Focke-Wulf 190 D9

GOLD EDITION™

Wingspan: 63.5 in [1613mm]
Wing Area: 711.5 sq in [45.9 sq dm]
Weight: 8 -10 lbs [3.6 - 4.5kg]
Wing Loading: 26-32 oz/sq ft
[80-98 g/sq dm]
Length: 57.75 in [1467mm]

WARRANTY..... Top Flite Models guarantees this kit to be free of defects in both material and workmanship at the date of purchase. This warranty does not cover any component parts damaged by use or modification. In no case shall Top Flite's liability exceed the original cost of the purchased kit. Further, Top Flite reserves the right to change or modify this warranty without notice. In that Top Flite has no control over the final assembly or material used for final assembly, no liability shall be assumed nor accepted for any damage resulting from the use by the user of the final user-assembled product. By the act of using the user-assembled product the user accepts all resulting liability. **If the buyer is not prepared to accept the liability associated with the use of this product, the buyer is advised to immediately return this kit in new and unused condition to the place of purchase.**

Top Flite Models P.O. Box 788 Urbana, Il 61803 **Technical Assistance Call (217)398-8970 productsupport@top-flite.com**

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

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INTRODUCTION

Thank you and congratulations for purchasing the Top Flite Gold Edition Focke-Wulf 190 D9. If you haven't yet spent much time studying the Focke-Wulf, you will soon come to realize that, although at a first glance it appears to be a rather conventional appearing plane, in actuality the Focke-Wulf has some very interesting lines and features. And the "D" model (a "stretched" version of its predecessor, the A) is the most interesting Focke-Wulf with the extended nose and aft "fuse plug". If you're not already a big fan of the Focke-Wulf, after a while it will begin to grow on you.

This 1/7th scale Top Flite Gold Edition model is an ideal plan-form with long nose and tail moments and adequate wing area—perfect ingredients for a smooth flying plane no matter what the type. In spite of its interesting lines, building this kit is rather straight-forward. Though the fuse is sheeted in several sections, none of the contours should present any difficulty for the average modeler (especially since the sheeting is only 1/16" thick). In the wing, pneumatic retract installation is straightforward with suggestions on air line routing and other details. The characteristic extra long landing gear struts, and the structural problems they present, have been addressed by slightly shortening the struts and by reinforcing the landing gear area with 1/8" birch ply landing gear webs.

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 Fw 190D. Experienced builders will find ways to add even more detail, making this Top Flite *Gold Edition* kit competitive in scale competition.

Your Focke-Wulf is not a toy, but a sophisticated working model that functions very much like a full-size airplane. Because of its realistic performance, if you do not assemble and operate your Focke-Wulf correctly, you could possibly injure yourself or spectators and damage property.

If this is your first scale model, get the assistance of an experienced modeler who has flown this type of plane before. Once completed, your Focke-Wulf will have much value. An experienced modeler can help you with "pre-flight" and possibly identify something you may have overlooked during construction or setup. He can also help you with your first few flights. If you're not already a member of a club, contact the Academy of Model Aeronautics (AMA), which has more than 2,500 chartered clubs across the country. AMA Membership is required at chartered club fields where experienced modelers and 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

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

1. You must build the plane **according to the plan and instructions.** Do not alter or modify the model, as doing so may result in an unsafe or unflyable model. **In a few cases the plan and instructions may differ slightly from the photos. In those instances the plan and written instructions are correct.**

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

3. You must use a proper R/C **radio** that is in first class condition, the correct sized **engine** and correct **components** (fuel tank, wheels, etc.) throughout your building process.

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

5. You must **test** the operation of the model before every flight to insure that all equipment is operating and you must make certain that the model has remained structurally sound.

6. If you are not already an experienced R/C pilot, you must **fly** the model **only with the help** of a competent, experienced R/C pilot.

Please inspect all parts carefully before starting to build! If any parts are missing, broken or defective, or if you have any questions about building or flying this model, please call us at:

(217) 398-8970
or e-mail us at
productsupport@top-flite.com

We'll be glad to help. 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.

Your Top Flite Gold Edition Focke-Wulf 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 Focke-Wulf for more rigorous types of flying such as racing or aggressive aerobatics, it is your responsibility to reinforce areas of the model that will be subjected to the resulting unusually high stresses.

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:

.61 to .75 cu. in. [10.0 - 12.0cc] **2-stroke**
-or-
.70 to .91 cu. in. [11.5 - 15.0cc] **4-stroke**

Your Focke-Wulf will fly **well** with any of the recommended engines. 4-stroke engines and most .75 cu. in. 2-stroke engines will turn a larger prop at lower RPM. This is often desirable for scale realism. However, many .61 cu. in. 2-stroke engines produce about as much horsepower as .75 2-stroke and will fly the Focke-Wulf extremely well. If you use a .61 2-stroke engine, a ball bearing, Schnuerle-ported engine is recommended. Our flying prototype flew on an O.S.® MAX .61 FX. This engine provided excellent performance and more than enough power. Although larger engines may be used, the extra horsepower is **not** needed.

The included adjustable engine mount will hold a range of engines from .61 cu. in. 2-stroke through .91 cu. in. 4-stroke.

EXHAUST SYSTEM

A Top Flite header and muffler are available that will fit inside the cowl. They are designed for 2-stroke engines mounted inverted as used on the model and shown in the instructions.

Headers for:

O.S.® .61SF, SX - TOPQ7920

SuperTigre® .61-.75 K series (muffler bolts go through the muffler and screw into the engine) - TOPQ7925

SuperTigre .61-.75 G series (muffler bolts go through the engine and screw into the muffler) - TOPQ7926

.61-.75 Warbird In-Cowl Muffler, TOPQ7915

There may be other exhaust systems that will work with this model. If you prefer to use another exhaust system, consider any modifications that may have to be made to accommodate it. It may be helpful to get your exhaust system as soon as possible and place it over the plan to visualize how it will fit. This will minimize delays when you get to that point.

FIXED GEAR OR RETRACTS

You may build your Focke-Wulf with either fixed or retractable landing gear. The pre bent landing gear wires are included to build the kit with fixed gear. Should you decide to install retracts, detailed instructions are provided. The Gold Edition Focke-Wulf is designed to accept the Century Jet Models' #39025 pneumatic retracts. You may use other retractable landing gear systems but it is up to you to make any modifications necessary. A micro servo was used in the prototype to operate the air control valve. A standard servo could be used for this, but will take up a bit more room.

These items are required for **retractable** landing gear:

CJM Focke-Wulf retractable landing gear (CJMQ3072)
Robart #164G Hand Pump with Gauge (ROBQ2363)
Williams Bros. #143 3-3/4" Smooth Contour Wheels (WBRQ1143)
Servo for the air control valve (micro or mini servo preferred)
Light weight glass cloth to reinforce wing sheeting in wheel wells (HCAR5000)
(8) #6 x 1/2" screws (GPMQ3160, pkg. of 8)

These items are required for **fixed** landing gear:

3-3/4" Main Wheels
(4) 3/16" wheel collars (GPMQ4308)

FLAPS

The Focke-Wulf is designed to incorporate scale split flaps; however, **flaps are optional** and **not necessary** for an excellent flying experience. Without flaps, the takeoff roll is longer and the landing speed is faster.

Flaps are not difficult to build, but they do require good craftsmanship to fit well. Flaps add nicely to the model's flight characteristics and scale appearance, and are highly recommended for those who wish to install them. You will find additional information on the use of the flaps in the *Flying* section near the end of this manual.

For Flaps, you will need the following additional items:

Two standard servos
(1) Y-connector (HCAM2500 - Futaba® J)
(6) Small Pivot Point Hinges (GPMQ4001, pkg. of 15)

COCKPIT AND PILOT

Your model won't be complete without the Top Flite Focke-Wulf Cockpit Kit (TOPQ8411). 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. Should you choose not to install the scale Top Flite Cockpit Kit, you could leave the cockpit empty or make your own cockpit from balsa or thin cardboard (from cereal boxes.)

Top Flite also offers a 1/7 scale WW II American Full Body Pilot (he could be painted in German flight gear!). The order number is TOPQ9000.

TRIM SCHEME

The model on the kit box was covered with dove gray Top Flite MonoKote® film, then painted with Testors Model Master Acrylic paint followed by a clear-coat of Top Flite LustreKote® flat clear. A painted finish is the only way to reproduce the spray painted camouflaged "patchwork" trim schemes found on full-size Focke-Wulfs. If you do decide to paint your model, the balsa skin must first be covered either with MonoKote film, glass cloth and resin, or another type of covering. Refer to the *Finishing* section near the back of the manual for more details that may help you decide how to finish your model. Since you don't have to finish it today, there is time to seek the advice of experienced builders in your club who can give you tips on how to prep, cover and paint a balsa model.

If you prefer not to do the work required of a painted trim scheme, you may find a simpler scale trim scheme, or make up your own scale-appearing trim scheme simply by covering the Focke-Wulf with a few of the **flat** military MonoKote colors such as dove gray, olive drab, cream, tan, sky blue, insignia blue and black.

COMPETITION-MINDED MODELERS

The outline of the Top Flite *Gold Edition* Focke-Wulf D9 was derived from three-view drawings, photos and highly detailed static kits. Some areas of the outline have been slightly changed to improve flight characteristics. Notably, the area of the "tail feathers" has been increased to improve directional stability and control. The landing gear struts have been shortened slightly to improve handling and durability, and do not retract fully into the wing, but protrude below the wing approximately 1/8".

The approximate scale of this model is 1:6.5.

If you plan to enter your Focke-Wulf 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 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 Focke-Wulf you are using for your model.

SCALE DOCUMENTATION

Three-view drawings and photo packs of full size Focke-Wulfs 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 Fw 190D for competition, photos and color drawings are **extremely useful** for completing much of the detail work such as the machine gun cover, landing gear covers, 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. One of the Focke-Wulf books is listed below and is available from most hobby shops.

Fw 190D Walk Around, No. 5510 (order number SSPZ5510)

OTHER ITEMS REQUIRED

These are the additional items you will need to complete your Focke-Wulf 190D 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.

- ❏ 4 to 6-Channel radio with 5 to 8 servos
- ❏ (2) 24" Servo extension cords ailerons (HCAM2200 - Futaba J)
- ❏ Switch/charging jack mount kit (GPMM1000)
- ❏ Propellers (refer to the instructions that come with your engine)
- ❏ 14 oz. Fuel tank (GPMQ4106)
- ❏ Fuel line (2', GPMQ4131)
- ❏ Fuel filler valve for glow fuel (GPMQ4160)
- ❏ 1" Tailwheel (GPMQ4241)
- ❏ 3/32" Wheel collar for tailwheel (GPMQ4302)
- ❏ R/C Foam padding (1/4", HCAQ1000, or 1/2", HCAQ1050)
- ❏ Top Flite MonoKote covering (*see* Finishing section)
- ❏ Paint (*see* Finishing section)
- ❏ 3" Spinner (GPMQ4530, white)

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

- ❏ 2 oz. Thin CA (GPMR6003)
- ❏ 2 oz. Medium CA+ (GPMR6009)
- ❏ 2 oz. Thick CA- (GPMR6015)
- ❏ CA Accelerator (GPMR6035)
- ❏ CA Debonder (GMPR6039)
- ❏ CA Applicator Tips (HCAR3780)
- ❏ 30-minute epoxy (GPMR6047), or 45-minute (GPMR6048) epoxy
- ❏ 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)
- ❏ Denatured or 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)
- ❑ Hobbico Builder's Triangle (HCAR0480)
- ❑ T-Pins (HCAR5100 — small, HCAR5150 — medium, HCAR5200 — large)
- ❑ Drill Bits: 1/16", 3/32", 7/64", 1/8", 5/32", 3/16", 7/32", 1/4", #29 (or 9/64", or Great Planes 8-32 tap and drill set listed below), #7 (or 13/64", or Great Planes tap and drill set listed below), #12 (for enlarging wheels to fit on axles of CJM **retracts**), or #9 (or 13/64" for enlarging wheels for **fixed landing gear**)
- ❑ 1/4-20 Tap and drill (GPMR8105)
- ❑ 8-32 Tap and drill (GPMR8103)
- ❑ Tap wrench (GPMR8120)
- ❑ Kyosho® *Lexan*® Curved Scissors (KYOR1010)
- ❑ Long handle 9/64" ball end hex wrench (GPMR8004)
- ❑ Silver Solder (GPMR8070 w/flux)
- ❑ Masking Tape (TOPR8018)
- ❑ Great Planes® Plan Protector™ (GPMR6167) or wax paper
- ❑ Dremel® #178 cutting bit (for countersinking screws in the servo hatch covers)
- ❑ Robart® Super Stand II (ROBP1402)
- ❑ Easy–Touch™ Bar Sanders*****

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 1/8", 3/16" and 5/32".

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 **Easy-Touch Bar Sanders** (patented) and replaceable **Easy-Touch Adhesive-backed Sandpaper**. While building the Focke-Wulf we used two 5-1/2" Bar Sanders and two 11" Bar Sanders equipped with 80-grit and 150-grit Adhesive-backed Sandpaper.

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

5-1/2" Bar Sander (GPMR6169)
11" Bar Sander (GPMR6170)
22" Bar Sander (GPMR6172)
33" Bar Sander (GPMR6174)
44" Bar Sander (GPMR6176)
11" Contour Multi-Sander (GPMR6190)

12' roll of Adhesive-backed:
80-grit sandpaper (GPMR6180)
150-grit sandpaper (GPMR6183)
180-grit sandpaper (GPMR6184)
220-grit sandpaper (GPMR6185)
Assortment pack of 5-1/2" strips (GPMR6189)

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

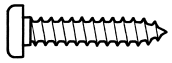
We recommend using plastic bags filled with lead shot for building weights. They assume the shape of the curved surfaces to apply uniform pressure without making dents in the balsa. You can purchase shot at sporting goods stores where hunting supplies are sold. We use #6 lead shot. One 25 lb. bag costs 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. Ten to fifteen bags may be required for this model.

IMPORTANT BUILDING NOTES

There are two types of screws used in this kit:

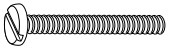
Sheet metal screws are designated by a number and a length.

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



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

For example 4-40 x 3/4" long [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 written you should rely upon your experience to decide what type of glue to use. When a specific type of adhesive works best for that step the instructions will make a recommendation.

- 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.

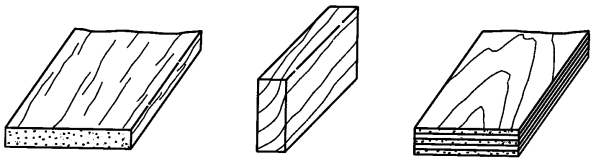
- **Photos** and **sketches** are placed **before** the step they refer to. Frequently you can study photos in following steps to get another view of the same parts.

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	

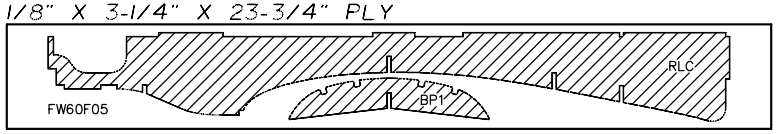
TYPES OF WOOD



BALSA **BASSWOOD** **PLYWOOD**

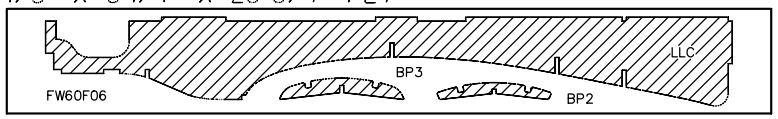
DIE-CUT PATTERNS

1/8" X 3-1/4" X 23-3/4" PLY



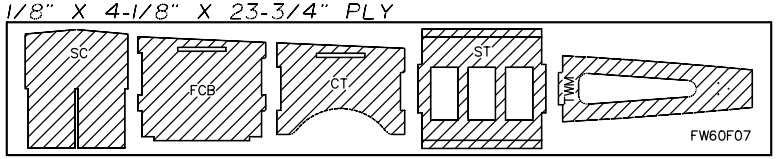
FW60F05 1 PER KIT

1/8" X 3-1/4" X 23-3/4" PLY



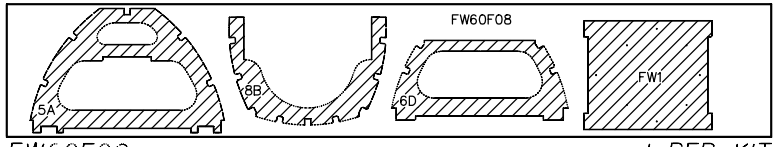
FW60F06 1 PER KIT

1/8" X 4-1/8" X 23-3/4" PLY



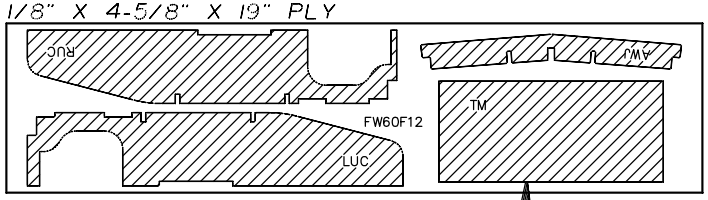
FW60F07 1 PER KIT

1/8" X 4-1/8" X 23-3/4" PLY



FW60F08 1 PER KIT

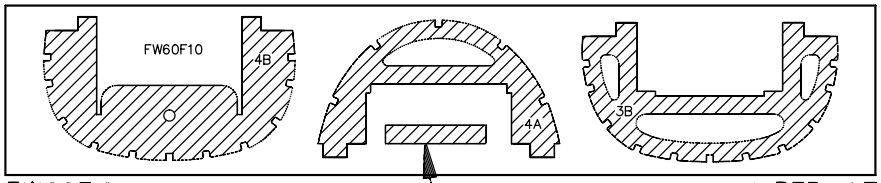
1/8" X 4-5/8" X 19" PLY



FW60F12 1 PER KIT

Tank Mount

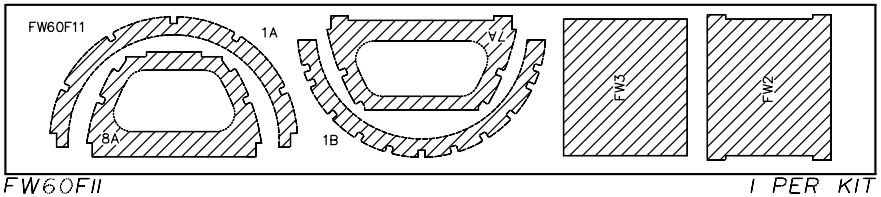
1/8" X 4-5/8" X 23-3/4" PLY



FW60F10 1 PER KIT

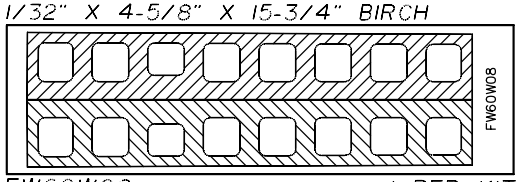
Tank Mount Doubler

1/8" X 4-5/8" X 23-3/4" PLY



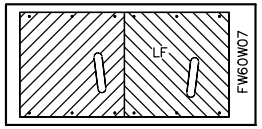
FW60F11 1 PER KIT

1/32" X 4-5/8" X 15-3/4" BIRCH



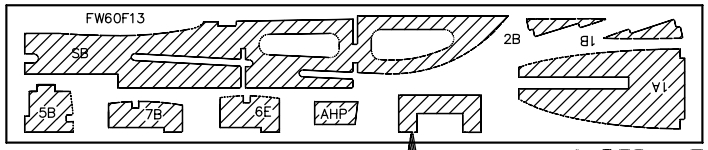
FW60W08 1 PER KIT

1/16" X 3-3/4" X 7-3/4" BIRCH



FW60W07 1 PER KIT

1/8" X 3-3/4" X 19" PLY



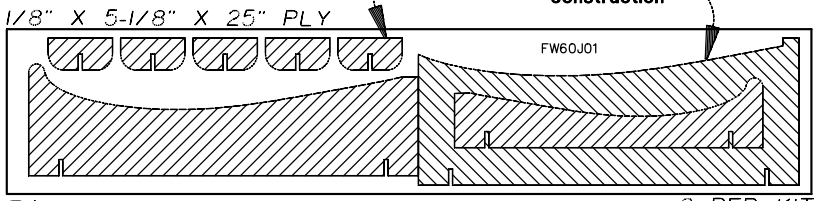
FW60F13 2 PER KIT

Wing Bolt Block Brace

Wing Jig Supports

Only one center jig will be used during construction

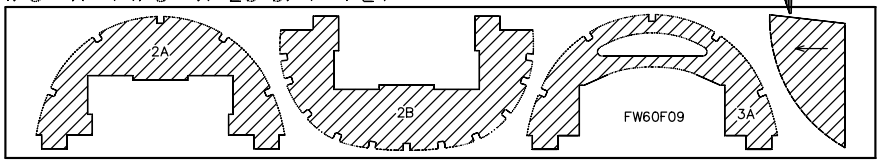
1/8" X 5-1/8" X 25" PLY



FW60J01 2 PER KIT

Dihedral Gauge

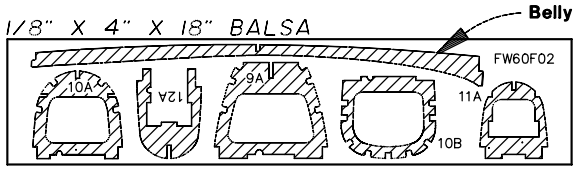
1/8" X 4-1/8" X 23-3/4" PLY



FW60F09 1 PER KIT

DIE-CUT PATTERNS

1/8" X 4" X 18" BALSA

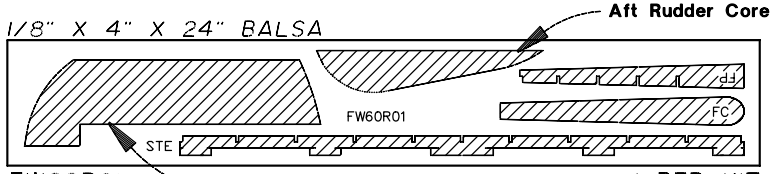


FW60F02 1 PER KIT

1/8" X 3" X 18" BALSA

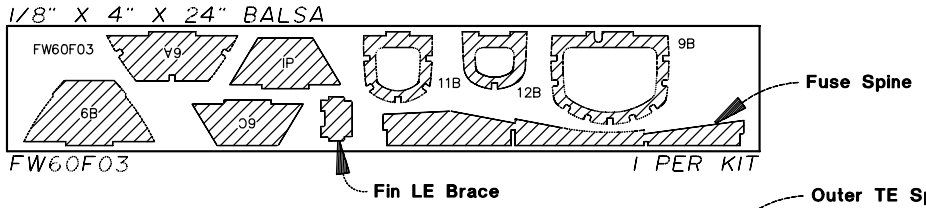
FW60W02 1 PER KIT

1/8" X 4" X 24" BALSA



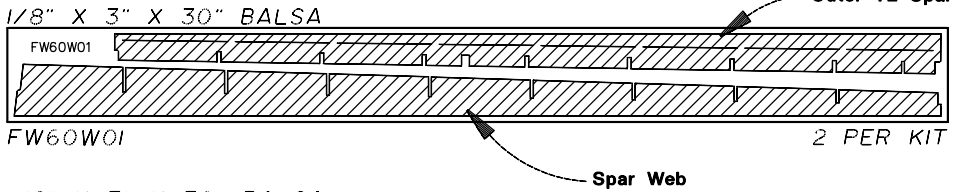
FW60R01 1 PER KIT

1/8" X 4" X 24" BALSA



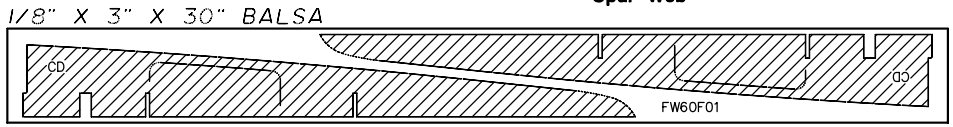
FW60F03 1 PER KIT

1/8" X 3" X 30" BALSA



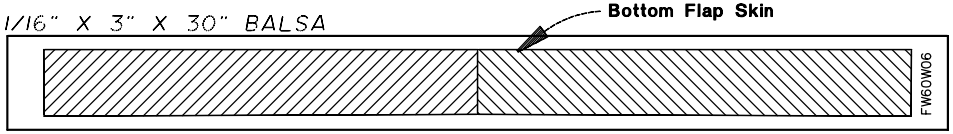
FW60W01 2 PER KIT

1/8" X 3" X 30" BALSA



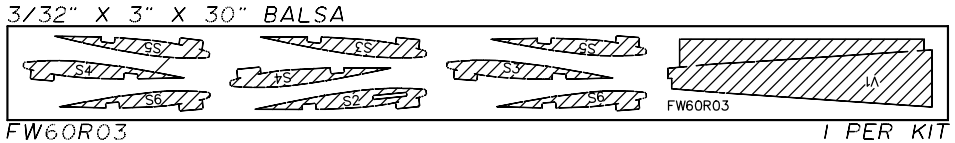
FW60F01 1 PER KIT

1/16" X 3" X 30" BALSA



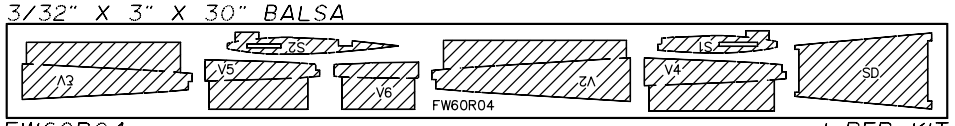
FW60W06 1 PER KIT

3/32" X 3" X 30" BALSA



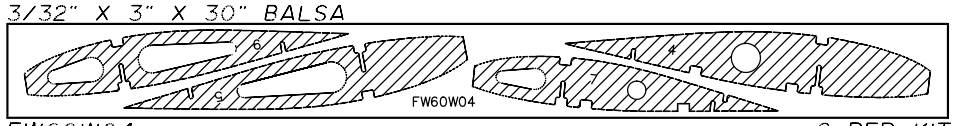
FW60R03 1 PER KIT

3/32" X 3" X 30" BALSA



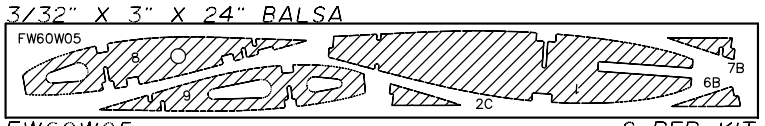
FW60R04 1 PER KIT

3/32" X 3" X 30" BALSA



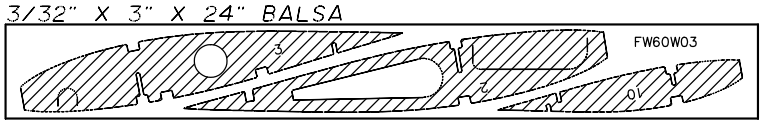
FW60W04 2 PER KIT

3/32" X 3" X 24" BALSA



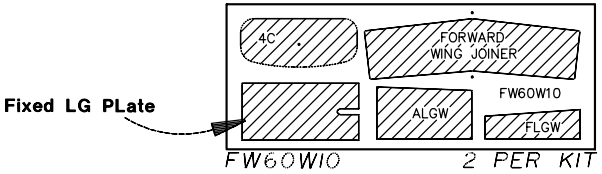
FW60W05 2 PER KIT

3/32" X 3" X 24" BALSA



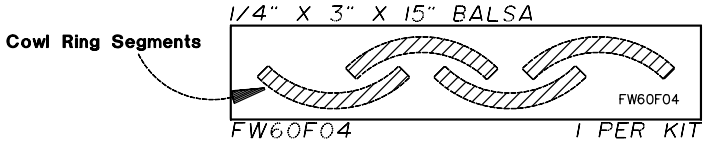
FW60W03 2 PER KIT

1/8" X 4-5/8" X 11-3/4" BIRCH PLY



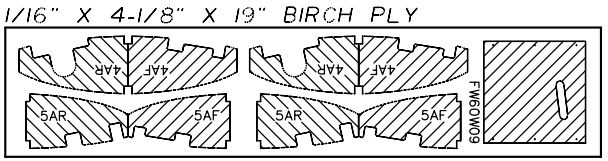
FW60W10 2 PER KIT

1/4" X 3" X 15" BALSA



FW60F04 1 PER KIT

1/16" X 4-1/8" X 19" BIRCH PLY



FW60W09 2 PER KIT

GET READY TO BUILD

❏ 1. A miniaturized building plan is included in the middle of this manual. It may be removed and used as a quick, handy reference, so you don't have to get out the full-size plan when you are not building over it.

❏ 2. 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.

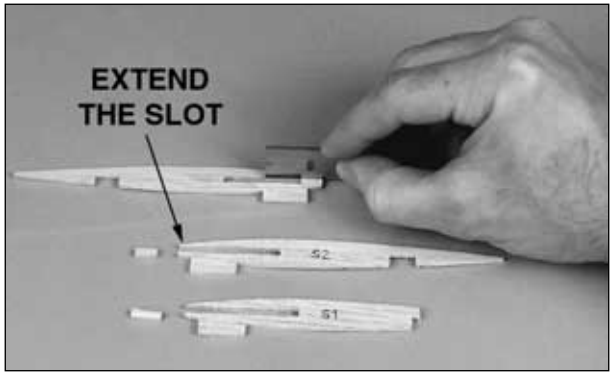
❏ 3. Remove all the parts from the box. Use a ballpoint pen (not a felt tip pen) to lightly write the **name** or **size** on each piece so you can identify it later. Use the ***die-cut patterns*** on pages 8 & 9 to identify and mark the die-cut and laser-cut parts **before** you remove them from their die sheets. Place a straightedge across the punchmarks on the die sheet on both sides of the **forward wing joiner** and draw a centerline. When it's time to join the wing halves, the centerline can be used to align the forward wing joiner. 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 scraps of wood.

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

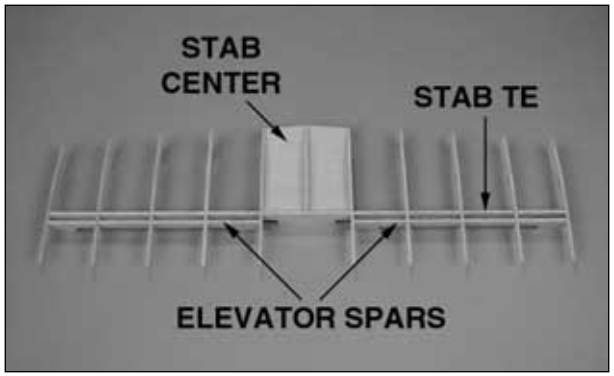
BUILD THE TAIL SURFACES

Build the stabilizer and elevators

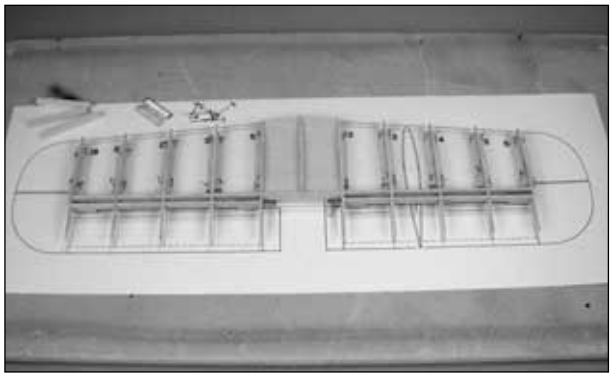
❏ 1. Cut the stab plan from the fuse plan sheet and place it over your building board. Cover the stab plan with Great Planes Plan Protector or waxed paper to protect it from glue. **Note:** If you are a neat builder, there is no need to protect the plan as the glue joints are raised off the plan.

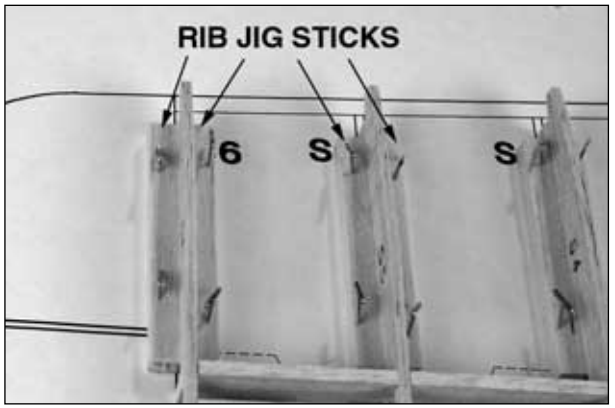


❏ 2. Use a single-edge razor blade to extend the slots through the leading edge in the die-cut 3/32" balsa **stab ribs S-1** and **S-2**.



❏ 3. Without using any glue, join S-1 and both S-2's to the die-cut 1/8" plywood **stab center**. Join the stab center with the ribs to the die-cut 1/8" balsa **stab TE (trailing edge)**, followed by the rest of the stab ribs and the die-cut 1/8" balsa **elevator LE (leading edge) spars**.

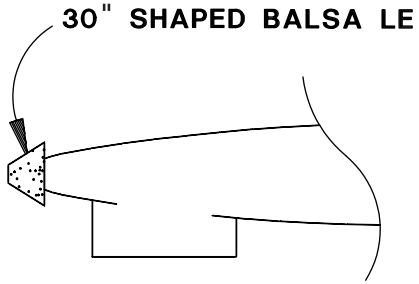




❏ 4. Position the assembly over the stab plan. Cut twenty 2-1/2" long **rib jig sticks** from two 1/4" x 1/4" x 30" balsa sticks. Pin the rib jig sticks to the building board on both sides of all the ribs (except S-1). As you can see, the rib jig sticks securely hold the ribs to the plan, yet will allow easy removal of the stab from the building board after the sheeting is glued into position. Temporarily remove the stab center to position the rib jig sticks on the inside edges of ribs S-2. **Note:** Make sure the T-pins do not protrude above the ribs so they will not interfere with the top stab sheeting that will be added later.

❏ 5. Make certain the stab TE is aligned over its location on the plan and that the jig tabs of all the ribs are contacting the plan. Use medium CA to glue the stab TE to the ribs. **Note:** Make certain both S-6's remain perpendicular to the plan. This way the stab and elevator tip blocks will align with the stab when it's time to glue them on.

❏ 6. Cut 2" from a 3/16" x 3/16" x 30" balsa stick. Use medium CA to glue the elevator LE spars to the ribs, inserting the stick between the elevator LE spar and the stab TE at each rib as you glue it.



❏ 7. Use a bar sander with 80-grit sandpaper or a hobby knife to carefully bevel the front of the ribs to match the aft sweeping angle of the LEs. Cut the 30" long shaped balsa **stab LE** to the correct length for both LEs. Glue them, centered vertically, to the front of the ribs and stab center.

❏ 8. Use a bar sander with 80-grit sandpaper to sand the tops of the ribs, the stab TE and the elevator LE spars so they are all even.

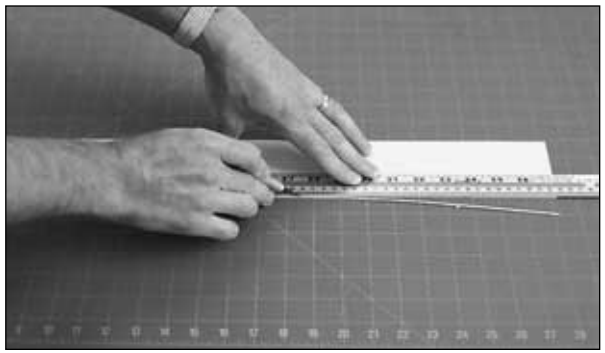
Top Flite selects balsa that is intended for sheeting, though occasionally a few of these sheets may have a small nick or split near the ends. If your kit contains a few of these sheets, arrange them and glue them together so the defects will not interfere with the final shape of the skin.

❏ 9. Use the 1/16" x 3" x 30" balsa sheets supplied with this kit and select four of the softer (and lighter) sheets to be used for sheeting the tail surfaces.

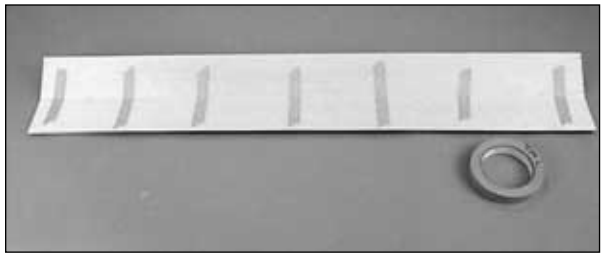
❏ 10. Use your own method or the ***Hot Tip*** that follows to make two 1/16" x 6" x 30" sheets from the four balsa sheets you selected in the previous step.

HOT TIP

HOW TO MAKE THE STAB SKINS

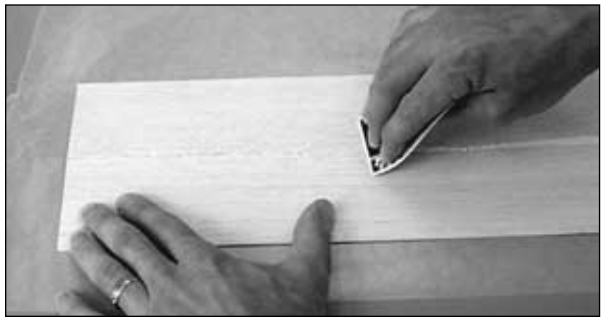


A. Use a straightedge to true one edge of two balsa sheets.

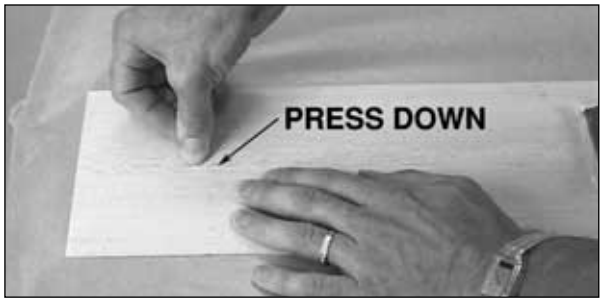


B. Use masking tape to tightly tape the trued edges of the sheets together.

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

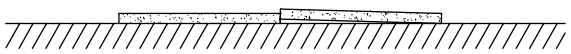


D. Lay the sheets on your workbench covered with wax paper. Use a credit card or something similar as a squeegee to simultaneously press the sheets flat as you wipe the glue from the seam.

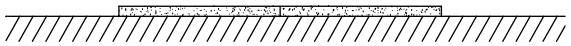


CROSS SECTION OF GLUE JOINT

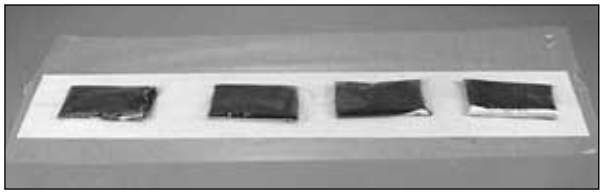
INCORRECT: SHEETS
NOT FLAT AND EVEN



CORRECT: SHEETS ARE
FLAT AND EVEN



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



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

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

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

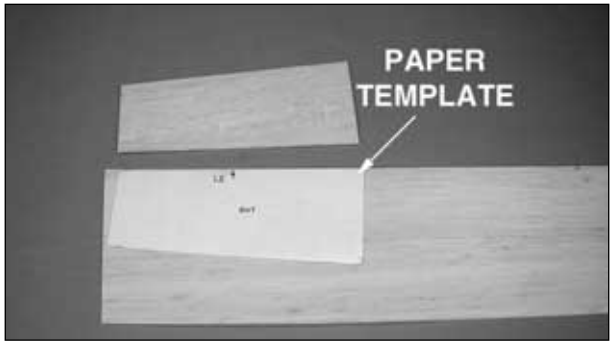
Here are a few other things to keep in mind while sanding balsa sheeting:

1. Make sure you sand the sheets on a flat work surface that is free from hardened drops of glue or other imperfections that will damage your sheeting.

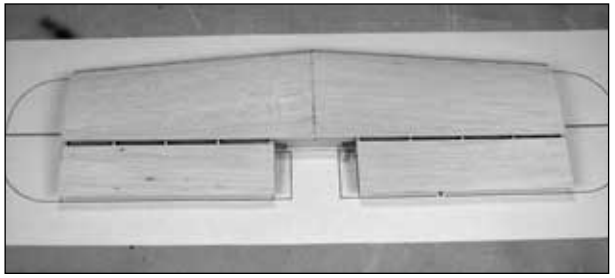
2. Sand the sheeting only as much as required. The inside of the sheeting needs to be sanded just enough to remove excess glue and doesn't have to be perfectly flat or smooth.

3. Though more material can be removed by sanding **across** the grain, this leaves scratches in the balsa. Balsa sheeting should be sanded **with** the grain—especially when finish-sanding.

4. If some of the glue joints are uneven, it may be best just to leave them that way, rather than to sand the sheets too thin. A slightly uneven glue joint is preferable to paper-thin balsa.



❏ 11. Make four **stab skins** from the two 1/16" x 6" x 30" balsa sheets you prepared in the previous steps (you can get three skins from one sheet, but will have to use the second sheet for the fourth skin). Note that the grain is parallel with the LE. **Hint:** Make a paper template and use it to make the skins. Always cut the skins slightly oversize to allow for trimming and positioning. Save the leftover sheeting for the elevators and fin.

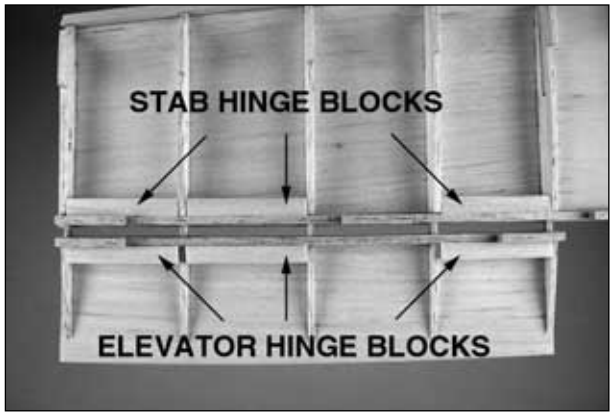


Refer to this photo for the following two steps.

❏ 12. Glue two of the skins to the top of the stab. Usually we recommend using aliphatic resin for this because of the time required for accurate positioning and adjustment. However, this is a relatively small stab, so if the skins fit well and you can work quickly, medium CA may be used.

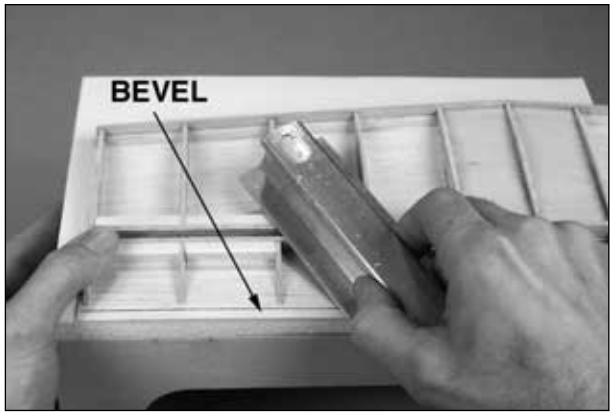
❏ 13. Use the smaller pieces of leftover balsa sheeting to make four **elevator skins**. Glue two of the skins to the top of the elevators.

❏ 14. Lift the stab from the building board. The ribs should slide out from in between the rib jig sticks. Glue the bottom of the stab center (where you couldn't reach when the stab was pinned to the building board) to the rest of the structure.



❏ 15. Cut the **stab** and **elevator hinge blocks** from a 1/4" x 3/8" x 30" balsa stick and glue them into position where shown on the plan.

❏ 16. Use a hobby knife to carefully trim the jig tabs from the bottom of the ribs, the stab TE and the elevator TE spars. Use a bar sander with 80-grit sandpaper to sand the hinge blocks even with the bottom of the stab and elevators.

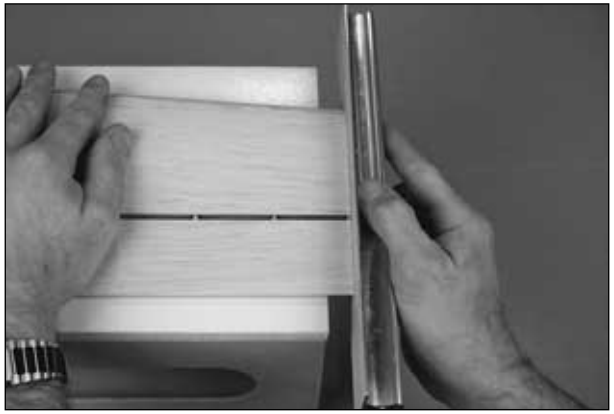


❏ 17. Position the stab on your workbench or a flat platform so that the TE of one of the elevator skins is even with the edge. **Carefully** sand a bevel to the elevator skin until the TE is 1/32" thick. The elevator ribs will set your bar sander at the correct angle. The line in the photo indicates the bevel. Sand the other elevator skin the same way.

❏ 18. Sand a similar bevel to the inside of the remaining two elevator skins. Glue the skins to the bottom of the elevators.

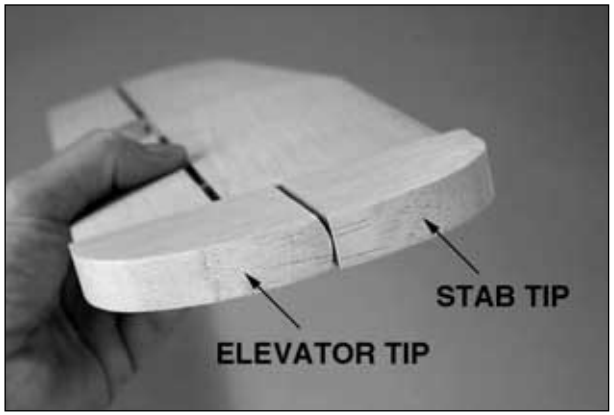
❏ 19. Glue the bottom stab skins to the bottom of the stab. Press the sheeting down evenly, being careful not to add any twist.

The stab is symmetrical. Now that it's sheeted there is no longer a "top" or a "bottom." At any time you can decide which surface looks the best and designate that as the top.



❏ 20. Sand the sheeting on both ends of the stab even with S-6.

❏ 21. Trim the top and the bottom of the stab LE's even with the sheeting, but don't round them until instructed to do so.

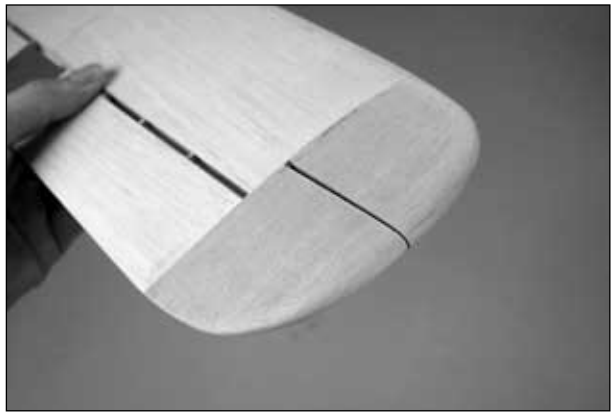


Refer to this photo for the following two steps.

❏ ❏ 22. Place one of the shaped 5/8" balsa **stab tips** and one of the shaped 5/8" balsa **elevator tips** over the plan (to be certain you identify the parts correctly—they look similar to each other). Glue the stab tip to the right side of the stab.

❏ ❏ 23. Slightly round the LE of the elevator tip. Glue the elevator tip to the end of the elevator, **but not to the stab**, with about a 1/16" space between them.

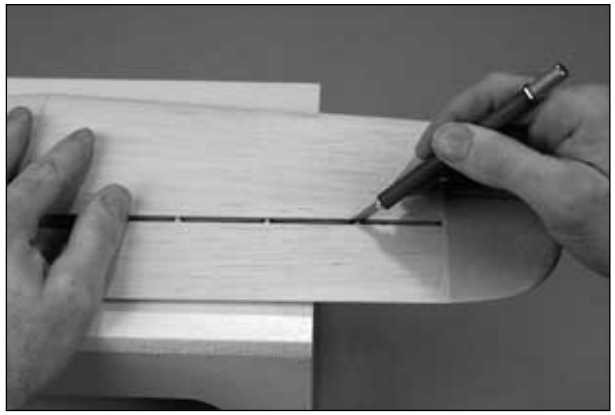
❏ ❏ 24. Shape the tips even with the stab and elevator, but do not round them yet. Our preferred method for shaping balsa tips is to first use a razor plane, followed by a bar sander.



❏ ❏ 25. Finish shaping the stab and elevator tips by rounding the corners. Round the LE on the right side of the stab to match the cross-section on the plan.

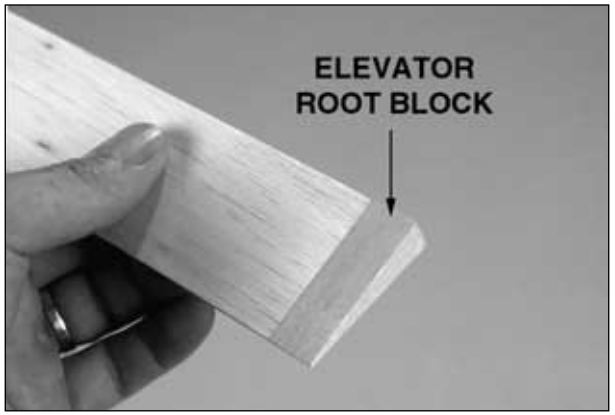
❏ 26. Repeat the previous four steps for the left side of the stab.

Finish the elevators



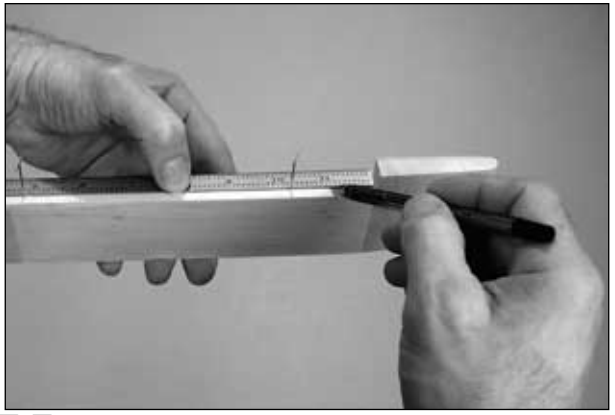
❏ 1. Use a razor saw to cut through the ribs, freeing both elevators from the stab.

❏ 2. Sand the protruding ends of the ribs and the stab sheeting even with the stab TE. Do the same with the both elevators and sand the ends of the elevator sheeting even with both S-2's.

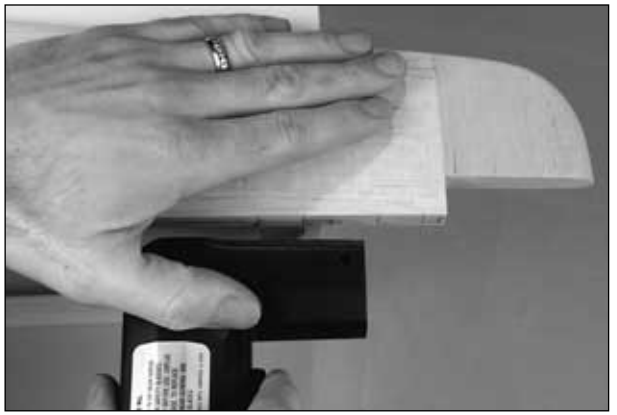


❏ ❏ 3. Glue one of the 1/2" x 5/8" x 1-15/16" balsa **elevator root blocks** to the end of one of the elevators. Shape the block to match the rest of the elevator. The corners on the end of the root block remain square.

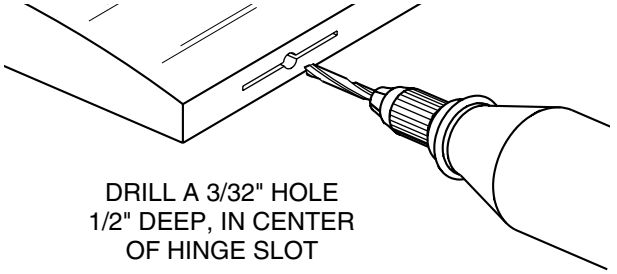
❏ ❏ 4. Cut the **elevator leading edge** from a 3/16" x 1/2" x 30" balsa stick, then glue it to the front of the elevator. The same as you've done with the tip and root blocks, shape the LE to match the rest of the elevator.



❏ ❏ 5. Mark a centerline on the LE of the elevator. An accurate way to do this is to stick a T-pin in the center of the elevator LE near both ends. Position a straightedge against the T-pins and draw a line with a ballpoint pen. Mark a centerline on the TE of the stab the same way.

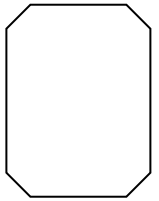


❏ ❏ 6. Using the centerlines you marked as a guide, cut the hinge slots in the elevator and corresponding stab half where shown on the plan. Of course, we use a Great Planes Slot Machine™ to cut hinge slots for CA hinges.

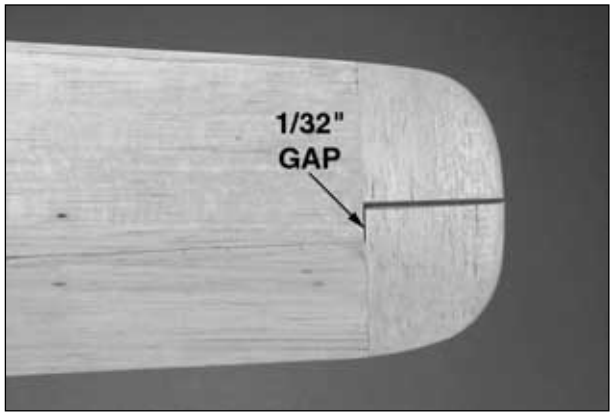


(**Note**: This step is not necessary if you have cut hinge slots with a Slot Machine.)

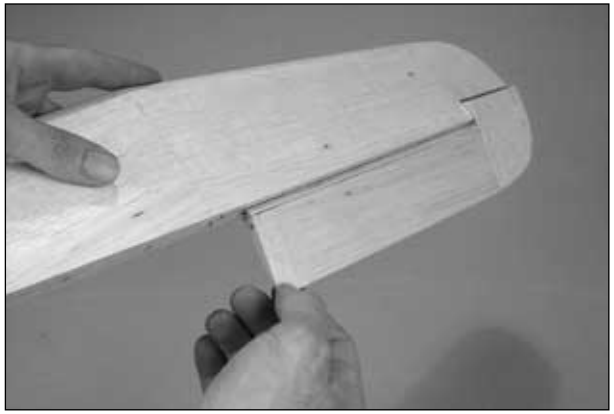
❏ ❏ 7. Drill a 3/32" hole, 1/2" deep in the center of the hinge slots. Use a rotary tool with a drill bit or a carbide cutter for the best results. Insert a knife blade to clean out the slot after you drill the holes.



❏ ❏ 8. Cut three 3/4" x 1" hinges from the CA hinge strip supplied with this kit. Snip the corners off so the hinges go into the slots easier.



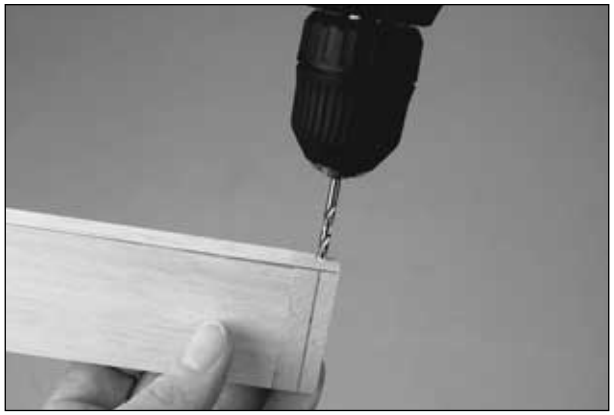
❏ ❏ 9. Test fit the elevator to the stab with the hinges. Shift the elevator over to create a 1/32" gap between the elevator tip and the end of the stab at S-6. Sand the elevator tip to match the stab tip.



❏ ❏ 10. Shape the LE of the elevator to a "V" for control throw. Make certain you can achieve 5/8" of both up and down control throw as described in the **Control Throws** section on page 58. Increase the angle of the bevel if necessary.

❏ 11. Repeat steps 3 through 10 to finish the other elevator.

❏ 12. With the elevators temporarily connected to the stab with the hinges, center the **elevator joiner wire** on the elevators where shown on the plan. Use a ballpoint pen to mark the location of the joiner wires on the elevator root blocks.

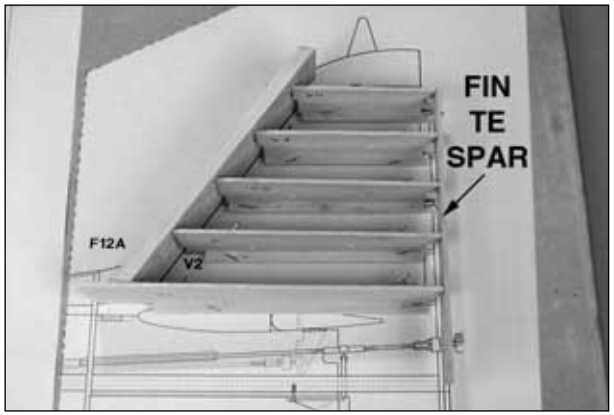


❏ 13. Drill 1/8" holes and cut grooves in both elevators to accommodate the joiner wire. **Hint:** Use a 1/8" brass tube sharpened on one end to cut the grooves in the LE.

❏ 14. Test fit the elevators to the stab with the joiner wire. Make certain both elevators are parallel. If necessary, bend one of the "arms" of the joiner wire to align the elevators with each other. **Note:** If you found it necessary to bend the wire, it must be inserted into the elevators the same way when it's time to glue it in.

Build the fin

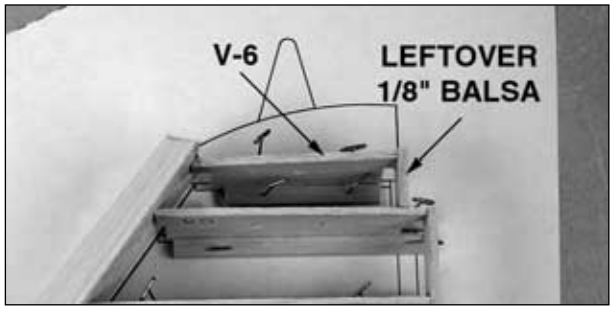
❏ 1. Cut the fin plan from the side view of the fuse plan along the dashed lines. Place the fin plan over your building board. The same as the stab, if you work carefully there is no need to protect the plan from glue.



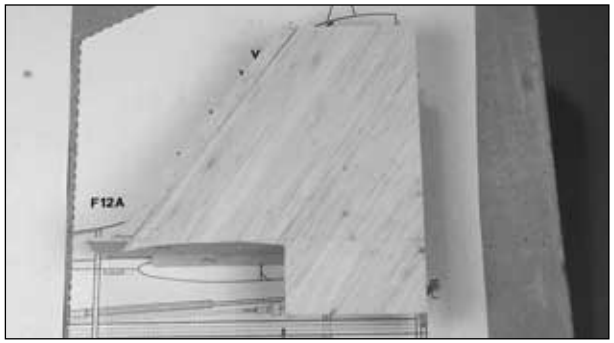
Refer to this photo for the following two steps.

❏ 2. Just the same as the stab, hold the die-cut 3/32" balsa **fin ribs V-1 through V-5** over the plan with rib jig sticks cut from two 1/4" x 1/4" x 24" balsa sticks. Note that the widest part of each rib is the LE. Add the die-cut 1/8" balsa **fin TE spar** and align it over the plan. Glue the ribs to the fin TE spar.

❏ 3. Sand the LE of the fin ribs to the angle of the LE on the plan. Cut the **fin LE** from the 3/8" x 1-3/4" x 12" balsa stick. Glue the fin LE to the front of the ribs. Trim the left side of the fin LE to within 1/8" of the upward facing (left side) of the ribs.



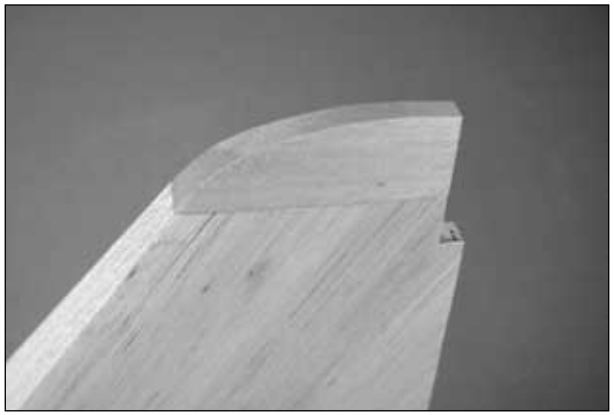
❏ 4. Add the die-cut balsa rib **V-6** and the top of the fin TE spar cut from leftover 1/8" balsa. Use a builder's square to make sure V-6 is perpendicular to the building board.



❏ 5. Sand left side of the fin TE spar even with the ribs. Use the pattern provided on the plan to make two **fin skins** from the 1/16" sheeting leftover from the stab. Glue one of the fin skins to the left side of the fin.

❏ 6. After the glue has hardened, remove the fin from the building board. Trim the jig tabs from the right side of the fin ribs. Cut two **fin hinge blocks** from the same 1/4" x 3/8" stick used for the stab and elevator hinge blocks, then glue the hinge blocks to the fin TE spar where shown.

❏ 7. Sheet the right side of the fin. Sand the fin sheeting even with the fin tip and TE spar, then sand the fin LE even with the sheeting. **Do not** round the LE of the fin until instructed to do so.



❏ 8. Glue the 11/16" x 1-3/16" x 3-3/8" balsa **fin tip** to the fin. Shape the tip to match the fin, but do not round until instructed to do so (after the rudder is completed).

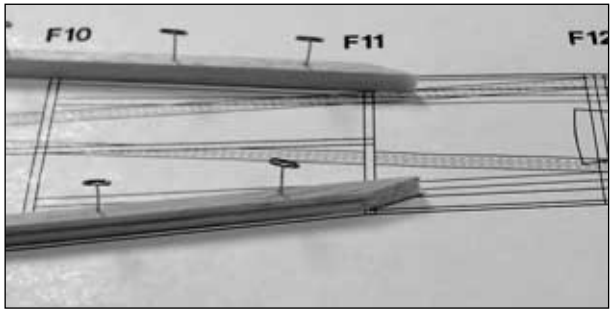
This is all that can be done on the fin for now, until the top of the fuse is built. The rudder is built directly onto the fin when the fuse is near completion. So now, it's time to build the fuse!

BUILD THE FUSE

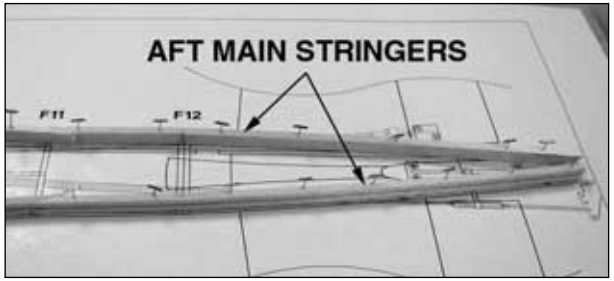
Frame the fuse top

Note: The formers that have part names stamped on them are stamped with only the necessary portion of their names (some formers are too small to have a name stamped on them). For example, former F-2A is stamped "2A". As noted earlier in the manual, refer to the die drawing pages to identify the parts correctly.

❏ 1. Cut the top view of the fuse plan from the fuse plan sheet. Place it over your building board covered with Great Planes Plan Protector or wax paper.



❏ 2. Cut the **forward main stringers** from two 3/16" x 3/8" x 48" grooved balsa sticks. Note the bevel that must be cut on the aft end of the stringers at F-11. It's okay to cut the stringers an inch or so longer than required so the excess extends forward of F-1. Pin both stringers to the plan.



Refer to this photo for the next two steps.

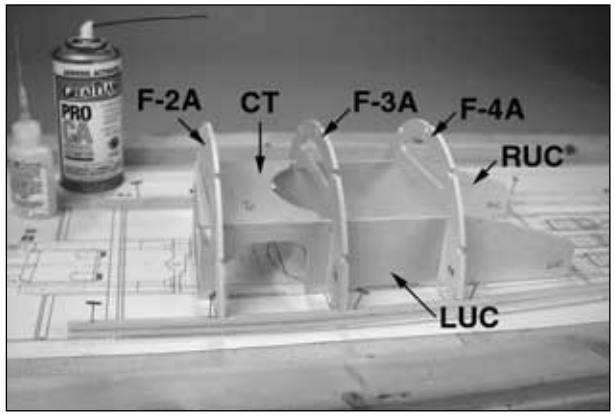
❏ 3. Cut the **aft main stringers** from the remaining 3/16" x 3/8" x 48" grooved balsa stick. Be certain to cut

the bevel on the front of the aft stringers to the correct angle (if you cut the stringers a few inches longer than required you will have enough material to make a few adjustments until you get the angle just right).

❏ 4. Use a razor saw to cut partway through the inside edges of the aft main stringers at F-12 so they can make the bend. Pin the stringers into position and glue them to the forward stringers. Add a few drops of medium CA to the stringers where you cut them at F-12.

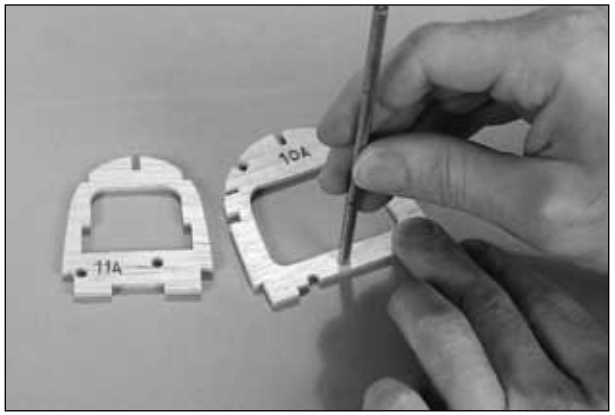
Now for some of the fun stuff...

Note: All the following parts are die-cut 1/8" plywood unless otherwise indicated.

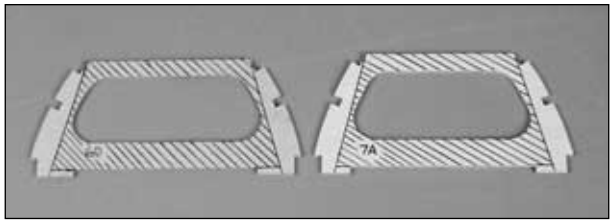


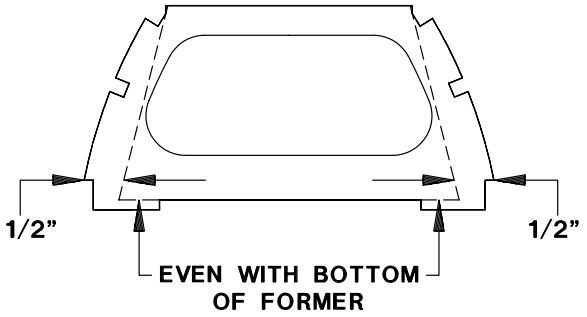
❏ 5. Without using any glue, join the parts of the upper crutch assembly including the **left** and **right upper crutches** (**LUC, RUC**), the **crutch top (CT)** and **F- 2A**, **F-3A** and **F-4A**. Fit the assembly to the main stringers over their location on the plan.

❏ 6. Glue the assembly together and to the main stringers. Use a small builder's square to make certain the formers are perpendicular to the building board. **Note:** Don't worry about glue joints you can't reach while the fuse top is pinned to the building board. We'll remind you to reinforce them later.



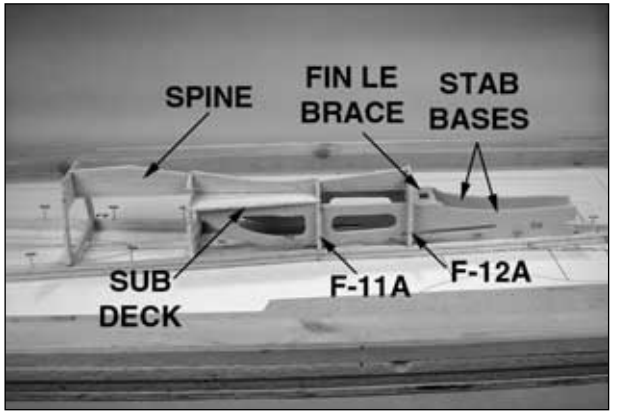
❏ 7. Use a 3/16" brass tube sharpened at the end to cut holes centered over the punchmarks in die-cut 1/8" balsa formers **F-11A** and **F-10A**.



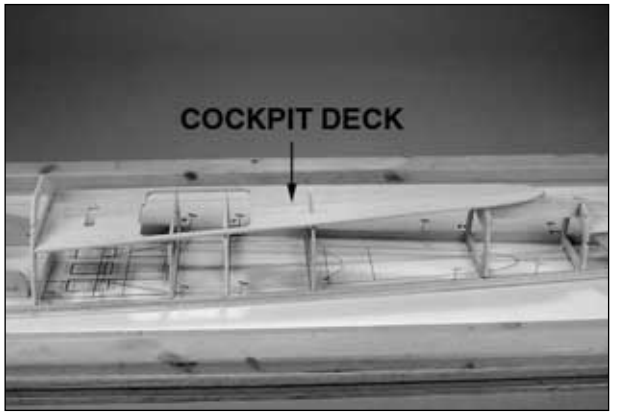


❏ 8. If you are going to install the optional Top Flite Scale Cockpit kit, use a straightedge and a ballpoint pen to mark the cut-out lines on both die-cut 1/8" plywood formers **F-6D** and **F-7A** as shown. The shaded portions shown in the photo will be removed **later** to accommodate the cockpit kit. Cut **partway** through the formers, so they will be easier to cutout after they are glued into position.

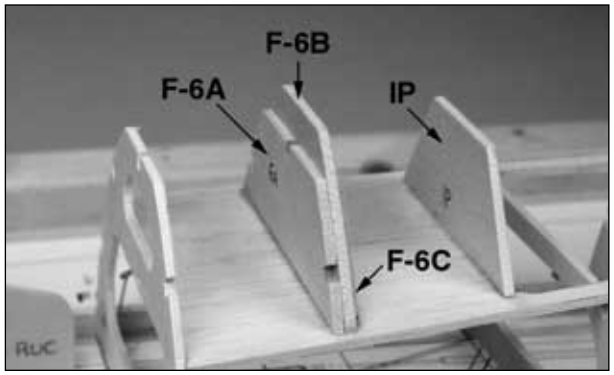
❏ 9. Glue formers **F-5A** through **F-10A** to the main stringers over their location on the plan. Make certain the formers are facing forward and use a builder's square to hold the formers perpendicular while gluing them in place.



❏ 10. Assemble the stab base assembly at the back of the fuselage with both **stab bases (SB)**, the **fin LE brace**, the die-cut 1/8" balsa formers **F-11A** & **F-12A**, the die-cut 3/32" balsa **sub deck** and the die-cut 1/8" balsa **spine**. Glue the pieces into position.



❏ 11. Glue together both halves of the die-cut 1/8" balsa **cockpit deck** so the notches align. Sand the pieces flat and even. If you are going to install the scale cockpit interior, cut the deck along the partially embossed lines and remove that section. Fit, then glue the cockpit deck into position.

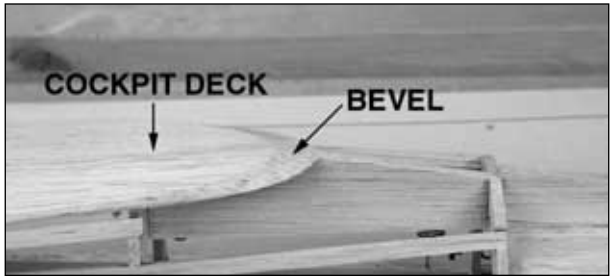


❏ 12. Glue together die-cut 1/8" balsa formers **F-6A**, **F-6B** and **F-6C**, then glue them into the notch in the cockpit deck. Glue the die-cut 1/8" balsa **instrument panel (IP)** to the cockpit deck. Note that the instrument panel and the F-6 assembly are perpendicular to the building board, not to the cockpit deck.

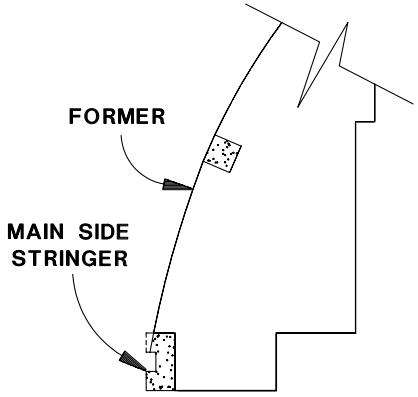
*Now for the **real** fun part...*

❏ 13. Use a total of seven 3/16" x 3/16" x 30" balsa sticks for the **stringers** in the top half of the fuselage. Without using any glue, start by fitting two stringers into the top three notches of F-1 to F-6D (you'll have about a half of a stringer leftover). Next, fit two more stringers into the notches of F-5A to F-9A (immediately under the cockpit deck) on both sides of the fuse (you'll have two half-stringers leftover). Then, fit the two leftover pieces into the notches of F-8A to F-10A on both sides of the fuse. And finally, fit three more stringers into the notches of F-1 to F-11A on both sides of the fuse. They will have to be spliced together at the notch in F-5A. Add former **F-1A** to the assembly as you are fitting the stringers to the front of the fuse.

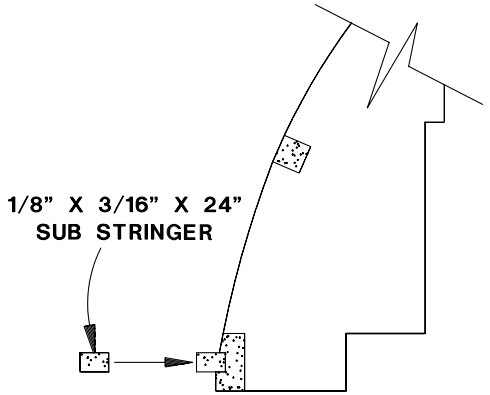
❏ 14. After the stringers and former F-1A have been fitted, glue them into position. Use a builder's square to make certain F-1A is perpendicular to the building board.



❏ 15. Bevel the edges of the cockpit deck to match the shape of the fuselage and the angle of the spine. Sand all of the stringers and the sub deck even with the formers.



❏ 16. Temporarily remove the T-pins from the main stringers and take the fuse top off the building board. Sand the main stringers to match the angle of the formers. Replace the fuse top on the building board, holding it down with T-pins.



❏ 17. Glue the five 1/8" x 3/16" x 24" **sub stringers** into the groove of the main stringers. Make sure none of the T-pins are protruding in the groove which would interfere with the fit of the sub stringers.

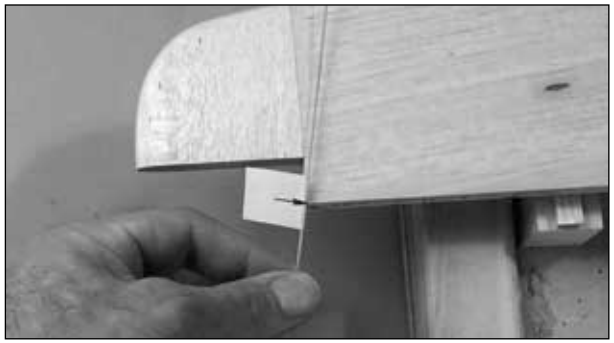
Before we can sheet the fuse top, the stab and fin must be glued into position.

Mount the stab and fin

❏ 1. Position the stab on the stab base. Taking careful measurements, make certain the stab is centered, side-to-side, on the stab bases. Place a weight on top of the stab to hold it down.

❏ 2. Measure the distance from the bottom of the stab at both tips down to the building board. If the

distances are not equal (if the stab is not level), **lightly** trim the stab bases until you can get the stab level. **Use caution not to change the incidence angle of the stab.** If the stab is not exactly level, but it's close, sometimes all it takes is shifting the weight slightly. **Hint:** Use balsa blocks of equal thickness to level the stab. If you do this, make certain the stab is fully contacting the stab bases.



❑ 3. Stick a T-pin into the center fuse stringer above F-1. Tie a small loop in one end of a 50" piece of non-elastic line such as monofilament or Kevlar fishing line. Slip the loop over the T-pin. Fold a piece of masking tape over the string near the other end and draw an arrow on it. Slide the tape along the string and 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 level and centered during this process.

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

❑ 5. Remove the stab. Mix up a batch of 30-minute epoxy. For additional strength, add Great Planes Milled Fiberglass (GMR6165). Apply epoxy to the stab bases and to the bottom of the stab where it contacts the saddles. Reposition the stab and place weights on top of it to hold it down. Confirm stab alignment with the pin and string. Wipe away excess epoxy and do not disturb the model until the epoxy has fully hardened.

Refer to this photo for the following three steps.

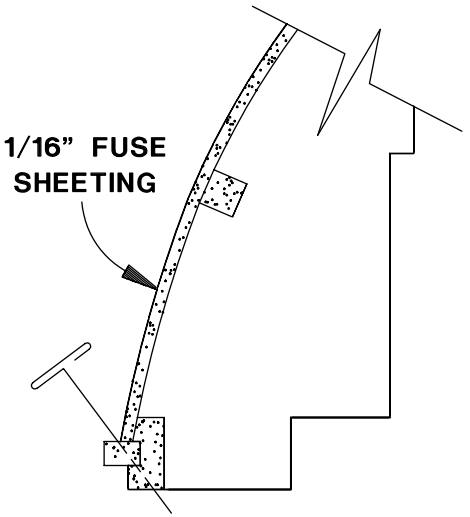
❑ 6. Use the "T-pin and straightedge" technique to mark a centerline down the TE of the fin. After the epoxy from the stab has fully hardened, test fit the fin to the stab and fuse. Use a builder's square placed along the centerline you marked on the fin TE to make sure the fin is vertical. Trim the fin sheeting where necessary for a good fit to the top of the stab and the sub stringers.

❑ 7. Temporarily join the elevators to the stab with the elevator joiner wire and the hinges. Cut round notches in the fin sheeting to accommodate the elevator joiner wire.

❑ 8. **With the elevator joiner wire in position**, glue the fin into position with 30-minute epoxy. Before the epoxy cures, make certain the fin is vertical and the front of rib V-1 is centered on F-12. Do not build up a fillet of epoxy between the fin sheeting and the stab.

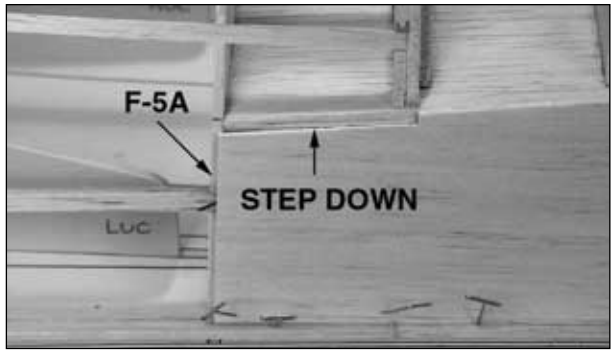
Sheet the top of the fuse

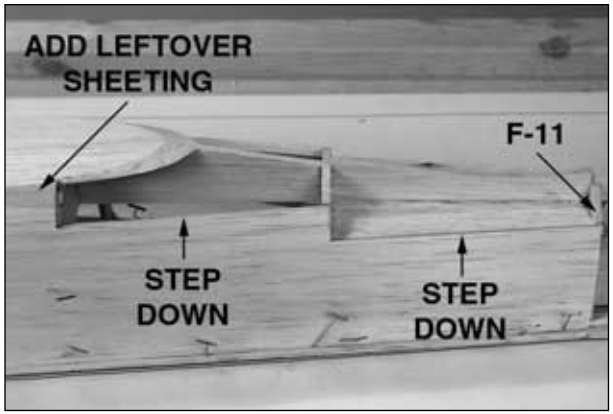
By now you've noticed that the Focke-Wulf fuselage has some interesting lines and curves. Unlike many other warbirds that have either a round fuselage (such as a Corsair) or a "slab-sided" fuselage (such as a Mustang), the Focke-Wulf fuse features a mixture of irregular curves and converging angles. While this doesn't necessarily make sheeting the fuselage difficult, careful thought and planning were required during the construction of our prototype to determine a procedure that modelers could duplicate. Blocks are used in areas where it would be too difficult to sheet. If you are an expert at sheeting models, or if you prefer to do it a different way, you could venture off. For most modelers, we recommend that you carefully follow these instructions to end up with a fuselage that replicates the lines of the Focke-Wulf.



❑ 1. One at a time, remove the T-pins from the main stringer and reinsert them as shown in the sketch. This way, the pins won't be concealed under the sheeting when it's time to take the fuse off the building board.

This is really the only "tricky" piece of sheeting. We've provided three photos to make sure you can do it correctly.

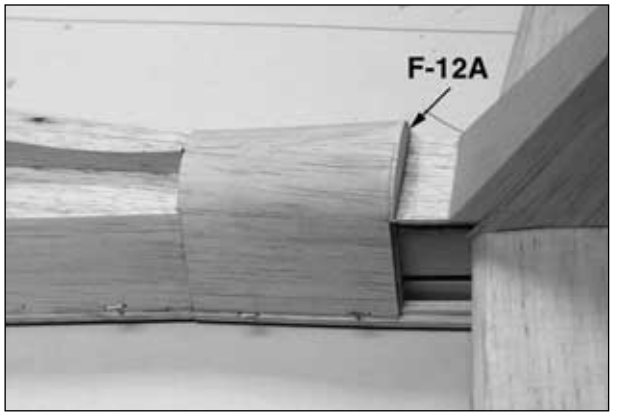




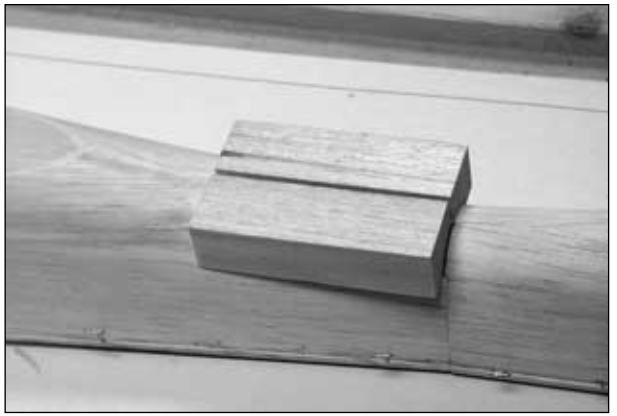
❏ 2. Cut 4" from a 1/16" x 3" x 30" balsa sheet. Set the 4" piece aside for use later. Cut the larger portion of the sheet to fit the fuse as shown. The sheet extends from the middle of F-5A to the middle of F-11. Cut the top edge of the sheet slightly higher than the cockpit deck (to be sanded flush later). The bottom of the sheet rests against the sub stringer. A piece of leftover 1/16" sheeting will have to be added to the top of the sheet where it cannot reach the cockpit deck. Note that the aft edge of the fuse sheet "steps down" twice; once to the middle of the stringer and once more to the top edge of the sub deck. The front of the sheet also has a step down to the stringer at F-6B. Once you have cut the sheet to fit, use a ballpoint pen to trace its outline onto another sheet to make a pattern for the right side.

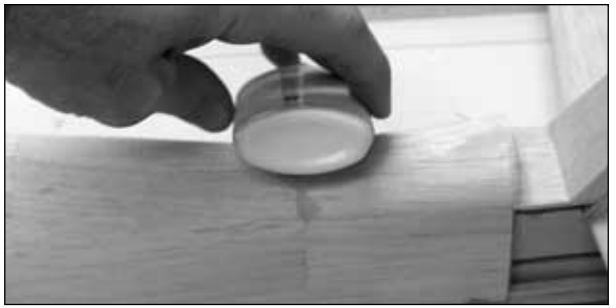
❏ 3. Glue the sheet into position. We prefer to use aliphatic resin to glue the sheet to the main and sub stringers holding it in place with T-pins. After the glue dries, wet the sheet with water or window cleaner (it shouldn't need much, it's only 1/16" thick), then use medium CA to glue it to the rest of the stringers, formers, sub deck and cockpit deck. Fit, then trim and glue the other sheet to the right side (setting aside another 4" portion of the sheet as you did in the previous step). **Hint:** When wetting the sheeting, use a paint brush to avoid getting over-spray on the rest of the structure.

❏ 4. Cut two 5" pieces from another 1/16" x 3" x 30" balsa sheet. Save the remaining 20" sheet for use later. Use the 5" pieces to sheet both sides of the fuse aft of the cockpit deck between F-9A and F-10A as shown in the photo.



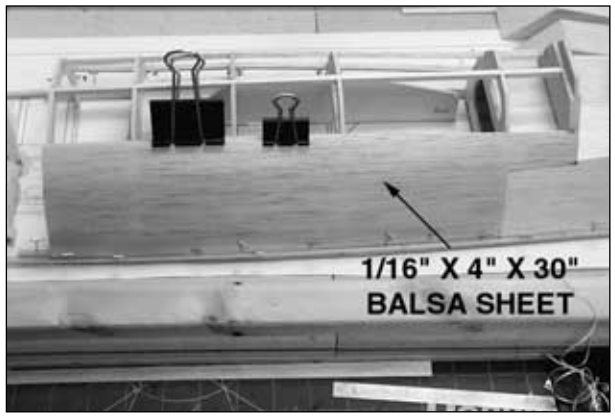
❏ 5. Sheet both sides of the fuse between F-11A and F-12A using both of the 4" pieces you cut in step 2 and 3. You'll have to add a strip of leftover sheeting to the bottom of the 4" sheet so it will reach all the way up to the spine. Note that the aft edge of the sheet extends to the **middle** of F-12A.



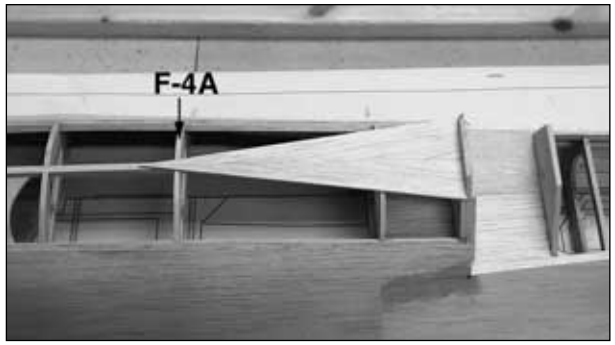


❏ 6. Glue both 1" x 1-3/16" x 4-1/8" balsa **aft turtle deck blocks** to the sub deck and the spine. Shape

the blocks to match the shape of the sheeting and the spine. **Hint:** After carving the block to the approximate shape, wrap a piece of Great Planes 80-grit adhesive back sandpaper around a glue bottle for a curved sander.



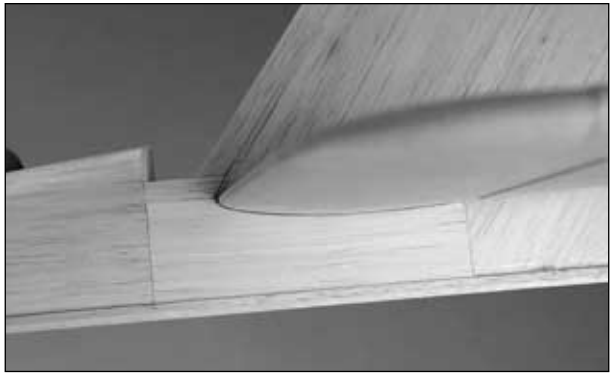
❏ 7. Sheet both sides of the front of the fuse as shown using one 1/16" x 4" x 30" balsa sheet.



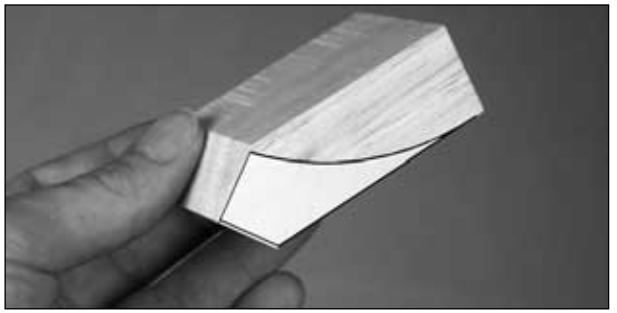
❏ 8. Cut 8" from the 20" sheet leftover from step 4. Use the 8" piece to sheet the top of the fuse from F-6B to a point 7/8" ahead of F-4A. Save the remaining 12" piece to sheet the fuse under the stab. Sheet the rest of the front of the fuse using a 1/16" x 3" x 30" balsa sheet. **Note:** Don't be too concerned about the appearance of the sheeting from F-6B to F-4A. This area of the fuse will be concealed by the molded ABS machine gun cover.

❏ 9. Sheet the instrument panel from F-6B to the IP with leftover 1/16" balsa.

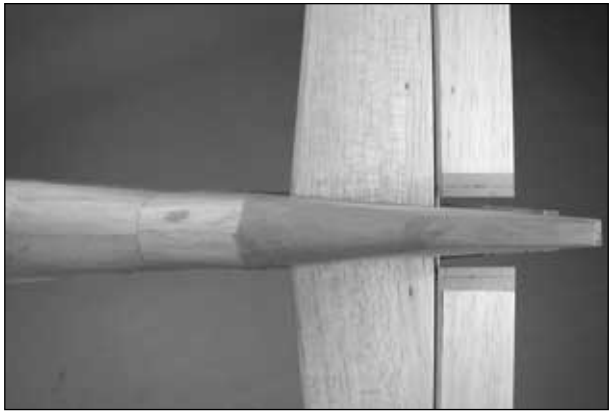
❏ 10. Remove all the T-pins and take the fuse top off the building board. Trim the sheeting and stringers even with F-1A. Look for glue joints you couldn't get to while the fuse top was pinned to the building board or ones that don't look strong enough and reinforce them with CA.



❏ 11. Use the 12" piece of 1/16" sheeting leftover from step 8 to sheet both sides of the fuse under the stab.



❏ 12. Use the pattern provided on the plan to shape the 1-1/8" x 1-7/8" x 3" balsa **fin fillet block** as shown in the photo.



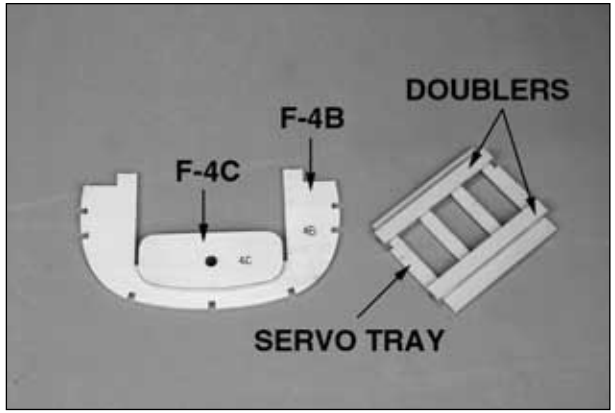
❏ 13. Glue the **fin fillet block** into position. Carve, then sand the fin fillet block blending it to the fin and the fuse. As you proceed, round the LE of the fin, but

do not round the tip of the fin until instructed to do so. Fill the gap between the fuse sheeting and the fin fillet block with balsa filler.

Note: From some viewpoints, the aft end of the fuse where it joins the fin features some "funny" angles. Due to the added fuse section, this represents the actual shape of the full-size Fw 190D. In truth, your model probably looks better than the real one! *Hey, they didn't build 'em pretty, they just had to get the job done!*

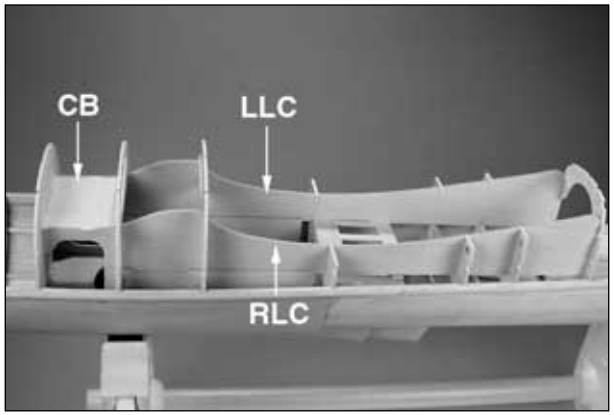
Build the fuse bottom

❏ 1. Reinforce the glue joint inside the fuse between the bottom of the stab and the stab bases with a small fillet of 30-minute epoxy. For additional strength, mix in milled glass fibers.



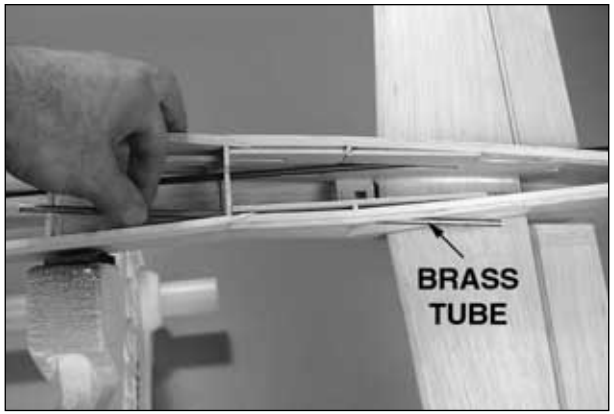
❏ 2. Test fit your servos in the die-cut 1/8" plywood **servo tray**. If necessary, make adjustments to the tray so your servos will fit. Glue the two **doublers** to the bottom of the servo tray for the servo screws. Drill a 5/16" hole through the punchmarks in the laser-cut 1/8" ply former **F-4C**, then glue it to the front of **F-4B** so the holes align. Remove glue from inside the holes before it hardens.

Do you enjoy puzzles? If you do, you'll enjoy the next few steps.



❏ 3. All of the parts in this step are die-cut 1/8" plywood. Fit but do not glue the **right** and **left lower crutches (RLC, LLC)**, the **crutch bottom (CB),** one of the firewall laminations **F-1**, the servo tray and **F-2B** through **F-8B**. Inspect all joints for a good fit and make adjustments where necessary.

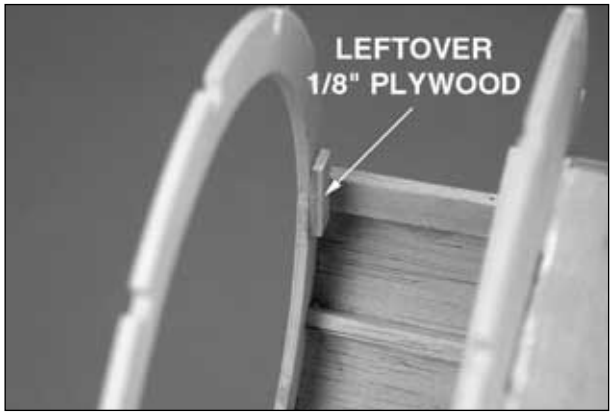
❏ 4. Once you are satisfied with the fit of all the parts, permanently glue everything **except for F-1B** into position.

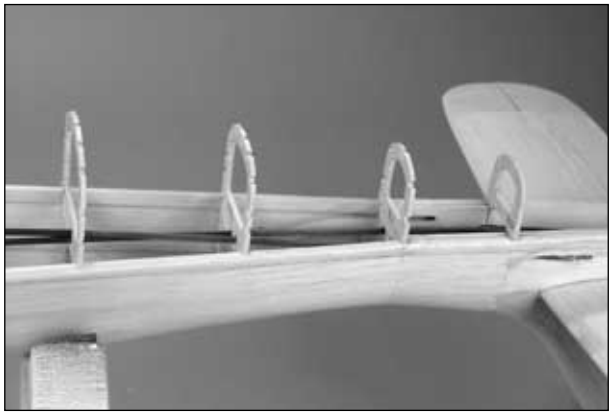


❏ 5. Cut elevator and rudder pushrod exit slots in the aft end of the fuse sheeting. **Hint:** Use a 3/16" brass tube sharpened on the end to cut the slots. Slide the tube through the holes in the formers so the slots will be in the correct position and at the correct angle.

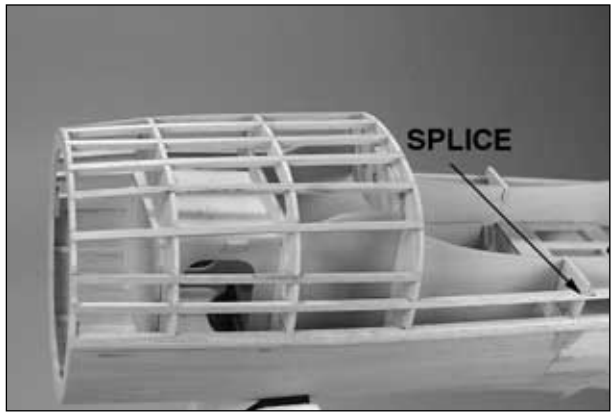
❏ 6. Cut two 3/16" pushrod guide tubes to a length of 29" and 31". Scuff the guide tubes with coarse sandpaper so glue will adhere.

❏ 7. Install the tubes and glue them to F-11A with CA and to the sheeting where they exit the fuse with epoxy mixed with microballoons. The tubes will be sanded even with the sheeting after the rest of the fuse is sheeted.





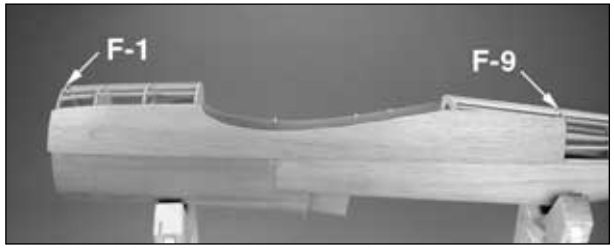
❏ 8. Glue **F-1B** and **F-9B** through **F-12B** to the main fuse stringers and to their respective formers. Glue a small strip of leftover 1/8" plywood across the glue joint between both sides of F-1A and F-1B.



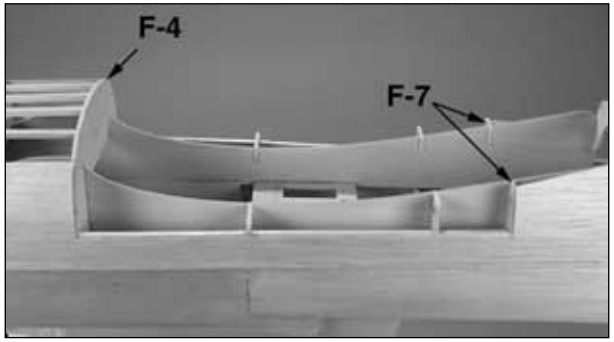
❏ 9. Cut ten 3/16" x 3/16" x 36" balsa stringers to the correct length, then glue them into the notches in the formers on the bottom of the fuse. Carefully view the formers and remove any twist as you glue the stringers to them. The stringers nearest the main stringer will have to be spliced together at F-5. Trim the ends of the stringers even with F-1, F-4, F-8 and F-12.

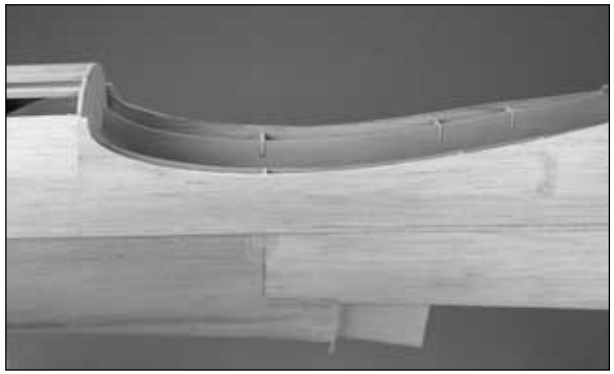
❏ 10. Sand the formers and stringers, blending them together.

Sheet the bottom of the fuse



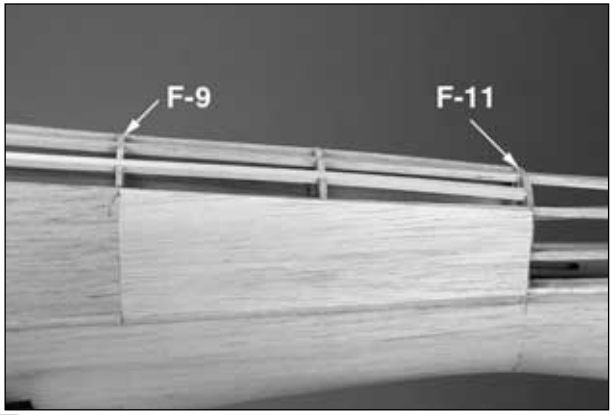
❏ 1. Sheet the right side of the fuse from F-1 to F-9 with a 1/16" x 3" x 36" balsa sheet. The aft end of the sheet must align with the middle of F-9. The same as you did when you glued the first piece of sheeting to the top half of the fuse, we recommend you first glue the sheet to the main stringer, allow the glue to dry, then wet the sheet and glue it to the rest of the stringers and formers. Trim the sheeting even with the lower fuse crutches.





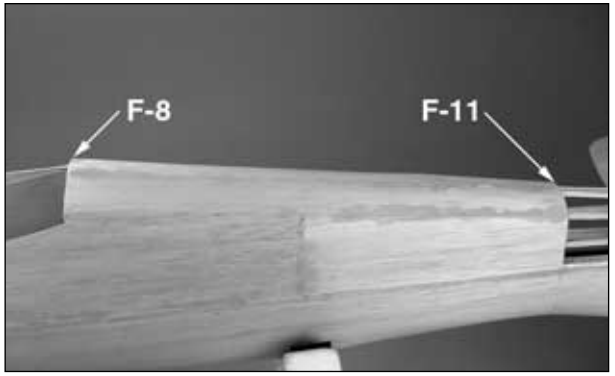
❏ 2. If you notice that, after it has been glued into place, the sheeting bows noticeably outward in the wing saddle area between F-4 and F-7 (it most likely will), first allow the water you applied for bending to **fully** dry. This may take a few hours or even overnight. If the sheeting is still bowed outward, cut that part of sheeting from the fuse and replace it with a separate piece of leftover 1/16" sheeting.

❏ 3. Sheet the left side of the fuse the same way.

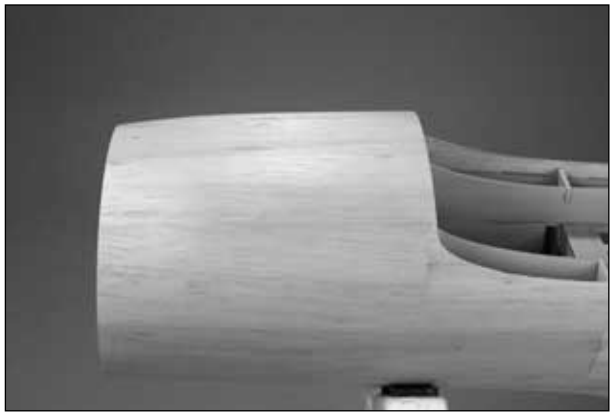


❏ 4. Sheet both sides of the fuse from F-9 to F-11 with one 1/16" x 3" x 30" balsa sheet.

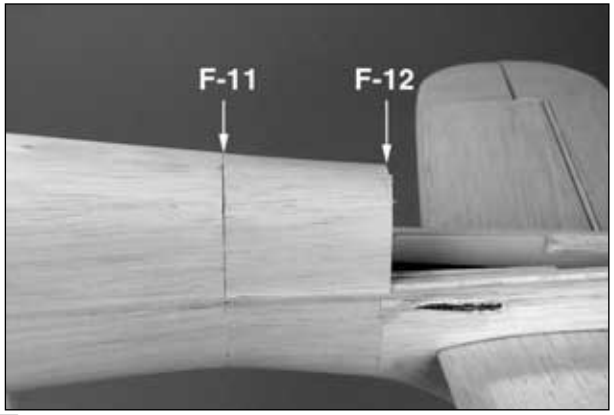
❏ 5. Glue the pushrod guide tubes to F-9 & F-10.



❏ 6. Sheet the bottom of the fuse from F-8 to F-11 with two 1/16" x 3" x 30" balsa sheets.



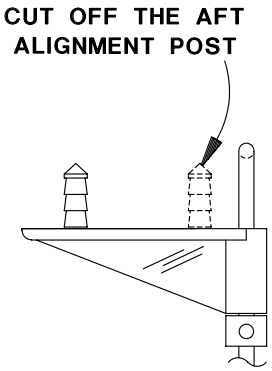
❏ 7. Sheet the rest of the fuse bottom from F-4 to F-1 with 1/16" sheeting left over from the preceding steps. Do this in three strips to distribute the compound bending that will be required of each sheet.



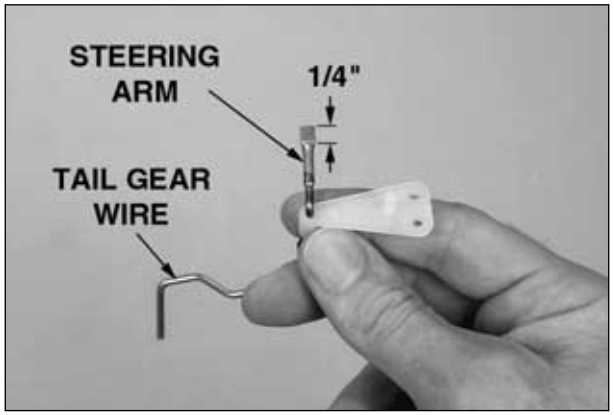
❏ 8. Sheet the last section of the bottom of the fuse from F-11 to F-12 using leftover 1/16" balsa sheeting.

❏ 9. Sand the fuse sheeting even with F-1, F-8 and F-12.

Mount the tail gear

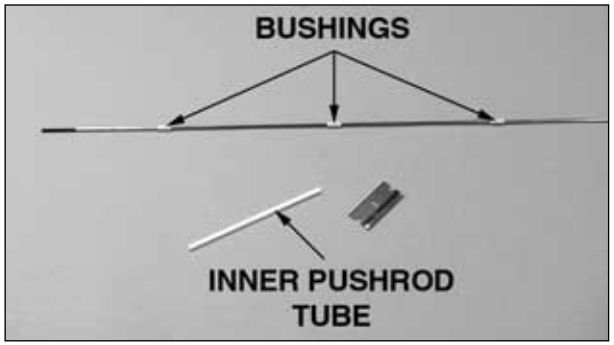


❏ 1. Cut the aft **alignment post** off the nylon **tail gear bracket**.



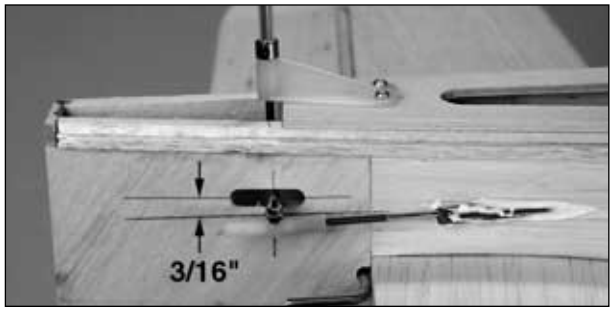
❏ 2. Use pliers to flatten 1/4" of one end of the 1/8" x 5/8" brass tube. Slide the tube onto the **tail gear wire** and place the assembly over the top view of the plan to make sure it is the correct length. Silver solder the brass tube to the tail gear wire. Drill a 1/16" hole through the end of the brass tube where shown on the plan. From now on this portion of the tail gear wire will be referred to as the ***steering arm***.

❏ 3. Drill a 1/16" hole through the two front punchmarks and a 1/8" hole through the aft punchmark in the die-cut 1/8" plywood **tail gear mount plate**. Make a 1/8" x 1/4" x 3/4" **doubler** for the screws that hold the **tail gear mount** and glue it across the two forward holes in the plate. Temporarily mount the tail gear mount to the tail gear mount plate with two #2 x 3/8" screws (you can see the assembly in the photo at step 6).



❏ 4. Use a tissue dampened with denatured alcohol or a similar solvent to remove the oil coating from one of the .074" X 36" pushrod wires. Cut twelve 3/8" long **bushings** from the 6" white inner pushrod tube, then slide them onto the wire and space them as shown on the **tail gear pushrod** on the fuse plan. Make sure you position the bushings at the ends of the wire so they will not protrude from the rudder guide tube, or the controls could become jammed during flight. If the bushings slide onto the wires easily, secure them with a drop of thin CA. Allow the CA to fully harden before proceeding. If the bushings are impossible to slide on, cut them to a shorter length to provide less resistance.

❏ 5. Slide the pushrod wire with the bushings on it into the rudder pushrod guide tube on the left side of the fuselage. Place a straightedge on the fuse and align it with the wire. Use a ballpoint pen to mark a line along the straightedge.



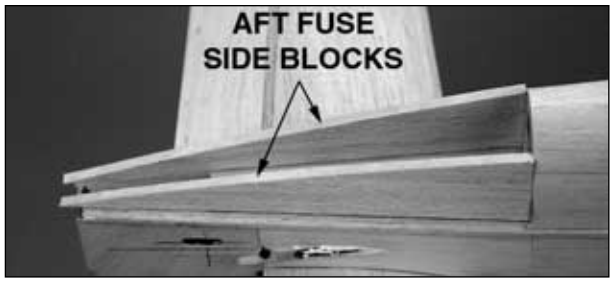
Refer to this photo for the following three steps.

❏ 6. Thread a nylon **dual-ended ball link** onto the wire pushrod, then snap in a **threaded ball**. Reinsert the pushrod into the guide tube. Neatly cut an exit slot in the fuse sheeting to accommodate the steering arm. The center of the slot should be 3/16" below the line you drew on the fuse sheeting.

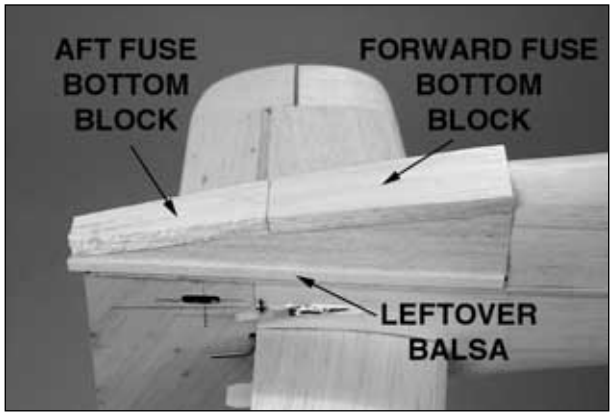
❏ 7. Without using any glue, position the tail gear mounting plate on the fuse. Temporarily mount the threaded ball (that you snapped into the ball link on the pushrod) to the steering arm with an **0-80 nut**.

❏ 8. Move the pushrod back and forth to see if the slot is long enough for the steering arm. Lengthen the exit slot if necessary.

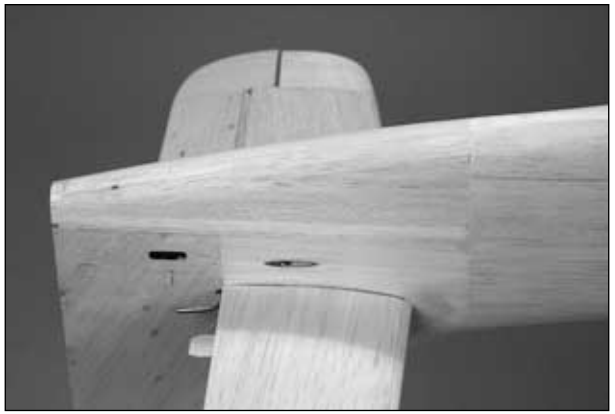
❏ 9. Remove the tail gear mount from the tail gear mounting plate. Permanently glue the mount plate to the main stringers and F-12. Glue a couple of leftover 1/8" balsa strips to the main stringers behind the tail gear mount plate to take up the empty space.



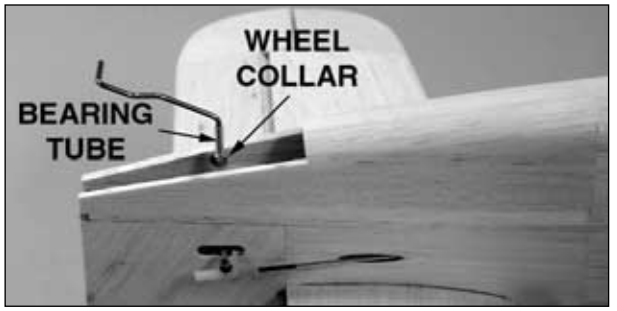
❏ 10. Glue both shaped 1/4" balsa **aft fuse side blocks** to F-12 and the bottom of the tail gear mount plate.



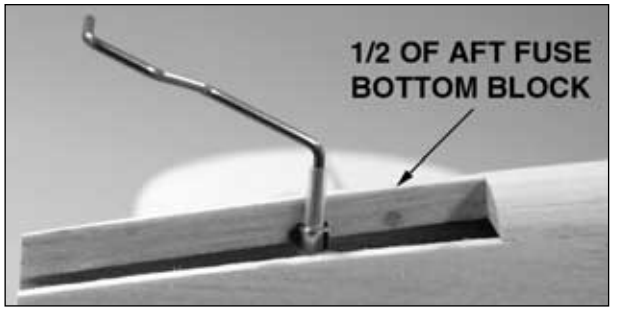
❏ 11. Permanently glue the 3/8" x 2" x 4-3/4" **forward fuse bottom block** to F-12 and the aft fuse side blocks. **Tack glue** the 3/8" x 1-3/8" x 4" x **aft fuse bottom block** to the aft fuse side blocks so it can be removed after it is shaped. After the fuse bottom has been final shaped, the aft fuse bottom block will be removed for installation of the tail gear. Glue a strip of leftover balsa into the groove on the main stringer on both sides of the fuse.



❏ 12. Remove the tail gear pushrod. Sand the guide tubes on both sides of the fuse even with the fuse sides. Use a razor plane or a carving knife followed by sanding to shape the blocks to match the fuse.



❏ 13. Pop off the aft fuse bottom block that you tack glued earlier. Permanently mount the tail gear mount to the tail gear mount plate with two #2 x 3/8" screws. Add a few drops of CA so the screws will never loosen. Add a drop of thread locking cement to the set screw that holds the wheel collar. Center the steering arm, height-wise, in the slot, then tighten the set screw. Add a drop of household oil to the tail gear wire where it enters the nylon bearing tube (so any glue that gets into the area will not adhere and bind the steering).

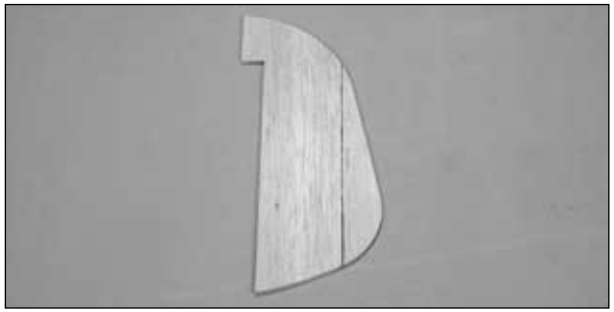


❏ 14. Cut the aft fuse bottom block into two pieces. Cut a half-round hole in each half that aligns with the tail gear wire. Permanently glue the blocks into position.

❏ 15. Glue the die-cut 1/8" balsa **fin TE** to the fin TE spar. Sand the fin TE to blend in with the fin and the bottom of the fuse.

Now the fuse is far enough along that the rudder can be built. For a perfect match, it's built directly onto the fin.

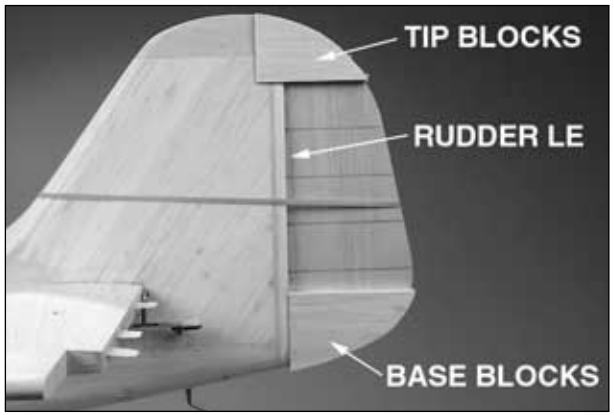
Build the rudder



❏ 1. Glue together both die-cut 1/8" balsa parts of the **rudder core**.

❏ 2. Place the rudder core over the rudder plan. Use a ballpoint pen to mark the locations of the rudder ribs on both sides of the rudder core.

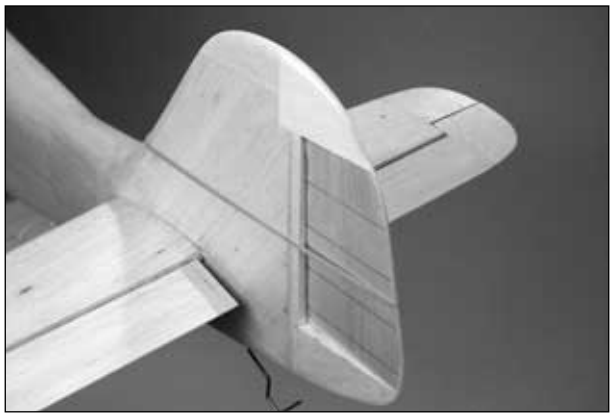
Refer to this photo for the following three steps.



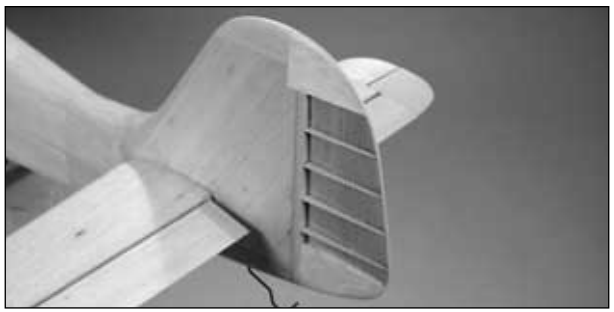
❏ 3. Make both **rudder tip blocks** from the 1/4" x 1-7/8" x 6" balsa sheet and make both **rudder base blocks** from the 3/8" x 2-1/8" x 7" balsa sheet. Glue the blocks to the rudder core, then shape them to match the rudder core, but do not round them yet.

❏ 4. Cut the **rudder LE** from the 1/4" x 7/8" x 12" balsa stick, then tack glue it to the TE of the fin.

❏ 5. Securely glue the rudder core and the tip and base blocks to the rudder LE that is tack glued to the fin. Be certain the rudder is centered. Be careful not to inadvertently glue the rudder to the fin. **Hint:** Use a rubber band to hold the rudder to the fin while you center it up for gluing it into position.



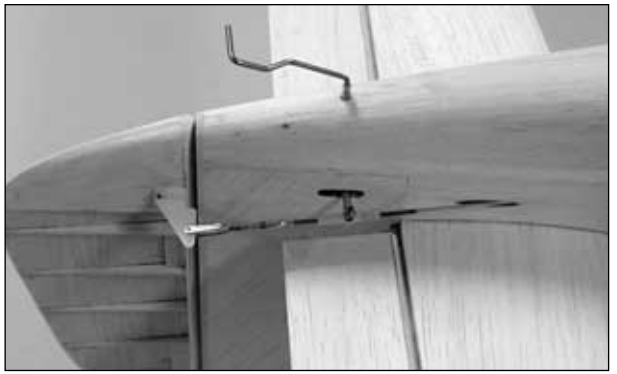
❏ 6. Start with a razor plane followed with a bar sander to carefully blend the rudder tip blocks to the fin, then round the fin tip and rudder tip to match each other. Round the rudder base blocks to match the bottom of the fuse.



❏ 7. Cut the **rudder ribs** from the 3/32" x 5/16" x 30" balsa stick, then glue them to the rudder. Shape the ribs to match the rudder.

❏ 8. Carefully break the rudder free from the fin. Cut the **rudder hinge blocks** from strips of leftover 1/8" balsa and glue them to both sides of the rudder core. The same as you did for the elevators, draw a centerline on the rudder LE and the fin TE and cut slots for the hinges. Bevel the LE of the rudder and round the balance tab to clear the fin. Test fit the rudder to the fin. Make certain you can achieve 1-1/4" of right and left control throw.

While we're working on the rudder and the back of the fuse, let's go ahead and mount the control horns. Do the rudder first.

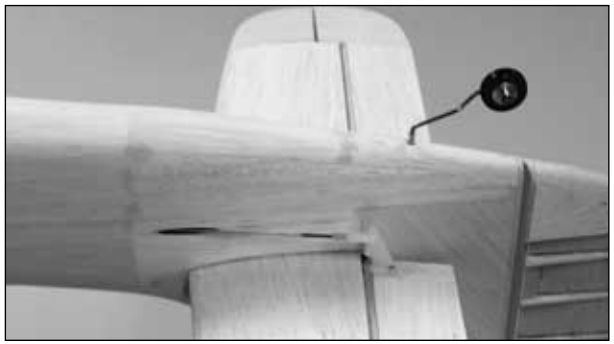


❏ 9. Install the tail gear pushrod and temporarily connect it to the steering arm on the tail gear the same as you did before. Connect the rudder to the steering arm using the hardware shown on the plan and in the photo. Use silver solder to join the .074" x 4" pushrod to the threaded coupler.

❏ 10. Adjust the metal clevis so the rudder will be centered when the tail gear is centered.

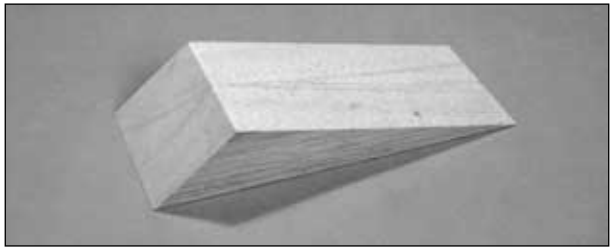
❏ 11. After you mount the control horn to the rudder, remove the control horn. Use a pin to poke several holes in the balsa in the area of the control horn. Apply a few drops of thin CA to the screw holes and to the area of the pinholes to harden the balsa for the control horn.

❏ 12. The same as you did the tail gear pushrod, prepare the **elevator pushrod** from a .074" x 36" threaded one end pushrod with 3/8" bushings cut from the inner pushrod tube. Connect the pushrod to a nylon clevis and a large nylon control horn. Mount the control horn to the elevator with two 2-56 x 5/8" screws and the nylon mount plate on the top of the elevator (see the elevator cross-section on the plan).



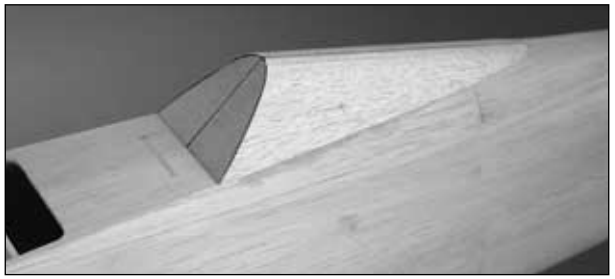
❏ 13. Remove the elevator horn. The same as the rudder, poke several holes in the rudder base block in the area of the horn and apply a few drops of thin CA. Sand smooth, then temporarily mount the elevator horn.

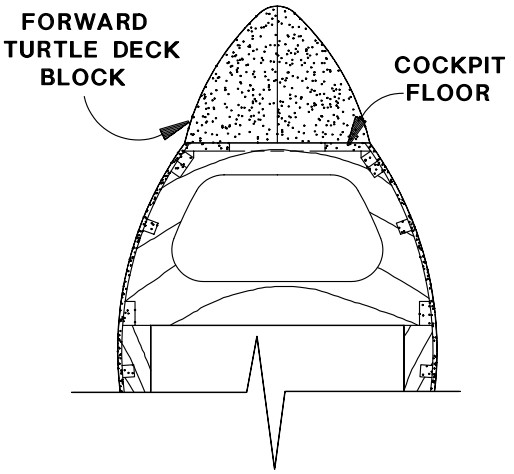
Finish the turtle deck



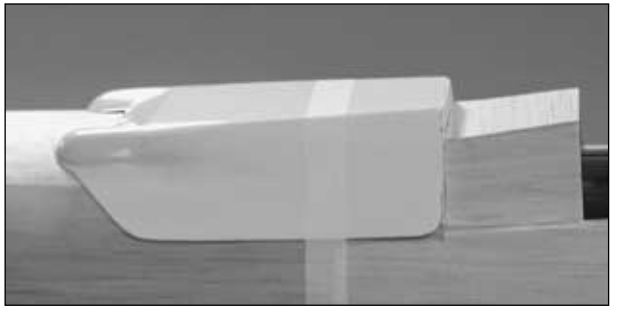
❏ 1. Glue together both shaped 1-1/2" balsa **forward turtle deck blocks**.

❏ 2. Cut the forward turtle deck pattern from the plan. Use a ballpoint pen to trace its outline onto the forward turtle deck block. Draw a centerline down the top of the block as well.

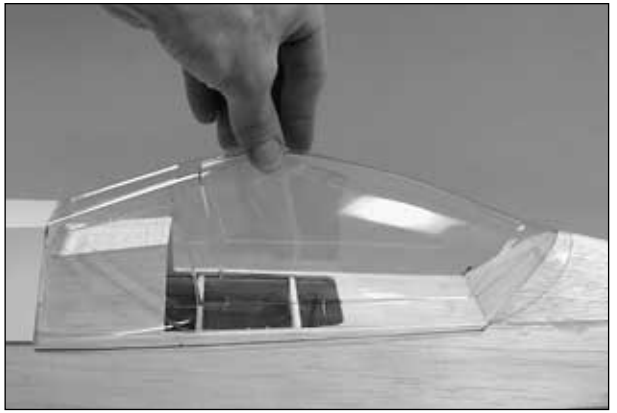




❏ 3. Glue the forward turtle deck block to the top of the cockpit deck. Use a razor plane followed by a bar sander to shape the block to match the outline you drew on the front. The block blends to the fuse in the rear. It's a little tricky to carve, because the shape of the fuse changes angles at the base of the block as shown in the sketch. Don't final shape the forward turtle deck block until you fit it to the canopy in the following steps.

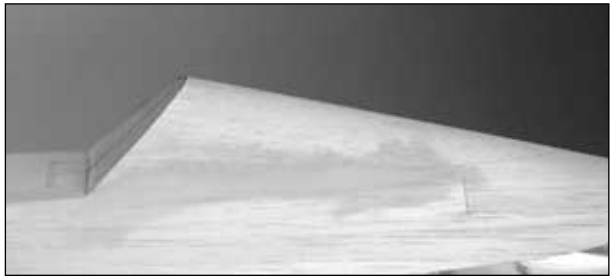


❏ 4. Use curved-tip scissors to trim the molded ABS machine gun cover along the molded-in cutlines. The cutlines are most easily seen from the inside. True the edges with a bar sander and 80-grit sandpaper. Temporarily hold the machine gun cover to the fuse with masking tape. Note that the aft edge of the machine gun cover aligns with the middle of former F-6B.



❏ 5. Trim the clear molded canopy along the molded-in cutlines. True the edges with a bar sander and 80-grit sandpaper. Test-fit the canopy to the fuse. The front edges of the canopy should join the aft edge of the machine gun cover. Trim both pieces as necessary for a good fit.

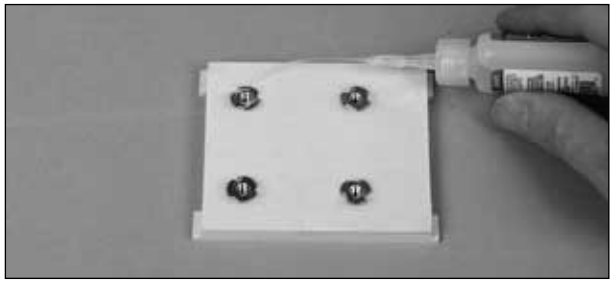
❏ 6. Trim the bottom edges of the canopy so that it overlaps the fuse by approximately 3/16" to provide a gluing surface.



❏ 7. Once you have achieved a good fit between the canopy and the fuse and between the canopy and the machine gun cover, finish shaping the forward turtle deck block to fit the canopy. Use balsa filler to blend the turtle deck block to the fuse at the seam where they join.

Mount the engine

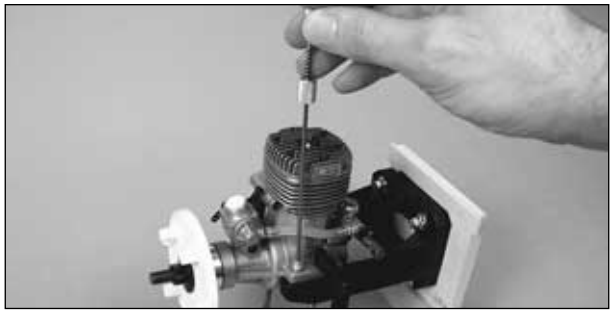
❏ 1. Use thick CA or epoxy to glue together the die-cut 1/8" plywood pieces **FW-1**, **FW-2** and **FW-3** that make up the **firewall**. If the individual pieces are twisted, clamp them to a flat table or piece of wood covered with wax paper. Be certain they stay in alignment. If the pieces are twisted, simply clamping them together may not cancel the twist.



❏ 2. Drill four 7/32" holes through the punchmarks in the firewall. Use a hammer to lightly tap four 8-32 blind nuts into the holes in the back of the firewall. Permanently glue the blind nuts into the firewall with a few drops of thin CA.

❏ 3. Cut a 2-3/4" long **forward tank mount tab** from the 1/4" x 3/8" x 36" basswood stick. Save the remainder of this basswood stick for the servo hatch rails in the wing. Glue the tab to the back of the firewall 1/8" above the bottom edge.

❏ 4. Mount the **Great Planes .60-1.20 Adjustable Engine Mount** to the firewall with four 8-32 x 1-1/4" socket head cap screws and #8 lock washers and flat washers (note that the engine is mounted inverted). Leave the screws loose enough to slide the halves of the mount in and out. Adjust the mount so it fits your engine, then tighten the screws and temporarily clamp the engine to the mount with the back plate of a 3" spinner 6-1/4" from the firewall. **Note:** Some spinners have a flat back plate and some spinners have an in-set back plate. Take this into account when mounting your engine. It may be a good idea to actually have your spinner back plate mounted on your engine for this step.



❏ 5. Use a Great Planes Dead Center Hole Locator (GPMR8130) to mark the locations of the holes in the mount for mounting your engine. Remove the engine, then drill four #29 (or 9/64") holes at the marks. Tap 8-32 threads into the holes. Mount the engine to the mount with four 8-32 x 1" screws and washers. Remove the engine mount from the firewall.

❏ 6. If you have your fuel tank on hand, drill 1/4" (or 15/64" for a perfect fit) holes through the firewall to pass the fuel tubing. If you don't have your tank yet or plan a mounting method other than that shown in the manual, you may wait until later to drill the holes.

❏ 7. Test fit, then glue the firewall to the fuse with 30-minute epoxy. Add Great Planes Milled Glass Fibers for additional strength. Make certain the firewall is oriented correctly, so the engine will be mounted as you intended (inverted if you've followed the instructions and plan).

That's about all that can be done on the fuse until we have a wing, so...let's build the wing.

BUILD THE WING

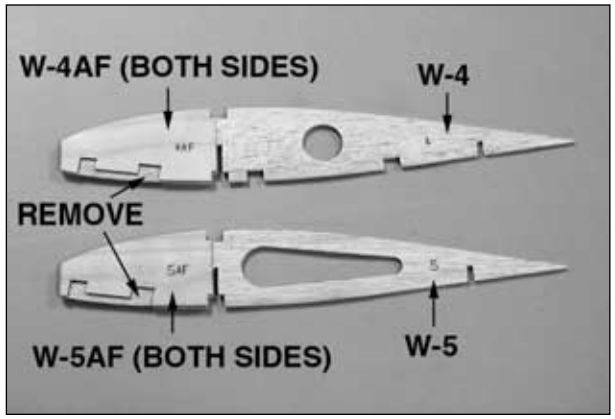
Preparation

Reminder: *If you're installing retracts, take the air lines out of the package and hang them somewhere in your workshop. This will straighten the lines and make them easier to install when it's time.*

Each wing panel is built right-side up over the wing panel plan. The manual shows photos of the **right** wing panel, so start building the right wing panel first.

❏ ❏ 1. Cut the **right** (or **left**, if this is your second wing panel) wing plan from the wing plan sheet and place it over your building board. Cover the plan with Great Planes Plan Protector or wax paper.

Perform steps F2 through F4 only if you are building your wing with FIXED landing gear. An "F" placed in front of each step notes that it is for FIXED landing gear ONLY.

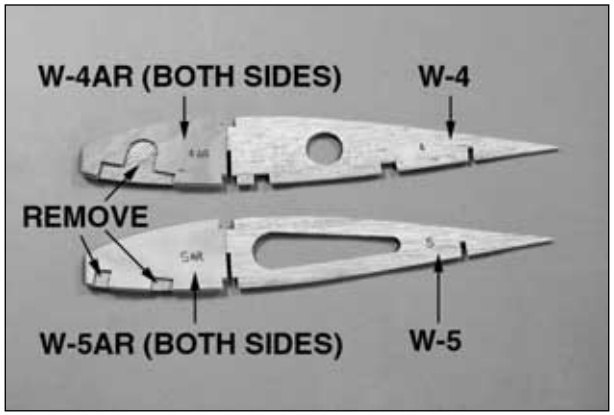


❏ ❏ F2. Use thick CA or epoxy to glue two die-cut 1/16" plywood **rib doublers W-4AF** to both sides of the die-cut 3/32" balsa **wing rib W-4**. Glue two die-cut 1/16" plywood **rib doublers W-5AF** to both sides of the die-cut 3/32" balsa **wing rib W-5.**

❏ ❏ F3. Use a hobby knife to remove the shaded portion of balsa shown in the photo.

❏ F4. Repeat the previous two steps to make another set of ribs for the other wing panel.

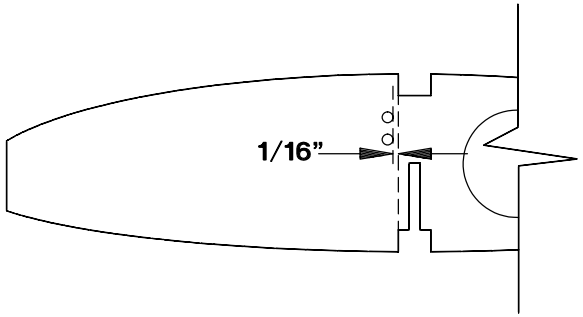
Perform steps R5 through R8 only if you are building your wing with RETRACTABLE landing gear. An "R" placed in front of each step notes that it is for RETRACTABLE landing gear ONLY.



❏ ❏ R5. Use thick CA or epoxy to glue two die-cut 1/16" plywood **rib doublers W-4AR** to both sides of the die-cut 3/32" balsa **wing rib W-4**. Glue two die-cut 1/16" plywood **rib doublers W-5AR** to both sides of the die-cut 3/32" balsa **wing rib W-5.**

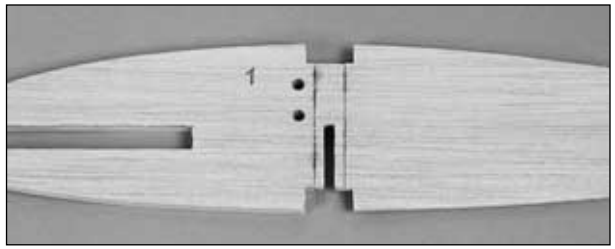
❏ ❏ R6. Use a hobby knife to remove the shaded portion of balsa shown in the photo.

❏ R7. Repeat the previous two steps to make another set of ribs for the other wing panel.



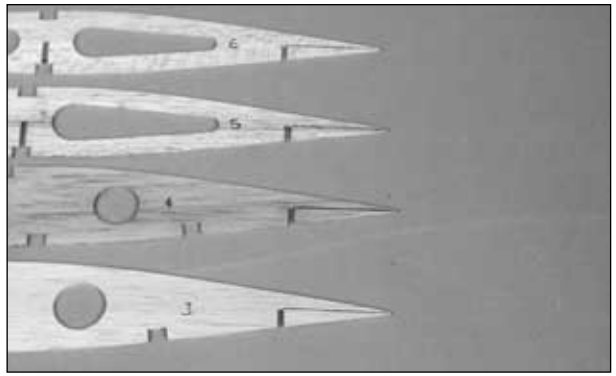
❏ R8. Use a 5/32" brass tube sharpened on the end to cut two holes for the air lines in each set of ribs W-1, W-2 and W-3. The holes should be located near the top of the ribs and the aft edge of the holes should be located 1/16" forward of the top and bottom main spars as shown in the sketch. The holes in both W-1's should align with each other.

❏ 9. Glue one of the die-cut 1/8" plywood **rib doublers W-1A** to one side of the die-cut 3/32" balsa rib **W-1**. Glue the other W-1A to the other side of the other W-1. Be certain you are making a **right** and a **left**. If you're installing retracts, drill the holes through the doublers for the air lines.



❏ 10. Use a hobby knife and a straightedge to **lightly** score both W-1's as shown. When it's time to join the wing panels, this section of balsa will be removed to accommodate the wing joiners.

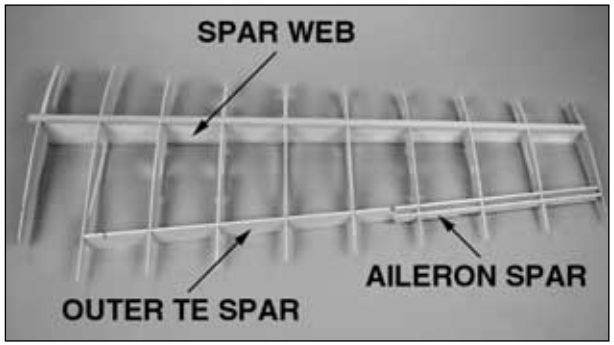
Perform this step only if you are building flaps.



❏ 11. Use a straightedge to cut partway through ribs W-3 through W-6 (and W-6B) from the aft notch to the tip of the rib. This section of rib will be removed when it's time to build the flaps.

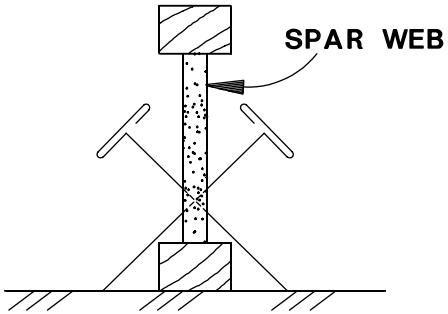
Frame the wing panel

Refer to this photo for the following two steps.

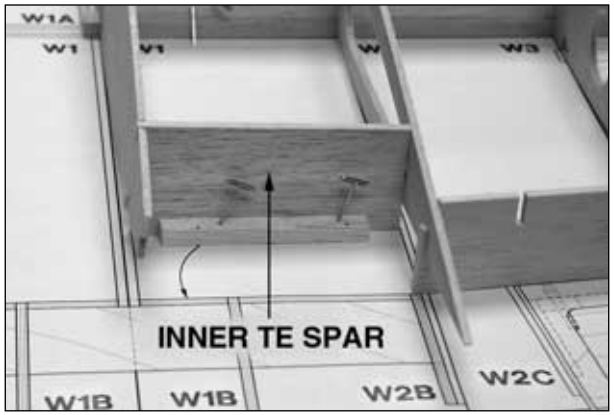


❏ ❏ 1. **Without using any glue** until instructed to do so, join ribs W-2 through W-9 to the die-cut 1/8" balsa **spar web**. Join the 1/4" x 3/8" x 30" basswood **top** and **bottom main spars**, followed by the die-cut 1/8" balsa **outer TE spar** and the die-cut 1/8" balsa **aileron spar**.

❏ ❏ 2. Join ribs W-10 and W-1 to the assembly. Make certain the ends of the top and bottom spars extend beyond W-1, so they can be trimmed flush later.



❏ ❏ 3. Place the assembly over the plan. Making certain the parts are accurately aligned over the plan, insert T-pins through the spar web to hold the bottom spar and the spar web flat on the building board. Insert T-pins through the TE spar (or use leftover rib jigs) to hold the TE spar to the building board.

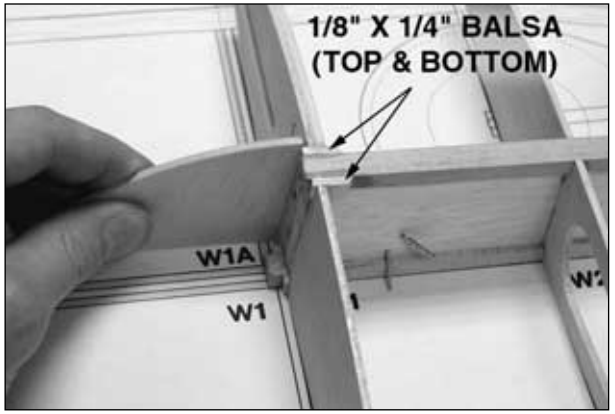


❏ ❏ 4. Join the die-cut 1/8" balsa **inner TE spar** to the assembly and hold it down with jig sticks pinned to the building board.

Now it's time to glue!

❏ ❏ 5. Be sure that all the parts align with their location on the plan, that the ribs are fully seated into the notches of the outer TE spar and that the TE spar is fully contacting the plan. Glue the spar web to the top and bottom spars and to all ribs **except W-1**. Glue the ribs to the outer TE spar and to the aileron spar. Use a small builder's square to make certain tip rib W-10 is perpendicular to the building board (this will align the wing tip blocks with the wing when it's time to glue them on).

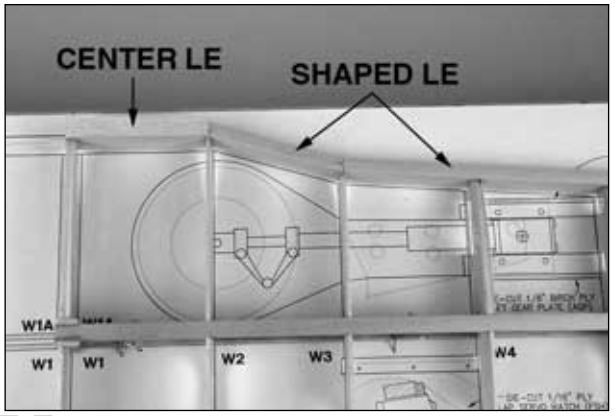
Refer to this photo for the following two steps.



❏ ❏ 6. Insert strips of leftover 1/8" x 1/4" balsa between the top and bottom main spars and rib W-1. These will help support W-1 when a portion of it is removed to accommodate the spar joiners.

❏ ❏ 7. Use the die-cut 1/8" plywood **dihedral gauge** to hold W-1 at the correct angle, then glue it into position. Don't glue W-1 to the spar web. Just glue it to the leftovers you glued in, in the above step and to the inner TE spar.

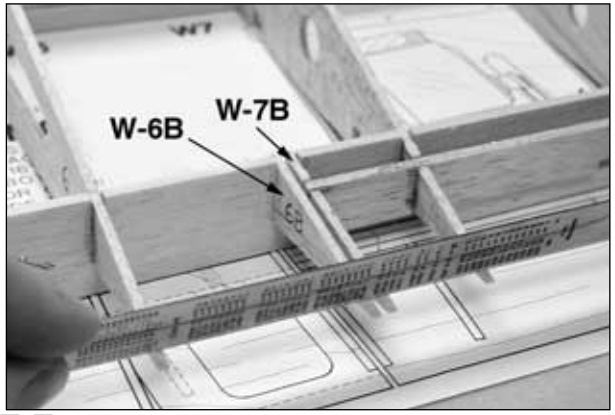
Refer to this photo for the following three steps.



❏ ❏ 8. Cut the shaped 30" balsa **leading edge** to the correct length to fit the wing from W-3 to W-10 as shown on the plan. Glue the LE, centered height-wise, to the fronts of the ribs.

❏ ❏ 9. Cut the remainder of the shaped LE to the correct length, then glue it to ribs 2 and 3.

❏ ❏ 10. Cut the 1/2" x 1-1/4" x 7" **center LE** into two 3-1/2" pieces. Use the dihedral gauge to mark the angle on one end of the center LE to match the angle of W-1. Cut the center LE at the line you marked and glue the center LE to the wing.



❏ ❏ 11. Add the die-cut 3/32" balsa **rib tips W-2C**, **W-6B** and **W-7B** to the outer TE spar. While gluing the ribs into position, use a straightedge to align them with the other ribs on the wing.

❏ ❏ 12. Use a bar sander with 80-grit sandpaper to sand the tops of the ribs and spars even.

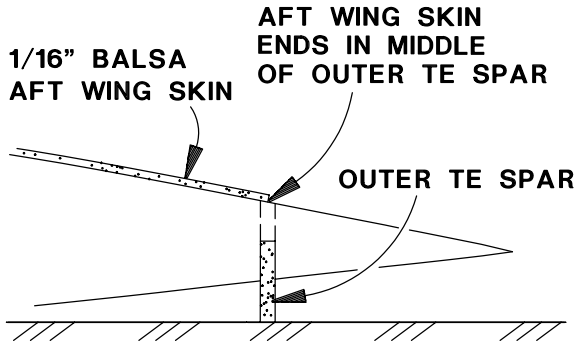
Now the wing is ready for the top sheeting. But first, you have to make the wing skins.

❏ 13. Glue together the wing skins the same as you did the stab and fin skins. Start by making eight 6" x 30" balsa sheets from sixteen 1/16" x 3" x 30" balsa sheets. (You can make all the skins in an *assembly-line* fashion now, or make them as you need them.)

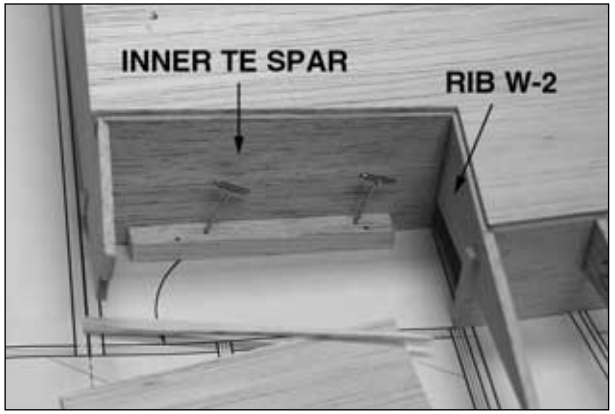
❏ ❏ 14. The top and bottom of both wing halves will be sheeted with two of the 6" x 30" balsa sheets you just made. The seam between the two pieces will be centered over the main spars. Make a **forward wing skin** for the top of the wing by trimming one of the 6" x 30" sheets to fit between the LE and the middle of the top spar. The grain direction is **parallel** with the LE. The gap between the front of the skin and the LE between ribs 1 and 3 (as seen in the following photo) will be filled in later.

❏ ❏ 15. Take out T-pins that you will not be able to get to after the sheeting is glued down.

❏ ❏ 16. Glue the forward wing skin into position. Our preferred method is to first apply aliphatic resin to the ribs, then to glue the sheet to the LE with thin CA. Lay weights on top of the sheeting to hold it to the ribs, then glue it to the main spar with thin CA.



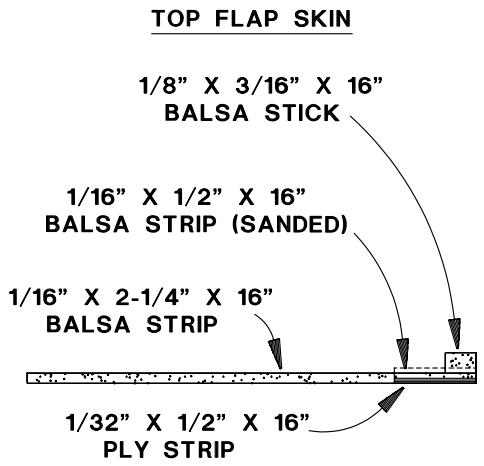
❏ ❏ 17. Make an **aft wing skin** for the top of the wing by trimming another 6" x 30" sheet to fit. The grain is parallel with the outer TE spar. You'll have to trim a piece from the trailing edge of the sheet near the tip, then glue it back onto the other end of the sheet to make it wide enough. The aft skin ends in the **middle** of the outer TE spar between rib W-6B and rib W-2. This will create a "ledge" to support the flap sheeting that will be added later. Glue the aft wing skin into position. **Do not** glue the sheeting to the inner TE spar and to rib 2 aft of the inner TE spar (see the following photo).



❏ ❏ 18. Cut the sheeting from the wing from the middle of the inner TE spar and the middle of rib W-2 aft of the inner TE spar. This will create a ledge to support the sheeting that will be added after the wing panels are joined.

❏ ❏ 19. Make an **aileron skin** from 1/16" sheeting left over from the top wing skins and glue it into position.

Sorry, the flap skin won't be so simple...but it's worth it.



Refer to this sketch for the following seven steps.

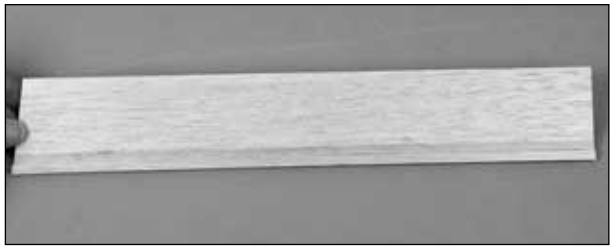
❏ ❏ 20. Cut the 1/32" x 1" x 16" plywood sheet into two 1/2" strips.

❏ ❏ 21. Cut a 1/2" x 16" strip and a 2-1/4" x 16" strip from a 1/16" x 3" x 30" balsa sheet.

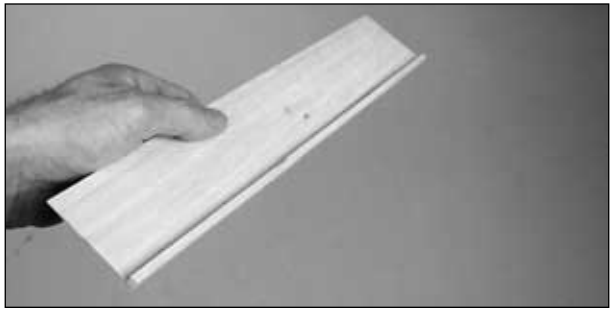
❏ ❏ 22. Laminate the 1/2" balsa strip to one of the 1/2" ply strips over a **flat** surface. You now have a 3/32" x 1/2" x 16" ply/balsa strip.

❏ ❏ 23. With the ply side down, glue one edge of the ply/balsa strip to the edge of the 2-1/4" balsa strip. This is now the **top flap skin**.

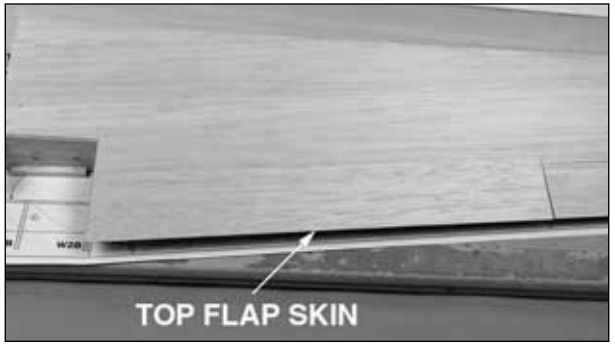
❏ ❏ 24. Sand the balsa side of the 1/2" x 3/32" portion of the top flap skin to the same thickness as the rest of of the top flap skin (which is 1/16" thick).



❏ ❏ 25. Trim the top flap skin to fit the wing from the middle of W-2 to W-6B. The ply side goes **down**. Make certain that the TE of the skin (the end with the 1/32" ply strip) aligns with the TE of the flap on the plan.

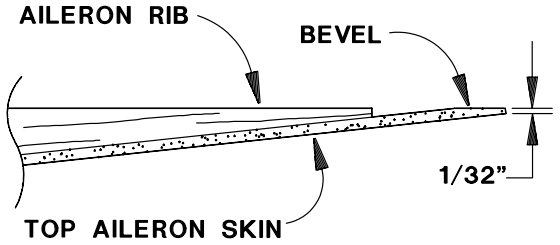


❏ ❏ 26. Cut a 1/8" x 3/16" x 30" balsa stick to the same length as the top flap skin, then glue it to the ply side along the TE as shown in the sketch. Later, this will be sanded to match the tapering angle of the wing.



❏ ❏ 27. Glue the top flap skin to the top of the wing.

❏ ❏ 28. Remove the wing panel from the building board. Use leftover 1/16" balsa sheeting to fill in the space between the forward skin and the LE. Look for glue joints you've missed, or ones that could use a little extra glue and reinforce them with CA. Apply a bead of medium or thick CA where the sheeting meets the LE inside the wing.

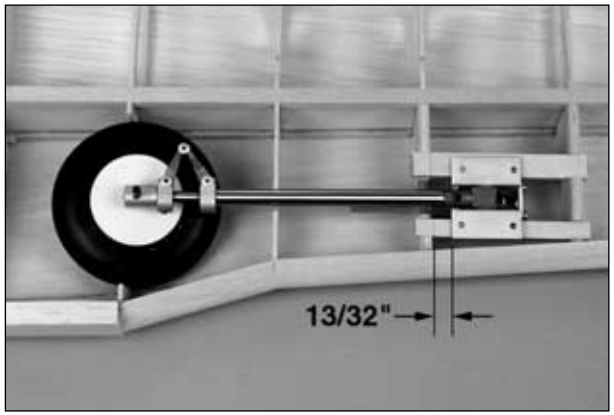


❏ ❏ 29. Trim the ends of the main spars close to the ribs on both ends of the wing. Follow-up with a bar sander with 80-grit sandpaper to sand the spars and sheeting even with the ends of the wing. If you would like to trim the top of the LE even with the sheeting, you may do so at this time, but do not final shape the LE until instructed to do so after the wing is sheeted and both panels are joined. Trim the tabs off the bottom of the outer and inner TE spars. Sand the bottoms of the ribs even with the bottoms of the spars to prepare the wing for the bottom sheeting. When sanding the bottom of the wing, use the ends of the ribs to guide your bar sander as you bevel the top aileron skins down to 1/32" at the TE as shown in the sketch.

Fit the landing gear

Perform steps R1 through R12 only if installing retractable landing gear. If installing fixed gear, skip to step F13.

Refer to this photo for the following three steps.



❑ ❑ R1. Test fit the 1/4" plywood **forward** and **aft landing gear rails** in the slots in ribs W-4 and W-5. If necessary, make adjustments to the notches or remove glue bumps so the rails fit well.

❑ ❑ R2. Mount a 3-3/4" wheel to your landing gear. This model was designed to use CJM (Century Jet Retracts) Focke-Wulf landing gear with Williams Bros. #143 3-3/4" Smooth Contour Wheels (WBRQ1143). These wheels have a narrow cross-section allowing the gear to fully lock in the retracted position. “Fatter” wheels will contact the top wing sheeting before the gear is fully retracted. Enlarge the hole in the wheels for the landing gear axle with a #12 drill bit.

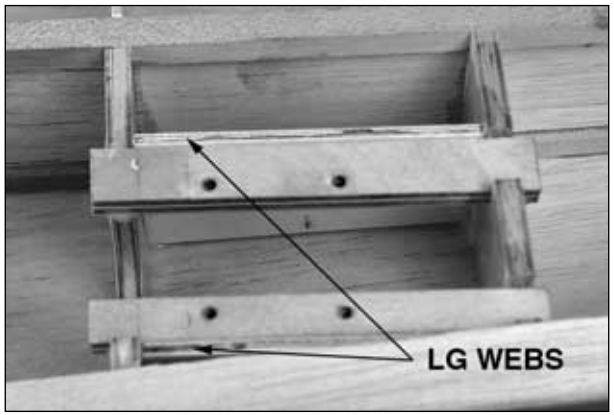
❑ ❑ R3. Temporarily remove the partially die-cut section of ribs W-3 & W-4 to accommodate the landing gear and the wheel for test fitting. Place the landing gear on the rails where shown on the plan (the edge of the aluminum body is 13/32" from the 1/16" ply rib doubler).

❑ ❑ R4. Extend the landing gear. Adjust the strut so you can barely detect any tow-in the wheel—about one-degree of tow-in is desirable to aid ground handling.

❑ ❑ R5. Retract the gear into the wing. Make sure the rails are correctly installed and are at the correct angle. There must be clearance between the wheel and the top wing sheeting when the gear is in the retracted position and fully locked. If this is your second time through and you’re on the left wing panel, make sure that the left landing gear is mounted at the same angle as the right landing gear.

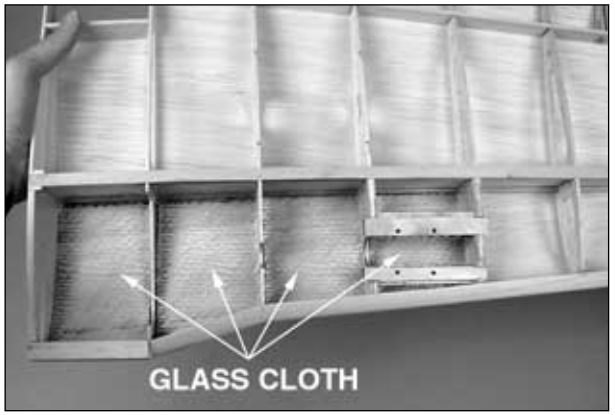
❑ ❑ R6. Once you have achieved a good fit of the wheels in the wing, Use 30-minute epoxy to glue the rails into position. Do not build up large fillets of glue at this time.

❑ ❑ R7. After the epoxy on the rails has fully hardened, reposition the gear on the rails as described earlier. Mark the location of the mounting holes, then drill 3/32" holes in the rails for #6 x 1/2" screws (not included).



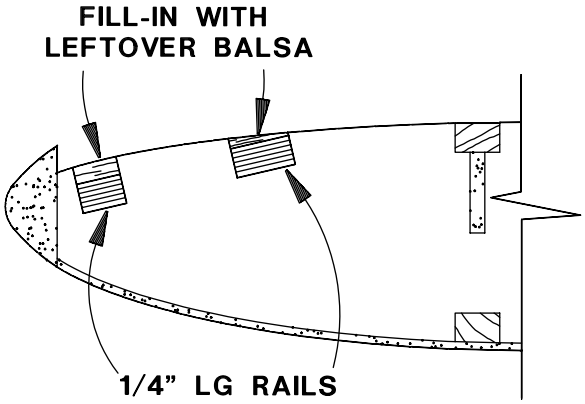
❑ ❑ R8. Test fit, then use 30-minute epoxy to glue the die-cut 1/8" plywood **forward** and **aft landing gear webs** into position. When you position the webs, be certain they are not pushing up against the inside of the top wing sheeting, thereby making a bump in the top of the wing. Note that the forward web should not extend below the forward rail. Otherwise, it will interfere with part of the retract.

❑ ❑ R9. Test mount the landing gear to the rails with #6 x 1/2" screws. Retract and extend the gear to make sure the wheel does not contact the top sheeting and that the gear is able to fully lock in the retracted position. Make certain you will be able to route the air lines after the bottom sheeting is glued into position. Remove the landing gear.



❑ ❑ R10. Use epoxy thinned with alcohol or finishing resin to apply light-weight glass cloth to the inside of the top wing sheeting between ribs W-1 through W-4. This will strengthen the exposed sheeting inside the wing and will seal the wood grain for painting later on.

❑ ❑ R11. Replace the section of rib W-2 you temporarily removed for retracting the gear. Just tack glue it into place. It will be removed after the bottom of the wing is sheeted, but will support the sheeting in the meantime.



❑ ❑ R12. Fill-in the notches in ribs 4 and 5 below the landing gear rails with leftover balsa. Sand the balsa to match the ribs so that it supports the bottom sheeting.

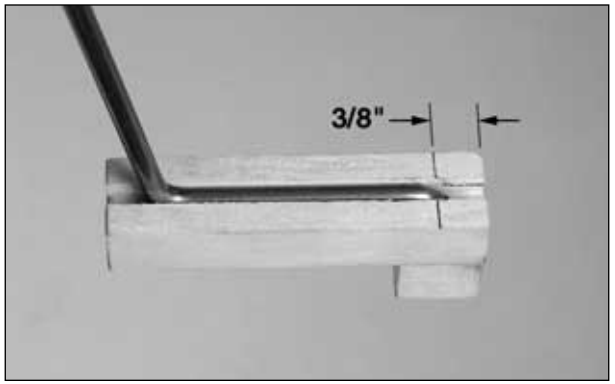
Perform steps F13 through F25 only if you are building fixed gear.

❑ ❑ F13. Test fit the 1/4" plywood **forward** and **aft landing gear rails** in the slots in ribs W-4 and W-5. If necessary, make adjustments to the notches or remove glue bumps so the rails fit well.

❑ ❑ F14. Once you have achieved a good fit of the rails, use 30-minute epoxy to glue them into position. Do not build up large fillets of glue at this time.

❑ ❑ F15. Test fit, then use 30-minute epoxy to glue the die-cut 1/8" plywood **forward** and **aft landing gear webs** into position. When you position the webs, be certain they are not pushing up against the inside of the top wing sheeting, thereby making a bump in the top of the wing.

Refer to this photo for the following three steps.

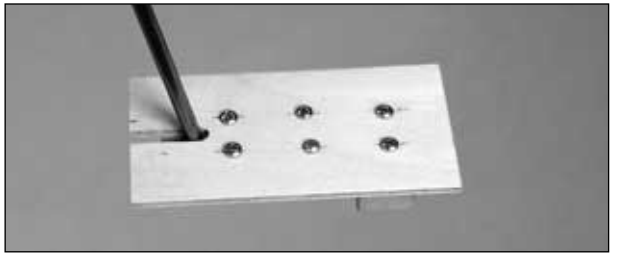


❑ ❑ F16. Use 30-minute epoxy to securely glue the 3/4" x 3/4" x 7/16" maple **torque block** to one end of the top of the 3" grooved **landing gear mount**.

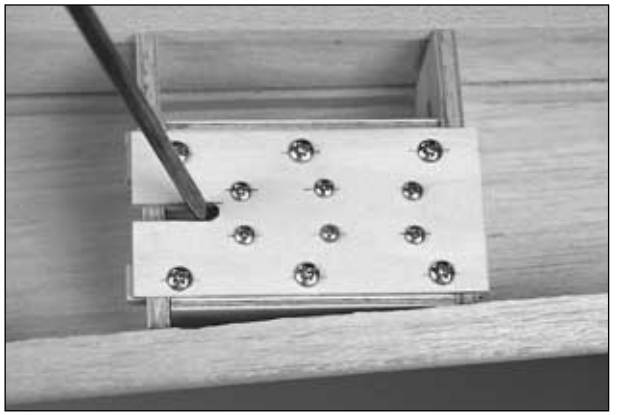
❑ ❑ F17. Drill a 3/16" hole through the groove in the landing gear mount and the torque block 3/8" from the end. This hole should be perpendicular to the bottom surface of the landing gear mount (for the most accuracy, use a drill press if you have one, or borrow a friend's). For easier installation of the landing gear, you could enlarge the hole with a #10 drill bit.

❑ ❑ F18. Chamfer the opening of the hole to accommodate the bend in the landing gear wire. Test fit one of the 3/16" **landing gear wires** into the landing gear mount and torque block.

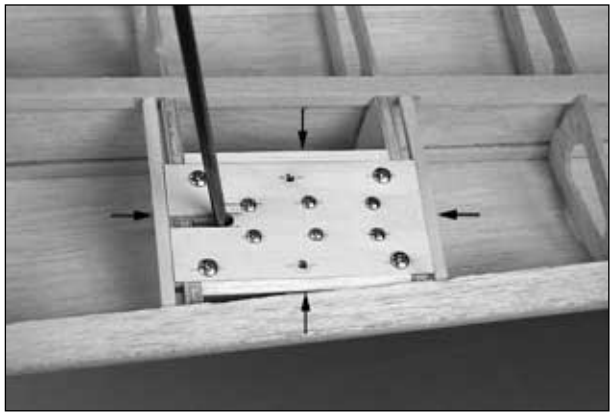
❑ ❑ F19. Test fit the die-cut 1/8" plywood **fixed landing gear plate** to the landing gear wire and the grooved mount. If necessary, lengthen the slot in the gear plate, so it can be centered, lengthwise, on the grooved mount.



❑ ❑ F20. Drill six 3/32" holes through the fixed landing gear plate and the grooved mount where shown on the plan. Enlarge the holes **in the plate only** with a 1/8" drill bit. Mount the plate to the grooved mount with six #4 x 1/2" screws.



❑ ❑ F21. Position the LG assembly between the LG rails in the wing. Drill six 3/32" holes through the LG plate into the rails. Remove the plate and enlarge the holes in the plate only with a 5/32" drill bit. Temporarily mount the assembly to the wing with six #6 x 1/2" screws.



❏ ❏ F22. Glue pieces of leftover 1/4" x 1/4" or 3/16" x 3/16" balsa around the fixed LG plate (but not to it) to support the sheeting after an opening is cut for the plate. Remove the plate, then sand the sticks even with the rest of the ribs .

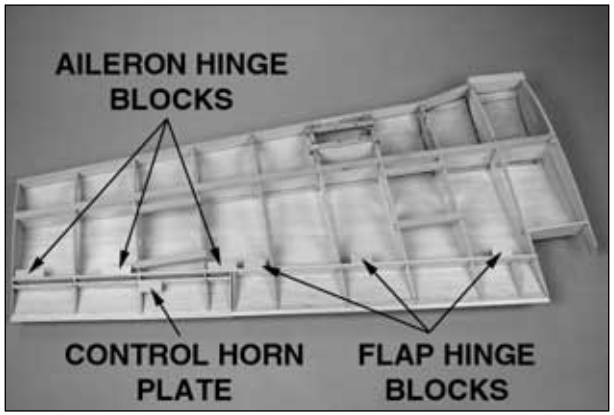
❏ ❏ F23. Take out all the screws and disassemble the landing gear assembly. Add a few drops of thin CA to the holes in the LG rails in the wing and to the holes in the grooved landing gear mount.

❏ ❏ F24. Enlarge the hole in the wheels with a or #9 (or 13/64") drill so they will fit on the landing gear wires.

❏ ❏ Test fit the wheel to the landing gear with a 3/16” wheel collar on both sides. File flat spots where the set screws of the wheel collars lock onto the gear.

Finish the bottom of the wing

Refer to this photo for the following three steps.



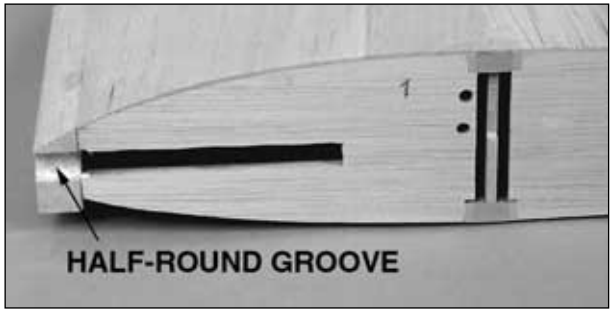
❏ ❏ 1. Cut three 1" long **flap hinge blocks (only if you are building flaps)** and three 1-1/2" long **aileron hinge blocks** from the 1/2" x 1/2" x 6" balsa sticks. Glue the hinge blocks into position. Note that the aileron hinge blocks are **centered**, height-wise, on the outer TE spar and that the flap hinge blocks are **even** with the bottom of the outer TE spar.

❏ ❏ 2. Glue the die-cut 1/8" plywood **control horn plate** into the notches of the aileron LE spar and rib 8.

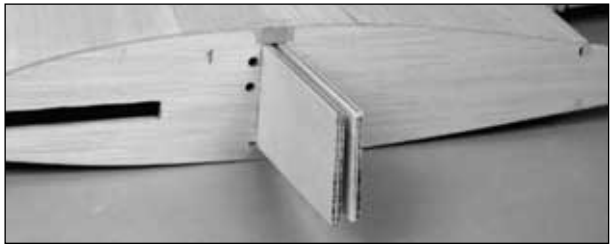
❏ ❏ 3. Cut the **aileron servo hatch rails** from the remainder of the 1/4" x 3/8" x 36" basswood stick you used for the forward tank mount tab. If you are building flaps, cut the **flap servo hatch rails** from the same stick. Keep the rest of the stick for the aft tank mount tab. Glue the rails into position.

Return to page 28 and repeat the process for building the left wing panel. Don’t forget to build over the left wing plan!

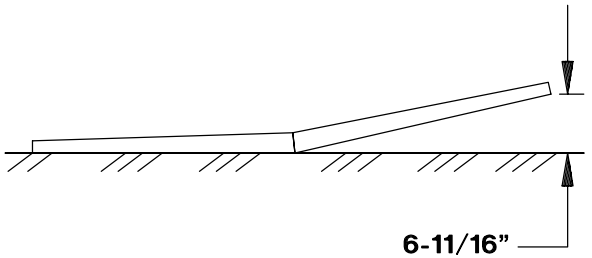
Join the wing panels



❏ 1. Cut the center out of rib W-1 on both wing panels. Make a half-round groove in the center LE block in alignment with the slot in W-1 to accommodate the wing dowel.



❏ 2. Test fit both die-cut 1/8" plywood **forward wing joiners** in both halves of the wing. Make adjustments where necessary so the joiners fit half-way.



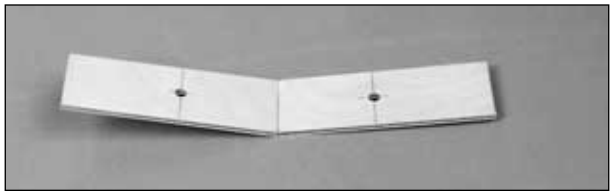
❏ 3. Without using glue, test join the wing halves with the forward joiners. Lay one of the panels flat on the

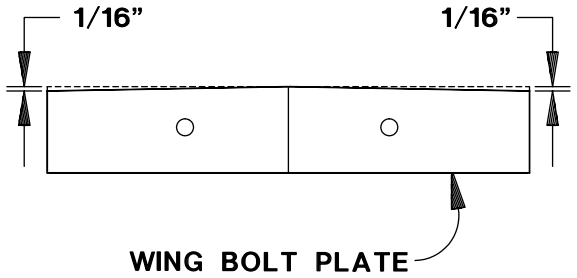
workbench. Measure the distance from the tip of the other panel down to the workbench. The distance should be 6-11/16", plus or minus 1/8", as measured from the bottom main spar at rib 12. If necessary, make adjustments so this measurement can be achieved.

❏ 4. Once the correct dihedral has been confirmed, and any other adjustments have been made for a good fit, permanently join both wing panels with 30-minute epoxy. Make certain the epoxy you are using provides enough working time to join all the parts and position your clamps. For the strongest bond, coat all contacting surfaces with epoxy (both sides of the spar web and the correct side of the forward wing joiners). Make certain the root rib W-1 of the panels are in alignment.

❏ 5. Use fuelproof paint or epoxy thinned with alcohol to coat and fuelproof the landing gear area. If you prefer to do this at a later time, make sure it is done **before** the covering is applied, otherwise the paint may soak through the top sheeting and blemish iron-on coverings. You can use brush-on paint, but you will have the most uniform coverage and the best results if you apply the paint with an airbrush. Mix a drop or two of blue to an ounce of yellow to get the light shade of green resembling chromate green used to protect aluminum in aircraft.

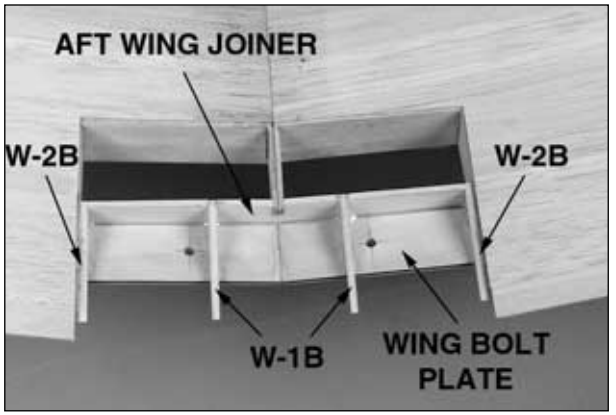
❏ 6. Test fit, then glue the die-cut 1/8" plywood **aft wing joiner** and the die-cut 1/8" plywood ribs **W-2B** to the wing (these parts can be seen in following photos).





❏ 7. Drill #7 (or 13/64") holes through the 1/8" x 1-1/4" x 7" plywood **wing bolt plate** where shown on the plan. Trim one edge of the wing bolt plate as shown in the sketch. This will now be the front. Cut partway through both sides of the center of the wing bolt plate. Bend the wing bolt plate to the same angle as the wing, trying not to break it. If you do, glue it together at the same angle as the aft wing joiner.

This photo gives you an idea of how to clamp the wing bolt plate into position.



❏ 8. Test fit the wing bolt plate to the wing. Trim the ends as necessary for a good fit. Use 30-minute epoxy to glue the wing bolt plate to the aft wing joiner. Glue ribs W-1B to the assembly.

Sheet the bottom of the wing

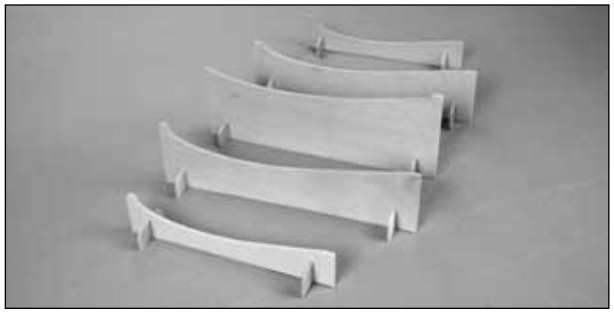
If you haven't done so already, make four 6" x 30" wing skins from eight 1/16" x 3" x 30" balsa sheets.

❏ 1. Plan the routing of the aileron and flap servo cords. They can be installed in the wing after the model is finished, though some may prefer to do it now. Cut a hole in rib 1 so the cords can be connected inside the wing, then passed through a hole cut in the top sheeting.

❏ 2. With the wing upside-down on a stand or a cradle, trim two of the 6" x 30" sheets to make the forward skins for both sides of the bottom of the wing. Do not glue the skins to the wing yet.

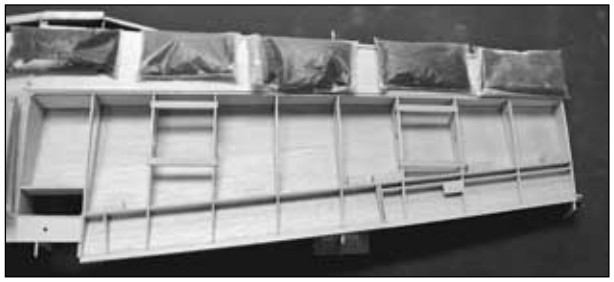
❏ 3. Use the other two 6" x 30" balsa sheets to make the aft skins. For now, cut the aft skins oversize to allow for trimming and positioning after the forward skins have been glued into position.

❏ 4. Sand the skins flat, smooth and even.



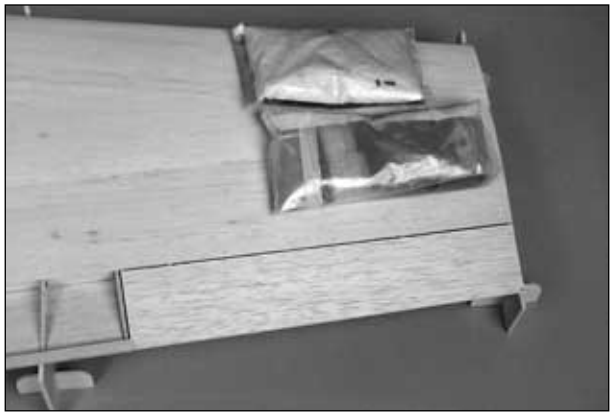
❏ 5. Make the five **wing sheeting cradles** from the die-cut 1/8" plywood parts as shown.

❏ 6. Place the wing upside-down on the cradles. Position the highest cradle over the centerline of the wing with the tab against the end of the W-1 ribs. Position the next highest cradles over rib 6. Position the shortest cradles over rib W-10. Place weights on the wing to hold it to the cradles. It may take more weights out toward the tips near the TE to lock-in the washout built into the wing. **Note:** If you find it helpful, you could tack-glue the cradles to the top wing sheeting.



❏ 7. Glue both forward skins to the bottom of the wing. Hold the skins down with T-pins and/or weights.

❏ 8. Now that the forward skins are glued into position, the aft skins can be trimmed to fit. Trim the aft skins to fit between the forward skins and the outer TE spar. The aft edge of the skins should extend beyond the outer TE spar by approximately 3/32" to allow for trimming later. Glue the aft skins into position. Use weights and/or T-pins to hold the sheeting down until the glue dries.

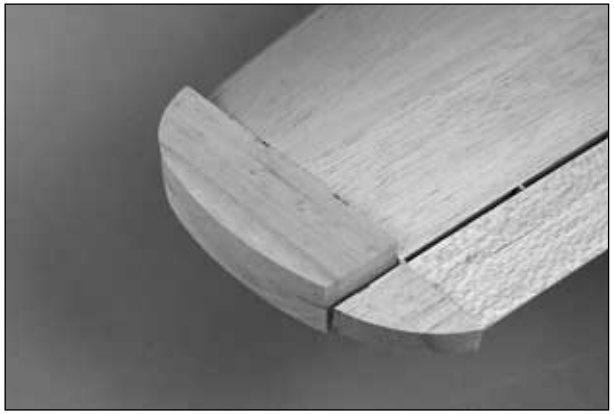


❏ 9. Make the **bottom aileron skins** from leftover 1/16" balsa sheeting. Bevel the aft edge of the skins the same as the top skins (with the TE thinned-down to 1/32"). Glue the bottom aileron skins to the wing and to the top skins.

❏ 10. After the glue dries, remove the weights and T-pins and take the wing off the cradles. Finish sheeting the open area between the forward skin and the LE with leftover 1/16" balsa. Trim the bottom of the LE even with the bottom sheeting, but do not final shape the LE yet.

Build the wing tips

Refer to this photo for the following two steps.



❏ ❏ 1. Sand the ends of the wing sheeting even with the ends of the wing. Glue two of the 3/4" shaped balsa **wing tips** together. Glue the wing tip to one end of the wing. Make sure the aft end of the wing tip is even with (or extends slightly beyond) the outer TE spar (so it can be sanded even later).

❏ ❏ 2. Glue the shaped 3/4" balsa **aileron tip** to the end of the aileron.

❏ ❏ 3. Starting with a razor plane and/or a carving knife, then finishing with a bar sander and 80-grit sandpaper, shape the tips to match the wing, but do not round them yet.

❏ ❏ 4. Round the wing tip and aileron tip.

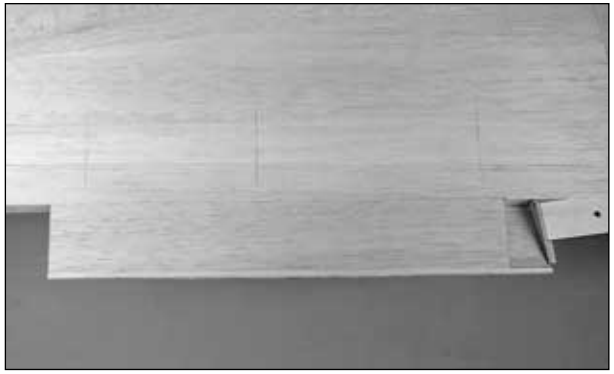
❏ 5. Repeat steps 1 through 4 to build the other wing tip.

Build the flaps

We'll show you the **right** flap...

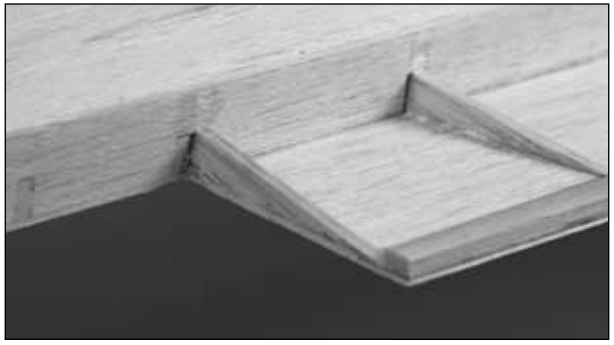
❏ ❏ 1. Cut the right aileron from the wing. True up the outer TE spar in the aileron area by sanding the remainders of the ribs and the top and bottom sheeting.

If you **are** building working flaps, go to step 3. If you **are not** building working flaps, perform step 2, then go to **Finsh building the ailerons** on page 39.



❏ ❏ 2. Cut the **bottom flap skins** from a 1/16" x 3" x 30" balsa sheet. The skins extend from rib W-6B to middle of rib W-2C. Glue both skins into position. Sand the skins and the 1/8" x 3/16" balsa strips on the underside of the top flap skins even with the bottom of the wing.

Refer to this photo for the following two steps.

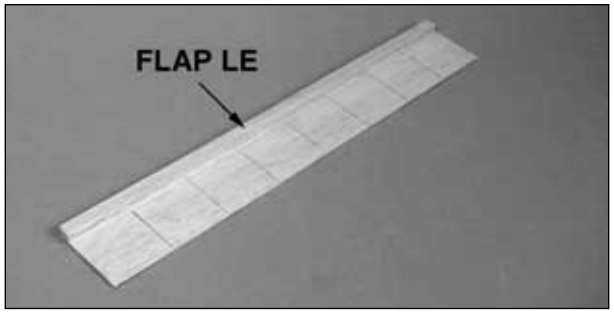


❏ ❏ 3. Finish cutting the rest of the way through ribs W-3 through W-6B (where you cut partway through during preparation) and remove that portion of the ribs.

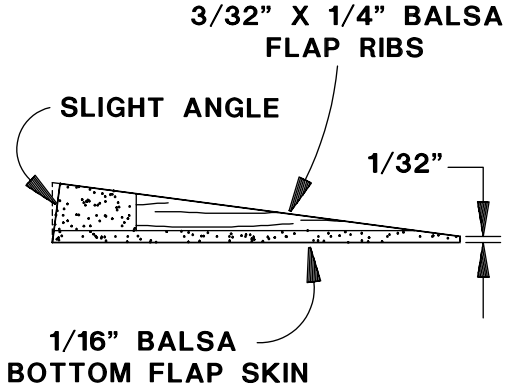
❏ ❏ 4. Trim the bottom wing sheeting even with the outer TE spar in the flap area.

❏ ❏ 5. Mark the locations of the flap ribs on the die-cut 1/16" balsa **bottom flap skins** where shown on the plan.

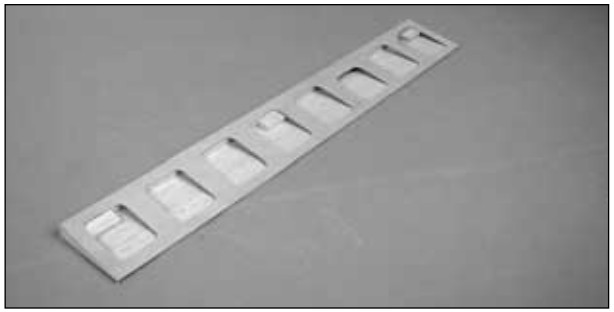
Note: The flap must be constructed over a **flat** surface so it fits the wing.



❏ ❏ 6. Cut the **flap LE** from a 1/4" x 7/16" x 24" balsa stick and glue it to the top of the bottom flap skin.



❏ ❏ 7. Cut the **flap ribs** from a 3/32" x 1/4" x 30" balsa stick. Cut the **flap hinge blocks** and the **flap control horn base** from the remainder of the 1/4" x 7/16" x 24" balsa stick you used for the flap LE. Glue the flap ribs, the hinge blocks and the control horn base to the flap. Use a bar sander with 80-grit sandpaper to bevel the ribs, the TE of the skin and the flap LE as shown in the sketch.

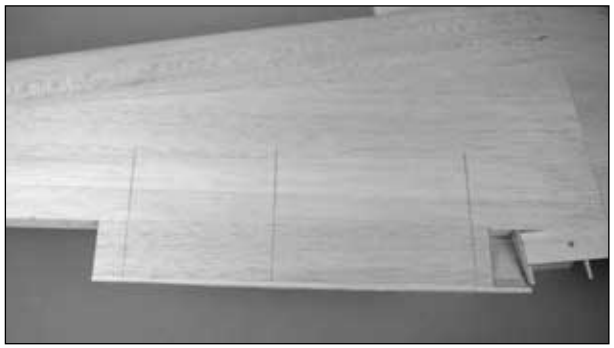


❏ ❏ 8. Glue the die-cut 1/32" plywood **flap frame** to the flap.

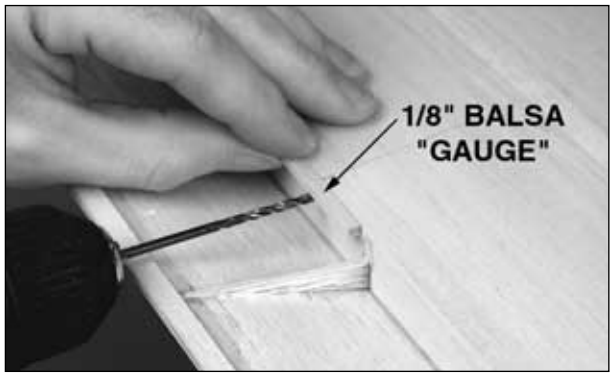
❏ ❏ 9. Test fit the flap to the wing. With the flap resting in position, sand the 1/8" x 3/16" balsa strip glued to the underside of the top flap skin even with the bottom flap skin. Make other adjustments where necessary for a good fit. Temporarily hold the flap skin to the wing with a strip of masking tape while you build the other flap.

❏ 10. Return to step 1 and build the other flap the same way.

Hinge the flaps



❏ ❏ 1. Use a straightedge and a ballpoint pen to **lightly** mark lines on the bottom wing sheeting, noting the location and alignment of the hinges. The lines should be perpendicular to the flap LE and the wing TE and centered over the hinge blocks.

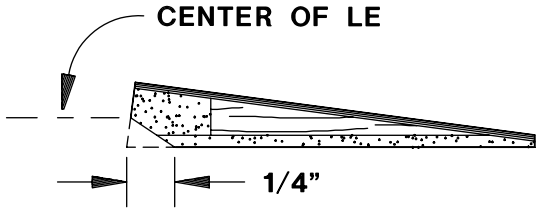


❏ ❏ 2. Using the lines you marked on the bottom of the wing as an alignment cue, drill 7/64" holes in the outer TE spar 1/8" above the bottom of the wing for Great Planes small Pivot Point Hinges GPMQ4001 (not included). It's okay to angle the drill slightly to clear the top flap skin, as long as the opening of the holes remain 1/8" above the bottom of the wing. **Hint:** Use a piece of leftover 1/8" balsa as a gauge to align the drill.

❏ ❏ 3. Drill 7/64" holes through the LE of the flap the same way. Use the 1/8" balsa gauge to make sure the holes are correctly aligned.

❏ ❏ 4. Enlarge the openings of the holes to accommodate the hinge pins, thus allowing the hinges to be inserted half-way in both the flap and the wing.

❏ ❏ 5. Test fit the flap to the wing with the hinges. Make certain all the hinges go in all the way. Make adjustments if necessary.



❏ ❏ 6. Use a straightedge and a ballpoint pen to lightly draw a line across the bottom of the flap 1/4" from the leading edge. Use a razor plane, followed by a bar sander with 80-grit sandpaper, to bevel the flap from the center of the LE up to the line you drew.

❏ ❏ 7. Reposition the flap to the wing with the hinges. Make certain you can get 1-11/16" of control throw as described in the back of the manual. Increase the angle of the bevel if necessary.

❏ 8. Drill the holes for the hinges and fit the other flap to the wing the same way.

Finish building the ailerons

We'll show you the **right** aileron first.

❏ ❏ 1. Sand the top and bottom aileron sheeting and the aileron tip even with the aileron spar. Cut the **aileron LE** from the 1/4" x 3/4" x 30" balsa stick. Glue the aileron LE to the aileron.

❏ ❏ 2. Shape the top and bottom of the LE even with the top and bottom of the aileron.

❏ ❏ 3. Use masking tape to securely tape the aileron to the wing with the tips in alignment. Shape the aileron LE in the tip area even with the wing tip and the aileron tip.

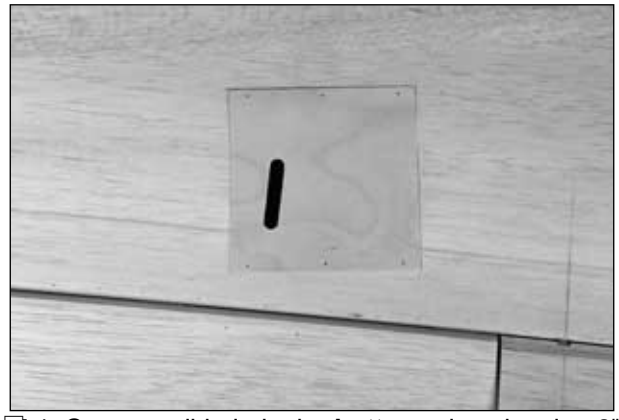
❏ ❏ 4. Remove the aileron. Use the "T-pin and straightedge" technique to mark centerlines down the LE of the aileron and the outer TE. Cut the hinge slots, then test fit the aileron to the wing with the hinges. Make adjustments where necessary.

❏ ❏ 5. Bevel the LE of the aileron for control throw. Make certain you can achieve 11/16" of up and down throw as described on page 58 of the manual.

❏ 6. Return to step 1 and build the other aileron.

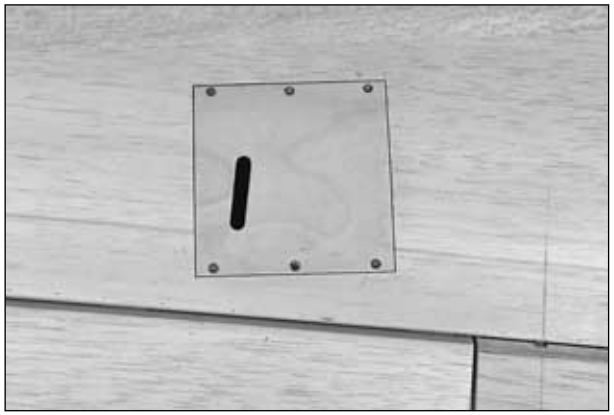
Hook up the flaps and ailerons

Note: All the die-cut 1/16" plywood **hatches** are the same and are interchangeable, **except** for the **left flap** hatch, which is noted "**LF**" on the die sheet. Reference the plan for the correct orientation of the hatches and servos.



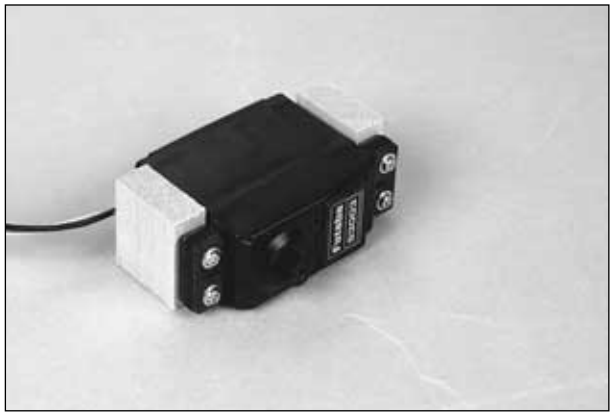
❏ 1. Cut a small hole in the **bottom** wing sheeting 8" from where the sheeting meets the right wing tip. Carefully enlarge the opening until you can just fit one of the die-cut 1/16" plywood **hatches**. **Hint:** As you "zero-in" on the opening, use the hatch itself as a template for trimming the edges of the balsa sheeting.

❏ 2. With the hatch in the wing, drill 1/16" holes through the punch marks in the hatch and through the servo rails. Remove the hatch. Enlarge the holes **in the hatch only** with a 3/32" drill. Use a Dremel #178 cutting bit to countersink the holes in the hatch for the #2 x 3/8" flat head screws.

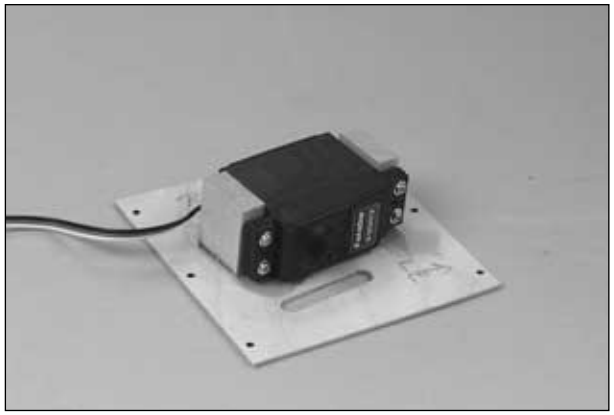


❏ 3. Use a straightedge and a **new** #11 blade to carefully trim the edges of the opening so there will be approximately 1/32" clearance all the way around. Use thin or medium CA to glue the wing sheeting to the ribs and the rails (remember, we instructed you earlier not to glue the sheeting to the ribs and rails in this area). Add a few drops of thin CA to the **holes in the rails** and allow to fully dry. Temporarily mount the hatch with six #2 x 3/8" flat head screws.

❏ 4. Mount the other aileron hatch and both flap hatches to the wing the same way. Make certain the hatches are positioned as shown on the wing plan.

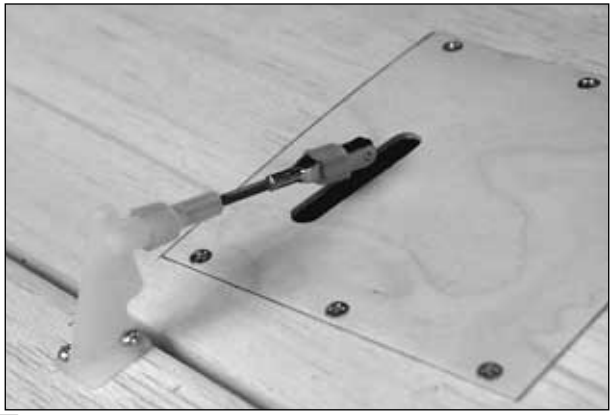


❏ 5. This will show the **right** aileron, so refer to the right aileron servo and hatch on the wing plan for the correct orientation of the servo. Use the screws that came with your servo to mount the aileron servo to two 5/16" x 3/4" x 7/8" basswood **servo mount blocks**. There should be an approximately 1/32" clearance between the blocks and the servo, and between the servo and the hatch. **Hint:** Use leftover 1/32" plywood or cardstock as shims under the servo and between the servo and the blocks when drilling the holes into the blocks.



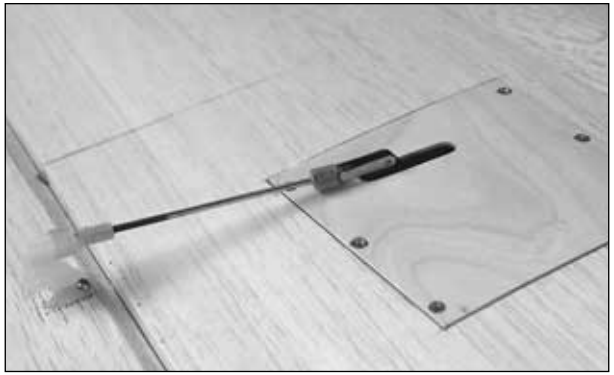
❏ 6. Use 30-minute epoxy to glue the servo mount blocks to the **right** aileron hatch. Make certain the servo is positioned so the servo arm will be **centered** and **aligned** with the slot in the hatch. **Note:** The basswood servo mount blocks are porous and rapidly absorb epoxy. After applying the first coat of epoxy to the mount blocks, wait a few minutes and apply an additional coat. You will see that in between coats, most or all of the epoxy will have soaked in, leaving little behind for gluing. Do this procedure a few times until a thick coat of epoxy remains.

❏ 7. Mount the left aileron servo and both flap servos to the hatches the same way.



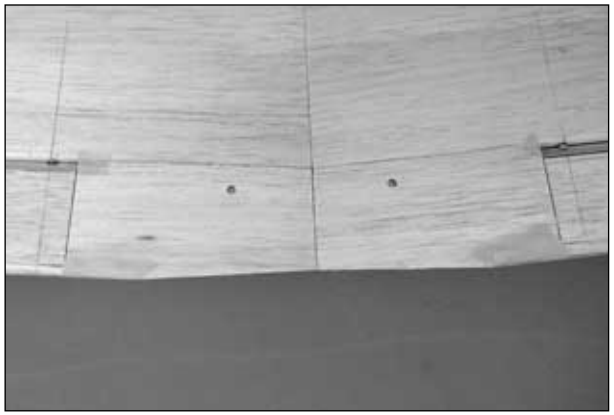
❏ 8. Install a long servo arm on the right aileron servo. Mount the right aileron hatch in the wing. Connect the servo to the aileron with the hardware shown on the plan. Add a few drops of thin CA to the holes in the aileron and the horn mount plate for the #2 x 3/8" screws.

❏ 9. Connect the left aileron servo to the left aileron the same way.



❏ 10. Make the pushrods and connect the flap servos to the flaps. Glue a small block of leftover balsa inside the flap where the aft #2 x 3/8" screw goes through the bottom flap skin. The same as the elevators and rudder, use a T-pin to poke several holes in the bottom flap skin where the flap control horn mounts to the flap. Harden the area by adding a few drops of thin CA to the holes. Allow the CA to dry, then sand smooth. Note that the flap control horn is mounted “backwards.”

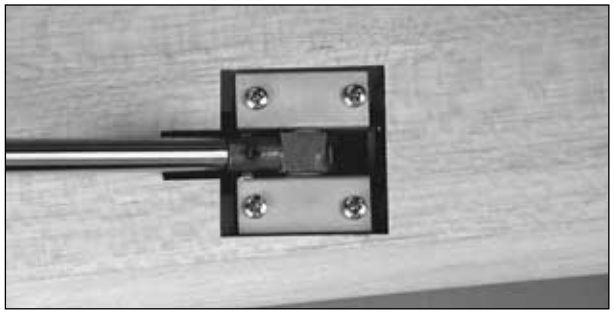
Finish the wing



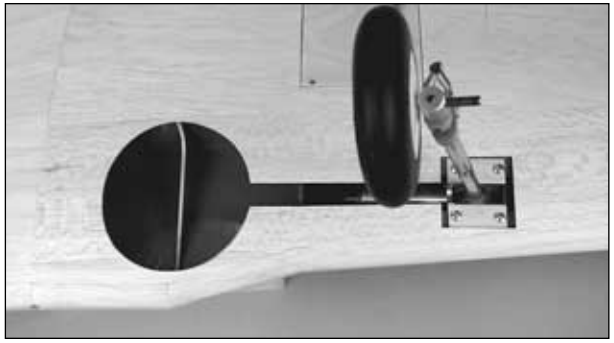
❏ 1. Use leftover 1/16" balsa to sheet the bottom of the center section of the wing between the flaps. Use the holes in the wing bolt plate as a guide to cut holes in the bottom sheeting.

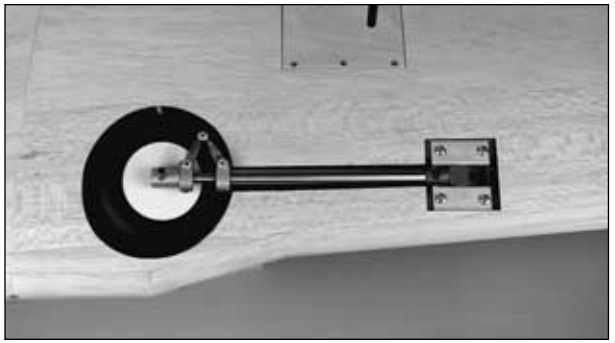
❏ 2. Sheet the top of the center section of the wing.

Perform steps R3 through R6 only if installing retractable landing gear. If installing fixed gear, skip to step F7.



❑ R3. The same as you did for the hatches, start by cutting a small hole, then enlarging it to accommodate the right landing gear mount. The cutout will have to be slightly over-size due to the extra clearance required when inserting the gear. Mount the right landing gear in the wing.



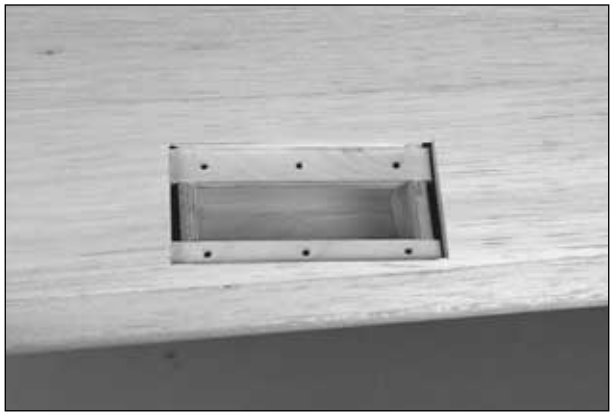


❑ R4. *Now you know how to do it!* Start by cutting a small hole, then gradually enlarge it until the wheel and the landing gear strut fit into the wing. Remove the portion of rib W-2 that you temporarily tack-glued back into position. **Note:** The hole in the wing for the wheel won't be circular, but will be oval shaped due to the angle at which the wheel fits into the wing. Allow approximately 3/16" to 1/4" clearance between the wheel and the aft edge of the opening (in case the strut gets bent slightly during a rough landing).

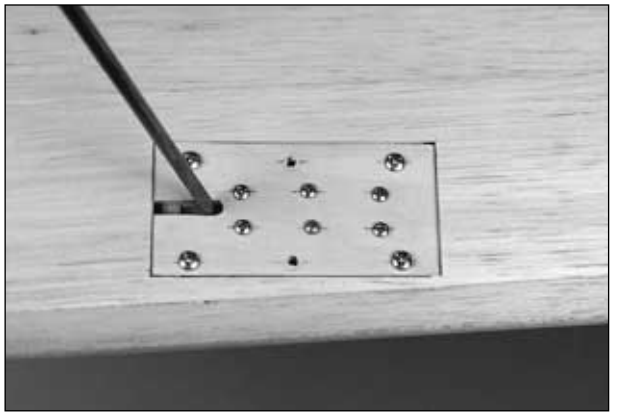
❑ R5. Glue leftover 1/16" balsa or 1/32" plywood (not included) to the inside of the bottom sheeting around the wheel opening. The grain should be perpendicular to the grain of the bottom sheeting. This will strengthen the sheeting around the edges of the opening, which is typically rather delicate. If you prefer, you could substitute 1/32" plywood (not included).

❑ R6. Cut the opening for the gear in the other wing panel the same way.

Perform the following three steps ONLY if you are installing fixed landing gear.



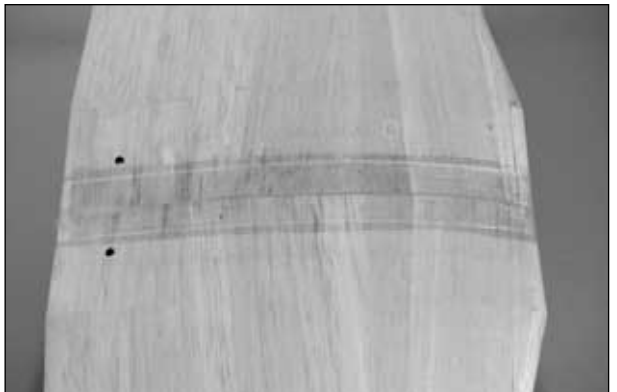
❑ F7. The same as you did for the hatches, start by cutting a small hole, then enlarging it to accommodate the right fixed LG mount plate.



❑ F8. Temporarily mount the gear assembly to the wing. If necessary, trim the edges of the opening so the gear will fit.

❑ F9. Fit the landing gear in the other wing panel the same way.

❑ 10. If you haven't done so already, final-sand the wing rounding the leading edges and tips as shown on the cross-sections of the plan. If you have to do much sanding to even any glue joints in the sheeting, it may be best just to leave the glue joints slightly uneven rather than over-sanding the sheeting.

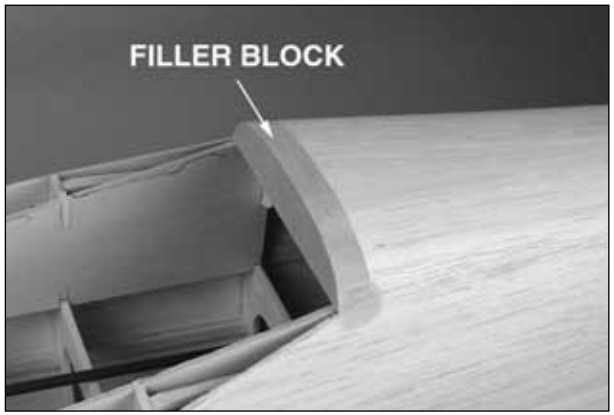


❑ 11. Use 30-minute epoxy to glue the 2" wide strip of glass cloth around the center section of the wing.

FINAL CONSTRUCTION

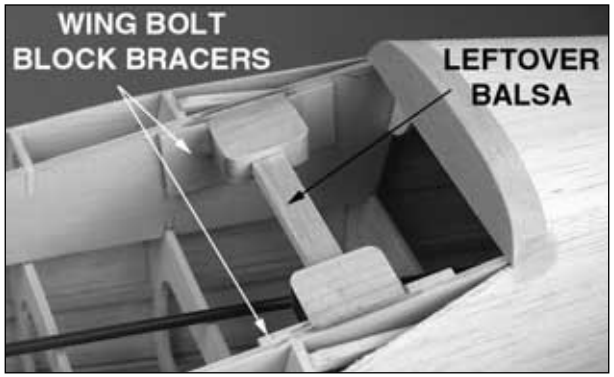
Mount the wing to the fuse

❏ 1. Round one end of the 5/16" x 5" **wing dowel**. Test fit the rounded end into the hole in former F-4. If necessary, sand the end of the dowel so it snugly fits into the hole, yet will not make removal of the wing difficult. Glue the dowel into the wing with 30-minute epoxy.

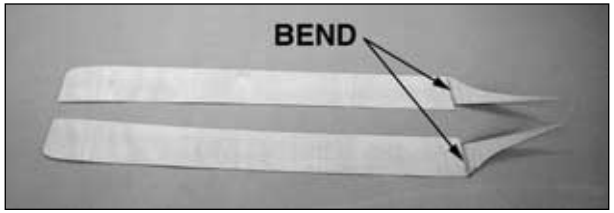


❏ 2. Trim the fuse sheeting even with the ply crutches. Glue the 1/2" x 7/8" x 4-1/2" **filler block** to former 8B and to the fuse sheeting. Sand the filler block even with the fuse.

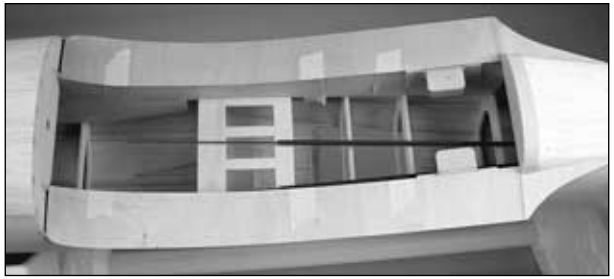
❏ 3. Test fit the wing to the fuse. Trim sheeting on both sides of the fuse until the wing is fully contacting the 1/8" ply crutches.



❏ 4. Use 30-minute epoxy to glue both 1/2" x 7/8" x 1-1/4" maple **wing bolt blocks** and both die-cut 1/8" plywood **wing bolt block braces** to the fuse crutches where shown on the plan. **Hint:** Use a leftover balsa stick to hold the blocks tightly to the crutches until the epoxy hardens.



❏ 5. Use the pattern provided on the plan to make two **wing fillet bases** from the 1/32" x 19" x 4" plywood strip. Lightly score both sides of the fillet bases where shown (at the TE of the wing), then carefully bend the fillets upward. Add a few drops of medium CA across both sides of the seam and allow to dry. Don't worry if the ends break off, just glue them back on at the angle shown on the plan.



❏ ❏ 6. Tape the fillet bases to the fuse crutches. Position the wing on the fuse. You may have to trim the fuse sheeting a little further to accommodate the fillet bases.

❏ 7. With the fillet bases taped to the fuse and the wing in position, place the fuse upside-down in a building cradle. Place weights on the wing to hold it to the fuse.

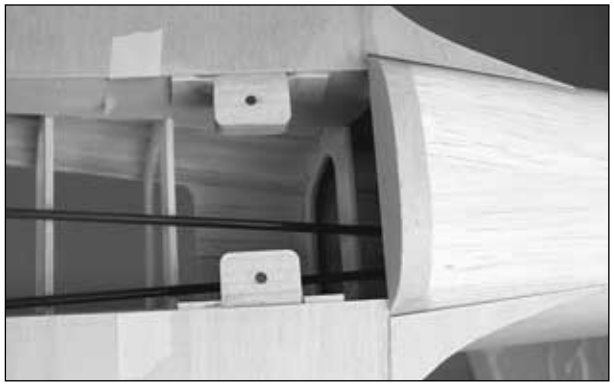
❏ 8. Stick a T-pin into the center of the bottom of the fuse just ahead of the rudder. Center the wing using the same "pin and string" technique we showed you for centering the stab.

❏ 9. Refer to the **Hot Tip** below. Using the wing bolt plate inside the wing as a guide, drill #7 (or 13/64") holes through the wing bolt blocks in the fuse.

Some modelers have difficulty drilling accurate holes in the wing bolt blocks. Here are a few things you can do to improve your results:

A. Use a #7 (or 13/64") drill or a 3/16" brass tube sharpened on the end to cut holes through the top sheeting in alignment with the holes in the wing bolt plate in the wing.

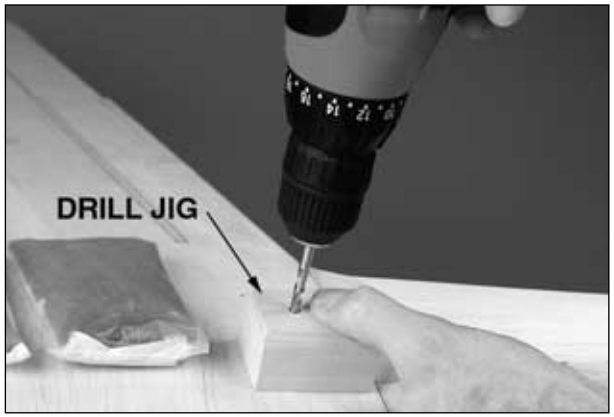
B. Once the wing is positioned in the fuse as described in the previous steps, mark the location of the wing bolt holes on the wing bolt blocks with a piece of wire dipped into some paint.



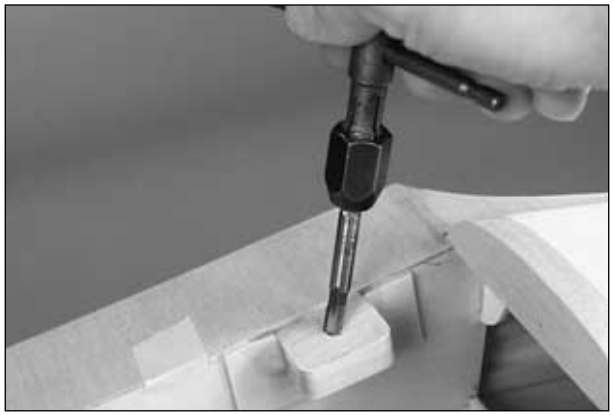
C. Remove the wing and see where you made the marks. This is where the holes will be drilled.

D. If the marks are near the center of the blocks, you're *good to go!* Reposition the wing and go to the next step. If the marks are near the edges of the blocks, there may be an alignment problem. Realign the wing and try it again.

E. Make a **drill jig** by using a drill press to drill a #7 (or 13/64") hole through an approximately 1-1/2" x 2" x 2-1/2" hardwood block. The purpose for using a drill press is to ensure that the hole in the block is **perpendicular** to the base.



F. Use the drill jig to guide your drill bit when drilling through the wing into the wing bolt blocks. Now your wing bolts will accurately align with the bottom of the wing and the wing bolt blocks.

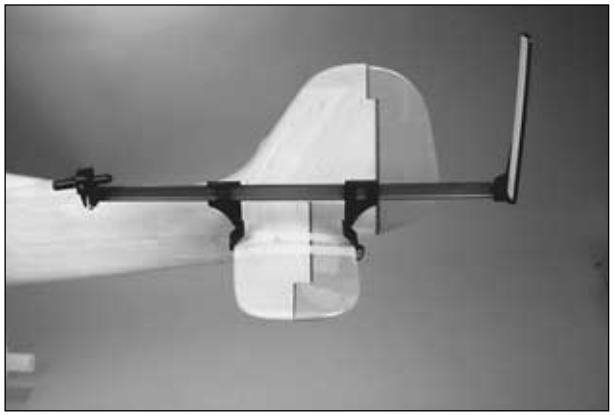


❏ 10. Remove the wing from the fuse. Use a 1/4-20 tap to tap threads in the wing bolt blocks. Enlarge the holes in the wing only with a 17/64" (or 1/4") drill.

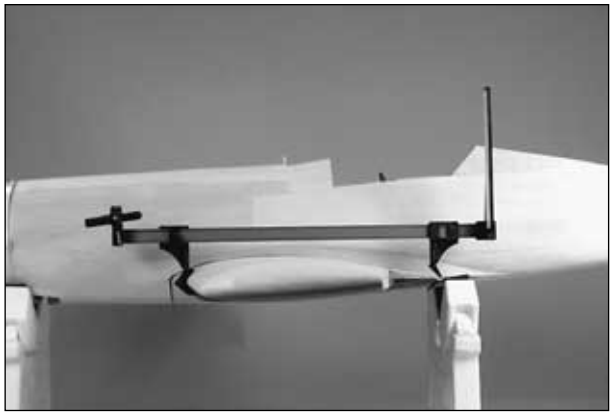
❏ 11. Harden the threads in the wing bolt blocks by adding a few drops of thin CA or epoxy and allowing to fully harden. Retap the threads.

❏ 12. Mount the wing to the fuse with the 1/4-20 x 2" nylon wing bolts. If you prefer, you can cut 3/4" off the bolts.

To achieve the highest degree of accuracy, some modelers prefer to measure the wing incidence during construction, and if necessary, correct it before finishing the model. If this is your preference, now is the time to measure the wing incidence and make adjustments if necessary. If adjustments are required, this can be accomplished by inserting shims of balsa between the 1/32" ply fillet base and the fuse sheeting, and between the fuse crutches and the wing, or by removing material from the fuse sheeting and the crutches. A Great Planes® AccuPoint™ Laser Incidence Meter (GPMR4020) is shown in the following illustration.



A. Use masking tape to securely hold the elevators neutral. Mount the incidence meter to the stab. Make certain the elevator remains neutral. Use additional masking tape if necessary. Adjust the meter until it reads +1 degree.

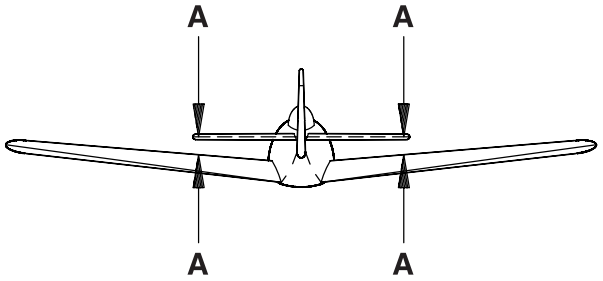


B. Without disturbing the model, remove the incidence meter from the stab and mount it to the wing near the fuselage. The wing should also have +1 degree incidence at the root. Due to washout, the wing should have **minus** 1 degree at both tips (when the ailerons are neutral).

C. Make adjustments to the wing incidence if necessary.

Make the wing fillets

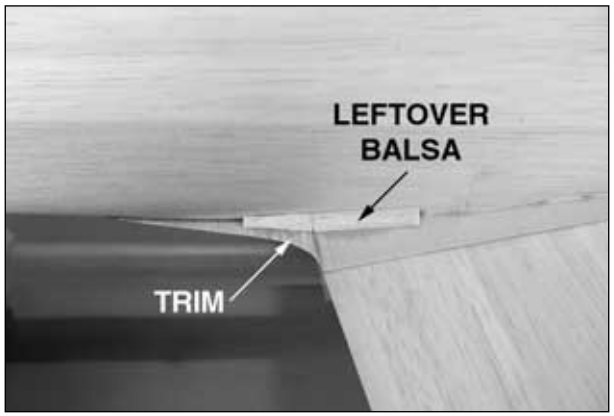
❏ 1. Remove the wing from the fuse. Cover the top of the center section of the wing with Great Planes Plan Protector or wax paper to keep glue from sticking when you glue the fillet bases to the fuse (with the wing in position).



❏ 2. Bolt the wing back onto the fuse. Stand about six to ten feet behind the model and observe the distance between both sides of the stab and the wing. If both distances are equal as shown in the sketch, then the wing is level (A = A). If the wing is not level, loosen the wing bolt on the "high" side and slip shims from leftover balsa between the fuse sheeting and the fillet base to bring the wing into alignment with the stab. Glue the balsa shims to the fuse, but not to the ply fillet bases.

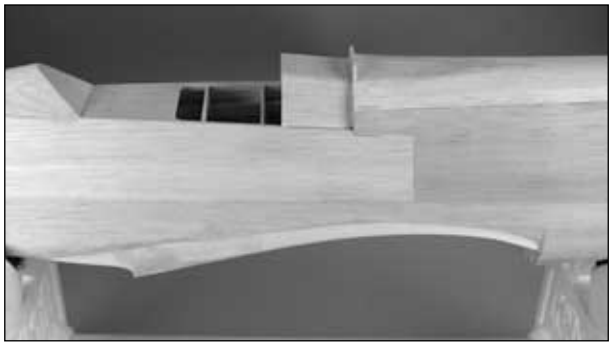
❏ 3. Remove the wing and the fillet bases from the fuse. Mix up a batch of 30-minute epoxy and microballoons. Apply the glue to the fuse crutches and to the fuse sheeting. Reposition the fillet bases and hold them in place with masking tape. Mount the wing to the fuse. Confirm the wing alignment with the stab. Adjust if necessary. Wipe away excess epoxy before it hardens.

❏ 4. Use CA to glue the fillet bases, aft of the wing, to the fuse. Do not disturb the model until the epoxy has fully hardened.



❏ 5. Trim the ply fillet bases even with the TE of the wing. Glue strips of leftover balsa to the fillet bases and to the fuse to strengthen the joint and to take up space, reducing the amount of filler that will be required.

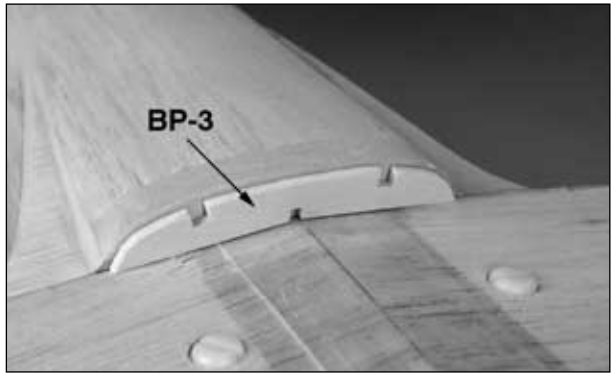
❏ 6. Remove the wing. Use the pattern provided to make a **wing fillet applicator** from leftover ABS plastic. This will spread the balsa filler while simultaneously providing the correct shape.



❏ 7. Use the wing fillet applicator to apply lightweight, sandable balsa filler to the fuse and the fillet bases. Note how the fillet has a concave shape. Do as neat a job as you can to smoothly apply the filler, thus minimizing sanding that will be required after it dries.

❏ 8. Bolt the wing to the fuse and place the model upside-down in a building stand. Glue leftover 1/16" balsa to the bottom of the fillet bases blending the bottom of the wing to the fuse. Blend the bottom of the fillet bases to the fuse with balsa filler. Sand when dry.

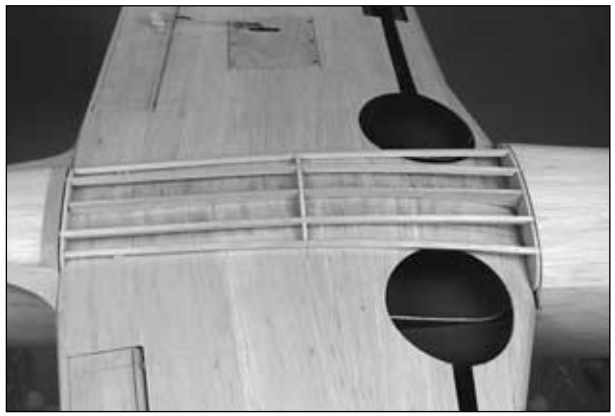
Build the belly pan



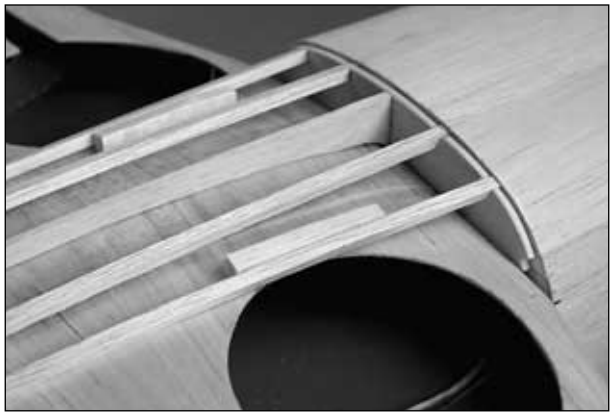
❏ 1. Position the die-cut 1/8" plywood **belly pan formers BP-1** and **BP-3** on the bottom of the wing up against the fuse where shown on the plan. If necessary, trim the tops of the formers so they are 1/16" shorter than the fuse bottom to accommodate the 1/16" belly pan sheeting.

❏ 2. Glue BP-1 and BP-3 and the die-cut 1/8" balsa **belly pan spine** to the bottom of the wing. Be certain you don't inadvertently glue the formers to the fuse, and be certain to leave a 3/32" gap between BP-3 and the fuse and a 1/16" gap between BP-1 and the fuse.

❏ 3. Glue **BP-2** to the bottom of the wing where determined by the notch near the middle of the spine.



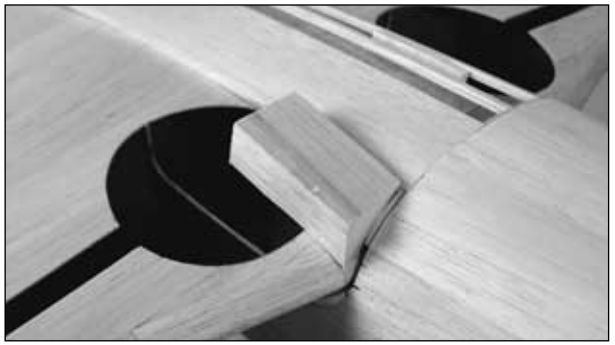
❏ 4. Cut the four stringers for the belly pan from two 3/16" x 3/16" x 30" balsa sticks and glue them into position.



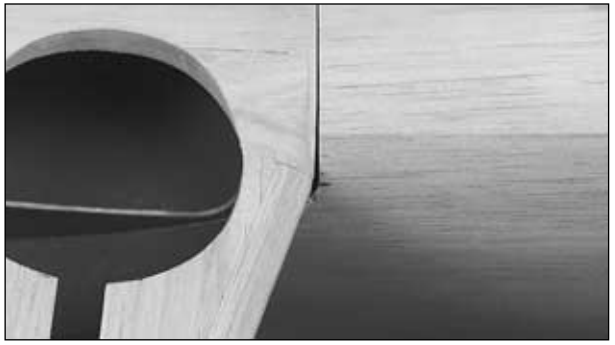
❏ 5. Glue two pieces of leftover 1/4" x 3/8" balsa to the bottom wing sheeting and to the stringers over the wheel wells. This will support the belly pan sheeting after it is trimmed even with the wheel wells.

❏ 6. Glue pieces of leftover 3/16" x 3/16" balsa to the stringers and to the bottom of the wing on both sides of the wing bolts. This will tie the stringers together after the holes are cut for the wing bolts.

❏ 7. Sheet one side of the belly pan with a 1/16" x 3" x 30" balsa sheet. The sheet extends from the center of the belly pan spine to the outer stringer (and can be seen in following photos).



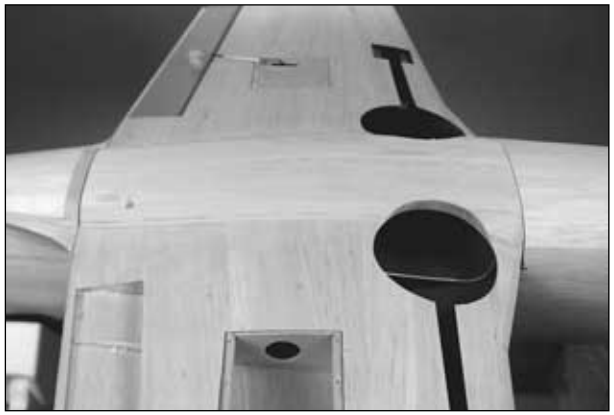
❏ 8. Carve the bottom of one of the 1" x 1-1/4" x 3" balsa **belly pan blocks** to fit the wing when placed on the forward belly pan former and the wing. Glue the block into position.

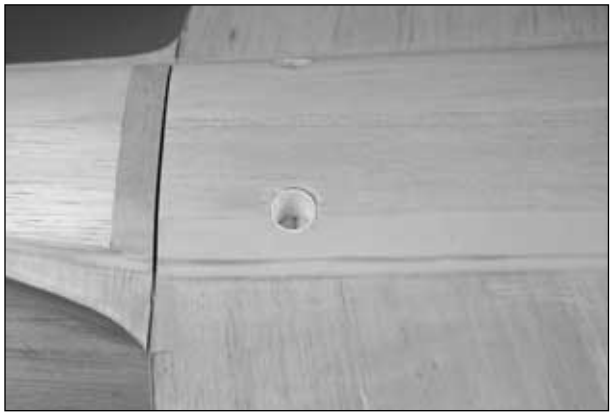


❏ 9. Finish shaping the belly pan block to match the fuse bottom, the belly pan and the wheel opening. Trim the belly pan block and the belly pan sheeting and stringers to reopen the wheel well.

❏ 10. Trim the belly pan sheeting and stringer as necessary to accommodate the 9/16" **paper wing bolt tube**. Cut 1" from the tube and use thick or medium CA to glue the 1" piece to the belly pan sheeting.

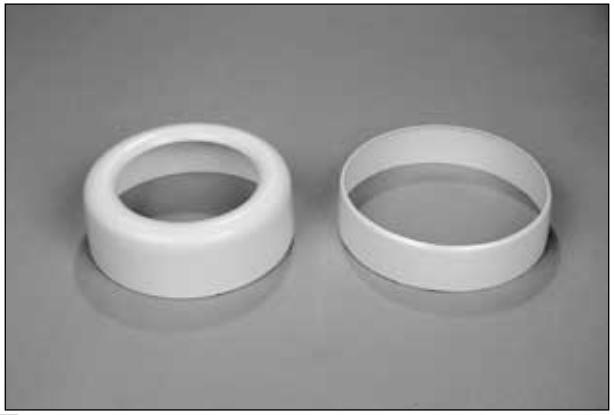
❏ 11. Sheet the other side of the belly pan and add the paper wing bolt tube and the belly pan block.





❏ 12. Blend both sides of the belly pan to the wing and the fuse with sandable balsa filler. Sand the filler after it dries.

Assemble the cowl



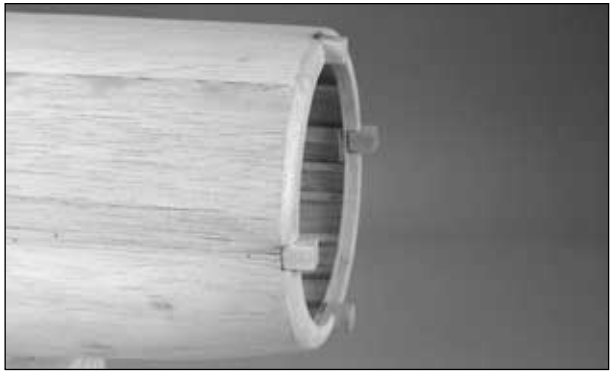
❏ 1. Use curved-tip scissors to trim the molded ABS **forward** and **aft cowl halves** along the molded in cutlines. The cutlines are most easily seen from the inside.

❏ 2. Use 150-grit sandpaper to **thoroughly** sand the seams all the way around both cowl halves where they will be glued together.

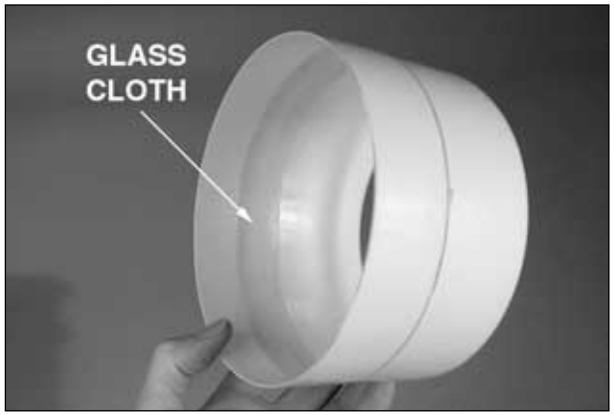
❏ 3. Place the forward cowl over the aft cowl and glue them together with thin or medium CA. Use only a small amount of CA accelerator if necessary. Too much CA accelerator can soften the plastic.

❏ 4. Temporarily clamp the 1/2" x 1/2" x 5/8" maple **cowl mount blocks** to former W-1 in the “3, 6, 9 & 12" positions as shown on the plan. Cut both die-cut 1/4" balsa **cowl rings** into two halves. Trim the cowl rings as necessary so they fit between the cowl mount blocks. Glue the cowl rings to F-1.

❏ 5. Remove the cowl mount blocks. Sand the cowl rings even with the fuse sheeting, then round them as shown on the plan.

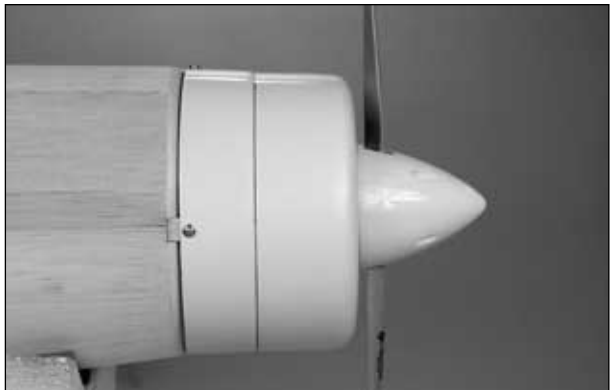


❏ 6. Slightly round the cowl mount blocks to match the curvature of the cowl. Glue the cowl mount blocks to the fuse between the cowl rings with 30-minute epoxy. **Note:** Be certain the cowl mount blocks are positioned so the cowl will fit over them. An additional 1/32" clearance at each cowl mount block should be allowed to accommodate the glass cloth that will be added to the inside of the cowl later. You don’t want to have to “stretch” the cowl by forcing it over the cowl mount blocks if they are spaced too far apart.



❏ 7. While the epoxy on the cowl mount blocks is hardening, reinforce the seam between the cowl front and rear with a 1" wide strip of glass cloth and 30-minute epoxy. **Note:** The inside of the cowl must be **thoroughly** scuffed with coarse sandpaper for the epoxy to adhere.

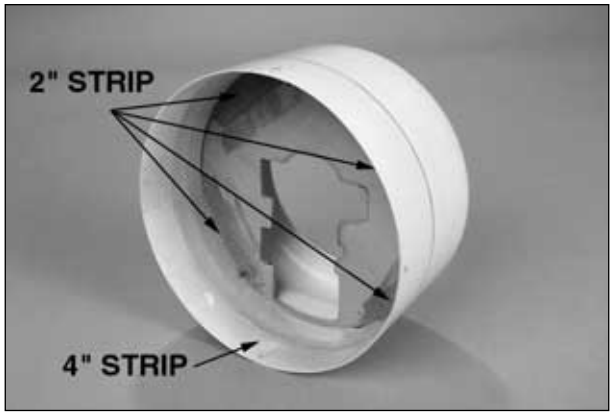
❏ 8. Mount the engine to the firewall. Position the cowl on the fuse over the cowl mount blocks. Mount a spinner and a prop to your engine. Align the cowl so there is adequate spacing between the front of the cowl and the propeller and between the back of the cowl and the fuse. Trim the aft edge of the cowl if necessary. Once the correct alignment has been achieved, tape the cowl into position. You can see the correct cowl alignment in the following photo.



❏ 9. 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 1/8" bit. Test mount the cowl to the fuse with four #4 x 3/8" screws and #4 washers.

❏ 10. Remove the cowl. Harden the threads in the cowl mount blocks by adding a few drops of thin CA to each hole.

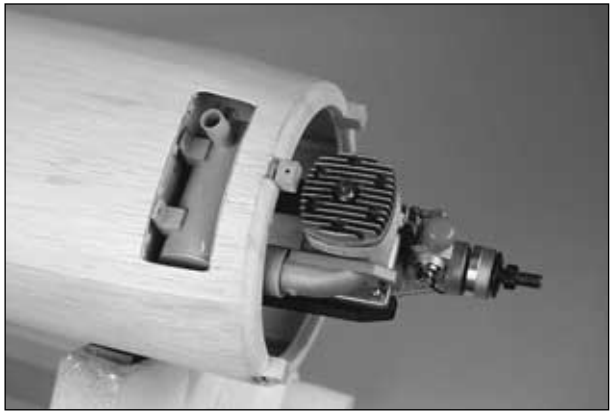
❏ 11. A pattern is supplied on the plan to make a **baffle** from 1/8" lite-ply (not supplied) to direct incoming air over the head of the engine. The cutout fits the O.S. Max .61 FX engine. If you are using a different engine, you will have to trim the baffle to fit your setup. Make the baffle, then use medium CA to tack-glue it to the inside of the cowl.



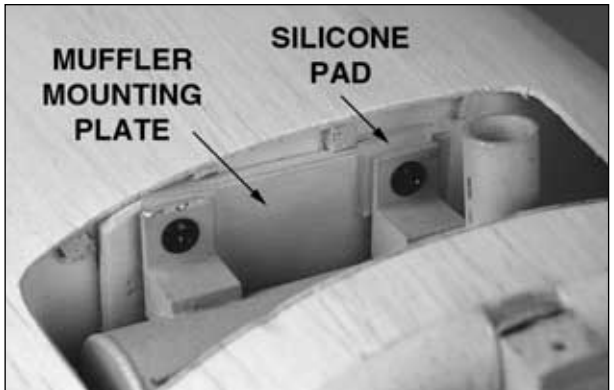
❏ 12. Test fit the cowl to the fuse, trimming the baffle as necessary until it fits around your engine. Once you have achieved a good fit, use 30-minute epoxy to glue four 2" long strips of 1" glass cloth to the cowl and the baffle. Glue a 4" strip of glass cloth across the aft edge of the bottom of the cowl. Glue three 1" strips over the three remaining cowl attachment screw holes inside the cowl.

Mount the muffler

❏ 1. While the epoxy from the previous step is curing, attach the header and muffler to the engine. On our prototype, we cut 3/16" from the exhaust header to allow the muffler to fit.



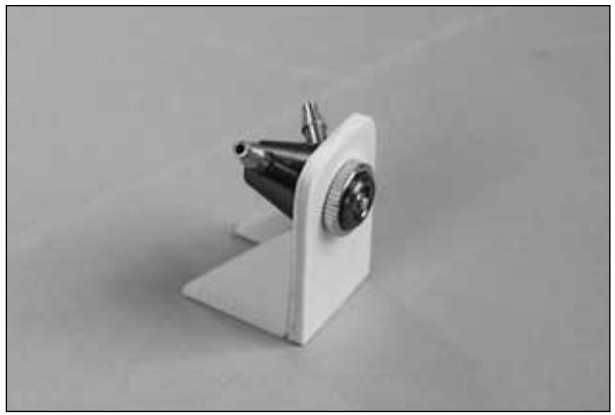
❏ 2. Cut an opening in the bottom of the fuse to accommodate the muffler and to allow adequate air flow. Mount the engine to the fuse with the muffler attached.

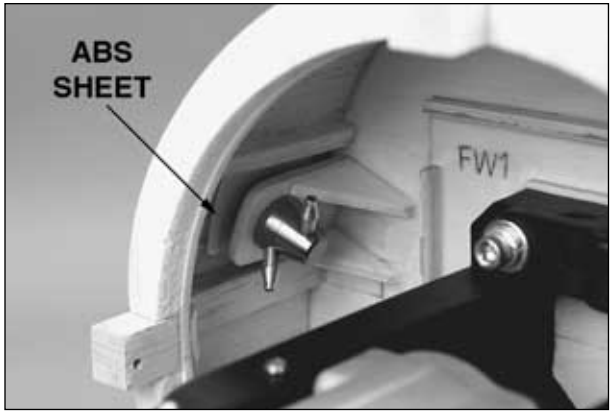


❏ 3. Use leftover 1/8" and 1/16" ply to make a 3/16" thick **muffler mounting plate** as shown on the plan.

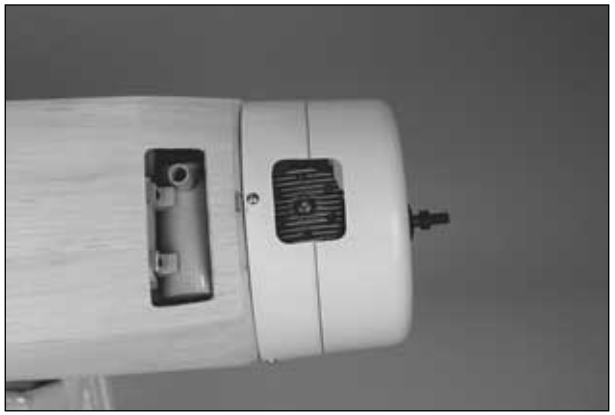
Mark the location of the holes in the muffler for the mounting screws onto the plate, then remove the plate and drill 3/32" holes for the screws. Reinstall the plate, glue it to F-2, then mount the muffler to the plate with the screws and the silicone pads included with the muffler.

❏ 4. Remove the muffler. Harden the threads in the muffler mounting plate by adding a few drops of thin CA to each hole.





❏ 5. If you are going to use a fuel filler valve, mount the valve at this time. We made a mount for a Great Planes Fuel Filler Valve and mounted it to the front of former 2 inside the fuse. Cut a hole through the sheeting in alignment with the filler valve. Reinforce the 1/16" balsa sheeting with a small sheet of leftover ABS or 1/32" plywood glued to the inside of the sheeting. Securely glue the filler valve mount into position.

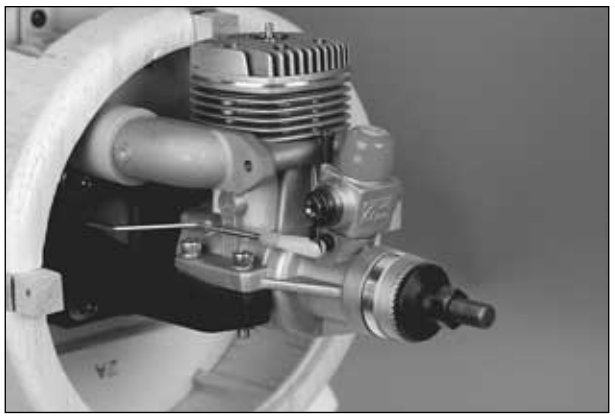


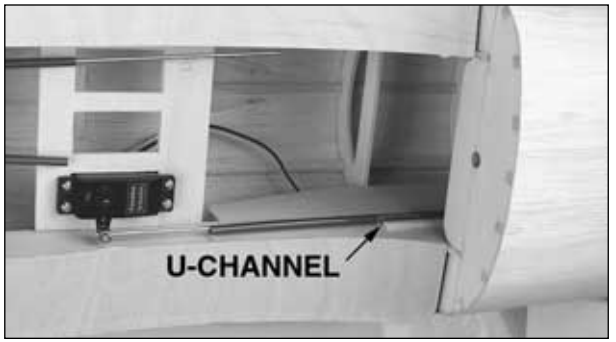
❏ 6. Cut an air passage in the bottom of the cowl under the head of the engine and additional holes as necessary to access the needle valve and other accessories as required.

The model is nearly ready to final sand and cover, but before doing so let's take care of a few final details...

Hook up the throttle

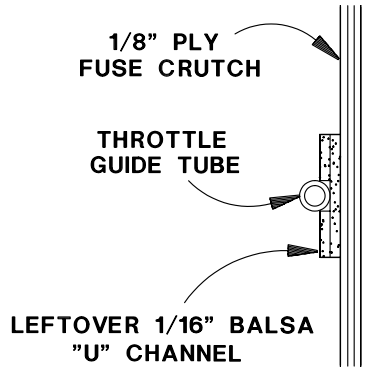
Refer to these photos to hook up the throttle.





❏ 1. Mount your throttle servo to the servo tray with the screws included with the servo.

❏ 2. Drill a 3/16" hole through the firewall right next to the left fuse crutch that is in alignment with the arm on your carburetor, then connect the carb arm to the throttle servo with a .074" wire pushrod, a 3/16" guide tube, a nylon clevis and a screw-lock pushrod connector supplied with this kit. If your setup is different, or if you prefer, you could substitute the supplied hardware and use your own equipment to hook up the throttle (such as a throttle cable). Make certain the screw in the screw-lock pushrod connector does not protrude below the wing fillet base - it's close, but should not be a problem).

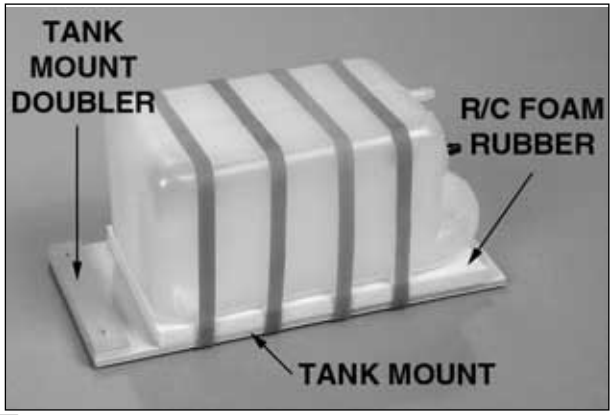


❏ 3. Support the guide tube near the servo with a "U" channel made from strips of leftover 1/16" balsa glued to the fuse crutch and the guide tube.

❏ 4. Mount the elevator and rudder servos to the servo tray with the screws included with the servos.

Install the fuel tank

Refer to this photo for the following two steps.



❏ 1. Glue the die-cut 1/8" plywood **tank mount doubler** along the aft edge of the **top** of the die-cut 1/8" plywood **tank mount**.

❏ 2. Assemble the fuel tank according to the instructions that came with the tank (we used a GP. 14 oz tank, GPMQ1406). Mount the tank to the tank mount with rubber bands and a sheet of R/C foam rubber in between.

Refer to this photo for the following two steps.

❏ 3. Cut the **aft tank mount tab** to a length of 2-3/4" from the last piece of 1/4" x 3/8" basswood (leftover from the servo hatch rails in the wing). Drill two 3/32" holes through the tab 1/4" from both ends. Glue the tab to former F-4 where shown on the plan.

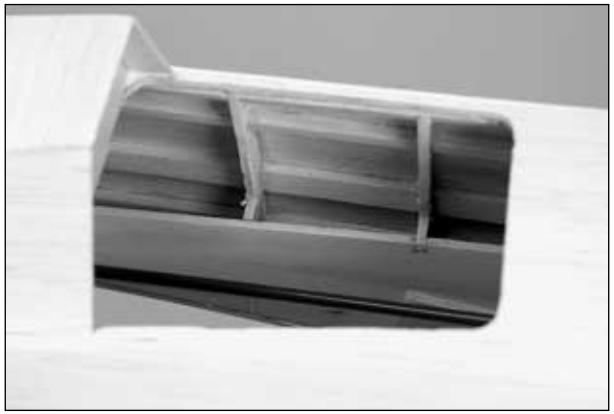
❏ 4. Fit the front of the tank mount under the forward tank mount tab on the back of the firewall. Use the holes in the aft tank mount tab as a guide to drill two 1/16" holes through the tank mount. Mount the tank mount to the aft tank mount tab with two #2 x 1/2" screws. Drill 1/4" (or 15/64" for a perfect fit) holes through the firewall for the fuel lines.

Now you've got a secure, yet readily removable tank mounting system for inspecting your fuel tank and lines whenever necessary. While we're installing "tanks", go ahead and install the air tank for the retracts (if you're installing retracts).

❏ 5. Connect the air line to the air tank for the retracts. Mount the tank to the cockpit deck inside the fuse as shown on the plan using RTV silicon cement. This installation is secure, yet not permanent in case the tank needs to be removed.

Test fit the cockpit kit

If you are not installing the Top Flite scale cockpit kit, skip this section. You may make your own, scale appearing cockpit from balsa, ply and/or thin cardboard (from breakfast cereal boxes).



❏ 1. Cut out formers 6 & 7 along the lines you marked previously.

❏ 2. Cut out the cockpit kit according to the instructions that came with it and test fit it into the fuselage. Make adjustments where necessary so all the parts fit. Make sure none of the radio components (receiver, battery pack, on/off switch, etc.) you are going to install will interfere with the cockpit kit when it's permanently glued into position later on.

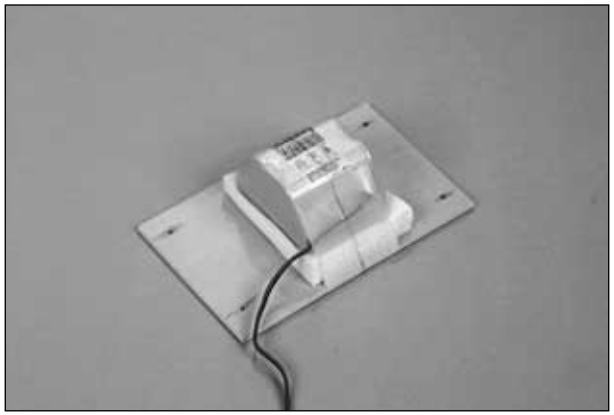
❏ 3. While you're working on the cockpit kit, now is a good time to assemble and test fit your pilot. We used a Top Flite 1/7th scale WWII pilot (TOPQ9000). You can install just the upper part of the body, or glue his legs and feet on and install the full body.

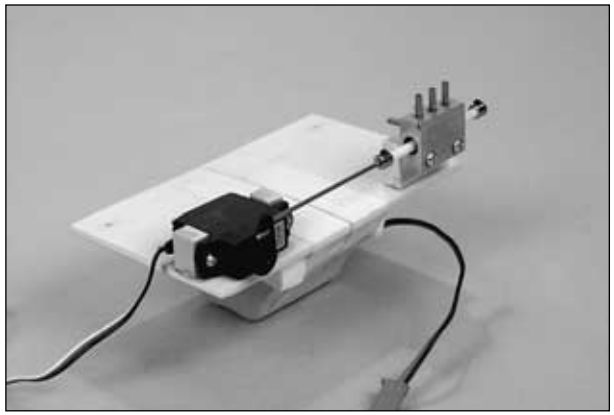
❏ 4. The cockpit kit and pilot can be painted and glued into position at any time before the canopy is permanently glued to the fuse.

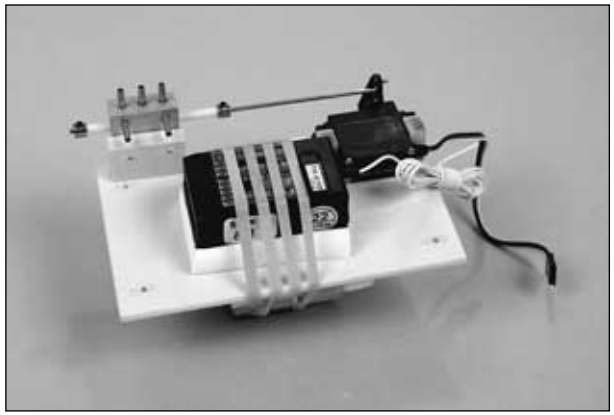
Mount the receiver and battery pack

Some modelers prefer to mount the receiver, battery pack and associated hardware (on/off switch, charge jack, air filler valve for retracts, etc.) **after** the model is covered. One advantage to doing this is that those components can be positioned where necessary to minimize additional weight that may be required to achieve the correct C.G. If, for example, while balancing the model (*see* **Balance your model** on page 57), you find that it is tail heavy, you could mount the battery pack in a location ahead of the C.G., so that no additional nose weight will be required. Our flying prototype, with the O.S. Max .61 FX engine, required no additional ballast to achieve the correct C.G. with the battery pack and receiver mounted where shown in the following steps. If you are using a similar setup, you could go ahead and mount your receiver and battery pack where shown and rest assured that little or no additional nose or tail weight will be required. If, however, you prefer to mount these components after the model is covered, return to this section when you are ready.

There is more than one way to mount your receiver and battery pack. Some modelers have developed their own proven methods. However you decide to mount your receiver and battery, they should be cushioned with R/C foam rubber and securely mounted so they cannot come loose upon a rough landing or abrupt maneuvers. Simply stuffing them into place with foam is not recommended. Space is a little tight inside the Focke-Wulf fuselage, but there's plenty of room for all the components if you plan carefully. The following steps illustrate the way we mounted the receiver, battery pack and air valve setup in our proto.

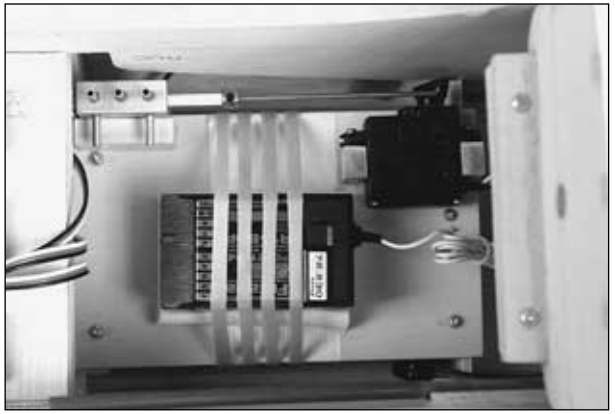






❏ 1. Make a 3" x 5" **receiver mounting plate** from 1/8" plywood (not included). Mount the battery pack, receiver and retract and air valve system to the plate.

On our prototype we mounted a 6 volt battery pack, cushioned with a piece of 1/2" R/C foam rubber, to the top of the plate and secured it with nylon filament tape. Connect the retract servo to the air valve according to the manufacturer's instructions (CJM system shown). The air valve was mounted to a basswood block. The receiver, also cushioned with 1/2" R/C foam rubber, was secured to the platform with two #64 rubber bands. **Note:** We used a 6 volt, 1,000 mAh battery pack in our prototype. Whatever type of pack you use, a larger capacity pack, such as 800 mAh or 1,000 mAh, is recommended if you have built your model with flaps and retracts.



❏ 2. Glue two 1/4" x 3/8" basswood rails (not included) to formers F-4 and F-5 where shown on the plan. Mount the platform to the rails with four #2 x 3/8" screws (not included).

❏ 3. Mount the on/off switch, charge jack (if you use one) and the retract air filler valve in a location that is easily accessible, that will not interfere with anything inside the model and is out of the way of engine exhaust residue. If you mount any of those items directly to the fuse sheeting, first glue a sheet of leftover ABS or 1/32" plywood to the inside of the sheeting in those areas.

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 an assistant 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

❏ 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 areas that may be exposed to fuel or engine exhaust. These include the wheel wells, the underside of the wing sheeting in the flap area, the firewall and the engine and muffler compartment, the fuel tank area, the wing saddle in the fuse, belly pan formers BP-1 and BP-3 and the paper wing bolt tubes.

❏ 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 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.

Trim scheme

The Focke-Wulf features a spray painted camouflage "patchwork" trim scheme where the transition from one color to the next is "feathered" with no defined lines. This means that, for the most accurate representation, the finish on the model should be spray painted. However, the balsa sheeting must first be prepped and sealed. This is typically done with the traditional "glass cloth and resin" method, where the entire model is covered with light-weight glass cloth bonded to the skin with polyester or epoxy resin. There are many products in the hobby industry, specially developed for this purpose, that have the correct viscosity and working time and that are sandable. Glass cloth and resin is unquestionably the most durable and long-lasting way to finish a balsa model, though it is probably also the most time consuming and has the potential to add much weight if not done correctly.

An alternate method to glass cloth for prepping the balsa for painting, and the method we have selected for the model on the kit box cover, is to cover it with dove gray MonoKote film. We have painted over some of our MonoKote-covered models with Top Flite LustreKote, and painted over others with Testors Model Master Acrylic paint. The colors used for the Focke-Wulf on the cover are Testors Dunkel Grun (dark green) RLM #82, Lichtblau (light blue) RLM #76, and Grauviolette (gray violet) RLM # 75. The cockpit interior was painted Gray RLM #02. RLM numbers are Germany's official, standardized military colors. After the Testors paint was applied, the finish was sealed with a light coat of LustreKote crystal clear (TOPR7200) to provide a fuelproof coating and to provide a smooth surface for the decals to adhere. After the clear sealer coat, the decals and panel lines were applied, then the entire model was once again painted with a coat of LustreKote flat clear. The trim scheme selected was taken from the Tamiya 1/48 scale Fw 190D, kit number 61041.

If you prefer not to go through all the work of a painted trim scheme, you may be able to find a simpler scale trim scheme, or make up your own, scale-appearing trim scheme by simply covering your Focke-Wulf with a few of the flat military MonoKote colors such as flat dove gray, flat olive drab, flat tan, and flat black.

The following instructions provide details on how to finish your model like the model on the kit box cover using a MonoKote-covered and painted trim scheme.

Cover the model

Warning: Never cut the covering on critical structural areas of the model. These areas include the stab sheeting, fin sheeting 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. 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.

❏ 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 control surfaces first (rudder, elevators, ailerons and flaps—if used). It may be helpful to mark which elevator and aileron is the right and left in an inconspicuous location.

❏ 3. Cover the wing. Begin with the belly pan, then the bottom of both panels, then the top of both panels. Cover the aileron and flap hatches.

❏ 4. Cover the fuse. Use your own preferences on the exact covering sequence. Usually it's best to first cover the bottom, then the sides, then the top of the fuse. If you are going to paint the covering as has been described, consider priming, then painting the wing fillet instead of covering it.

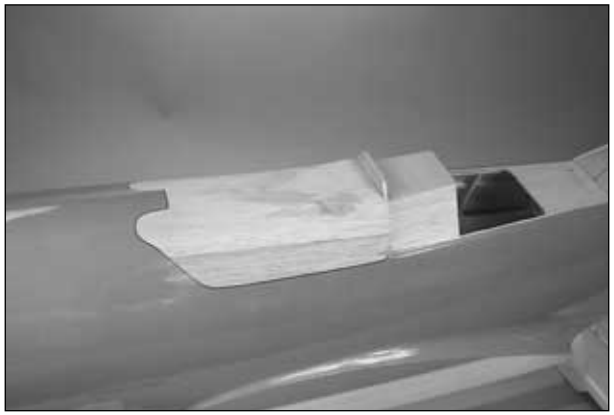
Machine gun cover

Note: If you are finishing your model by painting over MonoKote or glass cloth, glue the machine gun cover to the model before painting. If you are going for an entirely MonoKote-covered finish, paint the machine gun cover first, then glue it to the model after it has been covered.

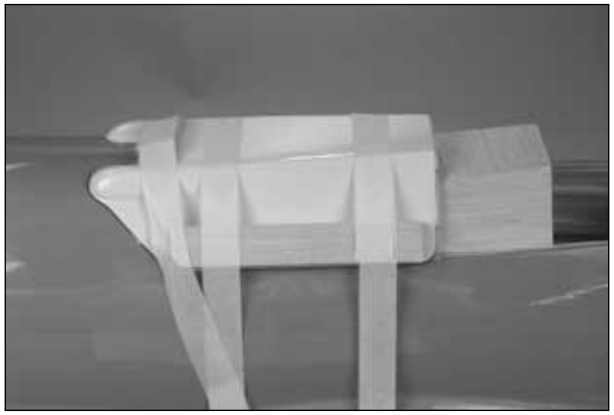
❏ 1. Position the machine gun cover on the fuse (with the aft edge aligned with the middle of former 6B).

❏ 2. Use a felt-tip pen to draw the outline of the machine gun cover onto the covering.

❏ 3. Use a sharp hobby knife to **carefully** cut the covering from the model slightly inside the lines you marked. Remove any ink left on the covering with denatured alcohol.



❏ 4. Remove the covering from the fuse, so the machine gun cover will be glued to bare balsa.



❏ 5. Glue the machine gun cover into position. If you have not yet painted the model, you could use thin or medium CA to glue the machine gun cover on. If the machine gun cover is already painted, it may be safer to use "canopy glue" (such as J & Z Products Z R/C 56) that will not damage the finish and can be removed with water.

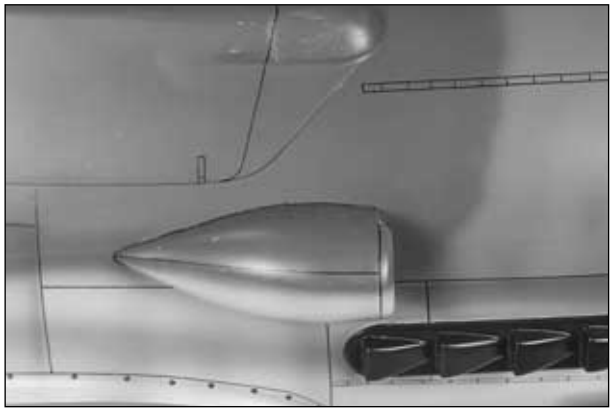
Supercharger intake

Note: Just the same as the machine gun cover, if you are finishing your model by painting over MonoKote or glass cloth, glue the supercharger intake to the model before painting. If you are going for an entirely MonoKote-covered finish, paint the supercharger intake first, then glue it to the model.

❏ 1. Cut out the two parts of the molded ABS **supercharger intake**.

❏ 2. Glue the super charger intake together with CA. Use automotive Bondo filler or plastic filler to fill the seam between the two parts. Test fit the supercharger intake to the fuse. Trim as necessary for a good fit.

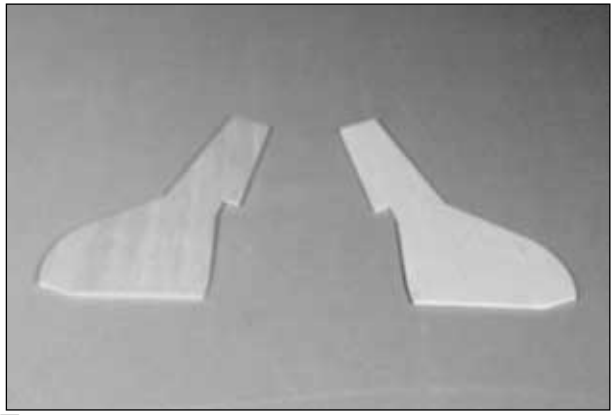
❏ 3. The same as you did for the machine gun cover, trim the covering from the fuse around the supercharger intake and remove the covering.



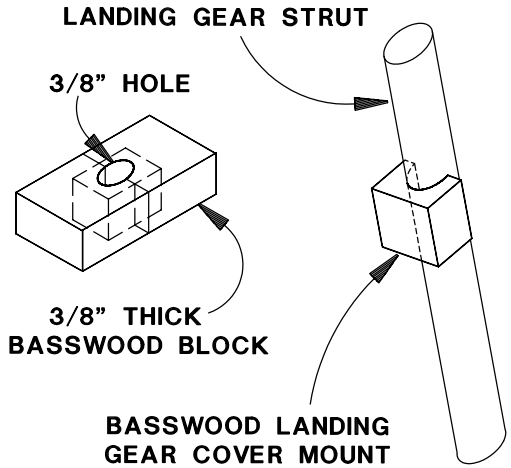
❏ 4. Glue the supercharger intake into position.

Landing gear covers

Note: The landing gear covers as featured on the kit box cover and shown in these instructions are not included with the kit and, if you have retractable landing gear, are not intended to be in position for flying. This is because the landing gear does not fully retract into the wing, thus leaving the covers extending below the wing creating much drag. Additionally, the landing gear covers interfere with the belly pan. They are intended for static display only.



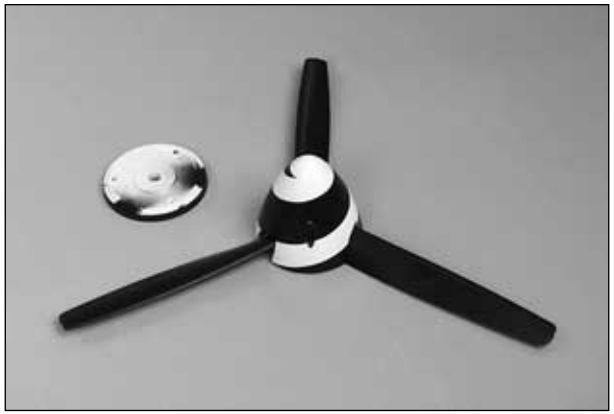
❏ 1. Use the pattern provided on the plan to make two **landing gear covers** from 1/8" lite-ply or 1/8" balsa.



❏ 2. Make two **landing gear cover mounts** for each landing gear cover as shown in the sketch from 3/8" thick basswood. If you are using CJM retracts, start by drilling a 3/8" hole through an approximately 3/8" thick sheet of basswood, then cut the sheet through the middle of the hole and trim the edges to make two mounts.

❏ 3. Glue the mounts to the inside of the wheel covers. Cover or paint the wheel covers, then mount them to the struts with the mounts with double-sided tape or something similar.

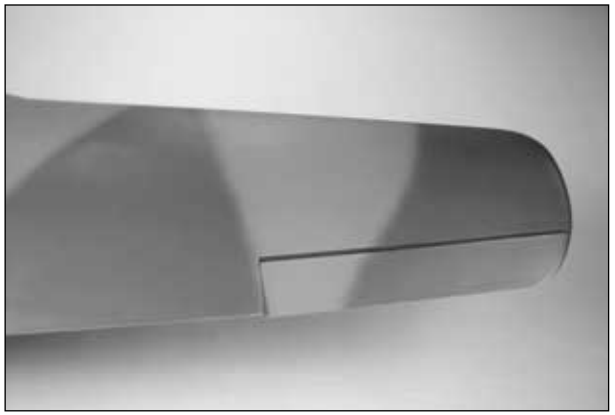
Display propeller



❏ There are different ways to make a propeller and spinner for static (non-moving/flying) display, depending upon how much effort you want to put forth and how accurate you wish the propeller to be. We simply used a Du-Bro white 3" 3-blade spinner (DUBQ3704) and a Master Airscrew 14" 3-bladed propeller (MASQ1947). This spinner and prop are the approximate scale size for a Focke-Wulf of this scale, but are not the correct shape (the actual Focke-Wulf spinner is more "blunt" and the propeller blade tips are more rounded). Paint the spinner to match the trim scheme you have selected. **Note:** The size of this propeller is not suitable for flying this model. Fly your model with the appropriate size propeller recommended by the engine manufacturer.

Painting

❏ 1. Prime the cowl with LustreKote® white primer, allow to dry, then wet-sand with 400-grit sandpaper. Paint the cowl with LustreKote dove gray to match the dove gray on the fuse. Paint the inside of the cowl and the engine baffle flat black.



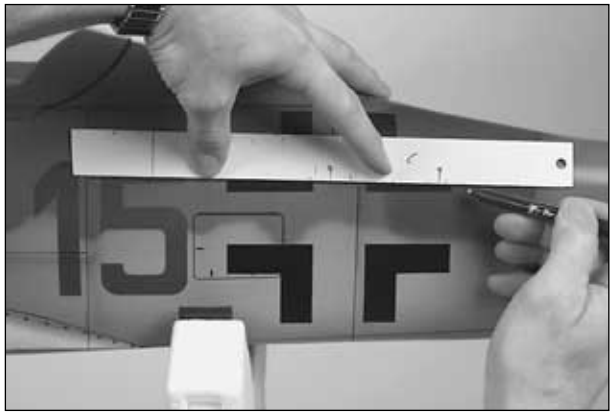
❏ 2. Temporarily join the control surfaces to the wing, stab and fin with the hinges, but do not glue the hinges into place yet. Attach the cowl to the fuse. This way, all patchwork of the camo trim scheme will line up (as shown in the photo).

❏ 3. Wipe the model down with a dust-free cloth and denatured alcohol. Follow with a tack-cloth to remove residual dust particles and lint.

❏ 4. Use an airbrush to paint the model according to the trim scheme you have selected.

❏ 5. Allow the paint to dry. Since Testors is not fuel proof, it must be sealed with fuelproof paint. Remove the control surfaces. Paint all parts of the model that were painted with Testors with two very light coats of LustreKote crystal clear (TOPQ7200).

❏ 6. After the clear has dried, temporarily rejoin the control surfaces to the model with the hinges. Cut the decals from the included decal sheet and place them on the model where shown on the kit box. For larger decals, peel the decal from its backing, then dip it in a solution of warm water and soap (about five or six drops of liquid dish soap per quart of water). This will aid in positioning the decal and eliminate air bubbles. Place the decal on the model, slide it into position, then squeegee the water out from underneath with a rubber squeegee or a piece of soft balsa. Some small wrinkles can be removed with a little heat from a heat gun.

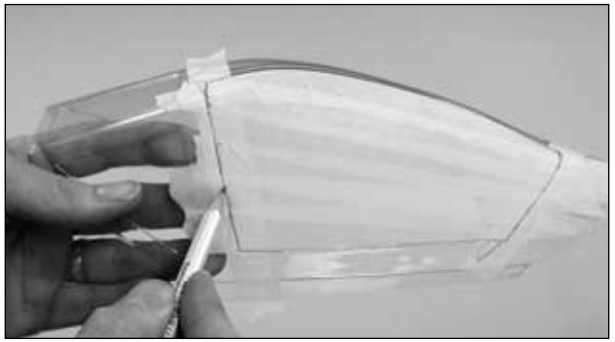


❏ 7. Apply panel lines with a Top Flite Panel Line Pen (TOPQ25210). Draw the various hatches and rivets with a Top Flite *Scale Template* (TOPR2187). Specialized templates can be made from sheets of plastic. Use a flexible straightedge such as a plastic strip or a thin, metal ruler to apply the panel lines. Apply a few strips of vinyl tape to the underside of your straightedge. This will raise it slightly off the surface, so the ink from the panel line pen will not "bleed" underneath.

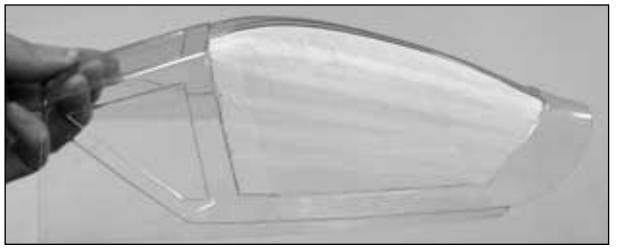
❏ 8. After the panel lines and decals have been applied, remove the control surfaces and apply a **light** mist coat of LustreKote flat clear (TOPQ7199) to all parts of the model. A light mist is required so that the panel lines will not run. After the mist coat has been applied, spray on an additional coat of flat clear.

Do not spray LustreKote directly on the canopy. Eventually, LustreKote will curl the butyrate plastic that the canopy is made of. If you are following these instructions and are painting the model with Testors, it will serve as a barrier, so if misted on lightly over the Testors, LustreKote will not distort the plastic. If you are not using Testors paint, select another type of paint that will not react with butyrate such as Pactra Formula-U or Chevron. Details for painting the canopy follow.

❏ 9. 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.



❏ 10. Mask the clear areas of the canopy. Use a pencil to simultaneously press the tape into the corners while marking guidelines for trimming.



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

❏ 12. Mask the rest of the clear areas of the canopy the same way and cover the inside of the canopy with tape or paper to protect it from over spray.

❏ ❏ 13. Paint the canopy. In the case of our prototype model on the kit box cover, the canopy was painted with Testors paint to match the rest of the model. After the Testors dries, apply a **light** mist coat of LustreKote flat clear to fuelproof the Testors.

Exhaust stacks

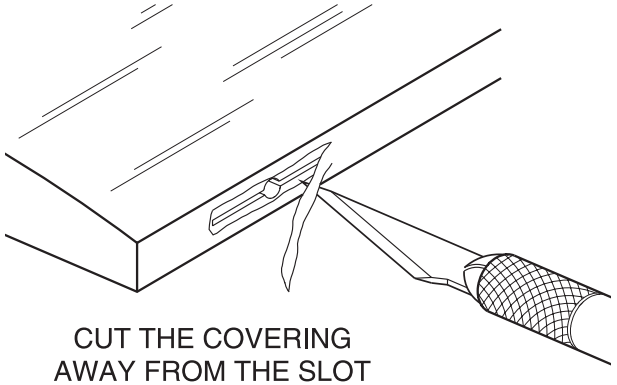
❏ 1. Cut out both molded ABS exhaust stacks as shown.

❏ 2. Paint the exhaust stacks. You could paint them a burnt, golden brown to match a full-size Focke-Wulf, or just paint them flat black. If the paint you are using is not fuelproof, coat the exhaust stacks with fuelproof paint.

❏ 3. The same way you did the machine gun cover, position the exhaust stacks on the fuse and trim around them with a felt-tip pen. Cut the covering from the fuse and glue the exhaust stacks into position.

FINAL ASSEMBLY

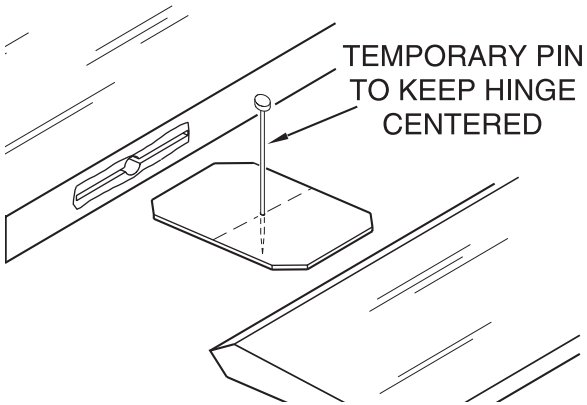
Join the control surfaces



CUT THE COVERING
AWAY FROM THE SLOT

❏ 1. Start with the stab and elevators. Remove a small strip of covering from the hinge slots.

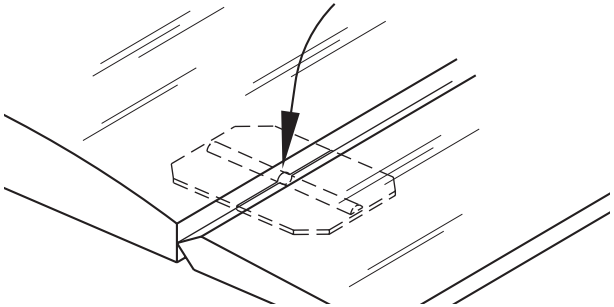
❏ 2. Without using any glue, insert the hinges into the stab. Fill the torque rod holes in the elevators with 30-minute epoxy.



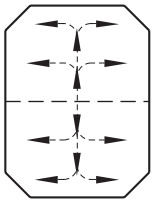
❏ 3. Join the elevators to the stab and the joiner wire. Wipe away excess epoxy with a tissue dampened with alcohol. If the hinges don't remain centered as you join the elevators, remove the stab and insert a pin in the center of the hinges. Make sure there is approximately a 1/64" gap between the elevators and the stab so you do not glue them together.

Do not use CA accelerator on any of the hinges and do not glue the hinges with anything but thin CA. Do not attempt to glue one half of the hinge at a time. The hinges will not be properly secured and could come out while the model is in flight.

ASSEMBLE, THEN APPLY 6 DROPS
OF THIN CA TO CENTER
OF HINGE, ON BOTH SIDES



THE CA WICKS
ALONG THE "TUNNELS"
TO THE ENTIRE
HINGE SURFACE



❏ 4. Cut a paper towel into 2" squares. Add six drops of thin CA to the center of the hinges on **both the top and bottom**. The *tunnels* you drilled will *wick* the CA into the entire hinge surface. Use the paper towel squares to absorb excess CA from the hinge gap.

❏ 5. Use the same hinging method to join the rudder to the fin and the ailerons to the wing.

❏ 6. If you've built working flaps, use a toothpick to apply a small amount of petroleum jelly to the pivot points of the hinges to keep epoxy out.

❏ ❏ 7. Mix enough 30-minute epoxy to do one flap at a time. Use a piece of wire or a toothpick to thoroughly coat the holes in one of the flaps and the holes in the wing with epoxy. Coat one side of the flap hinges with epoxy and insert them into the wing. Coat the other side of the hinges with epoxy and join the flap. Wipe away excess epoxy before it hardens.

❏ ❏ 8. Join the flap to the wing. Tape the flap in place until the epoxy has fully hardened.

❏ 9. Join the other flap to the wing the same way.

❏ 10. Reinstall the pushrods you disconnected before covering, and mount the control horns to the ailerons, flaps, elevator and rudder. Reinstall any hardware and other components you may not already have in place such as the fuel tank and fuel lines, servos, on/off switch, air tank, engine, muffler, fuel filler valve, air filler valve, etc.

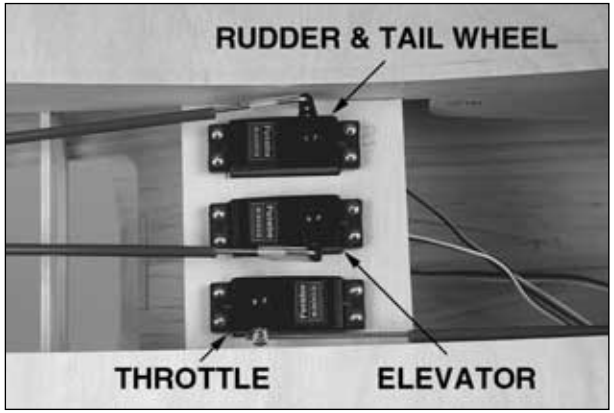
Hook up the controls

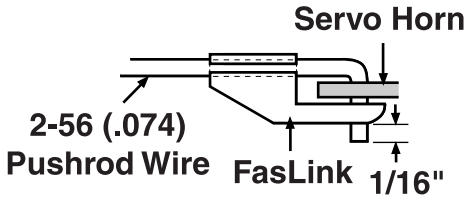
❏ 1. If you've built your model for retracts, route the air lines through the wing and hook up the air lines to the control valve and air tank in the fuse. Leave the lines long enough so they can be connected to the landing gear outside of the wing. Connect the air lines to the landing gear, then mount the gear. If you haven't already done so, secure the set screw that holds the axle to the strut 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. Mount the engine and muffler and hook up all the systems inside the cowl including the fuel lines, in-line fuel filler valve, etc.

❏ 3. Apply a few drops of thin CA to the holes in the servo blocks and servo tray for the servo mounting screws and allow to dry. 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.

❏ 4. Mount the control horns to the control surfaces (remember that the flap horns are mounted "backwards"). 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 the arms on all the servos **except** the flap servos. The arms on the flap servos should be in a position that holds the flaps up when the flap switch on the transmitter is in the "up" position.





❏ 5. Install the elevator and rudder pushrods in the fuse. Connect the pushrods to the elevator and rudder/tail gear. With the rudder and elevators neutral, use a felt-tip pen to mark the pushrods where they cross the holes in the servo arms. Make a 90-degree bend in the wires at the marks you made. Temporarily install a nylon Faslink™ on the wires, then cut them so that about 1/16" protrudes from the bottom of the Faslink. Connect the pushrods to the servos with the Faslinks. Disconnect the radio.

❏ 6. Mount the flap and servo hatches in the wing with the #2 x 3/8" flat head screws. Hookup the ailerons and flaps with the pushrods you've already made. Use a silicone retainer on all clevises.

❏ 7. Mount the receiver and battery pack if you are not waiting until checking the C.G. to determine where to mount them.

Mount the canopy

Here's a close-up photo of the canopy after the model has been finished.

❏ 1. If you haven't already done so, install the cockpit kit (if you've built one) and pilot.

❏ 2. 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.

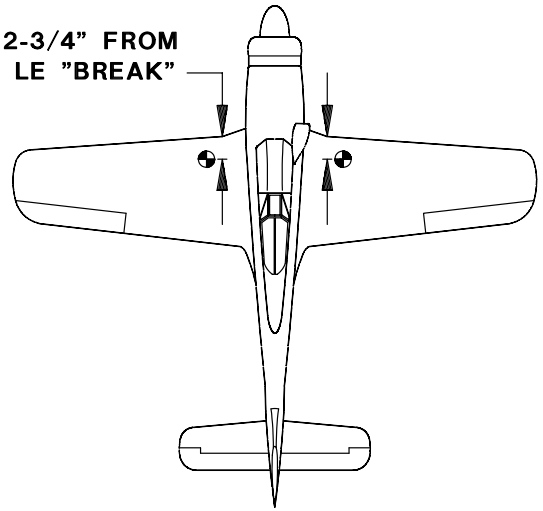
❏ 3. Securely glue the canopy to the fuse using canopy glue such as J & Z Products *Z RC/56* (JOZR5007). Use rubber bands or masking tape to hold the canopy in position until the glue dries.

GET YOUR MODEL READY TO FLY

Balance your model

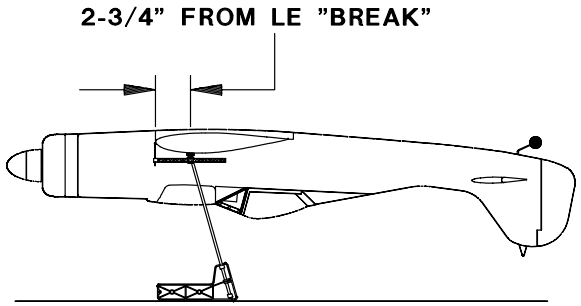
NOTE: This section is VERY important and must NOT be omitted! A model that is not properly balanced will be unstable and possibly unflyable.

At this stage your model should be in ready-to-fly condition with all of the systems in place including the engine, landing gear, covering and paint, and the radio system (less the receiver and battery pack if you are planning to determine their location based upon the current C.G. 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 2-3/4" back from the leading edge **at the LE "break" in the wing at rib W-3**. This is where your model should balance for your first flights. Later, you may wish to experiment

by shifting the C.G. up to 13/64" 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 (if you have retracts), place the model upside-down on a Great Planes CG Machine at the balance point you marked, or hold it upside-down in a stand with the stabilizer level.

❏ 3. If the tail drops, the model is "tail heavy" and you must add weight to the nose to balance. If the nose drops, the model is "nose heavy" and you must add weight to the tail to balance. An easy way to determine how much weight to add, and where to add it is to temporarily set segments of Great Planes (GPMQ4485) "stick-on" lead weight directly on the *outside* of the fuselage over a location where the weight could be permanently attached *inside* the fuselage. For example, if the model is tail heavy, a good place to add weight would be to former F-2 (don't attach weight to the cowl—it is not intended to support weight). Begin by placing incrementally increasing amounts of weight on the bottom of the fuse over F-2 until the model balances. Once you have determined the amount of weight required, it can be permanently attached to F-2 inside the fuse. This process should first be done with your receiver and battery pack if you have not yet mounted them. Add additional weight if required. Tail weight, if required, may be added by cutting open the bottom of the fuse aft of the tail wheel and gluing it permanently inside.

Note: Do not rely upon the adhesive on the back of the lead weight to permanently hold it in place. Over time, fuel and exhaust residue will soften the adhesive and cause the weight to fall off. Use #2 sheet metal screws, RTV silicone or epoxy to permanently hold the weight in place.

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

❏ 5. If you have not already done so, mount the receiver and battery pack. Attach additional lead weight where required.

❏ 6. **IMPORTANT:** Recheck the C.G.

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, ATV's and dual rates as necessary to provide the proper control surface movements as shown.

CONTROL SURFACE THROWS

❏ **NOTE**: Throws are measured at the **widest part** of the elevators, rudder, ailerons and flaps. Use a Great Planes AccuThrow™ meter to accurately measure control throw.

We recommend the following control surface throws:

ELEVATOR:	(High Rate)	(Low Rate)
	5/8" up	7/16" up
	5/8" down	7/16" down
RUDDER:	(High Rate)	(Low Rate)
	1-1/4" right	7/8" right
	1-1/4" left	7/8" left
AILERONS:	(High Rate)	(Low Rate)
	11/16" up	7/16" up
	11/16" down	7/16" down
FLAPS:	(Maximum setting)	1-11/16" down

The balance point and control surface throws listed in this manual are the ones at which the Focke-Wulf 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

Identification

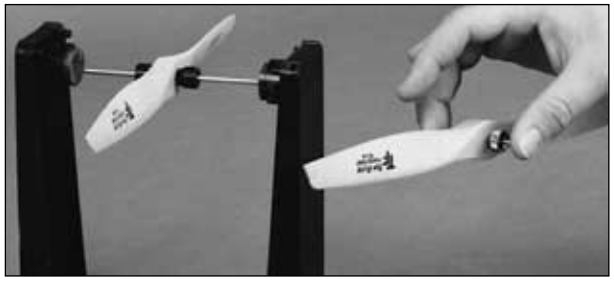
No matter if you fly at an AMA sanctioned R/C club site or if you fly somewhere on your own, you should always have your name, address, telephone number and AMA number on or inside your model. It is **required** at all AMA R/C club flying sites and AMA sanctioned flying events. Fill out the identification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

Charge 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**. 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 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

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

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 (Excerpt)

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

GENERAL

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...

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 in 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. 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. Use threadlocking compound to secure critical fasteners such as the set screws that hold the wheel axles to the struts, screws that hold the carburetor arm (if applicable), screw-lock pushrod connectors if used, etc.
- ❑ 7. Add a drop of oil to the axles so the wheels will turn freely.
- ❑ 8. Make sure all hinges are **securely** glued in place.
- ❑ 9. Reinforce holes for wood screws with thin CA where appropriate (control horns, servo hatches, servo mounting screws, etc.).
- ❑10. Confirm that all controls operate in the correct direction and the throws are set up according to the manual.
- ❑11. 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.
- ❑12. 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.
- ❑13. Make sure any servo extension cords you may have used do not interfere with other systems (servo arms, landing gear, pushrods, etc.).
- ❑14. Secure the pressure tap (if used) to the muffler with high temp RTV silicone, thread locking compound or J.B. Weld.
- ❑15. Make sure the fuel lines are connected and are not kinked.
- ❑16. Use an incidence meter to check the wing for twists and attempt to correct before flying.

❑17. Balance your propeller (and spare propellers).

❑18. Tighten the propeller nut and spinner.

❑19. Place your name, address, AMA number and telephone number on or inside your model.

❑20. Cycle your receiver battery pack (if necessary) and make sure it is fully charged.

❑21. If you wish to photograph your model, do so before your first flight.

❑22. Range check your radio when you get to the flying field.

FLYING

The Top Flite Focke-Wulf 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 flight, 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.

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 will 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 Focke-Wulf 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. 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 and landing gear (if you've installed retracts) 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!

Focke-Wulf Fw 190D-9

Type: Single Seat Fighter Bomber

Manufacturer: Focke-wulf

First Flight: Late 1942

Engine: Liquid cooled Junkers Jomo 213A-1 Inverted V12

Horsepower: 1,776 hp (2,240 hp Emergency Boost)

Wing span: 34 ft 5-1/2 in

Length: 33 ft 5-1/4 in

Height: 11 ft 1/4 in

Empty weight: 7,720 lbs

Loaded weight: 10,670 lbs

Maximum Speed: 404 mph

Range: 560 miles

Initial Climb: 3,300 ft per minute

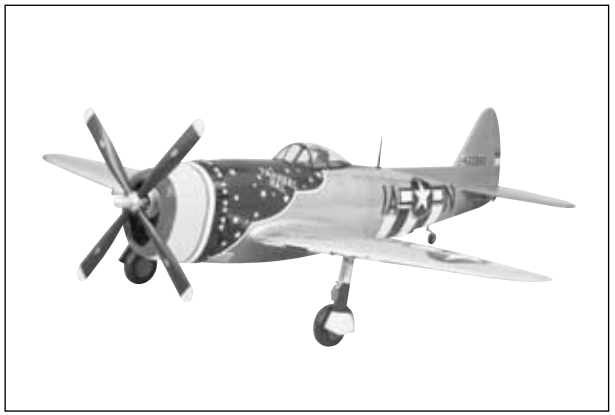
Service Ceiling: 32,810 ft

Armament: Two 13mm MG 131 above engine
Two 20mm MG 151/20 in wing roots
Two 20mm MG 151/20 or 30mm Mk 108 in outer wings.

Bomb Load: One 1,100 lb bomb on centerline.

Top Flite® Gold Giant P-47 Thunderbolt

(**TOPA0415**)



If you enjoyed building this Top Flite Gold Edition kit, and if you've ever thought of getting into giant-scale modeling, try the 85" wingspan Top Flite Gold Giant P-47 Thunderbolt. The Thunderbolt has long been recognized as a great flying plane—in any size! And because of its Gold Edition engineering and familiar wood construction, it's an ideal transition into giant-scale modeling.

Great Planes® AccuPoint™ Laser Incidence Meter

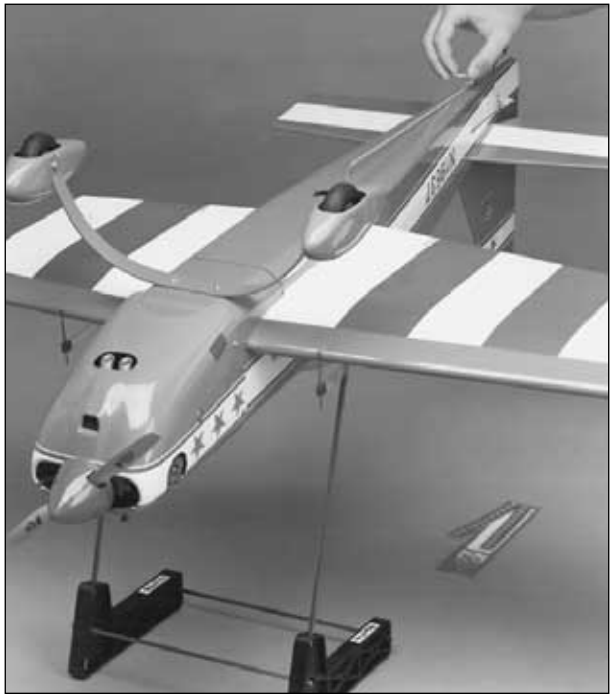
(**GPMR4020**)

• Measures incidence, washout and engine thrust angle with 1/4 degree accuracy!

If picture-perfect performance from your plane is a must, Great Planes' AccuPoint Laser Incidence Meter is an essential tool when you build. It's a perfect way for kit builders to see if kit incidence matches plan incidence, and a fast, easy aid for scratch builders as well. In either case, accurate incidence is the goal- and that's where the Laser Incidence Meter (literally!) shines. A low-energy laser, powered by the included battery, provides the incredible accuracy, and adjusting the angle of the laser sight does away with the need to level the entire plane. Just clamp it in place, turn it on, take readings and make adjustments as needed. It's a slick way to prevent warped wings and bad wing-to-tail alignment--and useful for setting accurate engine thrust angles and heli pitch, too. Included 20” bar fits wing chords up to 16". 1-year warranty. Available separately: an extra-long 36” Bar for big wings.

Great Planes® C.G. Machine™ Airplane Balancer

(**GPMR2400**)



Pat. D399,220

• Brings out your plane’s best performance!

Give your basic trainer maximum stability...make your low-wing aerobats more agile...help your pylon planes fly faster than ever. How? Balance them with optimum accuracy, using the ingenious and easy-to use Great Planes C.G. Machine! It works without the measuring, marking and error-prone finger gymnastics that balancing by hand requires. And it can be used with kits or almost ready-to-fly planes of any size and any wingspan. Slanted wire balancing posts accept any plane up to 40 lb...built-in rulers position the model exactly at the center of gravity recommended in the model’s instruction manual. There’s no guesswork...in fact, the C.G. Machine is so easy to use that even first-time pilots will achieve accurate results.

Great Planes® Cordless Slot Machine™ Motorized Hinge Slotting Tool

(**GPMR4011**)

• The ultimate in slot cutting convenience and ease!

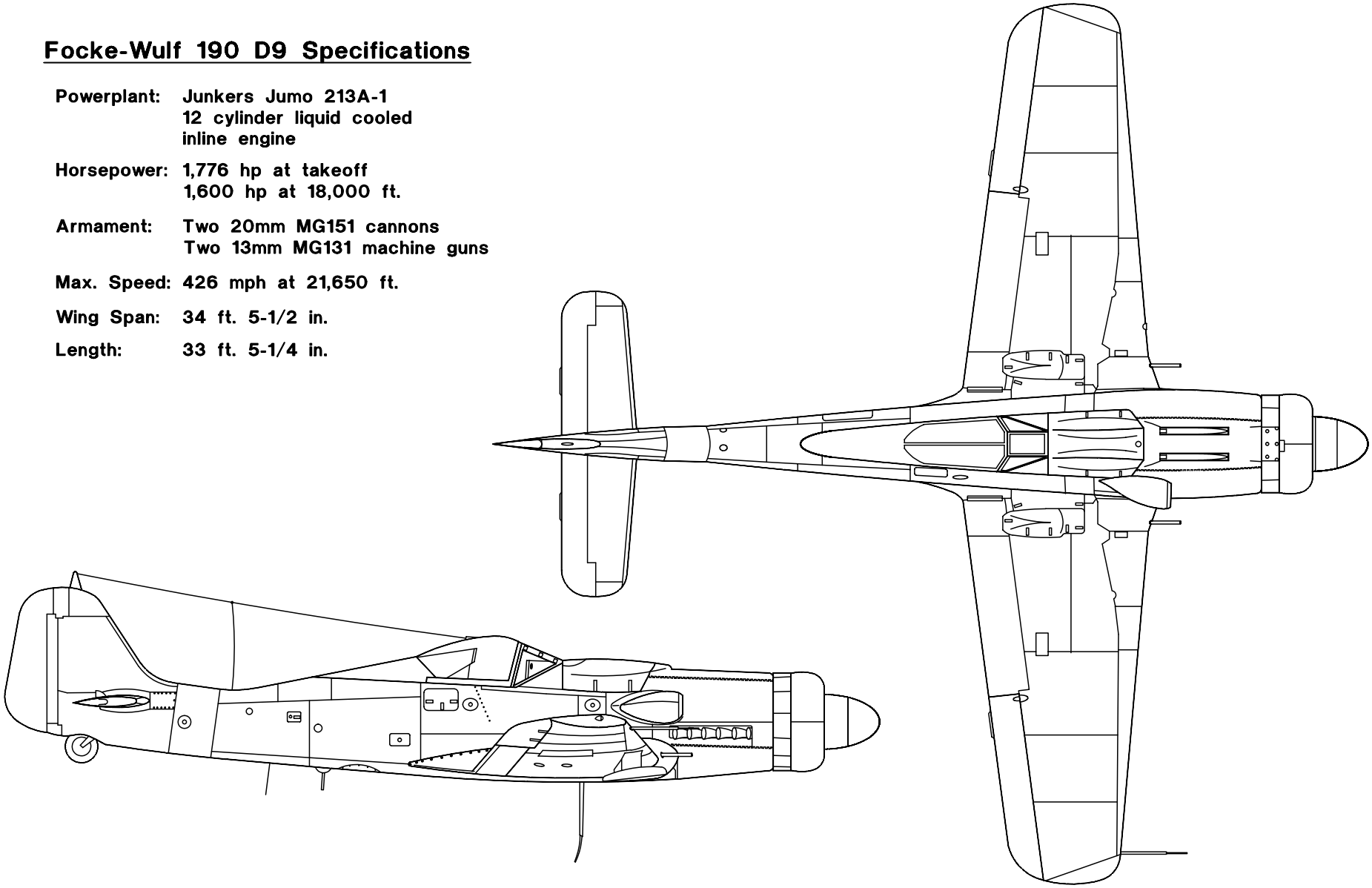
Now Great Planes adds cordless convenience to the Slot Machine's many advantages! Charge up the maintenance-free NiCds built into the case, and you have enough "juice" to cut 60 slots (for 30 hinges)...about the same number you'll find in an average kit. Recharging is easy with the included AC wall charger, and takes only about 3 hours. In the meantime, you can be installing hinges into the clean, accurate slots the Slot Machine is known for. And like the original, it arrives fully assembled, with two replaceable blades...all you have to do is place the blades against the wood, hit the "ON" switch and let Slot Machine do the work.

3-VIEW DRAWING

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

Focke-Wulf 190 D9 Specifications

Powerplant:	**Junkers Jumo 213A-1 12 cylinder liquid cooled inline engine**
Horsepower:	**1,776 hp at takeoff 1,600 hp at 18,000 ft.**
Armament:	**Two 20mm MG151 cannons Two 13mm MG131 machine guns**
Max. Speed:	**426 mph at 21,650 ft.**
Wing Span:	**34 ft. 5-1/2 in.**
Length:	**33 ft. 5-1/4 in.**



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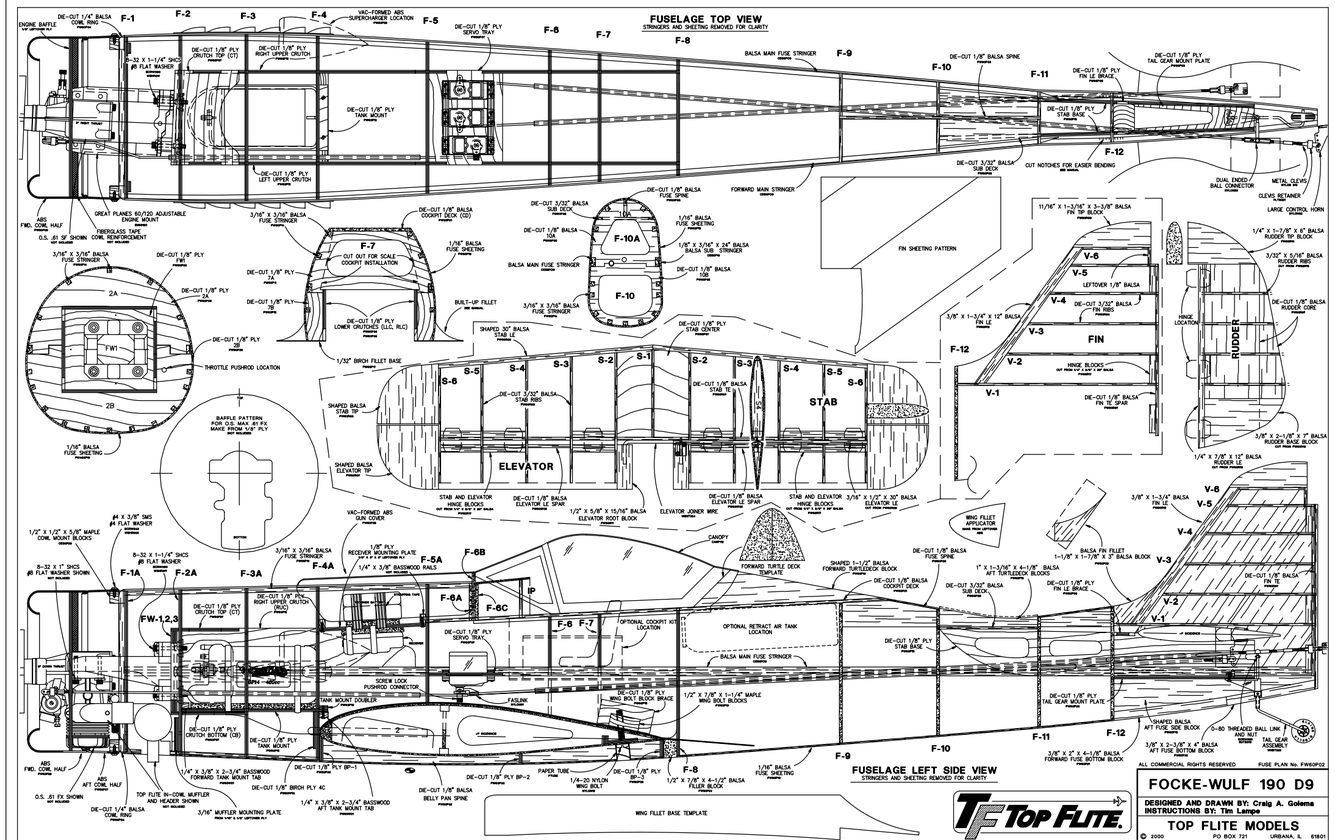
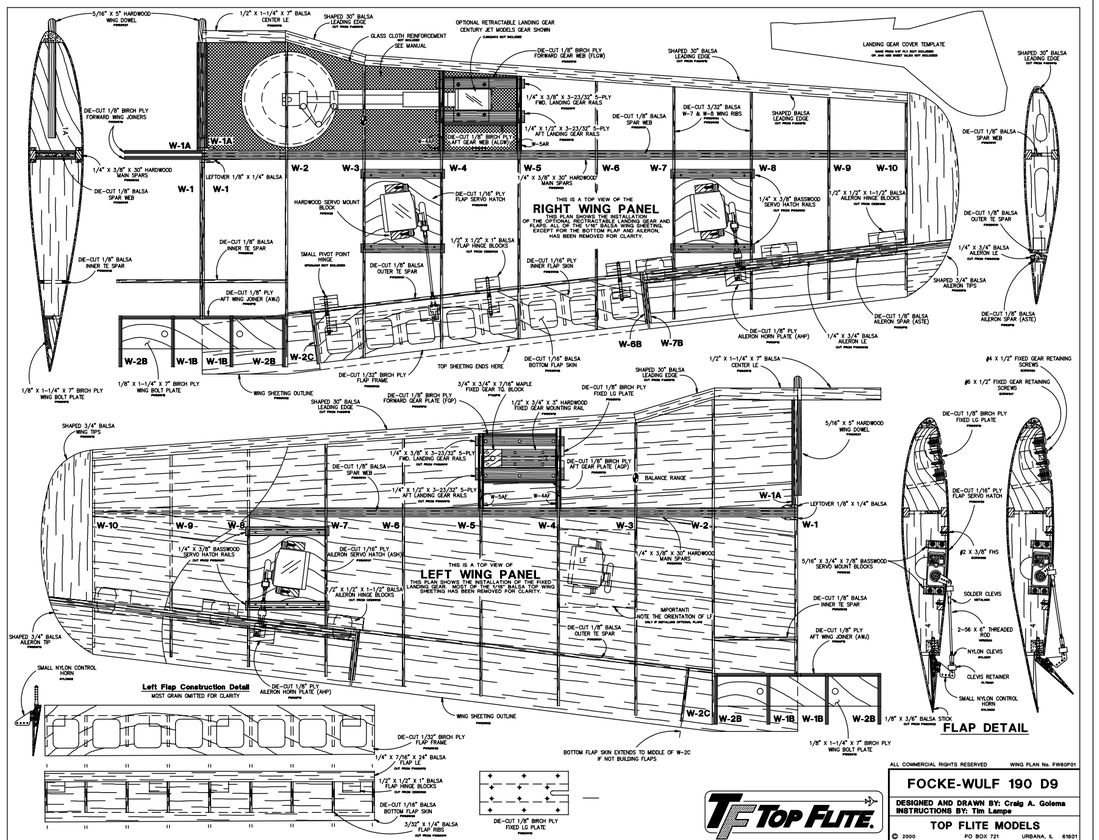

FUSELAGE TOP VIEW
STRINGERS AND SHEETING REMOVED FOR CLARITY
F-1
F-2
F-3
F-4
F-5
F-6
F-7
F-8
F-9
F-10
F-11
F-12
ENGINE BAFFLE
DIE-CUT 1/4" BALSA COWL RING
VAC-FORMED ABS SUPERCHARGER LOCATION
DIE-CUT 1/8" PLY SERVO TRAY
DIE-CUT 1/8" PLY RIGHT UPPER CRUTCH
DIE-CUT 1/8" PLY CRUTCH TOP (CT)
DIE-CUT 1/8" PLY TANK MOUNT
DIE-CUT 1/8" PLY LEFT UPPER CRUTCH
8-32 X 1-1/4" SHCS #8 FLAT WASHER
BALSA MAIN FUSE STRINGER
DIE-CUT 1/8" BALSA SPINE
DIE-CUT 1/8" PLY FIN LE BRACE
DIE-CUT 1/8" PLY TAIL GEAR MOUNT PLATE
DIE-CUT 1/8" PLY STAB BASE
DIE-CUT 3/32" BALSA SUB DECK
CUT NOTCHES FOR EASIER BENDING
FORWARD MAIN STRINGER
DUAL ENDED BALL CONNECTOR
METAL CLEVIS
CLEVIS RETAINER
LARGE CONTROL HORN
GREAT PLANES 60/120 ADJUSTABLE ENGINE MOUNT
FIBERGLASS TAPE
ABS FWD. COWL HALF
O.S. .61 SF SHOWN COWL REINFORCEMENT
3/16" X 3/16" BALSA FUSE STRINGER
3/16" X 3/16" BALSA FW
DIE-CUT 1/8" PLY 2A
DIE-CUT 1/8" PLY 2X
DIE-CUT 1/8" PLY 2B
DIE-CUT 1/8" PLY 2C
DIE-CUT 1/8" PLY FW1
THROTTLE PUSHROD LOCATION
1/16" BALSA FUSE SHEETING
F-7
CUT OUT FOR SCALE COCKPIT INSTALLATION
DIE-CUT 1/8" BALSA COCKPIT DECK (DD)
1/4" BALSA FUSE SHEETING
BUILT-UP FILLET
DIE-CUT 1/8" PLY LOWER CRUTCHES (LLC, RLC)
DIE-CUT 1/8" PLY 7A
DIE-CUT 1/8" PLY 7B
F-10A
DIE-CUT 1/8" BALSA 10A
DIE-CUT 1/8" BALSA 10B
F-10
DIE-CUT 3/32" BALSA SUB DECK
1/16" BALSA FUSE SHEETING
1/8" X 3/16" X 24" BALSA SUB STRINGER
3/16" X 3/16" BALSA FUSE STRINGER
FIN SHEETING PATTERN
11/16" X 1-3/16" X 3-3/8" BALSA FIN TIP BLOCK
V-6
V-5
LEFTOVER 1/8" BALSA
V-4
DIE-CUT 3/32" BALSA FIN RIBS
V-3
FIN
V-2
HINGE BLOCKS
V-1
DIE-CUT 1/8" BALSA FIN TE SPAR
3/8" X 1-3/4" BALSA FIN LE
F-12
HINGE LOCATION
RUDDER
DIE-CUT 1/8" BALSA RUDDER CORE
1/4" X 7/8" X 6" BALSA RUDDER TE BLOCK
3/32" X 5/16" BALSA RUDDER RIBS
3/8" X 2-1/8" X 7" BALSA RUDDER EDGE BLOCK
1/4" X 7/8" X 12" BALSA RUDDER LE
1/32" BIRCH FILLET BASE
S-6
S-5
S-4
S-3
S-2
S-1
DIE-CUT 1/8" BALSA STAB TE
STAB
DIE-CUT 1/32" BALSA STAB RIBS
SHAPED BALSA STAB TIP
SHAPED 30° BALSA STAB LE
ELEVATOR
STAB AND ELEVATOR HINGE BLOCKS
DIE-CUT 1/8" BALSA ELEVATOR LE SPAR
1/2" X 5/8" X 15/16" BALSA ELEVATOR ROOT BLOCK
ELEVATOR JOINER WIRE
3/16" X 1/2" X 30" BALSA ELEVATOR LE
SHAPED BALSA ELEVATOR TIP
BAFFLE PATTERN FOR CYL MAX .20 FX MAKE FROM 1/4" PLY
#4 X 3/8" SMS #4 FLAT WASHER
1/2" X 1/2" X 5/8" MAPLE COWL MOUNT BLOCKS
8-32 X 1-1/4" SHCS #8 FLAT WASHER
8-32 X 1" SHCS #8 FLAT WASHER SHOWN
3/16" X 3/16" BALSA FUSE STRINGER
F-1A
F-2A
F-3A
F-4A
F-5A
F-6B
F-6A
F-6C
F-6
F-7
IP
FW-1,2,3
VAC-FORMED ABS GUN COVER
1/8" PLY RECEIVER MOUNTING PLATE
1/4" X 3/8" BASSWOOD RAILS
DIE-CUT 1/8" PLY SERVO TRAY
DIE-CUT 1/8" PLY RIGHT UPPER CRUTCH (RUC)
DIE-CUT 1/8" PLY CRUTCH TOP (CT)
OPTIONAL COCKPIT KIT LOCATION
OPTIONAL RETRACT AIR TANK LOCATION
BALSA MAIN FUSE STRINGER
SCREW LOCK PUSHROD CONNECTOR
TANK MOUNT DOUBLER
FASLINK WIRE
DIE-CUT 1/8" PLY TANK MOUNT
DIE-CUT 1/8" PLY BP-1
DIE-CUT 1/8" PLY BP-2
DIE-CUT 1/8" PLY BP-3
DIE-CUT 1/8" PLY 4C
DIE-CUT 1/8" BIRCH PLY 4C
1/4" X 3/8" X 2-3/4" BASSWOOD FORWARD TANK MOUNT TAB
1/4" X 3/8" X 2-3/4" BASSWOOD AFT TANK MOUNT TAB
ABS AFT COWL HALF
O.S. .61 FX SHOWN
TOP FLITE IN-COWL MUFFLER AND HEADER SHOWN
3/16" MUFFLER MOUNTING PLATE
DIE-CUT 1/4" BALSA COWL RING
PAPER TUBE
1/4-20 NYLON WING BOLT
1/2" X 7/8" X 1-1/4" MAPLE WING BOLT BLOCKS
DIE-CUT 1/8" PLY WING BOLT BLOCK BRACE
1/2" X 7/8" X 4-1/2" BALSA FILLER BLOCK
1/16" BALSA FUSE SHEETING
BELLY PAN SPINE
WING FILLET BASE TEMPLATE
FUSELAGE LEFT SIDE VIEW
STRINGERS AND SHEETING REMOVED FOR CLARITY
WING FILLET APPLICATION
CANOPY
FORWARD TURTLEDECK BLOCK
SHAPED 1-1/2" BALSA FORWARD TURTLEDECK BLOCK
DIE-CUT 1/8" BALSA COCKPIT DECK
1" X 1-3/16" X 4-1/8" AFT TURTLEDECK BLOCKS
1-1/8" X 1-7/8" X 3" BALSA FIN BLOCK
DIE-CUT 1/8" PLY FIN LE BRACE
DIE-CUT 1/8" PLY STAB BASE
DIE-CUT 1/8" PLY TAIL GEAR MOUNT PLATE
3/8" X 2" X 4-1/8" BALSA FORWARD FUSE BOTTOM BLOCK
3/8" X 2-3/8" X 4" BALSA AFT FUSE BOTTOM BLOCK
SHAPED BALSA AFT FUSE SIDE BLOCK
G-80 THREADED BALL LINK AND SILT
TAIL GEAR ASSEMBLY
ALL COMMERCIAL RIGHTS RESERVED
FUSE PLAN No. FW60P02
FOCKE-WULF 190 D9
DESIGNED AND DRAWN BY: Craig A. Golema
INSTRUCTIONS BY: Tim Lampe
TOP FLITE MODELS
© 2000
PO BOX 721
URBANA, IL 61801


5/16" X 5" HARDWOOD WING DOWEL
1/2" X 1-1/4" X 7" BALSA CENTER LE
SHAPED 30° BALSA LEADING EDGE
GLASS CLOTH REINFORCEMENT SEE MANUAL
OPTIONAL RETRACTABLE LANDING GEAR CENTURY JET MODELS GEAR SHOWN
DIE-CUT 1/8" BIRCH PLY FORWARD GEAR MEB (FLGM)
LANDING GEAR COVER TEMPLATE
DIE-CUT 1/8" BIRCH PLY FORWARD WING JOINERS
1/4" X 3/8" X 3-23/32" S-PLY FWD. LANDING GEAR RAILS
1/4" X 1/2" X 3-23/32" S-PLY AFT LANDING GEAR RAILS
DIE-CUT 1/8" BALSA SPAR MEB
DIE-CUT 3/32" BALSA W-7 & W-8 WING RIBS
W-1A
W-1
W-2
W-3
W-4
W-5
W-6
W-7
W-8
W-9
W-10
1/4" X 3/8" X 30" HARDWOOD MAIN SPARS
LEFTOVER 1/8" X 1/4" BALSA
1/4" X 3/8" X 30" HARDWOOD MAIN SPARS
THIS IS A TOP VIEW OF THE
RIGHT WING PANEL
OF THE PLAN SHOWN. THE INSTALLATION OF THE FIXED LANDING GEAR, MOST OF THE 1/16" BALSA WING SHEETING, AND ALL OF THE 1/16" BALSA WING SHEETING, EXCEPT FOR THE BOTTOM FLAP AND AILERON, HAS BEEN REMOVED FOR CLARITY.
HARDWOOD SERVO MOUNT BLOCK
SMALL PIVOT POINT HINGE
DIE-CUT 1/8" BALSA INNER TE SPAR
DIE-CUT 1/8" BALSA OUTER TE SPAR
DIE-CUT 1/16" PLY INNER FLAP SKIN
1/2" X 1/2" X 7" BALSA FLAP HINGE BLOCKS
DIE-CUT 1/16" BIRCH PLY FLAP FRAME
1/2" X 1-1/4" X 7" BALSA CENTER LE
#4 X 1/2" FIXED GEAR RETAINING SCREWS
#6 X 1/2" FIXED GEAR RETAINING SCREWS
DIE-CUT 1/8" BIRCH PLY FIXED LG PLATE
DIE-CUT 1/16" PLY FLAP SERVO HATCH
#2 X 3/8" FHS
SOLDER CLEVIS
2-56 X 6" THREADED ROD
NYLON CLEVIS
CLEVIS RETAINER
SMALL NYLON CONTROL HORN
1/8" X 3/8" BALSA STICK
FLAP DETAIL
W-2B
W-1B
W-2C
W-6B
W-7B
DIE-CUT 1/8" BALSA AILERON SPAR (ASTE)
DIE-CUT 1/8" BALSA AILERON HORN PLATE (AHP)
1/4" X 3/4" BALSA AILERON LE
SHAPED 3/4" BALSA AILERON TIPS
TOP SHEETING ENDS HERE
BOTTOM FLAP SKIN EXTENDS TO MIDDLE OF W-2C IF NOT BUILDING FLAPS
1/8" X 1-1/4" X 7" BIRCH PLY WING BOLT PLATE
WING SHEETING OUTLINE
DIE-CUT 1/8" BIRCH PLY FORWARD GEAR PLATE (FGP)
3/4" X 3/4" X 2" MAPLE FIXED GEAR TE BLOCK
1/2" X 1/4" X 3" HARDWOOD FIXED GEAR MOUNTING RAIL
DIE-CUT 1/8" BIRCH PLY FIXED LG PLATE
DIE-CUT 1/8" BIRCH PLY AFT GEAR PLATE (AGP)
BALANCE RANGE
LEFTOVER 1/8" X 1/4" BALSA
5/16" X 5" HARDWOOD WING DOWEL
SHAPED 3/4" BALSA WING TIPS
1/4" X 3/8" X 3-23/32" S-PLY FWD. LANDING GEAR RAILS
1/4" X 1/2" X 3-23/32" S-PLY AFT LANDING GEAR RAILS
DIE-CUT 1/8" BALSA SPAR MEB
DIE-CUT 1/16" PLY AILERON SERVO HATCH (ASH)
1/4" X 3/8" X 30" HARDWOOD MAIN SPARS
1/4" X 3/8" BASSWOOD SERVO HATCH RAILS
5/16" X 3/4" X 2" BASSWOOD SERVO MOUNT BLOCKS
1/2" X 1/2" X 1-1/2" BALSA AILERON HINGE BLOCKS
THIS IS A TOP VIEW OF
LEFT WING PANEL
THIS PLAN SHOWS THE INSTALLATION OF THE FIXED LANDING GEAR, MOST OF THE 1/16" BALSA TOP WING SHEETING HAVE BEEN REMOVED FOR CLARITY.
IMPORTANT!! NOTE THE ORIENTATION OF 'LF'
DIE-CUT 1/8" BALSA INNER TE SPAR
DIE-CUT 1/8" PLY AFT WING JOINER (AWJ)
DIE-CUT 1/8" BALSA OUTER TE SPAR
SHAPED 3/4" BALSA AILERON TIP
SMALL NYLON CONTROL HORN
Left Flap Construction Detail
MOST GRAIN OMITTED FOR CLARITY
DIE-CUT 1/8" PLY AILERON HORN PLATE (AHP)
DIE-CUT 1/32" BIRCH PLY FLAP FRAME
1/4" X 7/8" X 24" BALSA FLAP LE
1/2" X 1/2" X 1" BALSA FLAP HINGE BLOCKS
DIE-CUT 1/16" BALSA BOTTOM FLAP SKIN
3/32" X 1/4" BALSA FLAP RIBS
DIE-CUT 1/8" BIRCH PLY FIXED LG PLATE
W-2B
W-1B
W-2C
W-6B
W-7B
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WING PLAN No. FW60P01
FOCKE-WULF 190 D9
DESIGNED AND DRAWN BY: Craig A. Golema
INSTRUCTIONS BY: Tim Lampe
TOP FLITE MODELS
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