using weights to hold it down until the glue dries.

❏ ❏ 7. Trim the aft skin to fit the wing. The aft skin extends from the main spar to the middle of the inner TE (refer to the cross section on the plan) and past the outer TE by approximately 1/8" (to allow for trimming later).

❏ ❏ 8. Sand the aft skin flat and smooth, then glue it to the wing. Sheet the TE of the wing between ribs 1 & 2 with leftover 3/32" balsa.

❏ ❏ 9. Use the **top** and **bottom flap skin patterns** on the plan to make the **top** and **bottom flap skins** from two 3/32" x 4" x 24" balsa sheets. The bottom skin doesn't quite fit on a 4" sheet, so you'll have to add a little piece of 3/32" balsa to the corner at the trailing edge. You can make just one top and bottom skin now, or make all four at the same time.

❏ ❏ 10. Use the **aileron skin pattern** on the plan to make two **aileron skins** from a 3/32" x 3" x 42" balsa sheet (or go ahead and make all four aileron skins from two 3/32" x 3" x 42" sheets).

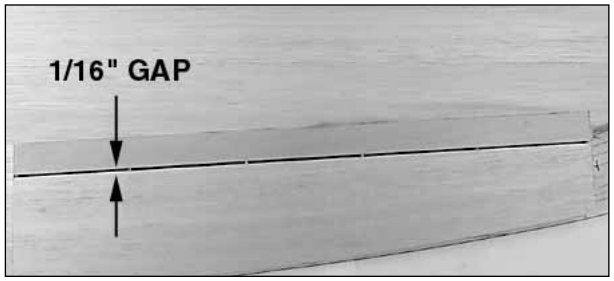


❏ ❏ 11. Position the **top** flap skin on the wing. Align the TE of the skin over its location shown on the plan. Mark the tops of the ribs as shown in the photo where the LE of the flap skin passes over them. Remove the flap skin.

❏ ❏ 12. Cut two 1" x 20" strips from the 1/32" x 2" x 24" plywood sheet. Use medium or thick CA to laminate one of the ply strips to a 1/16" x 2-3/4" x 24" balsa sheet. Trim the balsa sheeting to make a 3/32" x 1" x 20" balsa/ply strip. This will be the **inner TE sheeting** that goes in front of the flap on the top of the wing.

❏ ❏ 13. Trim the ends of the inner TE sheet to fit between ribs 2 & 7. The ply side goes up. The front of the sheet joins the wing sheeting already in position. The TE extends to 1/16" in front of the marks you made that indicate the front of the top flap skin

(providing a 1/16" gap between the flap skin and the inner TE sheet–refer to the photo in the following step). Test fit the inner TE sheet. If necessary, sand the balsa side of the inner TE sheet so it will be even with the aft wing sheeting. When satisfied with the fit, glue the inner TE sheet to the wing.



❏ ❏ 14. Bevel the **inside** of the TE of the top flap skin (as indicated by the dashed lines on the plan and in the sketch on page 38), then glue it to the top of the flap ribs. **Do not** glue the top flap skin to any of the wing sheeting.

❏ ❏ 15. Bevel the inside of the TE of one of the aileron skins, then glue it to the top of the aileron ribs.

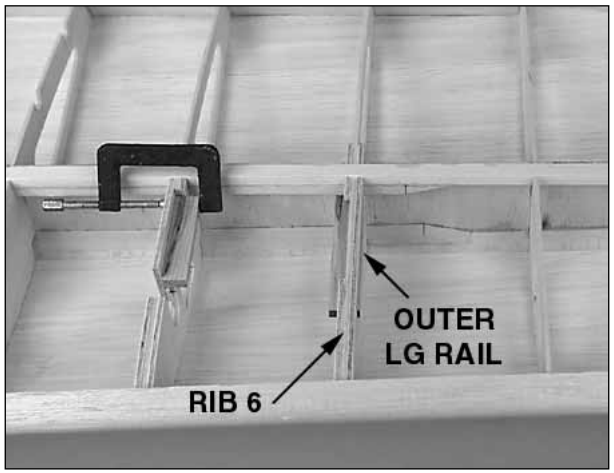
❏ ❏ 16. Remove the wing panel from your building board (*yaaaay!*). Trim the jig tabs off the bottom of the ribs. Look for glue joints that don't look strong or ones you've missed earlier and reinforce them with CA. Sand the bottom of the ribs, shear webs and spars even to accommodate the bottom wing sheeting. If you prefer, you can go ahead and "neaten up" the top of the wing by trimming the top of the LE and the tip LE even with the top sheeting. Don't final shape until instructed to do so.

❏ ❏ 17. Using the hole in the wing bolt plate as a guide, use a 1/4" drill or a 1/4" brass tube sharpened on one end to cut a hole in the top wing sheeting. This will help you locate the hole in the wing bolt plate after the wing is totally sheeted.

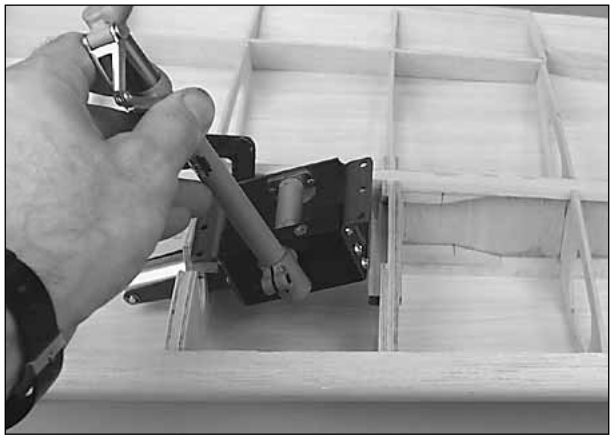
❏ 18. Return to step 1 on page 32, position the left wing panel plan over your building board and build the left wing panel.

Mount the landing gear

❏ 1. Make two 3" long **outer landing gear rails** from the 1/4" x 5/8" x 6" maple stick and two 2-1/4" long **inner landing gear rails** from the 1/4" x 1/2" x 5" maple stick.



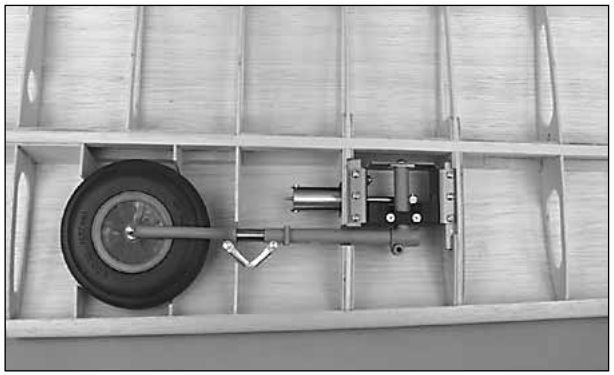
❏ 2. Position, but do not glue the outer rail in rib 6 of the right wing panel. Temporarily hold the inner rail to rib 5 with a small C-clamp.



❏ 3. Test fit the landing gear. Position the outer rail in rib 6 as close to the gear as possible (to give the mounting screws as much "meat" as possible to bite into), yet still allowing for installation and removal of the gear.

❏ 4. Once you have established the exact positioning of the landing gear rails and test fitted the gear, use 30-minute epoxy to permanently glue the rails into position. For additional strength, add Great Planes Pro Milled Fiberglass to the epoxy. For a secure bond, it is not necessary to apply an excessive amount of epoxy which makes a mess and interferes with the fit of the gear. Instead, make certain you **thoroughly** mix equal amounts of epoxy and make fillets, but keep them neat. **Do not** use fast curing epoxy.

❏ 5. After the epoxy has fully hardened, drill 7/64" holes in the rails for #6 x 1/2" screws (not included) to mount the gear. Temporarily mount the landing gear.



❏ 6. Temporarily remove the partially die-cut sections of ribs 2.5, 3.5 and 4, so the gear can be retracted for test fitting. Mount a 5" wheel to the landing gear, then retract the gear into the wing to make sure there is no interference with any of the ribs. Make adjustments where needed. **Note:** If you have to enlarge the hole in the wheel to fit on the axle bolt that comes with the gear, use a size "F" (or 1/4") drill.

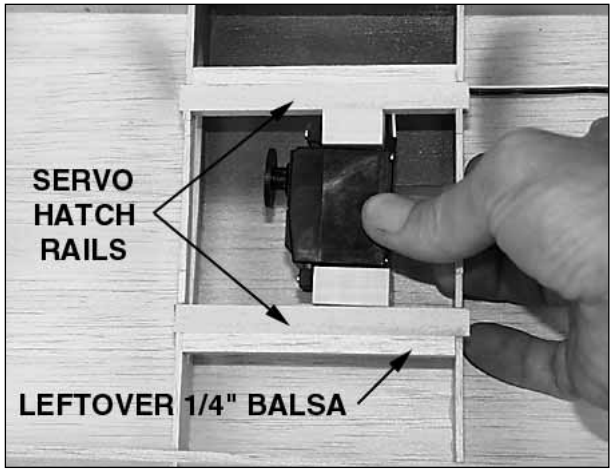
❏ 7. If you haven't already done so, drill holes in ribs 5 through 2A for routing your retract air lines.

❏ 8. Fit the retracts into the left panel the same way.

❏ 9. Now that you see how the retracts fit in the wing and that they operate correctly, replace the partially die-cut sections into the ribs and glue them in place.

❏ 10. Remove the gear. Coat the inside of the landing gear area on both wing halves with fuelproof paint or epoxy. For a scale appearance, simulate the green zinc chromate used to coat aluminum by mixing yellow, blue and aluminum paint. If possible, it is best applied with an airbrush for uniform coverage. For increased durability, first apply three strips of fiberglass cloth where indicated to the top sheeting inside the wing. This will strengthen the sheeting where the ribs will be trimmed to accommodate the wheel after the bottom sheeting is added.

Refer to this photo for the following three steps.



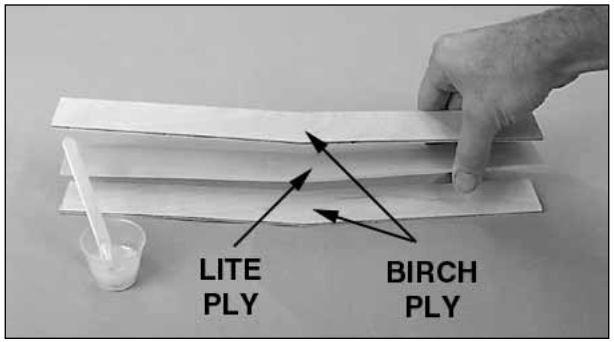
❏ 11. Cut four 3-15/16" long **servo hatch rails** from a 1/4" x 3/8" x 16" basswood stick. Test fit the rails into the notches in the ribs. Make certain your servos will fit between the rails when mounted to the 1/2" x 1" x 1" basswood **servo mount blocks**. If the servo rail spacing is not wide enough to accommodate your servos and the blocks, cut new notches in the ribs to increase the spacing.

❏ 12. Glue the servo hatch rails into the notches of the ribs for the aileron and flap servos. Glue leftover 1/4" x 1/4" balsa sticks to the servo rails to support the wing sheeting.

❏ 13. Some modelers install paper tubes in the wing for routing the servo cords. This is not really necessary on this model, because the lightening holes in the ribs are large enough to easily pass the cords by dangling them through after the wing is sheeted. But, if you prefer, install tubes at this time. You can make tubes from rolled up paper.

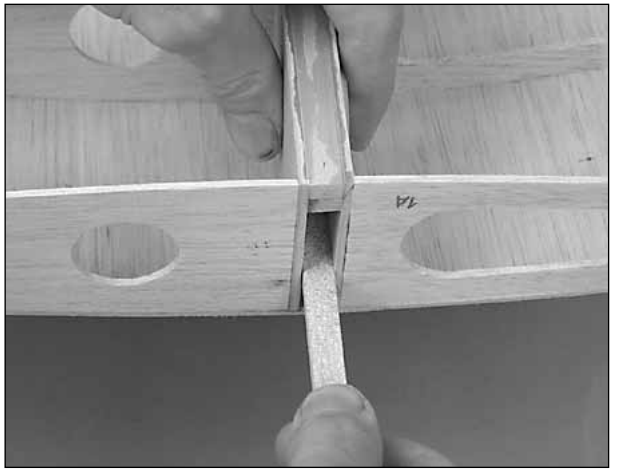
Completed on September 12, 1942, the improved P-47C was released featuring metal covered rudder and elevators and a vertical antenna mast.

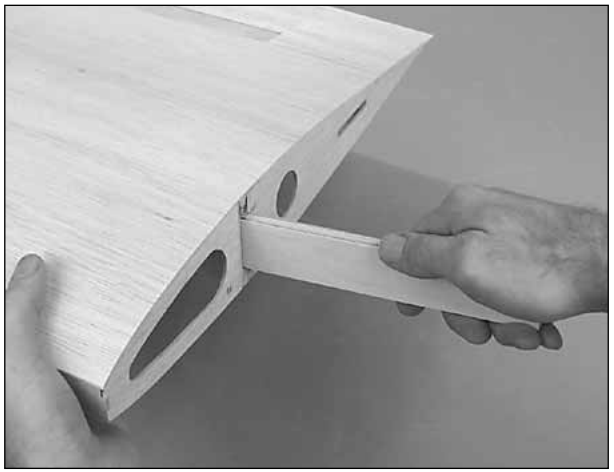
Join the wing panels



❏ 1. Use 30-minute epoxy to glue together the three die-cut 1/8" plywood **wing joiners**. Note that two of the joiners are birch ply and one of the joiners is lite-ply. The lite-ply joiner goes in the middle. It is best to clamp the assembly to a flat board or your workbench protected with wax paper to ensure that it will remain flat and true. Simply clamping the joiners to each other may result in a twisted part.

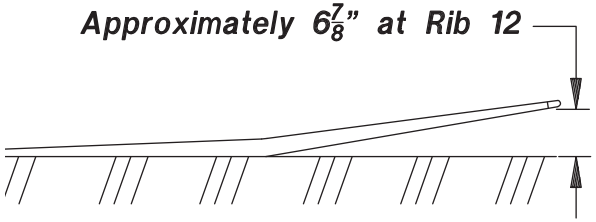
❏ 2. Use a long bar sander with 80-grit sandpaper to true the root end of both wing panels by sanding the ends of the spars and top wing sheeting even.





❏ 3. Test fit the joiner in both wing halves. It may be necessary to sand the bottom or sides of the joiner to get it to fit. If you encounter difficulty, there may be some glue or slivers stuck between the spars and spar

joiners in the wing. If this is the case, stick a piece of Great Planes Adhesive Backed 80-grit sandpaper to a leftover 1/4" x 3/8" basswood stick and use it as a mini sander to remove the obstruction.

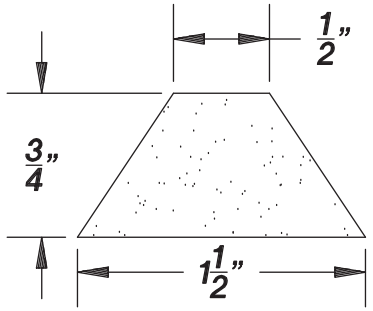


❏ 4. Without using glue, test fit the wing panels together with the wing joiner and the wing bolt plate. *How did it come out?* Make adjustments where necessary for a good fit and to achieve the correct dihedral. As shown in the sketch, one wing tip at rib 12 should be 6-7/8" above the workbench when the other half of the wing is laying flat.

IMPORTANT!
Make certain your 30-minute epoxy provides enough working time to complete the following step. It might help to make a dry run to see how long it takes you to position all of your clamps.

❏ 5. Once you have achieved a good fit of the wing panels with the wing joiner and the wing bolt plate, separate the wing panels, apply 30-minute epoxy to all joining pieces, then permanently glue the wing halves together. Hold with clamps until the epoxy fully hardens.

Sheet the bottom of the wing



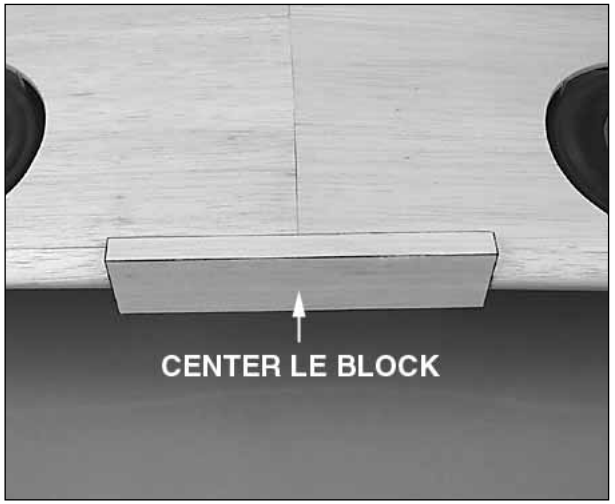
❏ 1. Cut eight 1-1/2” long **flap hinge blocks** from the 12” shaped balsa stick shown in the sketch. Glue the flap hinge blocks to the inner TE of both wing panels where shown on the plan. Use a ballpoint pen to make a dimple on the outside of the inner TE’s corresponding to the center of the hinge blocks. This will help you identify where to drill the holes for the hinges later.

❏ 2. Cut eight 1-1/4" long **hinge blocks** for the aileron hinges from the 1/2" x 3/4" x 12" balsa stick. Glue the hinge blocks to the outer TE of both wing panels where shown on the plan.

NOTE: Make the hinge blocks longer if you plan to use flat hinges instead of hinge points.

❏ 3. Sand the bottom edges of the spars, hinge blocks and wing ribs even and remove glue bumps that will interfere with the bottom sheeting.

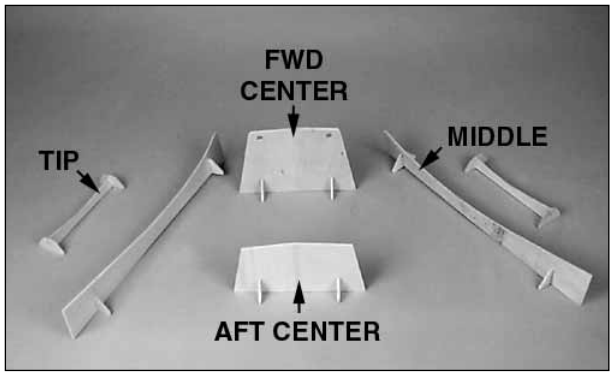
❏ 4. If installing optional machine guns (made from brass or aluminum K & S tubing, not included), glue leftover 1/4" balsa to the aft edge of the LE between ribs 6 & 7 as shown on the plan.



❏ 5. Trim the ends of the 5/8" x 1-1/2" x 8" balsa **center LE block** to fit against the forward dowel plates between the LE’s. Temporarily fit the center LE block into position, then use a ballpoint pen (or a 5/32" brass tube) to mark the location of the dowel holes on the back of the block (disregard the fact that the bottom of the wing is sheeted in this photo, as yours is not yet sheeted).

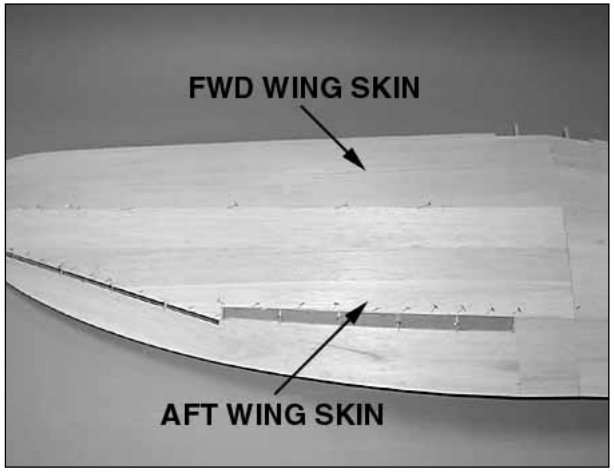
❏ 6. Use a 5/32" brass tube sharpened on the end or a 5/32" drill to drill holes through the center LE block at the marks you made. Set the center LE aside for now.

❏ 7. Cut the 5/16" x 15" dowel into two 6-7/8" **wing dowels**. Round one end of both dowels as shown on the plan and temporarily fit them into the wing. If the dowels fit tightly, don't force them into place, but sand them as necessary for an easy, yet snug fit. Do not glue the dowels in yet.



❏ 8. Assemble the die-cut 1/8" plywood wing jigs as shown. The shorter "jig feet" are for the tip jigs.

Refer to this photo for the following three steps.



❏ 9. Place the wing upside-down on your workbench and position the wing jigs under the wing. The **forward center jig** fits on the wing dowels. The **aft center jig** is positioned above the 1/8" ply wing bolt braces. The **middle jigs** should be positioned near ribs 7, so that they contact the top sheeting and support the wing. The **tip jigs** are positioned under ribs 12. If necessary, lightly tack glue the jigs to the wing to keep them from shifting.

❏ 10. Sheet the bottom of the wing the same as you did the top of the wing with the forward and aft wing skins. Do not apply glue to the ribs and the hatch mounting rails around the aileron and flap servo hatch openings. This will facilitate cutting the hatch openings and trimming the sheeting when it's time to fit the hatches. Use your weight bags or magazines to hold the sheeting down until the glue dries.

❏ 11. Bevel the inside edges of the bottom aileron and flap skins, then glue them into position. Avoid gluing the ends of the flap and aileron skins to each other. Use leftover 3/32" balsa to sheet the center TE between the flaps.

❏ 12. Remove the wing from the jigs. Trim the ends of the wing sheeting even with tip ribs W-12.

❏ 13. Use a razor plane followed with a bar sander and 80-grit sandpaper to trim the top and bottom of the leading edge even with the wing sheeting. Refer to the cross section on the plan to get the correct shape of the LE.

❏ 14. Using the holes in the top sheeting and the wing bolt plate inside the wing as a guide, use a 1/4" drill (or a 1/4" brass tube sharpened on one end) to cut 1/4" holes through the bottom wing sheeting.

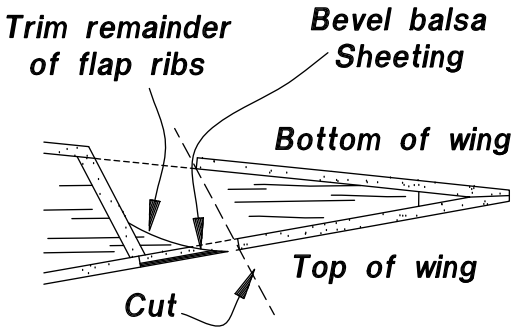
Build the ailerons

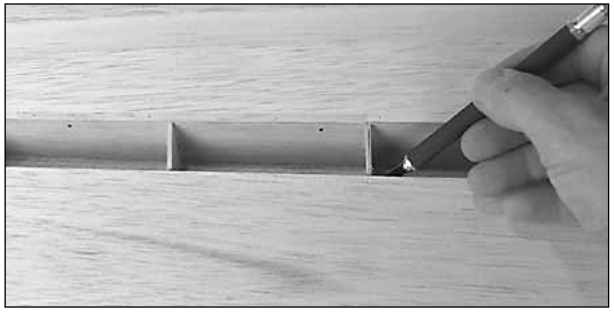
❏ 1. Use a razor saw to separate the ailerons from the wing by cutting through the ribs.

❏ 2. Sand the wing sheeting and the remainder of the ribs even with the outer TE's.

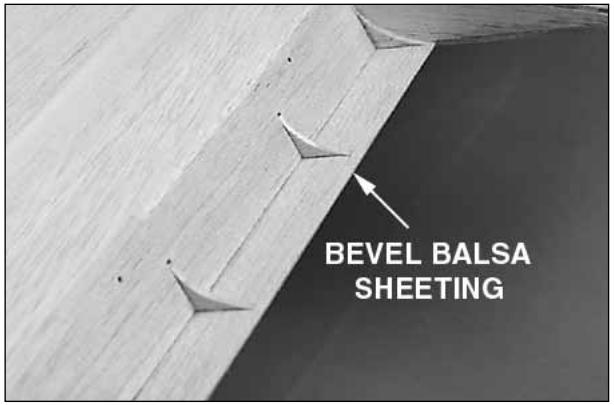
Even though we're working on the ailerons right now, let's go ahead and remove the flaps from the wing as well...

Refer to this sketch for the following two steps.





❏ 3. Place the wing upside-down on your workbench. Use a razor saw blade to cut through ribs 2C through 7 on both wing panels just ahead of the top and bottom flap skins as indicated by the dashed lines in the sketch. Remove the flaps from the wing.

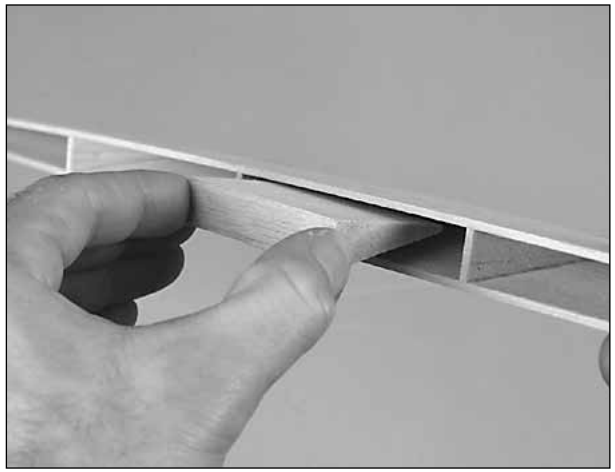


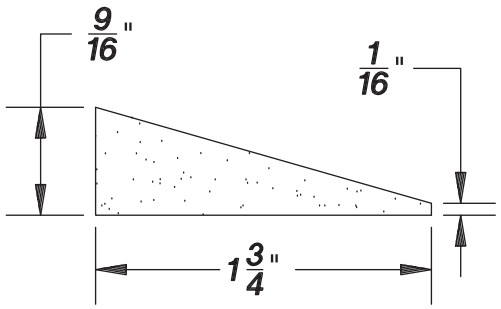
❏ 4. Trim the remainder of the ribs on the wing in the flap area as shown in the photo and the previous

sketch. Trim the bottom wing sheeting even with the inner TE's. Bevel the balsa portion of the top wing sheeting to the top ply sheeting.

Back to the ailerons...

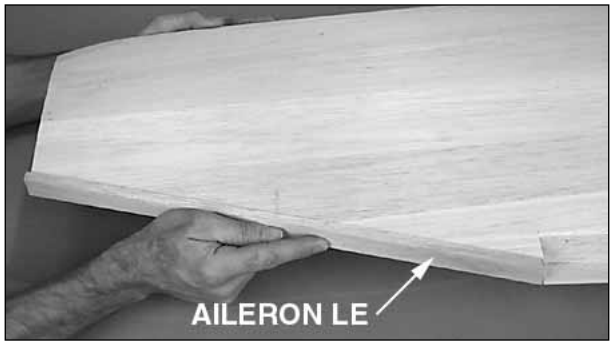
❏ ❏ 5. Sand the leading edges of the right aileron skins and aileron ribs even.





❏ ❏ 6. Cut a 2" long **control horn wedge** from the 12" tapered balsa stock shown in the sketch. Glue the wedge into the aileron where shown on the plan.

❏ ❏ 7. Cut three 1-1/4" long **aileron hinge blocks** from the same triangular balsa wedge, then glue them into the aileron where shown on the plan.



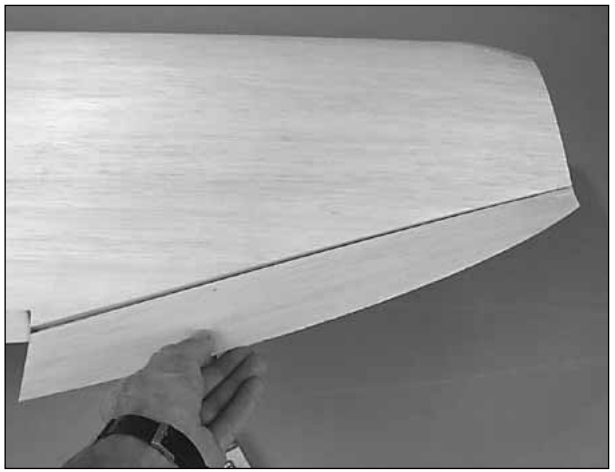
❏ ❏ 8. Tack glue the 3/8" x 7/8" x 24" balsa **aileron leading edge** to the outer TE spar. The best way to do this is to lightly spray the front of the aileron LE with CA accelerator, add five evenly spaced drops of thick or medium CA to the outer TE spar, then firmly press the aileron LE into position (the bottom of the right wing panel is shown in this photo, though the top of the right wing panel is shown in following photos).

❏ ❏ 9. Trim the top and bottom of the aileron LE even with the top of the wing.

❏ ❏ 10. Test fit, then glue the right aileron to the aileron LE. The aileron should quite accurately match up with the LE. After the aileron is glued into position, carefully sand the area, blending the aileron, LE and the wing.

❏ ❏ 11. Break the aileron free from the wing.

❏ ❏ 12. Mark the centerlines of both the aileron LE and the outer TE spar, then drill holes or cut slots for the hinges (not included). Just the same as on the tail surfaces, we use Robart large hinge points (you'll have to shorten the outermost hinge point to fit in the tip of the aileron).



❏ ❏ 13. Shape the aileron LE to a "V" to allow for control throw. The aileron on the wing plan shows how far aft to make the bevel. Test fit the aileron to the wing with the hinges. Be certain you can achieve 3/4" of control throw. Make adjustments if necessary.

❏ 14. Fit and hinge the left aileron to the wing the same as you did the right.

While we're working near the end of the wing, let's go ahead and finish up the wing tips...

The P-47D "Razorback" was actually a P-47C produced at Republic's new factory in Evansville, Indiana. They were identical in every way to the Farmingdale, Long Island-built P-47C's.

❏ ❏ 15. Center the right aileron and securely tape it to the wing. This will help with alignment and shaping of the wing tip.

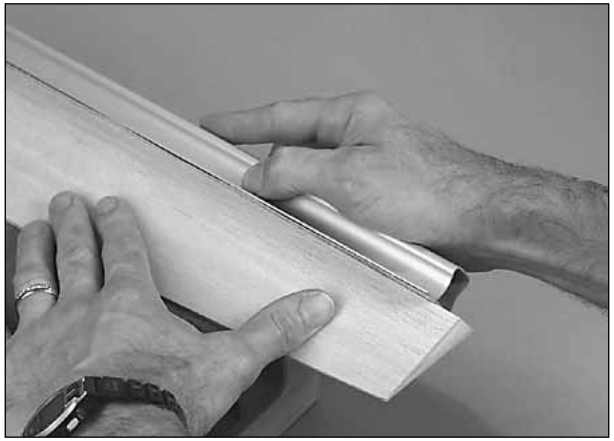
❏ ❏ 16. Glue one of the shaped 1-1/4" balsa **wing tip blocks** to the right wing tip. Use a razor plane or a carving knife followed by a bar sander with 80-grit sandpaper to shape the tip to match the wing, but do not round the tip yet. As you proceed, view the tip from all angles to be certain it matches the tapering angle of the top and bottom of the wing.

❏ ❏ 17. Round the wing tip and sand to its final shape.

❏ 18. Glue the other balsa wing tip block to the left tip and shape it the same way.

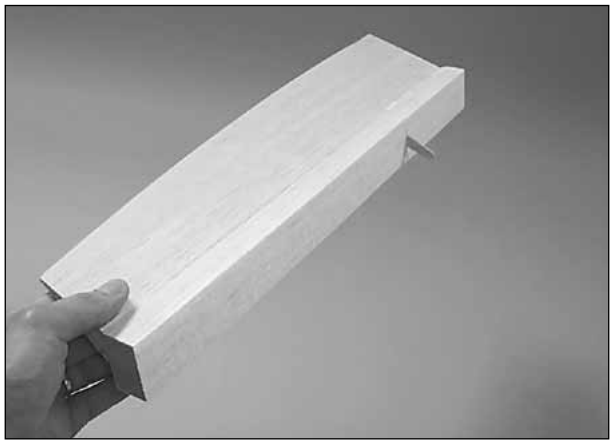
Build the flaps

We'll build the right one first...



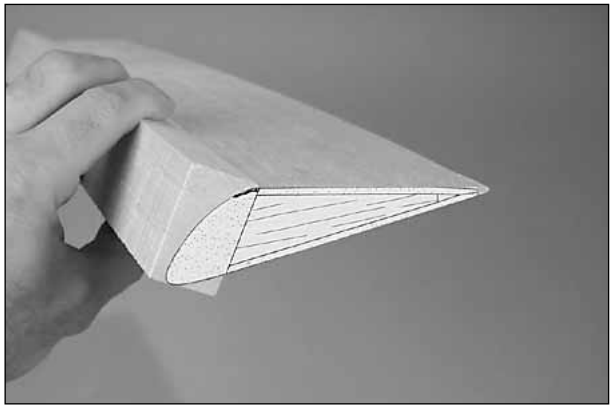
❏ ❏ 1. Sand the front edges of the top and bottom flap skin and the front of the flap ribs of the right flap even.

❏ ❏ 2. Place the right flap over the plan and temporarily insert the die-cut 1/16" plywood **flap horn** into the flap where shown.

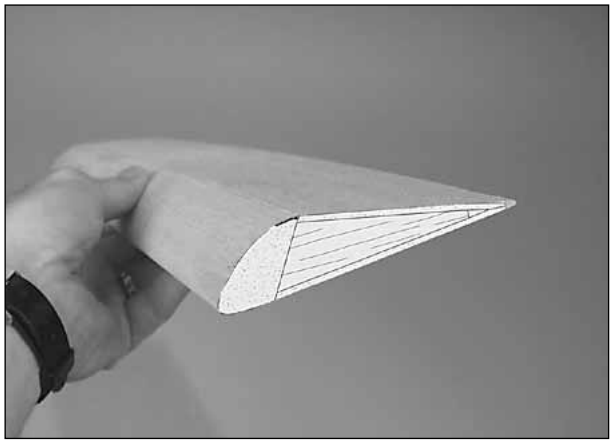


❏ ❏ 3. Cut the 7/8" x 1-5/8" x 24" balsa **flap LE** into two pieces 3/8" longer than shown on the plan. Securely glue both flap LE's to the flap, **but not to the flap horn**. Note that the **top** of the flap LE's should be even with the **top** of the flap, while the excess extends below (as seen in the following photo).

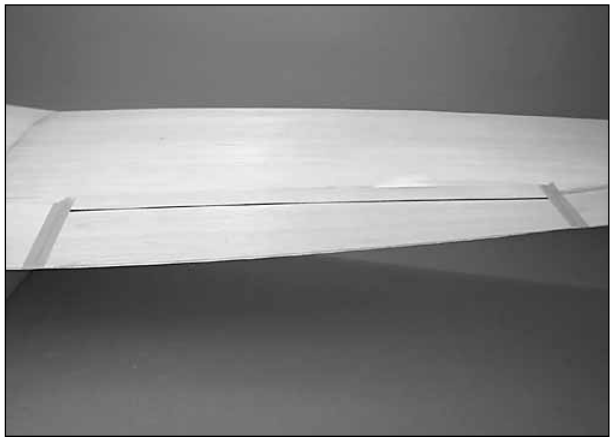
❏ ❏ 4. Remove the flap horn. True the ends of the flap LE's even with the ends of the flap.

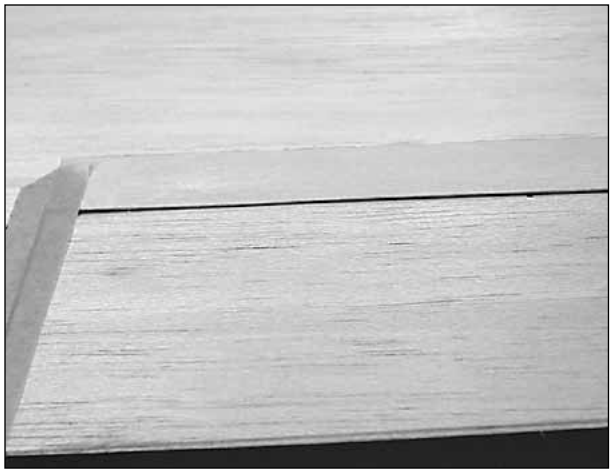


❏ ❏ 5. Cut a **flap root template** and **flap tip template** from the wing plan, then attach them to the ends of the flap using 3M 75 repositionable spray adhesive or something similar.



❏ ❏ 6. Use a razor plane followed by a bar sander to shape the flap LE to match the templates on the ends of the flaps. It's easiest to first shape the top and bottom of the flap LE even with the top and bottom of the flap, then shape the LE to match the templates on both ends.

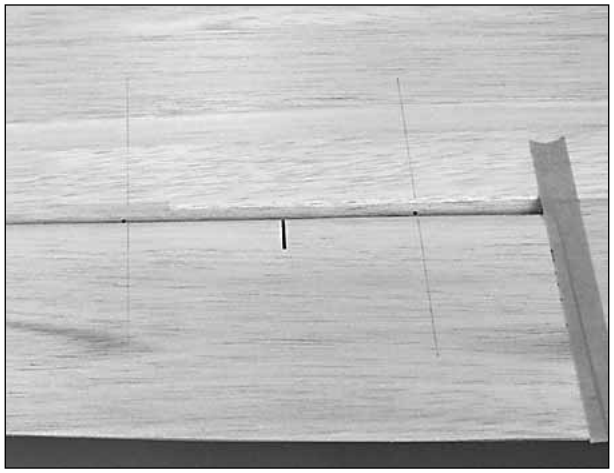




❏ ❏ 7. Test fit the flap to the wing. The root end of the flap should align with the wing and the tip end should align with the aileron. There should also be 1/32" to 1/16" gap between the top of the flap and the ply/balsa wing sheeting. Sand and shape the flap as necessary to achieve this fit.

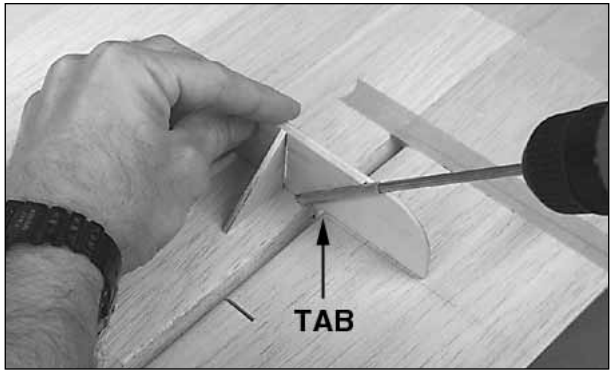
❏ ❏ 8. Sand the ends of the flap for adequate spacing between the wing and the aileron.

❏ 9. Return to the first step and assemble the left flap the same way.

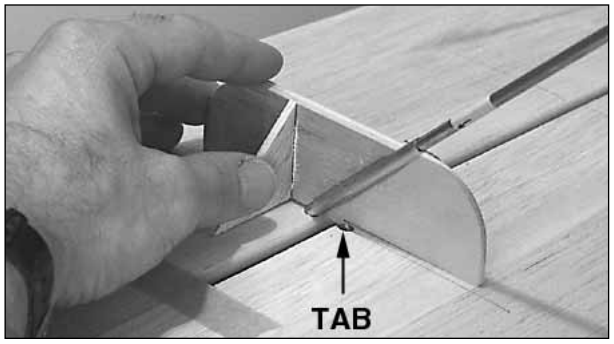


❏ 10. Use a straightedge and a ballpoint pen to lightly mark centerlines on the bottom of the flap and the bottom of the wing at the location of each hinge. Note that the centerlines are perpendicular to the flap LE and the inner TE spar.

❏ 11. Glue together both pieces of the die-cut 1/8" plywood **flap hinge drill jig**. As you can see in the following photos, the drill jig will be used to guide your drill for drilling the holes for the flap hinges. For additional accuracy, glue a 7/32" O.D. (3/32" I.D.) brass tube and a 1/8" balsa 90-degree gusset to the jig as shown.

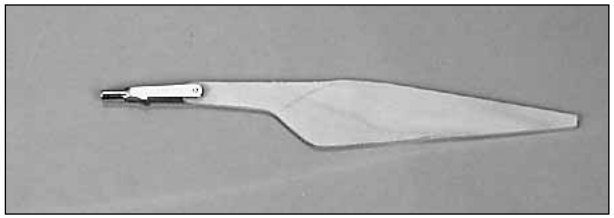


❏ 12. Position the flap hinge drill jig on the bottom of the wing, centering the brass tube over one of the hinge centerlines you marked. Push the drill jig forward until the tab on the bottom is contacting the inner TE spar. Use a 3/16" brass tube sharpened at the end or a 3/16" drill bit to drill the hole for the hinge. Drill the remaining holes in the wing the same way.



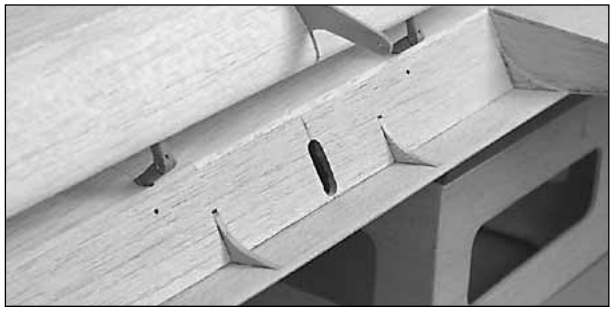
❏ 13. Turn the wing around so the LE is facing you. Reposition the drill jig as shown and drill the holes in the flaps. Just the same as when drilling the holes in the wing, be certain the tab on the bottom of the drill jig is contacting the inner TE. As you can see in the photo, we've wrapped a piece of tape around the brass tube so the holes drilled in the flap will only be 1-1/8" deep. The outermost hole in the flap should only be 7/8" deep.

❏ 14. Test fit the flaps to the wing with the hinges. The outermost hinge in each flap must be shortened. Move the flaps up and down and observe any points of interference. Make adjustments where necessary.



❏ 15. Drill a 1/16" hole through the punch mark in both 1/16" ply flap control horns. Add a few drops of thin CA to the holes to harden the wood. Allow the CA to fully harden. Sand the excess CA off and redrill the holes. Test fit a metal 4-40 clevis to make sure it fits well.

❏ 16. Final sand the flaps, finishing with 400-grit sandpaper, then use 30-minute epoxy to securely glue the flap horns into position. Fill the remaining gap between the two sections of the flap LE with leftover 1/16" balsa or balsa filler.



❏ 17. Cut a passage in the inner TE's to accommodate the flap horns. Test fit the flaps once more to make sure the horns do not interfere with the inner TE's. Make adjustments if necessary.

P-47 Fact

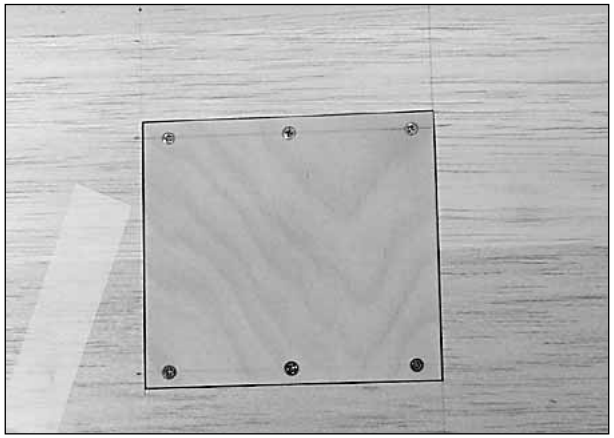
The "belly pan" under the wing conceals the air ducting for the supercharger. One duct carries air from the intake in the front of the cowl back to the supercharger (driven by the turbine) and two smaller ducts carry exhaust gasses from the engine to the turbine.

Make the servo hatches

Start with the right aileron hatch...

❏ 1. Cut a hole in the bottom wing sheeting of the right panel to fit the die-cut 1/16" plywood **aileron servo hatch cover**. Start with a small hole first, then carefully enlarge it to fit the hatch cover. As you "zero-in" on the correct size of the hole, use the hatch cover itself as a template to accurately trim the wing sheeting. Note that the sides of the opening should extend to the center of the ribs and the front and back edges of the opening should extend approximately 5/16" past the rails.

Refer to this photo for the following four steps.



❏ 2. Test fit the aileron servo hatch cover into the opening. If necessary trim the edges of the opening or sand the edges of the hatch cover for a good fit.

❏ 3. Securely tape the hatch cover into position. Drill 1/16" holes through the hatch cover and the servo rails.

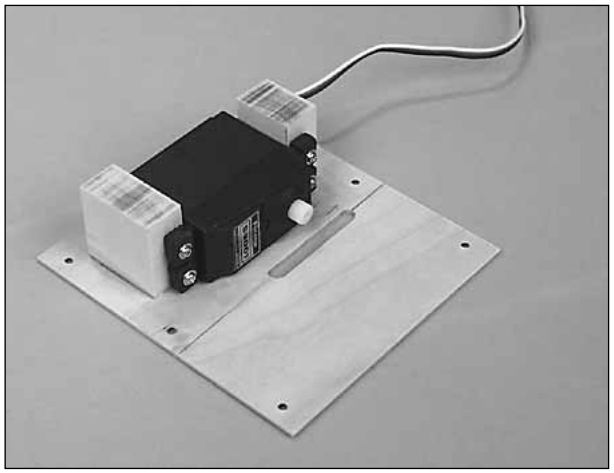
❏ 4. Remove the servo hatch and enlarge the holes **in the hatch cover only** with a 3/32" drill bit. Countersink the holes in the cover to accommodate the six #2 x 3/8" flat-head screws. A Dremel #178 cutting bit works perfectly for countersinking the holes. If you'd rather not bother countersinking the holes, you may use regular #2 x 3/8" screws (not supplied).

❏ 5. Temporarily mount the hatch cover to the wing with the screws.

❏ 6. Make the other aileron hatch and the flap hatches the same way.

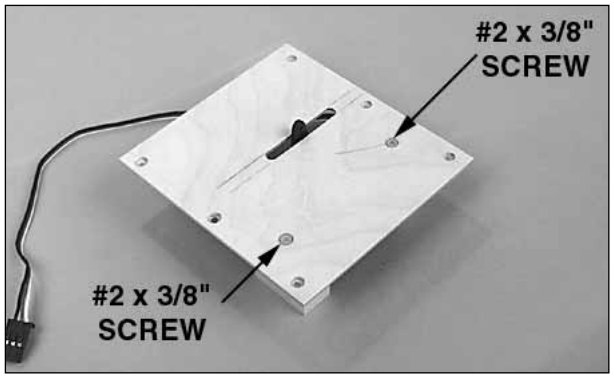
Hook up the controls

Refer to this photo for the following four steps.



❏ 1. Refer to the plan for the correct servo orientation, then use the screws included with the servos to mount both aileron and both flap servos to two 1/2" x 3/4" x 1" basswood **servo mounting blocks**. It will probably be necessary to trim some of the blocks to accommodate the servo cords.

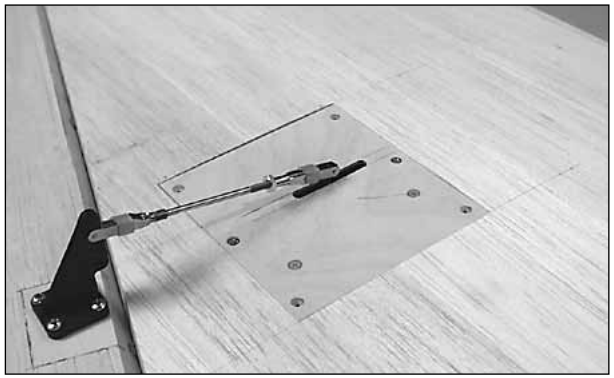
❏ 2. Use 30-minute epoxy to glue the servo mounting blocks to the inside of the hatch covers. Be certain the servos are positioned on the covers according to the plan and that the servo mounting blocks will not interfere with the hatch cover mounting rails.



❏ 3. Secure each servo mounting block to the hatch cover with a #2 x 3/8" flat head screw. Permanently install the screws with CA or epoxy.

❏ 4. Cut a slot in the aileron servo hatch covers for the servo arm.

Refer to this photo for the following four steps.



❏ 5. Determine the location of the die-cut 1/8" plywood **control horn mounting plate** on the bottom of the right aileron. Cut into the bottom of the aileron to accommodate the die-cut 1/8" plywood mounting plate, then glue it into position just the same as you did for the elevators and rudder.

❏ 6. Use four #4 x 1/2" screws to mount a control horn to the mounting plate.

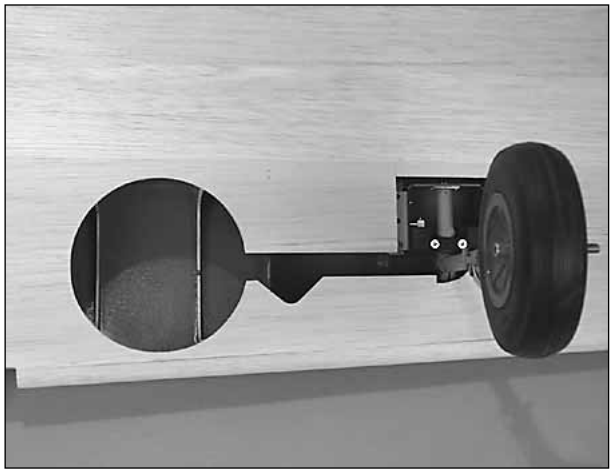
❏ 7. Connect the aileron to the aileron servo with a pushrod made from the hardware shown on the plan and in the photo (one of the 12" pushrods is the one with a threaded end leftover from hooking up the rudder). Be certain to use silver solder and don't forget to wipe away residual soldering flux right after the solder has solidified. Coat the pushrod and the clevis with a film of oil to prevent rusting.

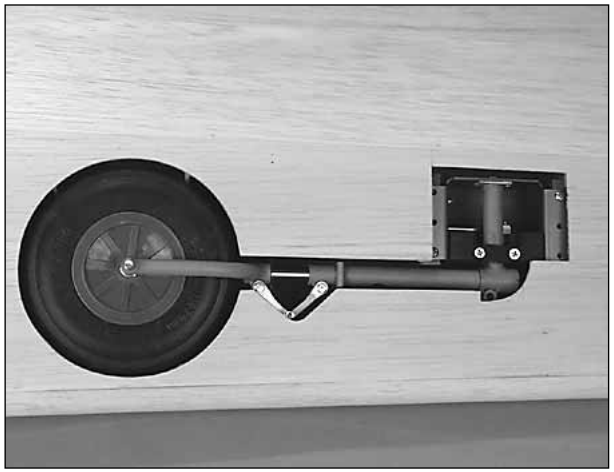
❏ 8. Hook up the left aileron the same way.

❏ 9. Make the flap pushrods from the hardware shown on the plan. For most servos the length of the pushrods will be the same as shown on the plan. Temporarily connect the flaps to the flap servos with the pushrods.
Note: Don't forget that the flap servos are not centered, but the servo arms are forward when the flaps are retracted (up).

Finish the wheel wells

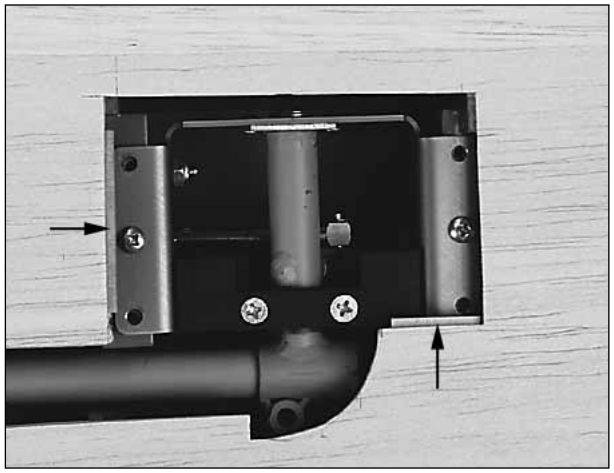
❏ ❏ 1. Using the right wing plan as a guide, cut the opening in the bottom of the wing to accommodate the landing gear. Start by cutting a small hole, then carefully enlarge it until you can get the gear in.



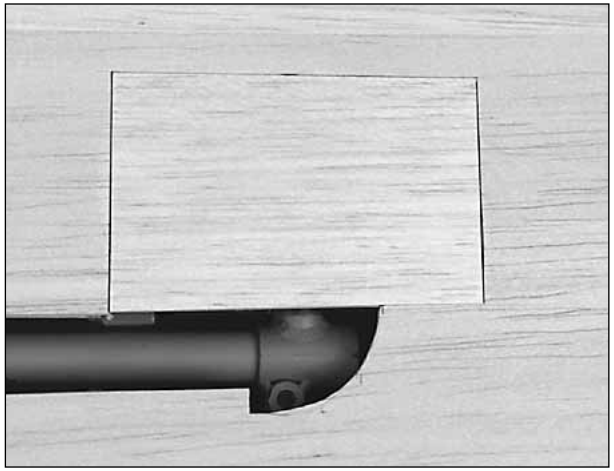


❏ ❏ 2. Temporarily mount the right landing gear in the wing. Cut the wheel well opening and the ribs so the gear can be retracted. Just the same as you did in the previous step, start with a small hole and carefully enlarge it until you can retract the gear. A Dremel moto tool with a Robart 90-degree adapter and a sanding drum is a useful tool to neatly trim the ribs to accommodate the wheel.

❏ 3. Fit the left landing gear and wheel in the wing the same way. Reinforce the unsupported sheeting around the wheel opening by laminating leftover 1/16" cross-grain balsa to the inside of the bottom sheeting.

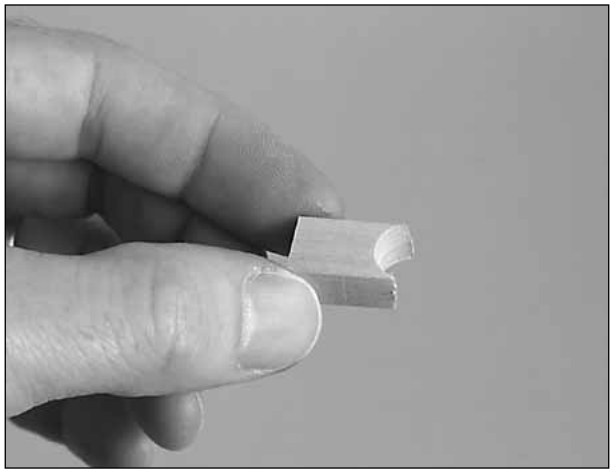


❏ 4. Glue strips of leftover 1/32" plywood under the balsa sheeting inside the landing gear cutouts to support a balsa landing gear cover.

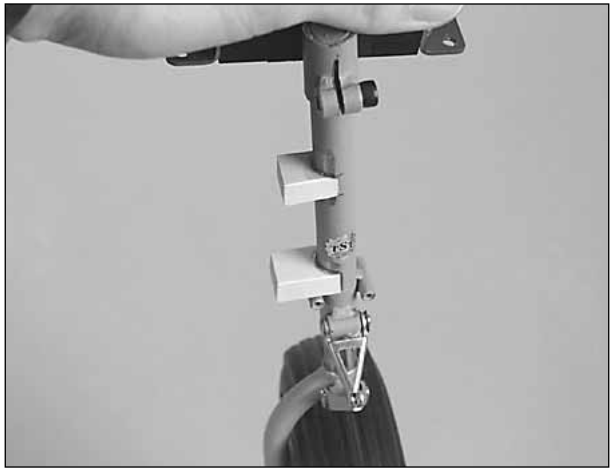


❏ 5. Make landing gear hatch covers from leftover 3/32" balsa. After the model is covered, the hatch covers can be attached with clear tape.

You can make the optional wheel covers now, or wait until the model is covered. Since the landing gear struts do not retract fully into the wing, the wheel covers extend below the wing and should not be on the model when in flight. Therefore, the wheel covers shown in the photos on the box cover are intended for static display only.

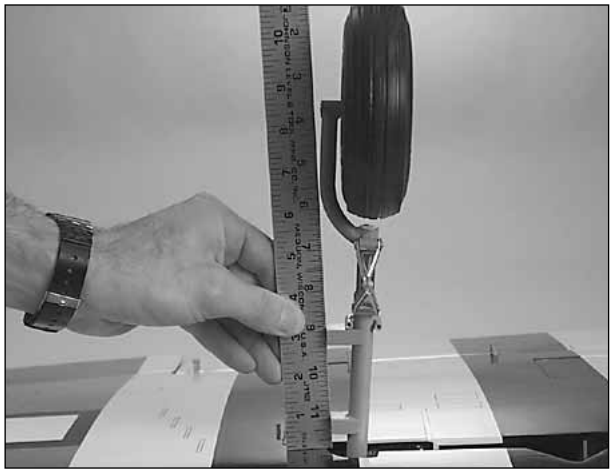


❏ 6. Make **wheel cover mounts** by drilling 1/2" holes through a 1/2" thick basswood sheet (not included with this kit). Cut or sand away surrounding material until you have a block with a half-circle on one end as shown in the photo. Make four of these.



❏ 7. Use 30-minute epoxy to permanently glue two mounts to each landing gear strut as shown in the photo.

❏ 8. Cut out two wheel covers from 1/8" lite ply (not included with this kit) using the pattern supplied on the plan.



❏ 9. Trim the ends of the blocks so the covers will align with the gear. Use a straightedge for alignment. As you can see in the photo, the length of the blocks determines how close you can get the covers to the gear.

❏ 10. Attach the gear covers to the mount blocks with #2 x 1/2" screws (not included). When it's time to cover the model, cover the landing gear covers to match the invasion stripes on the bottom of the wing (if the trim scheme you've chosen has invasion stripes).

While we're finishing the wing, let's go ahead and work on the optional machine guns...

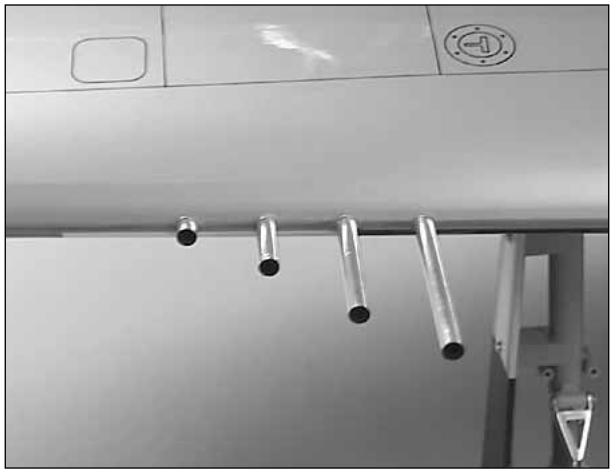
We made the machine guns on our prototype after the wing was covered, but they are easier to make now, **before** the wing is covered.

❏ 11. Refer to the wing plan and mark the location and spacing of the machine guns on the LE of the wing. Use a 9/32" brass tube sharpened on one end to drill holes through the LE and the 1/4" balsa inside. **Hint:** After you drill the first hole, insert a brass tube. Use it as an alignment cue for drilling the rest of the holes in that wing half. This way all your machine guns will align.

❏ 12. After you've drilled all the holes for the machine guns in both wing halves, cut the 9/32" brass tube into eight 1-1/4" pieces. Deburr the ends of each tube.

❏ 13. Glue the tubes into the wing. Use a bar sander to sand the ends of the tubes so they are flush with the LE.

❏ 14. Make the machine guns from three sizes of telescoping K & S brass or aluminum tubing (1/4", 7/32", 3/16"). Cut the tubes to the correct length, glue them together with thick or medium CA, then square-off and deburr the ends.



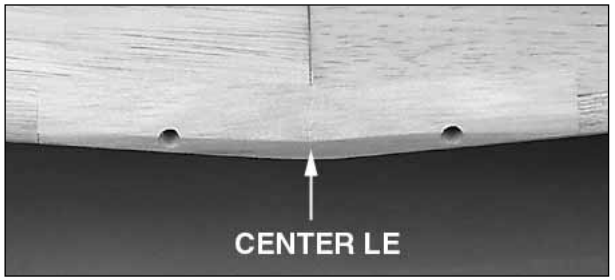
❏ 15. Lightly coat one end of each machine gun with a dab of CA. Allow to fully harden. This will provide enough interference to hold the machine guns in the brass tubes in the wing, yet allow for removal during transportation.

There were several versions of the "D", beginning with the D-1, featuring an additional pair of cowl flaps. The D-5 featured water injection and two-point bomb or drop tank shackles on the belly.

FINAL CONSTRUCTION

Mount the wing to the fuselage

❏ 1. Use 30-minute epoxy to securely glue both 1/2" x 1-1/4" x 1-1/4" maple **wing bolt blocks** in the fuse where shown on the plan. As you can see in the photo at step 6, one corner of the blocks has been rounded for a finished appearance.

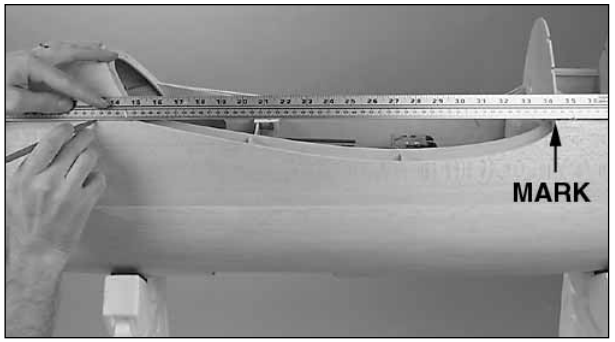


❏ 2. Temporarily position the wing dowels in the wing, then glue the center LE (prepared earlier) into position. Remove the dowels, then shape the center LE to match the shape of the wing and the LE's.

You may permanently glue the dowels in place as described in the following step, or wait until the model is covered.

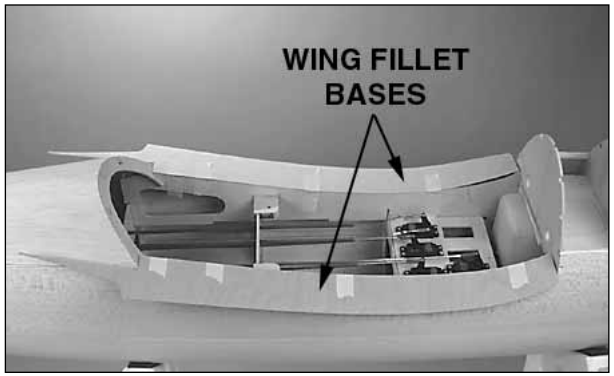
❏ 3. Use a piece of leftover music wire or something similar to apply 30-minute epoxy to the holes in the aft dowel braces where the dowels fit and in the holes in the LE of the wing. Apply epoxy to the dowels as you twist them into position, thoroughly spreading the epoxy. Wipe away excess epoxy before it hardens.

❏ 4. Securely tape the flaps to the wing in the up position. Place the fuse upside-down in a building cradle and set the wing in the fuse. Mark both sides of the fuse where the wing LE contacts it (refer to the following photo). Remove the wing from the fuse.



❏ 5. Place a straightedge on one side of the fuse across the line you marked and the aft edge of the

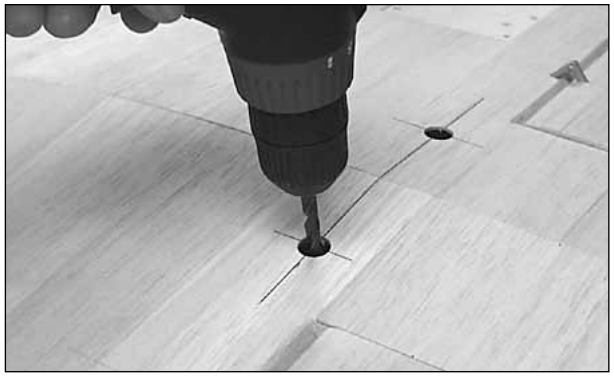
wing cradle where former 5 and the crutch meet. Draw a 6" line on the fuse as shown. This will be a guide to position the aft portion of the ply wing fillet base later.



❏ 6. Use masking tape to hold the die-cut 1/32" plywood **wing fillet bases** to the fuse crutches.

❏ 7. Place the wing on the fuse. As best as you can, center the wing dowels in the oversized holes in F2.

❏ 8. Stick a T-pin into the center of the bottom of the aft end of the fuse. Align the wing using the same “pin and string” technique we showed you for aligning the stab. Once the wing is aligned, place weights on the bottom of the wing to hold it in position while you drill the wing bolt holes in the next step.



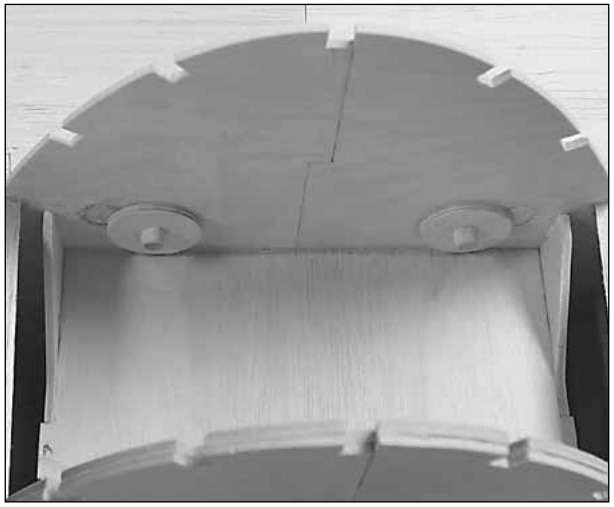
❏ 9. Using the 1/4" holes in the sheeting and the wing bolt plate inside the wing as a guide, drill #7 (or 13/64") holes through the wing bolt blocks in the fuse.

❏ 10. Remove the wing from the fuse. Enlarge the holes in the wing bolt plate in the wing with a 17/64" drill. Enlarge the holes in the bottom sheeting to accommodate the head of the nylon 1/4-20 wing bolts and the paper **wing bolt tube** (refer to the photo at step 11 of Build the Belly Pan).

❏ 11. Use a 1/4-20 tap to cut threads in the wing bolt blocks in the fuse. Add a few drops of thin CA to the holes and allow it to harden. Retap the holes.

❏ 12. Reposition the wing on the fuse and bolt it in place with the fillet bases still taped down.

❏ 13. Stand approximately ten feet behind the model and view the alignment of the stab and wing. If necessary, place shims made from leftover balsa between the fillet and the fuse to bring the wing into alignment with the stab.



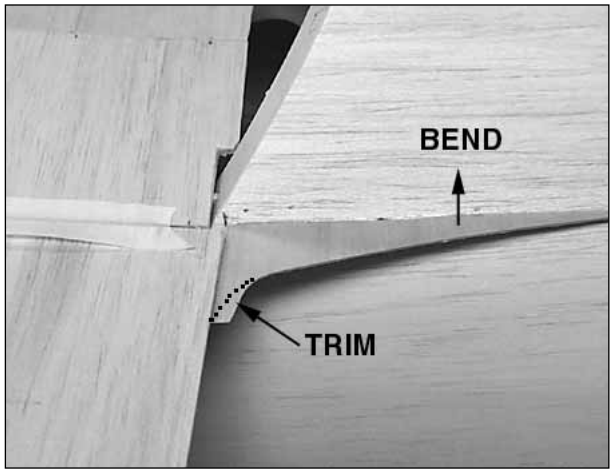
❏ 14. Once you have achieved alignment, use 30-minute epoxy to glue the laser-cut plywood **wing dowel doublers** to former 2. Be certain you have not glued the dowels to the doublers. Do not disturb the model until the epoxy has fully cured.

Build the wing fillets

❏ 1. Turn the model right side up and place it on its landing gear or in your building cradle. Check to make sure the ply fillet bases are positioned correctly and that they will fit the wing. Make adjustments where necessary. This may require removing the wing and repositioning the fillets a few times.

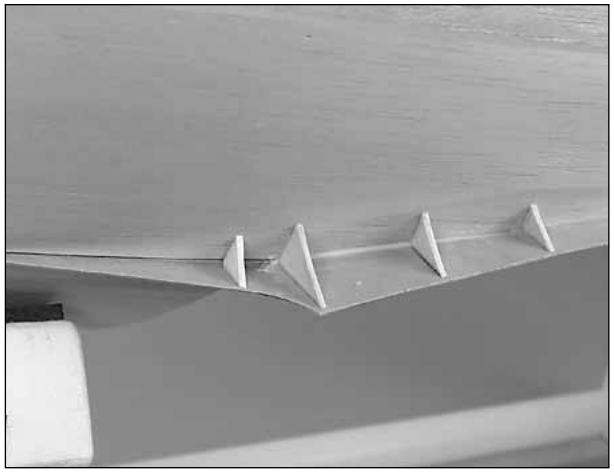
❏ 2. Place the model upside-down in your building cradle and remove the wing and ply fillet bases. Protect the center section of the wing with wax paper or Great Planes Plan Protector so glue from the wing fillet bases will not adhere.

❏ 3. Glue the wing fillet bases to the fuse with a mixture of 30-minute epoxy and microballoons or other suitable filler. Working quickly before the epoxy cures, tape the fillet bases back into position and bolt the wing to the fuse. Reposition the model on your workbench right side up and wipe away excess epoxy and filler. Use whatever practical means necessary to be certain the fillet bases are fully contacting the wing (you can see in the photo that we tack glued leftover balsa to the fuse, holding the fillet down in the flap area). Do not disturb the model until the epoxy has fully cured.

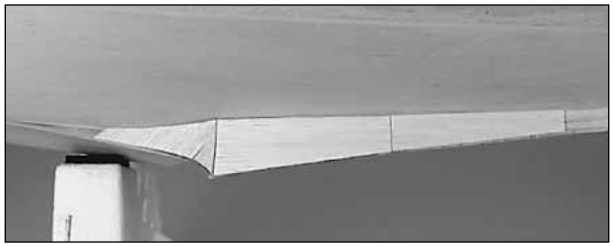


❏ 4. Use a hobby knife to carefully score the fillet bases at the TE of the flaps. Make a sharp bend in the fillet bases toward the bottom of the fuse where you scored them. Glue the fillet bases to the fuselage in alignment with the lines you marked earlier. Trim the fillet bases even with the TE of the flap.

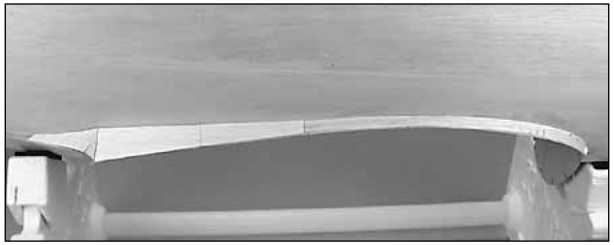
❏ 5. Take the wing off the fuse and trim the inner edges of the fillet bases even with the fuse crutches.



❏ 6. Use the templates on the plan to make two sets of **fillet gussets** from leftover 3/32" balsa. Glue the gussets to the fillet bases and the fuse sides as shown.

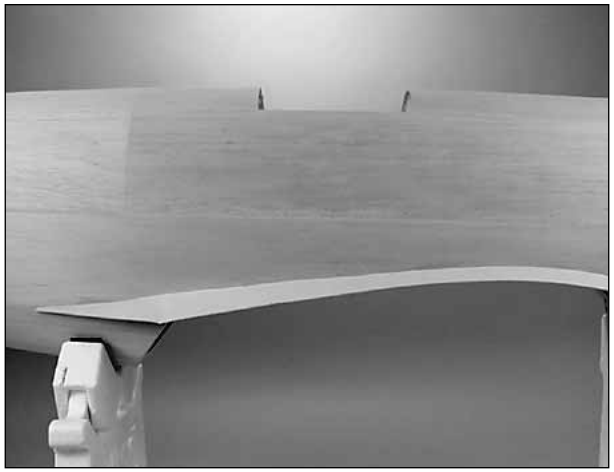


❏ 7. Cover the fillet gussets joining the fuse to the fillet bases with leftover 1/16" balsa.



❏ 8. Cut the 1/2" x 30" balsa tri stick into two 15" pieces. Make saw cuts in the tri stock and glue it to the fillet base and the fuse. Glue an additional piece of leftover 1/16" balsa over the tri stock.

Now for the fun part...



This is a photo of the balsa filler just after application. As you can see, little sanding will be required when it dries.

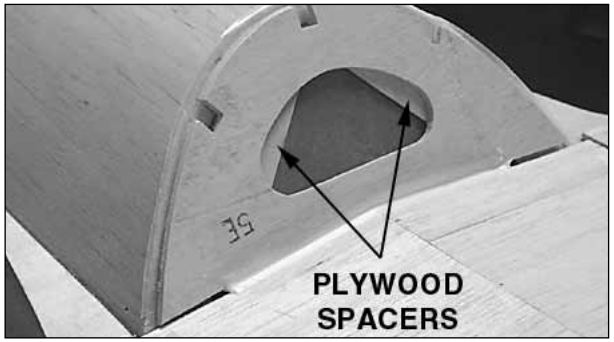
❏ 9. Use lightweight balsa filler to build up a smooth fillet covering the balsa sheeting and tri stock and blending the fuse to the fillet base. The more time you spend applying and smoothing the filler, the less sanding you will have to do after it dries.

❏ 10. Sand the fillets as necessary, blending them to the fuse.

Build the belly pan

❏ 1. Set the fuse upside-down in your building stand and bolt the wing to the fuselage. Mark the locations of the die-cut 1/8" plywood **belly pan formers 3C** and **4C** on the bottom of the wing.

Refer to this photo for the following three steps.

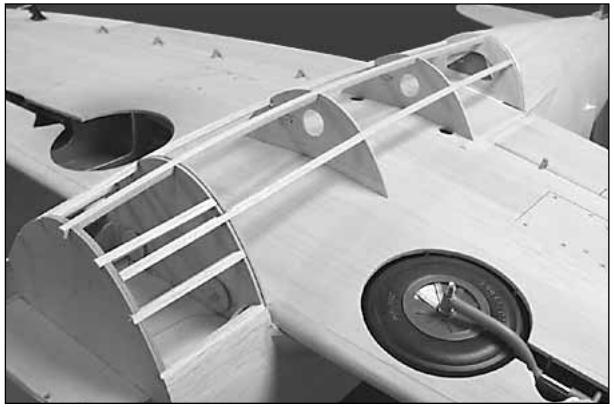


❏ 2. Bevel the bottom edge (remember, the bottom is the bottom of the plane even if it is upside-down in your stand right now) of the die-cut 1/8" plywood **belly pan former 5E** to accommodate the sheeting when it is added later. Test fit 5E and make sure that when in position on the trailing edge of the wing, it is the same height as 5D so the fuse sheeting and the belly pan sheeting will align.

❏ 3. Cover former 5D on the fuselage with wax paper so you don't inadvertently glue 5-E to it. You can use 3M 75 Repositionable spray adhesive to hold the wax paper in position.

❏ 4. Glue 5-E to the bottom of the wing with 1/16" plywood spacers between it and former 5-D.

Refer to this photo for the following four steps.



❑ 5. The same as you did at the back of the wing, place 1/16" spacers between 2C and F-2, then glue 2C to the bottom of the wing.
Note: Make certain that the spacers are at least 1/2" from the outer edges of the formers, so they will not interfere with your razor saw when you cut through the sheeting that will be added later.

❑ 6. Cut three 1/4" x 1/4" x 30" balsa stringers to the correct length and glue them into the notches of formers 5E, 2C, 2 and 1. The formers will naturally bow outward continuing the curvature of the belly pan.

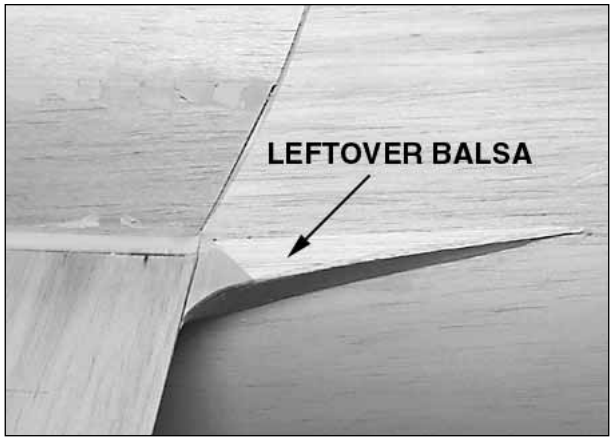
❑ 7. Insert formers 3C and 4C, then glue them into position.

❑ 8. Glue leftover 1/4" x 1/4" balsa sticks into the notches of former 2 and the firewall.

❑ 9. Use the **belly pan sheeting pattern** on the plan and two 3/32" x 3" x 30" balsa sheets to make the two sheets that cover the belly pan between the bottom of the wing and the middle of the first stringer. Test fit one of the sheets, trim as required for a good fit, then glue it into position. Fill the little corner near the wing leading edge with a piece of leftover 3/32" balsa.

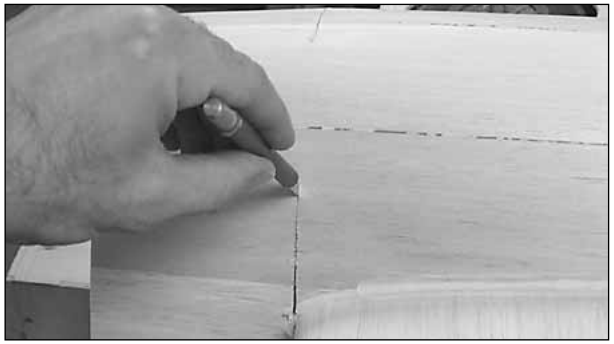
❑ 10. Glue the other sheet into position the same way.

❑ 11. Cut holes in the belly pan sheeting for the wing bolt tubes. Cut two **wing bolt tubes** from the 1/2" cardboard tube, then glue them into position.



❑ 12. Cover the rest of the belly pan with two more 3/32" x 3" x 30" balsa sheets. While you're working on the bottom of the fuse, add pieces of leftover 3/32" balsa to the bottom of the wing fillet bases.

❑ 13. Apply lightweight balsa filler where needed to blend the belly pan to the wing. Allow to dry fully, then sand smooth.

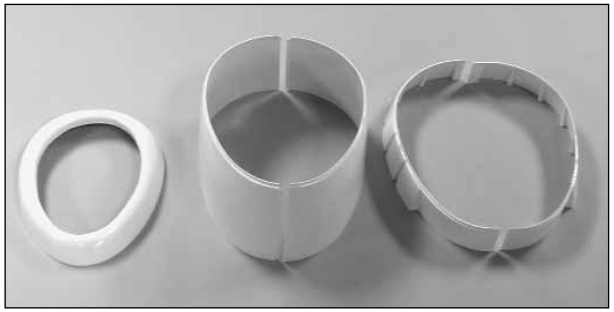


❑ 14. Use a fine razor saw to cut through the sheeting and stringers between 2B and 2C separating the belly pan from the fuse.

❑ 15. Remove the wing from the fuse and sand the edges of the belly pan sheeting even with the formers on the front and back of the wing. Similarly, sand the sheeting even with former 2B on the fuse.

❑ 16. Bolt the wing back onto the fuse and make certain everything fits well. Use filler or sand where necessary so the joint between the belly pan and the wing looks good.

Assemble the cowl

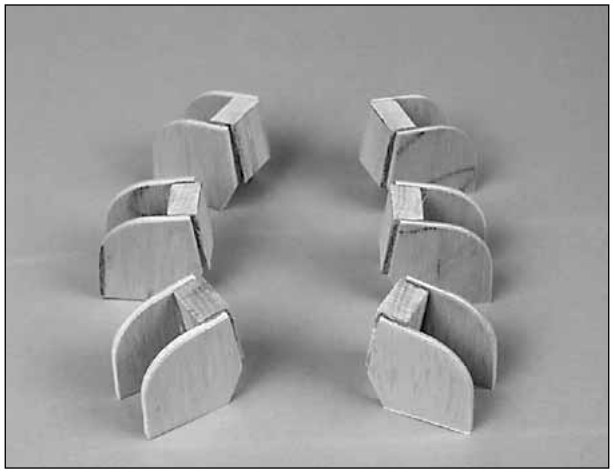


❑ 1. Use curved-tip scissors to cut the molded ABS **left** and **right cowl sides**, **cowl front** and **left** and **right cowl rings** along the molded-in cutlines. The cutlines are most easily seen from inside the pieces.

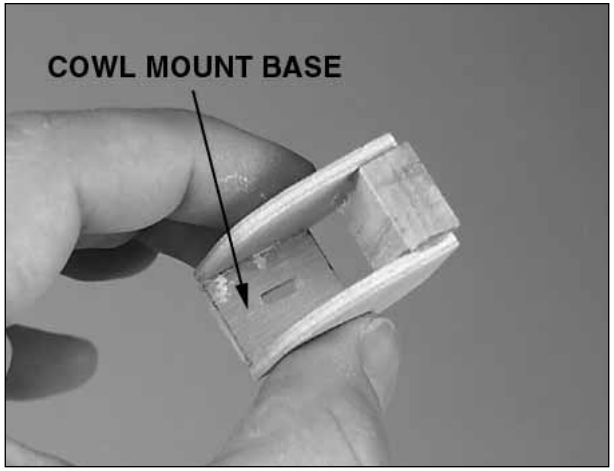
❏ 2. Use a bar sander with 80-grit sandpaper to true the edges of the cowl pieces so they fit well. Clean the plastic with alcohol, then **thoroughly** roughen the inside edges of all the joints with coarse sandpaper. Later, the inside seams will be reinforced with fiberglass tape and epoxy. The plastic must be scuffed for the epoxy to adhere.

❏ 3. Securely tape the left and right cowl sides together on the **inside** and the **outside** with masking tape. Join the cowl front to the taped-together sides. Use CA to glue the sides to the front, then to each other.
Note: If CA accelerator is required, apply only a small amount just where it is required. Too much accelerator may soften the plastic.

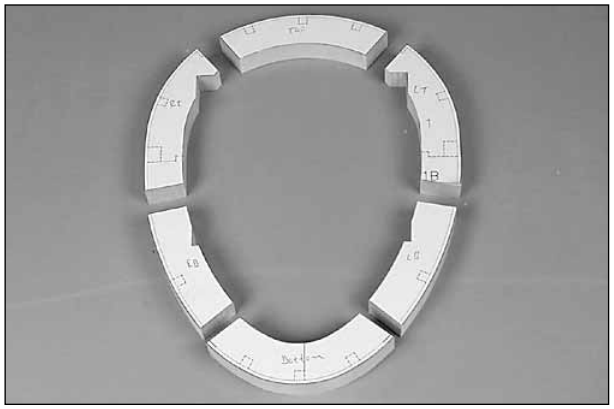
❏ 4. If necessary, trim the aft edges of the cowl sides so they are even. Tape the cowl flaps together, then test fit them to the cowl. When a good fit is achieved, glue the cowl flaps to the cowl, and then to each other.



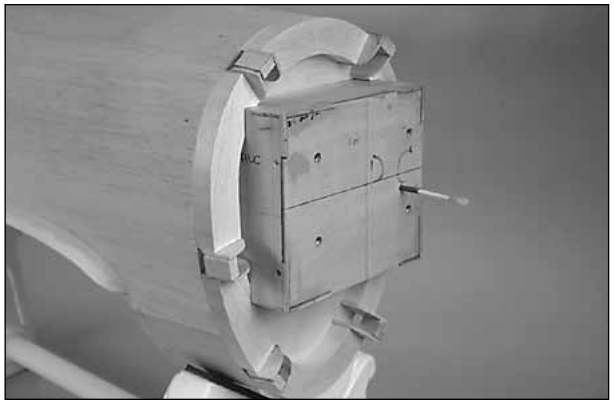
❏ 5. Make six **cowl mounts** using the twelve die-cut 1/8" plywood **cowl block sides** and six 3/8" x 5/8" x 7/8" hardwood **cowl mount blocks**.



❏ 6. Glue a die-cut 1/8" plywood **cowl mount base** between the supports at the bottom. Use a moto-tool to cut an elongated hole in the center of each base. The hole should be approximately 3/32" wide and 3/8" long.



❏ 7. Use the template on the plans to cut the **cowl ring sections** from the 5/8" x 2" x 30" balsa sheet.
Hint: Use 3M 75 Repositionable spray adhesive to temporarily glue the templates directly onto the balsa sheet. Cut the sections out, then peel off the paper templates.
Note: If you do not have a table saw or a belt sander to accurately cut out the cowl rings, keep in mind that the ends of the cowl rings are the only edges that really need to be cut accurately (since they determine the locations of the cowl mounts). The outer edges will be sanded flush with the fuse and the inner edges do not join to anything.

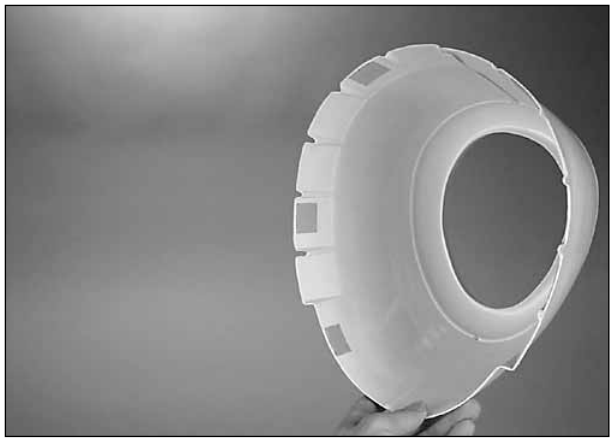


❏ 8. Test fit the cowl ring sections and the cowl mounts to the front of the fuselage. Make adjustments to the cowl ring sections if necessary.
Hint: Removing the elevators and rudder enables you to stand the fuselage vertically on its tail.

❏ 9. Once you have positioned the cowl mounts and the cowl rings, remove one of the cowl ring sections, add medium CA, then carefully reposition the cowl ring, permanently gluing it into position. Glue the remaining five cowl ring sections into position the same way. **Do not** glue the cowl mounts to the fuselage until after the fuse is covered.

❏ 10. Remove the cowl mounts. Sand the cowl ring sections even with the fuselage. Round the edges as shown on the plan. As you can see, this is easily done with the cowl mounts off the model.

❏ 11. Reposition the cowl mounts to the fuse. Drill 1/16" holes through the elongated holes in the cowl mount bases and into former 1. Temporarily hold the cowl mounts in position with six #2 x 3/8" screws and #2 washers. The cowl mounts will be permanently glued in place after the model is covered.



❏ 12. Cut six 1" x 1" squares from the leftover 1/32" ply sheeting (from the flap area of the wing). Glue the squares to the inside of the cowl where they will align with the cowl mounts.

❏ 13. Mount the engine to the fuse. Place the cowl on the fuse and mount a prop on your engine. Align the cowl so the prop will have clearance all the way around and is centered on the engine. View the alignment of the cowl with the engine and the fuselage from all angles. Make adjustments as needed.

❏ 14. Have an assistant hold the cowl in position, or use masking tape. Drill 3/32" holes through the cowl and the cowl mount blocks. Remove the cowl and enlarge the holes **in the cowl only** with a 5/32" drill. Add a few drops of thin CA to all the holes and allow it to harden.

❏ 15. Test mount the cowl to the cowl mounts with six #6 x 1/2" screws and #6 washers.

Refer to this photo while building the engine baffle in the next few steps.

❏ 16. Now that you've mounted the cowl, use the template on the plan to make an **engine baffle** from 1/8" lite plywood (not included). The baffle will guide all incoming air over the head and cylinder of the engine for maximum cooling. The cutout is for the US Engine 41cc. If you are using a different engine, you'll have to make the cutout by trial and error fitting.

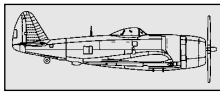
❏ 17. Test fit, then temporarily tack-glue the baffle into the cowl against the lip that joins the cowl front to the sides. Trim as necessary for a good fit.

❏ 18. Fit the cowl to the engine, trimming the opening in the baffle as necessary until you have achieved adequate clearance all the way around.

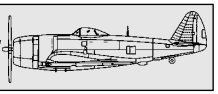
❏ 19. Remove the cowl. Determine the location of accessories to be mounted inside the cowl, such as an ignition switch (if using an ignition engine), fueling system, remote glow igniter, air fill valve, etc. Temporarily mount those items where you prefer, then cut holes in the cowl to access them. Cut additional holes where necessary for the exhaust outlet and the needle valve.

Note: IMAA rules specify that magneto spark ignition engines must be equipped with a manually operated coil-grounding switch to stop the engine. This switch must be mounted in a location that is readily available to both the pilot and the helper. As mentioned in the front of the manual, Great Planes makes an Ignition Switch Harness (GPMG2150) that is suitable for this purpose.

❏ 20. Glue the baffle to the cowl. Reinforce the seam between the cowl front and sides with several 3-inch long strips of 1" glass cloth and 30-minute epoxy. Reinforce the seams on the top and bottom of the cowl sides and around the cowl flaps with additional strips of 1" glass cloth and epoxy. While you're at it, use some of the leftover epoxy to lightly coat the plywood baffle so it will be fuelproof and water resistant when wet-sanding the cowl.



P-47 Fact

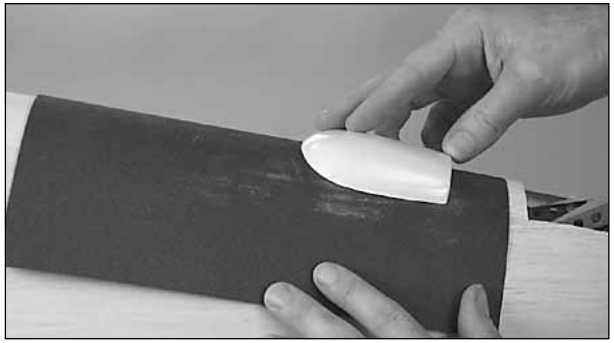


With demand for P-47's beginning to exceed production capabilities at the Evansville and Farmingdale plants, a third factory was needed. Under license, the Curtiss Aircraft Company in Buffalo, NY, began production on the P-47G, identical to P-47D's.

❏ 21. Make certain the outside of the cowl is **thoroughly** scuffed with sandpaper. Fill the seam between the cowl front and the cowl sides and the seams between the cowl sides with filler such as automotive Bondo. It is not necessary to fill the seam between the cowl flaps and the rest of the cowl as this is an actual seam on the P-47. You will probably have to apply the Bondo in a few stages as it hardens rapidly. After the Bondo fully hardens, wet-sand the cowl starting with 150-grit sandpaper, gradually progressing to finer grades ending with 400-grit. When you're done sanding, your cowl should look something like the one in the photo.

While we're working with plastic parts, let's prepare the turbo-supercharger cover and the oil cooler shutters.

❏ 22. Cut the turbo-supercharger cover along the cutlines (most easily seen from the inside).



❏ 23. Place a sheet of coarse sandpaper on the bottom of the fuse. Use the bottom of the fuse to final-shape the turbo-supercharger cover exit.

❏ 24. Refer to the photo on the box and at step 4 of Scale Details for placement of the oil cooler shutters, then shape the oil cooler shutters as you did the turbo-supercharger cover.

The "bubble canopy" version was a result of pilots' complaints of lack of rearward visibility. In 1943 a P-47D-5 was modified by removing the razor spine and fitting a modified Hawker Tempest bubble canopy. In addition to the new canopy was a flat, armored windscreen. The first production version of the bubble canopy was designated P-47D-25-RE (produced in Farmingdale), of which 385 were built.

Balance the airplane laterally

IMPORTANT: Do not confuse this procedure with "checking the C.G." or "balancing the airplane fore and aft." That very important step will be covered later in the manual.

Now that the basic airframe is completed, it's time to balance the airplane laterally (side-to-side).

❏ 1. Make sure all the main components are installed in the model (landing gear, servos, engine, exhaust system, etc.). Mount the wing to the fuse.

❏ 2. With the wing level, have a helper help you lift the model by the engine propeller shaft and the bottom of the fuse under the TE of the fin. Do this several times.

❏ 3. If one wing always drops when you lift the model, it means that side is heavy. Balance the airplane by gluing weight inside the other wing tip. **An airplane that has been laterally balanced will track better in loops and other maneuvers.**

FINISHING

Final Preparations

While some modelers prefer to mount the receiver and battery pack before covering the model (and before the C.G. is checked), it is best to mount them after the model is covered. By correctly positioning the receiver battery and the receiver, the model may require no additional ballast to achieve the desired C.G. Instructions on balancing the model are provided after the covering section.

❏ 1. If you haven't already done so, remove all components including the engine, servos, pushrods, landing gear etc.

❏ 2. Use fuelproof model paint, finishing resin or epoxy thinned with alcohol to fuelproof all areas that may be exposed to fuel or engine exhaust. These include the wheel wells, trailing edge of the wing in the flap area, the firewall and engine compartment, the wing saddle in the fuse, belly pan formers 2 and 5 and the inside of the tail gear compartment.
Note: It is highly recommended that the wheel wells be fuelproofed **before** covering the top of the wing. If the covering is already down, some of the paint may soak through the balsa, causing blemishes in the covering.

❏ 3. Inspect all surfaces for uneven glue joints and seams that require filler. Apply filler where needed. Many small dents or scratches in the balsa can be repaired by applying a few drops of water to the area and allowing it to dry. This will cause the wood to swell, so you can sand it back to shape.

❏ 4. Final sand the entire model with progressively finer grits of sandpaper, finishing with 320 or 400-grit. Don't press down too hard while sanding over sheeted areas (*which is pretty much the whole model!*). This can cause thin spots in the sheeting over ribs or formers. It's also helpful to use fresh, new sandpaper.

Painting

Everything that was painted on this model was painted with Top Flite LustreKote (except for the canopy frame–more on that later). LustreKote was selected because it matches MonoKote and dries fast. Usually, you can paint one color in the morning, then wet-sand and paint a second coat later that same day. Some modelers prefer to do the painting after they cover the model, but we recommend painting the intercooler air exits (if you have built them in the open position) and the wing fillets before, since they are attached to the model. The wing fillets can be covered with MonoKote if done in several sections, but we think it's easier to paint them.

Due to all the hard-to-reach corners and small surfaces of the intercooler air exits, it would be nearly impossible to paint them with a spray can. Too much paint comes from a can to coat all the "nooks and crannies" without ending up with runs. Painting small parts like this is much better accomplished with an airbrush. With an airbrush you have control over the amount of paint that is being applied–a much finer mist can be sprayed, making it virtually difficult to get the paint to run. The wing fillets could be painted from a spray can, but you will achieve better results if these are airbrushed too. Though LustreKote is only available in spray cans, there is a way to apply it through an airbrush. Here's how:

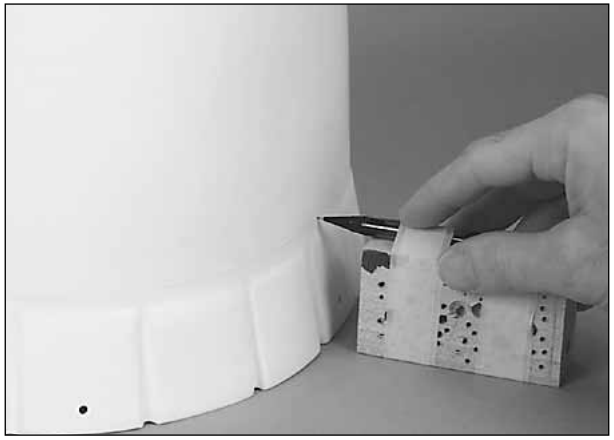
❏ 1. Spray the paint through a tube into a cup. Spraying the paint through a tube keeps much of it from becoming airborne.

❏ 2. Transfer the paint from the cup into your airbrush jar. Thin LustreKote about 50%. We use K & B thinner. Other thinners may work, but should be tested for compatibility. Now your LustreKote is ready to spray through your airbrush.

❏ 3. Mask and paint the intercooler air exits to match your trim scheme. A little bit of careful sanding will remove ridges built up where the paint meets the masking tape. A final coat of clear (also applied through an airbrush) will finish the job.

Note: If using aluminum, **do not** sand the final coat. Small scratches left from even the finest sandpaper will not disappear after a clear coat is applied. It is best just to apply aluminum (such as on the wing fillet), let dry, then clear coat.

The rest of the plastic parts that are not built onto the model (such as the cowl, oil cooler shutters, turbo-supercharger cover on the bottom of the fuse, the canopy) can be painted after the model is covered. Paint these parts whenever you're ready. Following are instructions how to paint the cowl like the one on the kit box cover...



❏ To mark the stripes around the cowl after you've applied primer, tape a pencil to a wood block of appropriate height and **lightly** draw lines all the way around. Use the line as a guide for applying masking tape for painting.

If you choose to duplicate the paint scheme on the kit box, paint the cowl in this sequence:

A. Apply at least two coats of primer, allowing to dry and wet-sanding between coats.

B. Paint the aft end of the cowl white.

C. Mark the guidelines for the yellow as described above. Mask, then paint the yellow.

D. Mark the guidelines for the red. Mask, then paint the red.

E. Mark the guidelines for the blue. On the full-size Tarheel Hal, the blue extends only about halfway across the cowl flaps. As you can imagine, this would be difficult and time consuming to mask. We cheated by painting the entire cowl flaps blue (nobody will notice!). If you want a really professional job (as we did on our prototype–don't try this unless you're a pretty good painter), you could apply stick-on stars to the white you already painted on the cowl flaps, then paint the cowl flaps blue. Peel off the stars, leaving behind stars of white paint under the blue. Now the stars will never peel off.

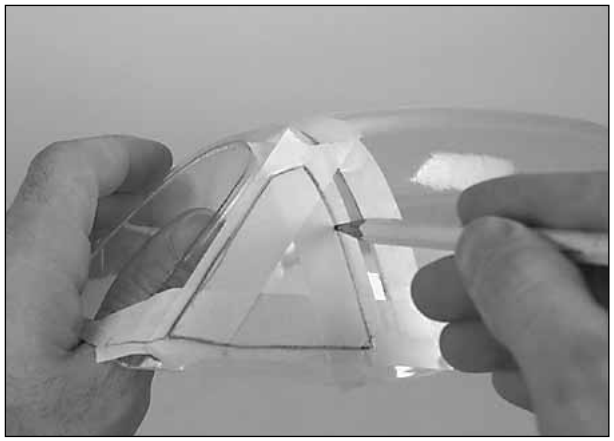
F. **Lightly** wet-sand the entire cowl with 400- or 600-grit sandpaper, then spray on a coat of clear.

G. Paint the inside of the front of the cowl and the baffle flat black.

Just like the cowl, the canopy can be painted at any time. Here are some guidelines on how to paint the canopy...

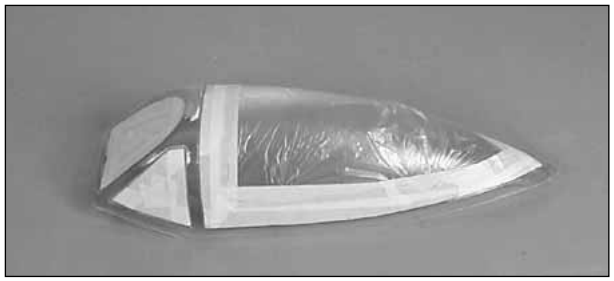
LustreKote is **not** recommended for painting the clear butyrate canopy frame because it will curl the edges over time. Select another type of paint that will not react with butyrate, such as Pactra Formula-U or Chevron.

❏ 1. After the canopy has been cut out and trimmed to fit the fuse, carefully sand the edges with 400-grit sandpaper, then wash the canopy in warm, soapy water.



❏ 2. Mask off the clear areas of the canopy by applying masking tape to the framing. Use a pencil to simultaneously press the tape into the corners while marking guidelines for trimming.

❏ 3. Use a hobby knife to trim the masking tape along the pencil-drawn guide lines, then peel off the excess tape.



❏ 4. Cover the rest of the clear areas with masking tape or a plastic bag. Mask off the inside of the canopy to protect it from overspray.

❏ 5. Paint the canopy frame.

❏ 6. Paint the rest of the molded plastic parts to match your trim scheme (including the turbo-supercharger cover and the oil cooler shutters).

Covering

Warning: Never cut the covering on critical structural areas of the model. These areas include the stab, fin and wing sheeting–especially near the fuse where the stresses can be high. Modelers who cut the covering on the model tend to cut into the sheeting, weakening it. If you have a colorful trim scheme (such as the one on the kit box), occasionally it may be necessary to make a small cut in the covering here and there. This is acceptable as long as the cut is **small** and is **not over sheeting on a critical area**. Cuts that go across the grain weaken the balsa more than cuts that go with the grain.

The model on the kit box cover was covered with MonoKote film. This trim scheme isn't as difficult as it is time-consuming and can be accomplished by modelers who are fairly skilled with iron-on films. It helps to tackle the job in small sections (seams are preferred over wrinkles and frustration!). Some of the covering techniques we used are described below. If you are anxious to get your model in the air as soon as possible, or would rather not spend too much time covering, there are many conventional military schemes (such as olive drab and aluminum or grey) that are easier to duplicate. Top Flite offers flat MonoKote in several military colors. The stars and bars insignias provided on the decal sheet should work with any military trim scheme.

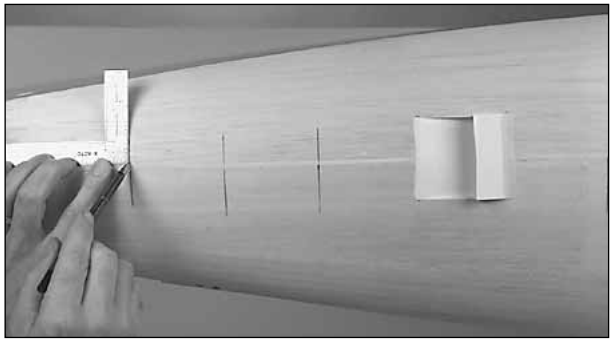
Cover the fuse

❏ 1. Use a dust brush, compressed air or a Top Flite Tack Cloth to remove balsa dust from the model. Thoroughly clean your work area, removing any balsa dust or particles that could get underneath the covering and mess up your finish. Get out your covering tools and "gear up" your work shop for covering.

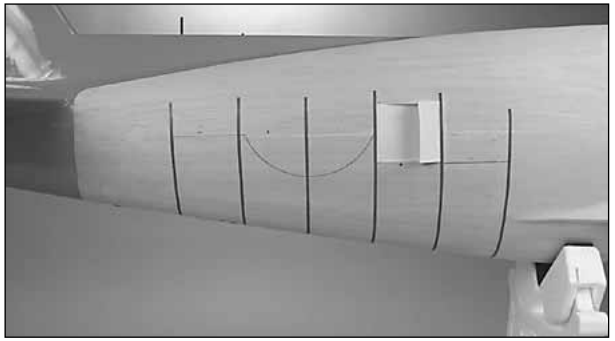
❏ 2. Cover the stab, fin and dorsal fin first. This is rather straightforward. You can cover the elevators and rudder now, or wait until later.

❏ 3. Make the invasion stripes for the fuse. As you can see, the invasion stripes are not simply straight strips of black and white MonoKote, but are curved due to the oval cross-section and tapering angle of the fuse. Each invasion stripe must be custom made to fit the fuse. Here's how we made the invasion stripes for our prototype on the kit box:

A. Determine the width of the stripes. On our prototype we made them 3" wide. Mark their location on both sides of the fuse along the side stringer.

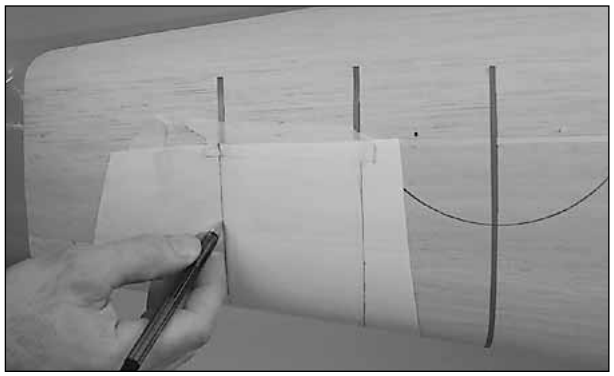


B. Use a builder's square to mark short vertical guidelines.

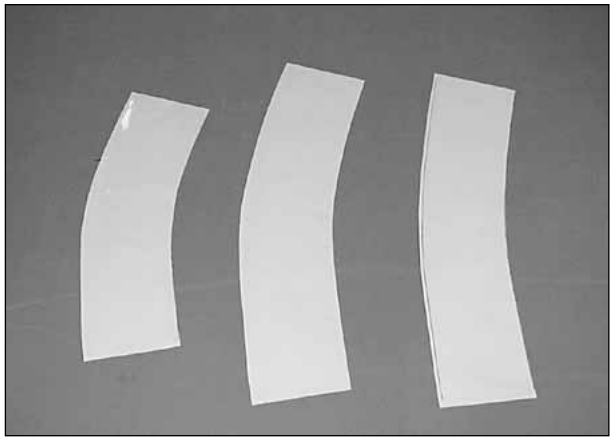


C. Using the guidelines as a start, mark the invasion stripes around the fuse with 1/8" wide flexible vinyl tape. On this model you can see that the invasion stripes go only about halfway (whew!).

Carefully view the stripes from all angles, making sure they are vertical and parallel with each other. This is a total “eyeball” procedure, so taking your time now will show when your model is done.

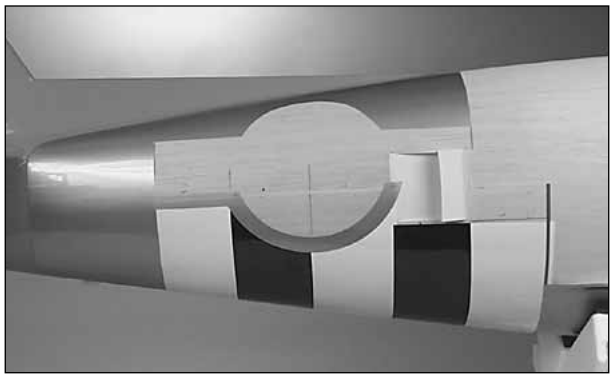


D. Peel the backing off a piece of white MonoKote film and tape it to the fuse tightly over the first invasion stripe. As you can see, the 1/8" wide tape on the fuse will show through the covering. Using the tape underneath to guide your pen, mark both edges of the invasion stripe on the covering.

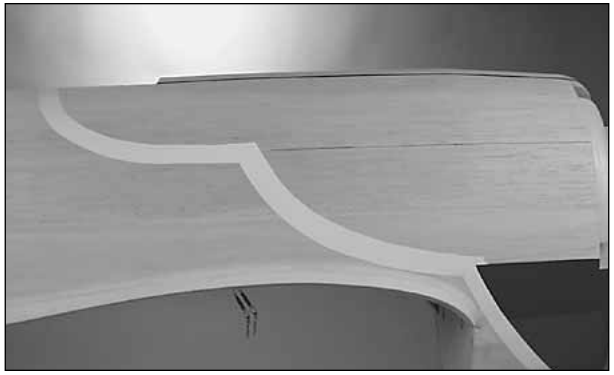


E. Remove the covering and cut the stripe along the guidelines you drew (making the white invasion stripes 1/8" wider on both sides to allow for overlapping). Use a tissue dampened with denatured alcohol to remove any ink left on the covering. Cut the rest of the stripes the same way.

F. Before you remove the 1/8" wide tape from the fuse, use a fine pencil or a ballpoint pen to **lightly** mark the stripes directly on the fuse. These will serve as guidelines for positioning the MonoKote stripes when you iron them on.



G. Iron the invasion stripes to the fuse. As can be seen in the photo, we are planning to make the stars and bars from MonoKote (though your kit comes with decals which can be applied directly over the covering).



❏ 4. The red, white and blue “scallops” on the front of the fuse were done the same as the invasion stripes–using 1/8" wide vinyl tape on the fuse as a guide to draw the outlines directly onto the covering. Note that the blue was applied in three strips. The photo shows the white outline and the bottom blue strip already ironed into position. Don’t forget to **lightly** mark the pattern on the fuse before you remove the tape. The aluminum on the fuse was applied after the white and blue scallops, followed by the flat black anti-glare in front of and behind the cockpit on the top. The red pinstripes between the white scallops and aluminum are cut from red MonoKote using a Top Flite Smart Stripe™ and then are ironed into position carefully, curving them as you go.

❏ 5. Cover the elevators and rudder. The blue, yellow and red flag on the rudder is made from MonoKote and ironed into position after the rudder is covered in orange. The stripes are 1-1/8" wide (meaning the yellow one in the middle is 1-1/4" to allow for overlap) and extend to 2-1/2" from the trailing edge of the fin.

❏ 6. After the fuse is covered, fuelproof the cowl mounts and then glue them into position.

The final variant of the P-47 was the P-47N-25 rolling off the Republic Farmingdale production line in 1945. The “N” featured squared-off clipped wing tips and an increased wingspan to accommodate four additional 50-gallon internal wing tanks. The goal of increasing range to fulfill the roll of bomber escort (and to become more competitive with the P-51 Mustang) was accomplished.

Cover the wing

❏ 1. If you've chosen the "Tarheel Hal" trim scheme on the kit box cover, the wing isn't as detailed as the fuse and is rather straightforward. Start by covering the belly pan in four strips running from front to back.

❏ 2. Add the invasion stripes. These can be straight strips of MonoKote. On our prototype we made them 3-1/2" wide (meaning the white stripes should be 3-3/4" wide to allow for a 1/8" over lap on both sides of the black).

❏ 3. Cover the remainder of the wing in aluminum.

❏ 4. Cover the flaps and ailerons starting with the ends, then the bottoms and tops. Make certain the invasion stripes on the flaps line up with the invasion stripes on the wing.

❏ 5. Cover the 1/16" ply aileron and flap hatch covers, the balsa retract hatch covers and the wheel covers (if you've made them) to match the bottom of the wing.

Apply the decals

❏ 1. Cut the decals from the included decal sheet.

❏ 2. Place the decals on the model where shown on the kit box. For larger decals such as the stars and bars, first dip the decal in a solution of warm water and soap (about five or six drops of liquid dish soap per quart of water). Then, place the decal on the model, slide it into position, and squeegee the water out from under the decal with a rubber squeegee or a piece of soft balsa. This will aid in positioning the decal and eliminate air bubbles. Some small wrinkles can be removed with a little heat from a heat gun.

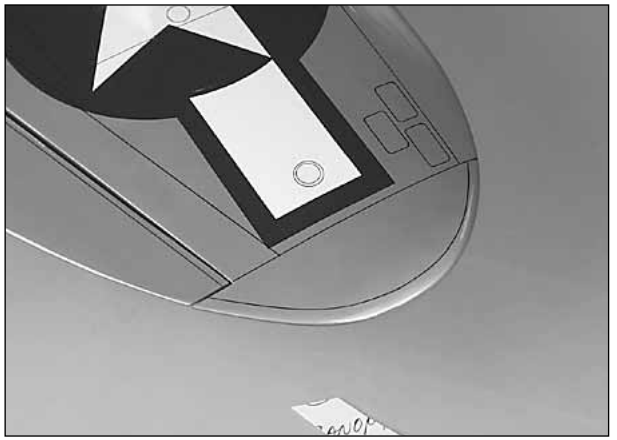
❏ 3. Don't forget to fill out the identification decal and stick it somewhere in your model. The AMA requires this information in or on the model.

Apply panel lines

If you plan to do the panel lines with a pen, don't do them until after the model is completely finished and has been balanced. This will minimize all the handling you'll be doing in the meantime which can smudge the panel lines.

If you think your model looks good now, wait 'til you see it with panel lines. Panel lines are easy to apply and really enhance the model's appearance. The pictures on the box cover may be used as a reference, but if your model will be entered in competition refer to 3-view drawings in your documentation package for accurate placement of the lines.

Some of the panel lines on the model on the kit box cover are made from MonoKote and some of them are drawn with a Top Flite Panel Line Pen (TOPQ2510). The ones that go around the fuse are MonoKote because, the same as the invasion stripes, they are not straight and cannot be drawn on with a straightedge. All the rest of the panel lines are made with the Panel Line Pen. Use a Top Flite Smart Stripe (TOPR2420) to cut panel lines from black MonoKote.



The various hatches and rivets were made using a Top Flite *Scale Template* (TOPR2187) and homemade templates from sheets of plastic.

Note: Ink panel lines that come into contact with fuel will wash away immediately. Over time they will smudge and fade from handling with oily hands, but they can always be "freshened up" by going back over them with a Panel Line Pen. If you would prefer more permanent panel lines, make them from MonoKote.

FINAL ASSEMBLY

Join the control surfaces

❏ 1. Test fit the control surfaces with the hinges to make sure they fit. If necessary, trim hinges that are too long (a few of the flap and aileron hinges on our prototype had to be shortened to fit all the way in).

❏ 2. Join all the control surfaces to the model with the hinges using 30-minute epoxy. Do one control surface at a time, mixing up fresh batches of epoxy as required.

Hint: Add a drop of plastic-compatible oil or a dab of petroleum jelly to the hinge pins to keep epoxy from entering. You can also lightly coat the LE of the control surface and the TE of the model with a thin film of oil to prevent epoxy from adhering.

Hook up the controls

❏ 1. Route the air lines through the wing for the main gear. Leave the lines long enough to connect them to the landing gear outside of the wing. Connect the air lines to the landing gear, then mount the gear in the wing. Hold the landing gear hatch covers to the wing with clear tape. If you haven't already done so, secure the wheel axle and nuts with a drop of thread locking compound. Add a drop of oil to the axles (even if the wheels spin freely now, the plastic hubs can soften and deform due to the friction caused by the speed and weight of the model while taking off and landing–we've seen it happen!

❏ 2. Route the air lines through the fuselage, then connect them to the cylinder on the tail gear. Mount the tail gear. Make certain all the set screws on the tail gear are secured with a drop of threadlocking compound.

❏ 3. Mount the engine and hook up all the systems inside the cowl including the fuel lines, in-line fuel filler valve, remote glow igniter (if used), etc.

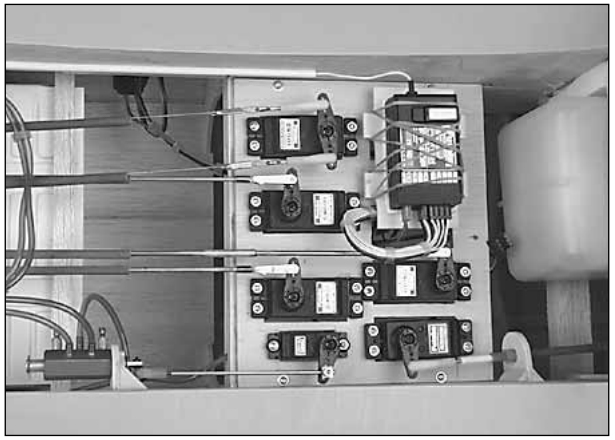
❏ 4. Apply a few drops of thin CA to the holes in the servo blocks and servo tray for the servo mounting screws, allow to dry, then mount the servos in the wing and fuse. Install servo extension cords as necessary. Secure all connections with vinyl tape, heat shrink tubing, or special clips intended for that purpose. Make certain none of the servo cords will interfere with the landing gear or other moveable systems.

❏ 5. Temporarily connect the servos to your receiver and battery pack (they may not yet be mounted in the model), turn on your radio, center the trims on the transmitter, then center all the servos.

❏ 6. Tentatively connect the servos to the pushrods (adjustments may need to be made when the control throws are set up later). Mount the flap and servo hatch covers in the wing with the #2 x 3/8" flat head screws. Disconnect the radio.

❏ 7. Add a few drops of thin CA to the holes for the control horn mounting screws in the elevators, rudder and ailerons. Mount the control horns using four #4 x 1/2" screws on each horn.

❏ 8. Connect the horns to the clevises on the pushrods using 4-40 nuts to lock the clevises to the rods. Use a silicone retainer on every clevis.

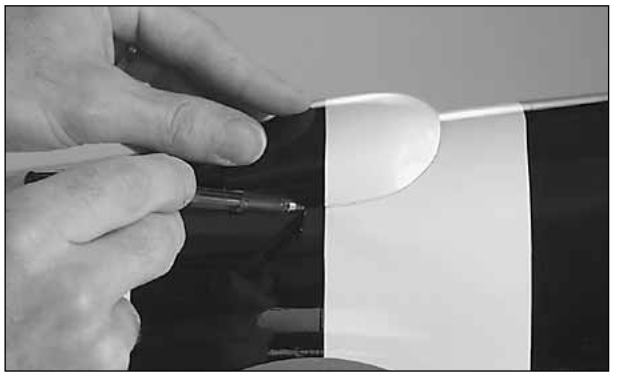


❏ 9. Mount the retract air valve and air valve servo. In our prototype, we mounted the air valve to the fuse crutch with a scratch-built mount and mounted the air valve servo to the servo tray as shown. Though a micro servo was used, there is room for a standard servo.

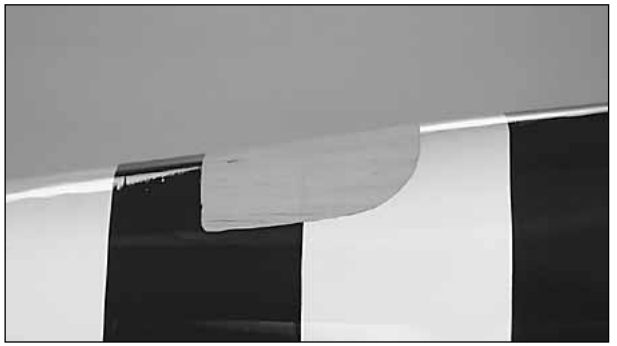
❏ 10. Install your scale Top Flite cockpit kit (if you've built one) and a pilot. We used the Top Flite 1/5-scale WW II pilot (TOPQ9032). This is an upper body only pilot, but there is a full body pilot available as well (TOPQ9030).

One problem that occurred with the removal of the razor spine to accommodate the bubble canopy was tail flutter. Beginning with the D-40, a dorsal fin was added to rectify this. The dorsal fin was also retrofitted to all previous variants still flying.

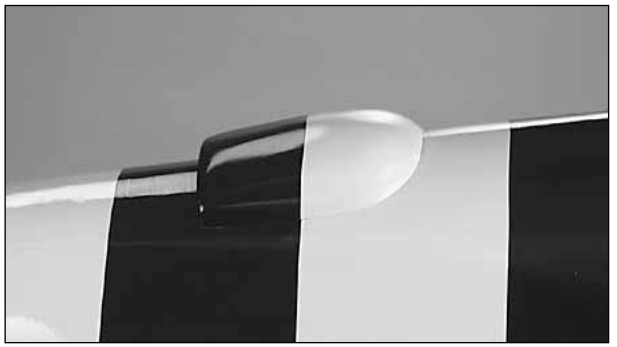
Scale details



❏ 1. Position the turbo-supercharger cover on the bottom of the fuse and draw a line around it with a felt-tip pen.



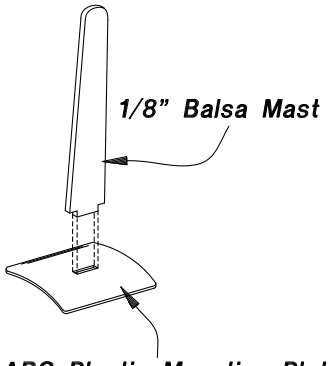
❏ 2. Carefully cut the covering just inside the line you marked. Peel the covering off.



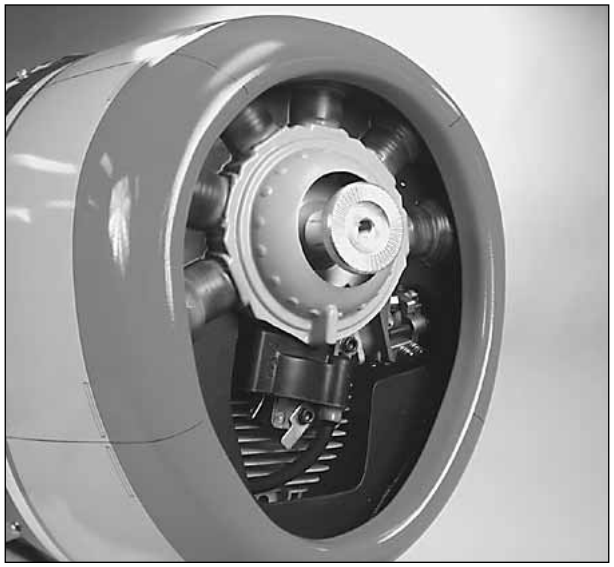
❏ 3. Glue the turbo-supercharger cover in position with thin CA. Do not use CA accelerator.

❏ 4. Mount the oil cooler shutters the same way.

There are several ways to make a scale antenna mast. However you do yours, you should not permanently mount the antenna mast to the fuselage–if it gets bumped, it's best to have the mast pop off rather than break off which would require a repair job.



❏ 5. Refer to the photos on the kit box cover or to your scale documentation for the exact location and shape of an antenna mast. We shaped our antenna mast from a piece of leftover 1/8" balsa and glued it to a mounting plate that was made from a piece of leftover ABS. Heat the mounting plate and bend it to match the curve of the fuse. Paint the antenna mast to match your trim scheme, then attach the mounting plate to the fuse with double-sided tape.



❏ 6. Fill the empty space inside the cowl with a Top Flite 1/5-scale Replica Radial Engine (TOPQ7903). You can get as detailed as you prefer. We just trimmed the engine to fit, painted it grey and black, then held it to the ply baffle in the cowl with a couple of #2 x 3/8" screws (not supplied). A few of the simulated cylinders will have to be cut off to accommodate the real engine.

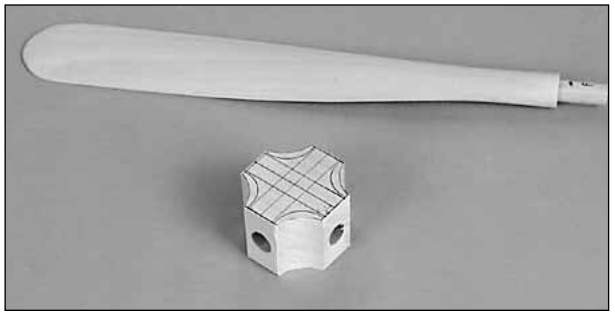
Mount the canopy

Though the bubble canopy is shown in the photos, the razorback canopy is mounted the same way.

❏ 1. Position the canopy on the fuse. Use a felt-tip pen to trace its outline onto the covering. Use a hobby knife with a sharp #11 blade to carefully cut a 1/16" strip of covering from the fuse. Remove the covering, exposing the bare balsa. This will allow the canopy to be securely attached to the fuse–not just to the covering.

❏ 2. Securely glue the canopy to the fuse using canopy glue such as J & Z Products *Z RC/56* (JOZR5007). Use rubber bands or masking tape to hold the canopy in position until the glue dries.

Static display propeller



If you choose to make a static display propeller and prop hub, the amount of effort and time required will be determined by the level of accuracy you wish to achieve. On our prototype we simulated the Hamilton Standard hydromatic prop (13ft. 1-7/8" dia.) by shaping a single

wood blade from a block of basswood and using it as a mold to vacuum-form four front halves and four back halves from .030" ABS plastic sheet. The halves were glued together making four complete blades. We glued a 1/2" x 6" wood dowel into the root of each blade so they could be plugged into the hub. The hub was shaped from a basswood block with a rotary tool and a drill press. The spinner was turned on a lathe from a basswood block, then joined to the hub. The bolts were added later. Finish your display prop with a Hamilton Standard decal sheet by Major Decals (MAJQ0006), followed by a light coat of flat clear LustreKote.

The Curtiss electric prop (13ft. dia.) would be easier to model due to the simplicity of the hub and the closer resemblance to model airplane propellers–you could purchase two oversize wood model airplane props, round the tips and join them in a four-blade fashion. A spinner could be made from a wood dowel.

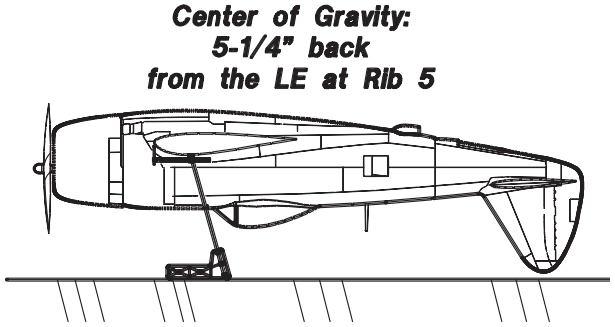
GET YOUR MODEL READY TO FLY

Balance your model

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

At this stage your model should be in ready-to-fly condition with all of the systems in place including the engine, landing gear, scale details, covering and painting and the radio system (less the receiver and battery pack). After you find out where the C.G. is right now, you can mount the receiver and battery pack in a location that will minimize (or eliminate) the amount of additional ballast required to get the C.G. at the correct location.

❏ 1. Accurately mark the C.G. on the top of the wing on both sides of the fuselage. The C.G. is shown on the plan (CG) and is located 5-1/4" back from the leading edge **at the location of rib 5** (not alongside the fuse). This is where your model should balance for your first flights. Later, you may wish to experiment by shifting the C.G. up to 1/2" forward or back to change the flying characteristics. Moving the C.G. forward may improve the smoothness and arrow-like tracking, but it may then require more speed for takeoff and make it more difficult to slow down for landing. Moving the C.G. aft makes the model more agile with a lighter and snappier feel. In any case, start at the location we recommend and do not at any time balance your model outside the recommended range.



❏ 2. With the wing attached to the fuselage, all parts of the model installed (ready to fly), an empty fuel tank and the landing gear retracted (up), place the model on a Great Planes C.G. Machine at the balance point you marked, or hold it upside-down with the stabilizer level. **Note:** It will be necessary to substitute the base rods that come with the C.G. Machine with longer base rods.

❏ 3. If the tail drops, the model is “tail heavy" and you must add weight* to the nose to balance. If the nose drops, it is “nose heavy” and you must add weight* to the tail to balance.
**If possible, first attempt to balance the model by positioning the battery pack and receiver where required. If you are unable to obtain proper balance by doing so, then it will be necessary to add weight to the nose or tail to achieve the correct balance point.*
NOTE: Nose weight may be easily installed by gluing lead weights into the engine compartment. **Do not** attach weight to the cowl. It is not intended to support weight. Tail weight may be added by using Great Planes (GPMQ4485) “stick-on” lead weights and later, if the balance proves to be OK, you can open the fuse bottom and glue these permanently in position.

❏ 4. Once you have determined where to mount the battery pack and receiver and any additional weight required to achieve the correct balance, take the model off the balance stand and remove the wing.

❏ 5. Mount the receiver and battery pack. As you can see in previous photos we mounted our receiver on a plate (with R/C foam rubber in between) made from leftover 1/8" plywood that was attached to the servo tray. The battery pack was wrapped in R/C foam rubber and securely held in position above the fuel tank with a sheet of lite-ply. Simply stuffing the battery pack into position with foam rubber is not sufficient. Attach additional lead weight to the tail or nose as necessary.

❏ 6. Mount the receiver on/off switch and charging jack where they can be connected to the receiver and battery pack and will be readily accessible from outside the model. Secure the connection between the battery pack and the switch with vinyl tape, heat shrink tubing or special clips suitable for that purpose. Route your receiver antenna inside or outside the fuselage.

❏ 7. Mount the wing onto the fuse and recheck the C.G.

The cost of production P-47’s as delivered was $82,997 for a B model in 1942, $79,752 for a D model in 1944 and $78,642 for an N model in 1945.

Set the control surface throws

❏ 1. If you haven't already done so, center all the servos. The servo arms on the flap servos should be positioned so the flaps are up when the switch on the transmitter is in the "up" position.

❏ 2. Make certain all the controls move in the correct direction.

❏ 3. Adjust your pushrod hookups as necessary to provide the proper control surface movements as shown.

CONTROL SURFACE THROWS
We recommend the following control surface throws:

NOTE: Throws are measured at the **widest part** of the elevators, rudder, ailerons and flaps.

	High Rate	Low Rate
ELEVATOR:	3/4" up 3/4" down	1/2" up 1/2" down
AILERONS:	3/4" up 3/4" down	1/2" up 1/2" down
RUDDER:	1-3/4" right 1-3/4" left	
FLAPS:	3-1/4" down	

TRIM MIXING
Mix 1/16" of down elevator at full flaps to eliminate pitch-up that occurs when the flaps are extended.

The balance point and control surface throws listed in this manual are the ones at which the P-47 flies best. Set up your aircraft to those specifications. If, after a few flights, you would like to adjust the throws or C.G. to suit your tastes, that is fine. Too much control surface throw can make your model difficult to control or force it into a stall, so remember...More is not better.

PREFLIGHT

Identify your model

No matter if you fly at an AMA sanctioned R/C club site or if you fly somewhere on your own, you should always have your name, address, telephone number and AMA number on or inside your model. It is **required** at all AMA R/C club flying sites and AMA sanctioned flying events. Fill out the identification sticker included with this kit and place it on or inside your model.

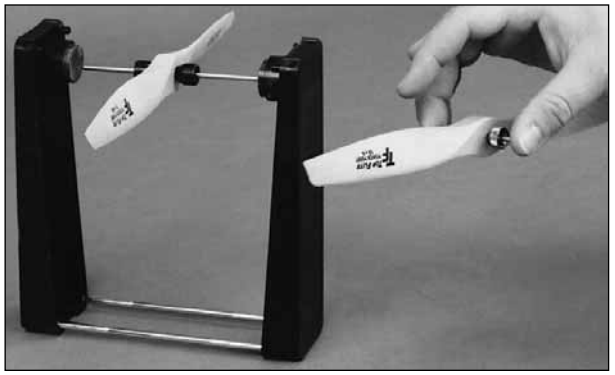
Charge your batteries

Follow the battery charging procedures in your radio instruction manual. You should always charge your transmitter and receiver batteries the night before you go flying and at other times as recommended by the radio manufacturer.

NOTE: Checking the condition of your receiver battery pack is **highly recommended**. This is especially important on a large scale model such as this. All battery packs, whether it's a trusty pack you've just taken out of another model, or a new battery pack you just purchased, should be cycled, noting the discharge capacity. Oftentimes a weak battery pack can be identified (and a valuable model saved!) by comparing its actual capacity to its rated capacity. Refer to the instructions and recommendations that come with your cycler. If you don't own a battery cycler, perhaps you can have a friend cycle your pack and note the capacity for you.

Balance your propellers

Carefully balance your propellers before you fly. An unbalanced prop is the single most significant cause of vibration that can damage your model. Not only will engine mounting screws and bolts loosen, possibly with disastrous effect, but vibration may also damage your radio receiver and battery. Vibration can also cause your fuel to foam, which will, in turn, cause your engine to run hot or quit.



We use a Top Flite Precision Magnetic Prop Balancer™ (TOPQ5700) in the workshop and keep a Great Planes Fingertip Prop Balancer (GPMQ5000) in our flight box.

Ground check your model

Follow the engine manufacturer's instructions to break-in your engine. After you run the engine on your model, inspect your model closely to make sure all screws remain tight and your pushrods and connectors are secure.

Range check your radio

Ground check the operational range of your radio before the first flight of the day. With the transmitter antenna collapsed and the receiver and transmitter on, you should be able to walk at least 100 feet away from the model and still have control. Have an assistant stand by your model and, while you work the controls, tell you what the control surfaces are doing. Repeat this test **with the engine running** at various speeds with an assistant holding the model, using hand signals to show you what is happening. If the control surfaces do not respond correctly, **do not fly!** Find and correct the problem first. Look for loose servo connections or broken wires, corroded wires on old servo connectors, poor solder joints in your battery pack or a defective cell, or a damaged receiver crystal from a previous crash.

ENGINE SAFETY PRECAUTIONS

Failure to follow these safety precautions may result in severe injury to yourself and others.

Keep all engine fuel in a safe place, away from high heat, sparks or flames, as fuel is very flammable. Do not smoke near the engine or fuel; and remember that engine exhaust gives off a great deal of deadly carbon monoxide. Therefore, **do not run the engine in a closed room or garage**.

Get help from an experienced pilot when learning to operate engines.

Use safety glasses when starting or running engines.

Do not run the engine in an area of loose gravel or sand; the propeller may throw such material in your face or eyes.

Keep your face and body as well as all spectators away from the plane of rotation of the propeller as you start and run the engine.

Keep these items away from the prop: loose clothing, shirt sleeves, ties, scarfs, long hair or loose objects such as pencils or screwdrivers that may fall out of shirt or jacket pockets into the prop.

Use a “chicken stick” or electric starter to start the engine. Do not use your fingers to flip the propeller. Make certain the glow plug clip or connector is secure so that it will not pop off or otherwise get into the running propeller.

Make all engine adjustments from behind the rotating propeller.

The engine gets hot! Do not touch it during or right after operation. Make sure fuel lines are in good condition so fuel will not leak onto a hot engine, causing a fire.

To stop a glow engine, cut off the fuel supply by closing off the fuel line or following the engine manufacturer’s recommendations. Do not use hands, fingers or any other body part to try to stop the engine. To stop a gasoline powered engine an on/off switch should be connected to the engine coil. Do not throw anything into the propeller of a running engine.

AMA SAFETY CODE

Read and abide by the following Academy of Model Aeronautics Official Safety Code:

GENERAL (Excerpt)

1. I will not fly my model aircraft in sanctioned events, air shows, or model flying demonstrations until it has been proven to be airworthy by having been previously successfully flight tested.

2. I will not fly my model aircraft higher than approximately 400 feet within 3 miles of an airport without notifying the airport operator. I will give right of way to and avoid flying in the proximity of full scale aircraft. Where necessary an observer shall be used to supervise flying to avoid having models fly in the proximity of full scale aircraft.

3. Where established, I will abide by the safety rules for the flying site I use and I will not willfully and deliberately fly my models in a careless, reckless and/or dangerous manner.

7. I will not fly my model unless it is identified with my name and address or AMA number, on or in the model.

9. I will not operate models with pyrotechnics (any device that explodes, burns, or propels a projectile of any kind).

RADIO CONTROL

1. I will have completed a successful radio equipment ground check before the first flight of a new or repaired model.

2. I will not fly my model aircraft in the presence of spectators until I become a qualified flier, unless assisted by an experienced helper.

3. I will perform my initial turn after takeoff away from the pit or spectator areas and I will not thereafter fly over pit or spectator areas, unless beyond my control.

4. I will operate my model using only radio control frequencies currently allowed by the Federal Communications Commission.

IMAA SAFETY CODE (excerpts)

Definition:
For the purpose of the following IMAA Safety Code, the term Giant Scale shall refer to radio controlled model aircraft, either scale or non-scale, which have a wingspan of 80 inches or more for monoplanes and 60 inches or more for multi-winged model aircraft and have a ramp weight (fueled and ready to fly) of 55 lbs. or less.

Section 1.0: SAFETY STANDARD
1.1 Adherence to Code: This safety code is to be strictly followed

1.2 The most current AMA Safety Code in effect is to be observed. However, the competition sections of the code may be disregarded.

Section 3.0: Safety Check
3.4 Flight Testing: All Giant Scale R/C aircraft are to have been flight tested and flight trimmed with a minimum of six flights before the model is allowed to fly at an IMAA Sanctioned event.

3.5 Proof of Flight: The completing and signing of the Declaration section of the Safety Inspection form by the pilot (or owner) shall document as fact that each aircraft has been successfully flight-tested and proven airworthy prior to an IMAA event.

Section 5.0: EMERGENCY ENGINE SHUT OFF (kill switch)
5.1 All magneto spark ignition engines must have a coil grounding switch on the aircraft to stop the engine. This will also prevent accidental starting of the engine. This switch shall be readily available to both pilot and helper. This switch is to be operated manually and without the use of the radio system.

5.2 Engines with battery power ignition systems must have a switch to turn off the power from the battery pack to disable the engine from firing. This will also prevent accidental starting of the engine. This switch shall be readily available to both pilot and helper. This switch shall be operated manually and without the use of the radio system.

5.3 There must also be a means to stop the engine from the transmitter. The most common method is to close the carburetor throat completely using throttle trim; however, other methods are acceptable. This requirement applies to all glow/gas ignition engines regardless of size.

Section 6.0: RADIO REQUIREMENTS
6.1 All transmitters must be FCC type certified.

6.2 FCC Technician or higher-class license required for 6 meter band operation only.

Additional General Recommendations

Servos need to be of a rating capable to handle the loads that the control surfaces impose upon the servos. Standard servos are not recommended for control surfaces. Servos should be rated heavy-duty. For flight-critical control functions a minimum of 45 inch/ounces of torque should be considered. This should be considered a minimum for smaller aircraft and higher torque servos are strongly encouraged for larger aircraft. The use of one servo for each aileron and one for each elevator half is strongly recommended. Use of dual servos is also recommended for larger aircraft.

On-board batteries shall be 1000 mAh up to 20 lbs., 1200 mAh to 30 lbs., 1800 mAh to 40 lbs. and 2000 mAh over 40 lbs. flying weight. The number and size of servos, size and loads on control surfaces and added features should be considered as an increase to these minimums. Batteries should be able to sustain power to the onboard radio components for a minimum of one hour total flying time before recharging.

Redundant and fail-safe battery systems is recommended.

The use of anti-glitch devices for long leads are recommended.

There is no maximum engine displacement limit, as it is the position of this body that an underpowered aircraft presents a greater danger than an overpowered aircraft. However, the selection of engine size relative to airframe strength and power loading mandates good discretionary judgement by the designer and builder. Current AMA maximums for engine displacement are 6.0 cu. in. for two-stroke and 9.6 cu. in. for four-stroke engines. These maximums apply only to AMA Sanctions concerning competition events (such as 511, 512, 515 and 520) and, as such, the maximums apply. All IMAA (non competition) events should be sanctioned as Class "C" events, in which these engine size maximums do not apply.

Generally, it is recommended that no attempt should be made to fly a radio controlled model aircraft with a gasoline engine in which the model aircraft weight would exceed twelve (12) pounds (underpowered) per cubic inch of engine displacement, or be less than five (5) pounds (overpowered) per cubic inch of engine displacement. Example: Using a 3 cu. in. engine, a model would likely be underpowered at an aircraft weight greater than 36 pounds. With the same engine, an aircraft weighing less than 15 pounds would likely be overpowered.

Servo arms and wheels should be rated heavy duty.

Glass-filled servo arms and control horns are highly recommended.

Control surfaces linkages are listed in order of preference:

1. Cable system (pull-pull). A tiller bar is highly recommended along with necessary bracing.

2. Arrow Shaft, fiberglass or aluminum, 1/4" or 5/16" O.D. bracing every six (6) to ten (10) inches is highly recommended.

3. Tube-in-tube (nyrod). Bracing every few inches is highly recommended. Inner tube should be totally enclosed in outer tube.

4. Hardwood dowel, 3/8" O.D. bracing every six (6) to ten (10) inches is highly recommended.

Hinges should be rated heavy duty and manufactured for Giant Scale use primarily. Homemade and original design hinges are acceptable if determined to be adequate for the intended use.

Clevis (steel, excluding heavy-duty ball links) and attachment hardware should be heavy duty 4-40 threaded rod type. 2-56 threaded size rod is acceptable for some applications (e.g. throttle). Clevis is to have lock nuts and sleeve or spring keepers.

Propeller tips should be painted or colored in a visible and contrasting manner so as to increase the visibility of the propeller tip arc.

- END OF IMAA SAFETY CODE -

CHECK LIST

During the last few moments of preparation your mind may be elsewhere anticipating the excitement of your first flight. Because of this, you may be more likely to overlook certain checks and procedures that should be performed after your model is built. To help avoid this, we've provided a checklist to make sure you don't overlook these important areas. Many are covered in the instruction manual, so where appropriate, refer to the manual for complete instructions. Be sure to check the items off as you complete them (that's why we call it a *check list!*).

- ❑ 1. Fuelproof all areas exposed to fuel or exhaust residue such as the firewall/engine compartment, fuel tank compartment, wing saddle area, trailing edge of the wing, the flap area and wheel wells, etc.
- ❑ 2. Check the C.G. according to the measurements provided in the manual.
- ❑ 3. Secure the battery and receiver with a strip of balsa or plywood. Simply stuffing them into place with foam rubber is not sufficient.
- ❑ 4. Extend your receiver antenna and make sure it has a strain relief inside the fuselage to keep tension off the solder joint inside the receiver.
- ❑ 5. Balance your model *laterally* as explained in the instructions.
- ❑ 6. If you haven't already done so, glue the wing dowels into the wing with epoxy.
- ❑ 7. File flat spots on the tail gear axle and steering shaft for the set screws to lock onto.
- ❑ 8. Use threadlocking compound to secure critical fasteners such as the nuts that hold the main gear axles in place, screws that hold the carburetor arm (if applicable), set screws, screw-lock pushrod connectors if used, etc.
- ❑ 9. Add a drop of oil to the axles so the wheels will turn freely.
- ❑ 10. Make sure all hinges are **securely** glued in place.
- ❑ 11. Reinforce holes for wood screws with thin CA where appropriate (control horns, servo hatches, servo mounting screws, etc.).
- ❑ 12. Confirm that all controls operate in the correct direction and the throws are set up according to the manual. Make sure there are silicone retainers on all the clevises and that all servo arms are secured to the servos with the screws included with your radio.
- ❑ 13. Make sure the jam nuts are present and tightened on all thread-on metal clevises.
- ❑ 14. Secure connections between servo wires and Y-connectors or servo extensions, and the connection between your battery pack and the on/off switch with vinyl tape, heat shrink tubing or special clips suitable for that purpose.
- ❑ 15. Make sure any servo extension cords you may have used do not interfere with other systems (servo arms, landing gear, pushrods, etc.).
- ❑ 16. Secure the pressure tap (if used) to the muffler with high temp RTV silicone, threadlocking compound or J.B. Weld.
- ❑ 17. Make sure all fuel lines are connected and are not kinked.
- ❑ 18. Use a Great Planes AccuPoint Laser incidence meter (GPMR4020) to check the wing for twists and attempt to correct before flying.
- ❑ 19. Balance your propeller (and spare propellers).
- ❑ 20. Tighten the propeller nut and spinner.
- ❑ 21. Place your name, address, AMA number and telephone number on or inside your model.
- ❑ 22. Cycle your receiver battery pack (if necessary) and make sure it is fully charged.
- ❑ 23. If you wish to photograph your model, do this before your first flight.
- ❑ 24. Range check your radio when you get to the flying field.

One might question the selection of an older technology, bulkier radial engine vs. a more modern and streamlined "V" engine for the P-47. A problem of "V" engines is their liquid cooling systems (including a radiator) which is susceptible to gun fire. Before Glycol became available, liquid cooled engines also featured extremely large radiators adversely affecting aerodynamics. Early P-47 design team members were not willing to "put all their eggs in one basket" and utilized "V" engines for some of their other projects.

FLYING

The Top Flite Giant P-47 is a great-flying scale warbird that flies smoothly and predictably. It does not, however, possess the self-recovery characteristics of a primary R/C trainer and should be flown only by experienced R/C pilots.

CAUTION

(THIS APPLIES TO ALL R/C AIRPLANES): If, while flying, you notice any unusual sounds, such as a low-pitched "buzz," this may indicate control surface *flutter.* Because flutter can quickly destroy components of your airplane, any time you detect flutter you must **immediately** cut the throttle and land the airplane! Check all servo grommets for deterioration (this may indicate which surface fluttered) and make sure all pushrod linkages are secure and free of play. If the control surface fluttered once, it probably will flutter again under similar circumstances unless you can eliminate the free-play or flexing in the linkages. Here are some things which can cause flutter: Excessive hinge gap; Not mounting control horns solidly; Poor fit of clevis pin in horn; Side-play of pushrod in guide tube caused by tight bends; Poor fit of Z-bend in servo arm; Insufficient glue used when gluing in the elevator joiner wire; Excessive *play* or *backlash* in servo gears; and Insecure servo mounting.

Fuel mixture adjustment

A fully cowled engine may run at a higher temperature than an un-cowled engine. For this reason, the fuel mixture should be richened so the engine runs at about 200 rpm below peak. By running the engine slightly rich, you will help prevent dead stick landings caused by overheating.

Takeoff

Before you get ready to takeoff, see how the model handles on the ground by doing a few practice runs at **low speeds** on the runway. Hold "up" elevator to keep the tail wheel on the ground. If necessary, adjust the tail wheel or main wheels until the model rolls straight down the runway. If you need to calm your nerves before the maiden voyage, shut the engine down and bring the model back into the pits. Top off the fuel, then check all fasteners and control linkages for peace of mind. Takeoff on high rates–especially if you are taking off into a crosswind. For your first few flights takeoff with the flaps retracted (up). Later, the takeoff roll can be shortened by taking off with half-flaps.

When you're ready for takeoff, point the model straight down the runway, hold a bit of up elevator to keep the tail on the ground to maintain tail wheel steering, then gradually advance the throttle. As the model gains speed decrease up elevator allowing the tail to come off the ground. One of the most important things to remember with a tail dragger is to always be ready to apply **right** rudder to counteract the torque of the engine, keeping the model heading straight. Gain as much speed as your runway and flying site will safely allow before gently applying up elevator, lifting the model into the air. At this moment it is likely that you may need to apply more right rudder to counteract engine torque. Be smooth on the elevator stick, allowing the model to establish a **gentle** climb to a safe altitude before turning into the traffic pattern.

For reassurance and to keep an eye on other traffic, it is a good idea to have an assistant on the flight line with you. Tell him to remind you to throttle back once the plane gets to a comfortable altitude. While full throttle is usually desirable for takeoff, most scale models fly more smoothly and more scale-like at reduced speeds.

Flight

Take it easy with your P-47 for your first few flights, gradually getting acquainted with it as your engine breaks in. Adjust the trims to maintain straight and level flight. After flying around for a while, and still at a safe altitude, execute practice landing approaches by reducing the throttle and extending the gear to see how the model handles at slower speeds. If you plan to land with the flaps, practice slow flight and landing approaches with the flaps extended while still at a comfortable altitude. Add power to see how she climbs with flaps as well. Continue to fly around, executing various maneuvers and making mental notes (or having your assistant write them down) of what trim or C.G. changes may be required to fine tune the model so it flies the way you like. Mind your fuel level, but use this first flight to become familiar with your model before landing.

Landing

Landings may be executed with or without flaps. Modelers unfamiliar with flaps usually make their first few landings without them, but learn to prefer landing with flaps later on. If you are unsure, you could always land with the flaps set to half of their full setting. Mix down elevator with flaps as described in the "Control Throws" section on page 59 of the manual. If you are landing without flaps, the nose of the model will pitch down slightly when the landing gear is extended. When you're ready to land with flaps, maintain an engine R.P.M. that is slightly higher than normal to overcome the additional drag. Flaps should be extended after the throttle and airspeed have been reduced and the model is on the downwind leg of the landing pattern.

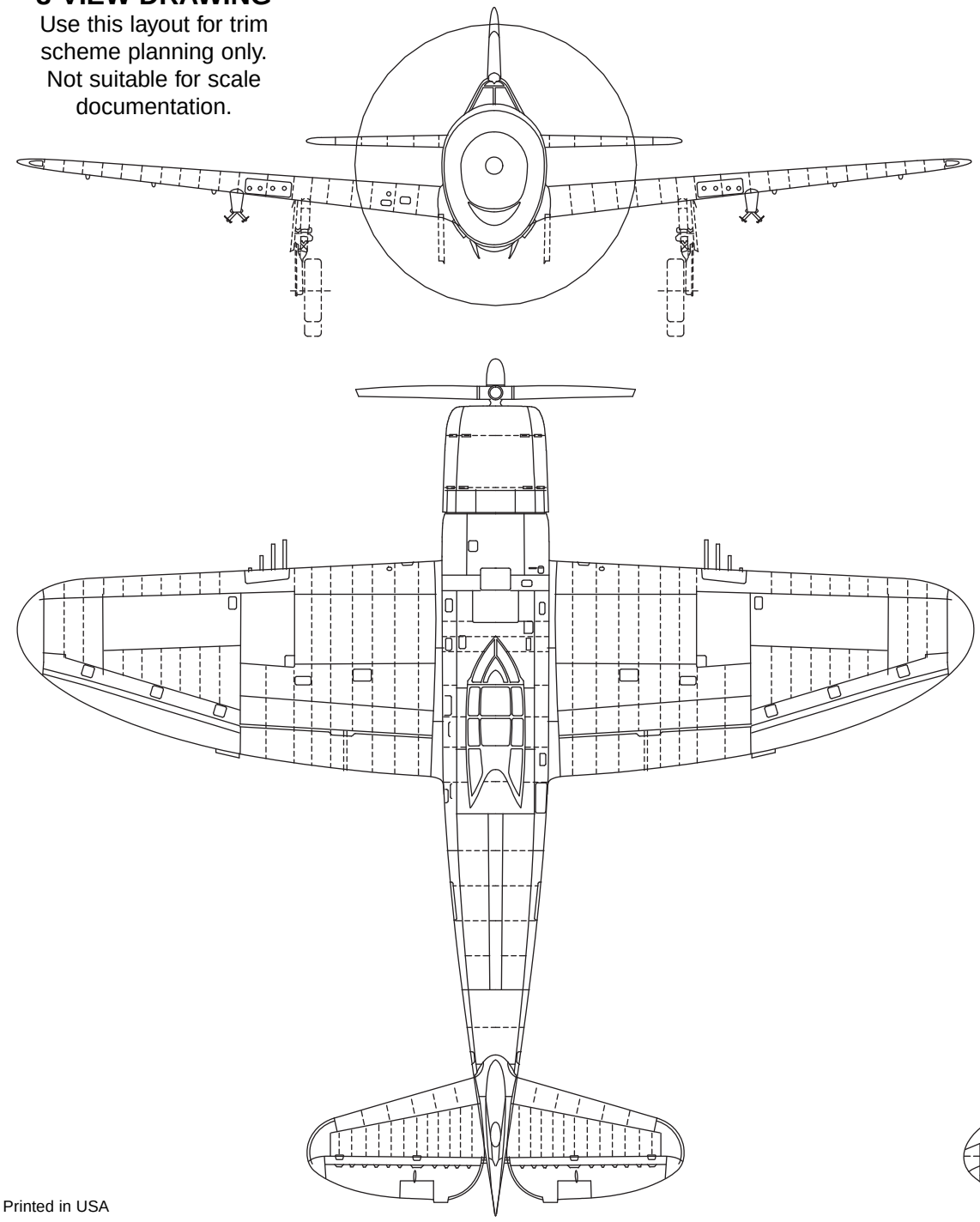
To initiate a landing approach, make your final turn toward the runway (into the wind) keeping the nose down to maintain airspeed and control. Level the attitude when the model reaches the runway threshold, modulating the throttle as necessary to maintain your glide path and airspeed. If you are going to overshoot, smoothly advance the throttle (always ready on the right rudder to counteract torque) and climb out to make another attempt. When you're ready to make your landing flare and the model is a foot or so off the deck, smoothly increase up elevator until it gently touches down. Once the model is on the runway and has lost flying speed, hold up elevator to place the tail on the ground, regaining tail wheel control. Refrain from using flaps during dead-stick landings unless you're near the runway and already lined-up. Without power, flaps will reduce the model's range causing it to land shorter than you may normally expect.

Have a ball! But always stay in control and fly in a safe manner.

GOOD LUCK AND GREAT FLYING!

3-VIEW DRAWING

Use this layout for trim scheme planning only. Not suitable for scale documentation.



Here is the Engineering and Performance data for a P-47-D-25 (similar to the one on our kit box cover):

Model: P-47D-25-RE
Quantity built: 385
AAF Serial numbers: 42-26389 to 42-26773
Engine: Pratt & Whitney R-2800-59
Power rating: 2,000/2,300 hp
Propeller: Hamilton Standard Hydromatic 25E50 13' 1-7/8" dia.

Dimensions:
- Span: 40' 9-5/16"
- Length: 35' 10"
- Height: 14' 9-1/8"
- Wing area: 300 sq ft

Weights:
- Empty: 10,000 lb
- Gross: 14,600 lb
- Max: 17,500 lb

Speeds:
- Max: 429 mph at 30,000 ft
- Landing: 106 mph
- Climb:
  - 6.2 min to 15,000 ft
  - 8.5 min to 20,000 ft
  - 11 min to 25,000 ft

Service ceiling: 42,000 ft

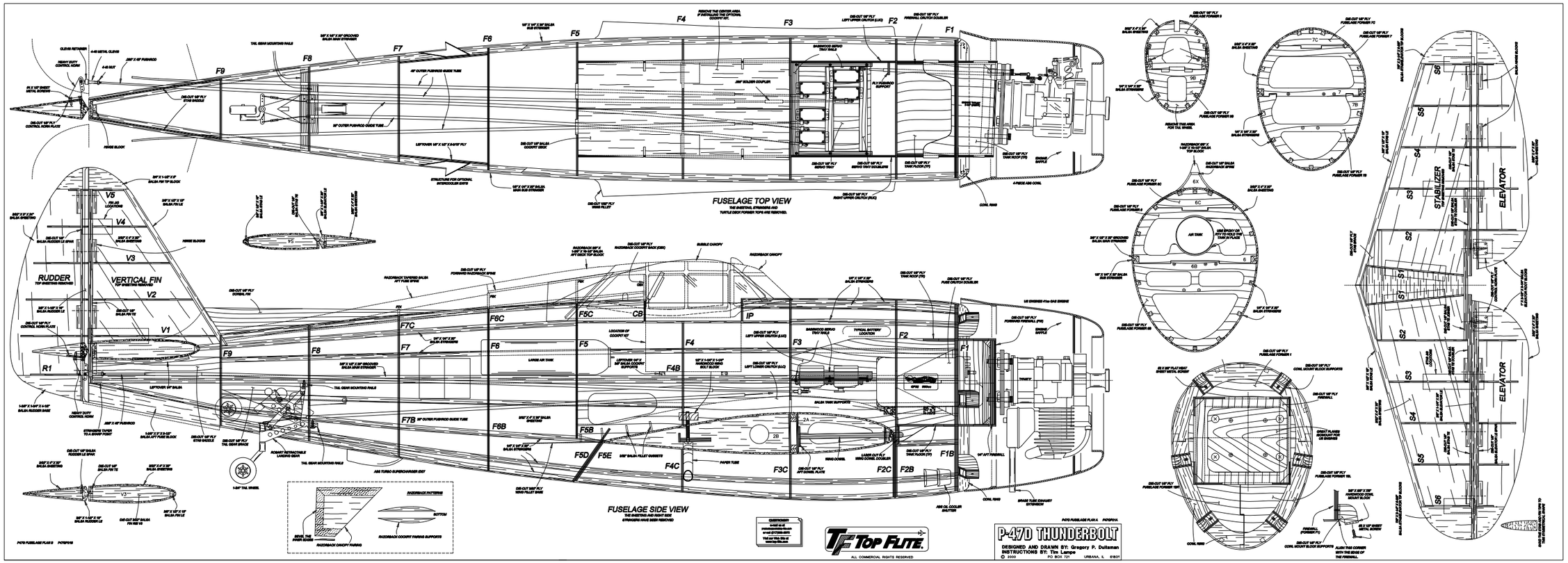
Fuel:
- Internal: 370 US gal
- External: 410 US gal

Range:
Max: 1,030 miles @ 10,000 ft (5.3 hrs)
- Normal: 590 miles @ 25,000 ft

Armament: 6 or 8 x 0.50-in mg (fifty caliber machine gun) with from 267 to 425 rpg (rounds per gun)

Bombs: 2 x 1,000 lb, Max load 2,500 lb

Printed in USA


FUSELAGE TOP VIEW
THE BASETRAIL STRINGERS AND TURTLE DECK FORMER TOPS ARE REMOVED.
FUSELAGE SIDE VIEW
STRINGERS HAVE BEEN REMOVED
RUDDER
TOP SHEETING REMOVED
VERTICAL FIN
TOP SHEETING REMOVED
STABILIZER
ELEVATOR
P-470 THUNDERBOLT
DESIGNED AND DRAWN BY: Gregory P. Dullaman
INSTRUCTIONS BY: Tim Lampe
PO BOX 721 URBANA, IL 61801
TOP FLITE
ALL COMMERCIAL RIGHTS RESERVED

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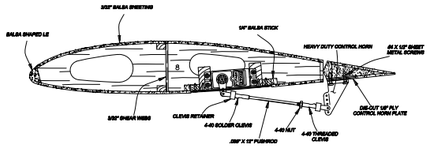

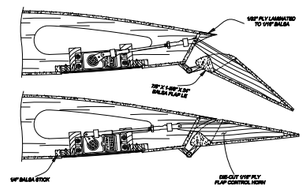

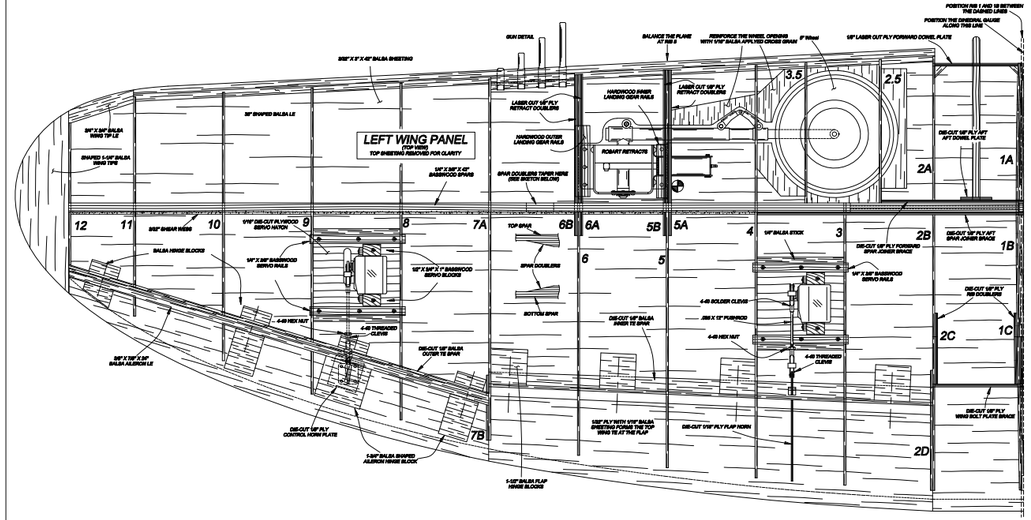

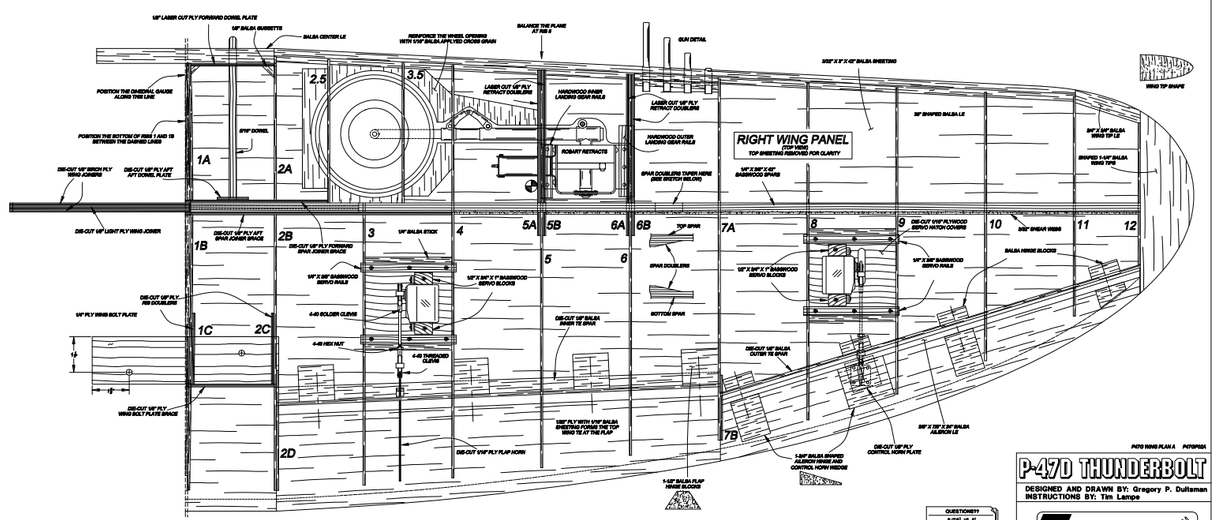

PCTO WING PLAN A PCTOP20A

P-47D THUNDERBOLT

DESIGNED AND DRAWN BY: Gregory P. Dullaman
INSTRUCTIONS BY: Tim Lampe

QUESTIONS?
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