

# PT-19

- BUILDS QUICKLY
- REALISTIC FUN SCALE MODEL
- HUGE, 89" WINGSPAN (IMAA Legal)

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



## WARRANTY

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



# TABLE OF CONTENTS

<b>Introduction .....</b>	<b>2</b>
<b>Precautions.....</b>	<b>3</b>
<b>Preparations.....</b>	<b>3</b>
Required Accessories .....	3
Suggested Supplies .....	3
Optional Accessories .....	4
Building Notes.....	4
Adhesives .....	4
Common Abbreviations.....	5
Types of Wood .....	5
Metric Conversion.....	5
Die Patterns .....	6&7
<b>Build the Fuselage .....</b>	<b>8</b>
<b>Build the Wing .....</b>	<b>12</b>
<b>Build the Ailerons .....</b>	<b>16</b>
<b>Build the Stabilizer &amp; Elevators .....</b>	<b>17</b>
<b>Build the Vertical Fin &amp; Rudder .....</b>	<b>19</b>
<b>Mount the Wing to the Fuselage .....</b>	<b>20</b>
<b>Final Assembly .....</b>	<b>22</b>
<b>Finishing.....</b>	<b>26</b>
Set The Control Throws.....	27
Balance Your Model.....	27
<b>Preflight.....</b>	<b>27</b>
At Home.....	27
At the Flying Site .....	28
<b>Engine Safety Precautions.....</b>	<b>28</b>
<b>FLYING.....</b>	<b>28</b>
Find a Safe Place to Fly.....	28
Takeoff.....	29
Flight.....	29
Landing .....	29
Terms & Definitions .....	30
<b>Cockpit &amp; Wing Tip Patterns.....</b>	<b>Center Spread</b>

# INTRODUCTION

Congratulations on your choice of this kit for your next project. The Fairchild PT-19 is a Fun Scale® model of a true classic aircraft and has the presence that only a big model can carry off.

At Dynafite we take pride in offering kits that are simple and straight forward to build and provide value for your modeling dollar. Because of the size and cost of this model we assume you have built several models and have a general working knowledge of modeling and its terms. If you HAVE NOT built and flown several kits, do yourself a favor and get some experience before beginning this kit.

## PROTECT YOUR MODEL, YOURSELF & OTHERS... FOLLOW THIS IMPORTANT SAFETY PRECAUTION

Your PT-19 is not a toy, but a sophisticated working model that functions like a full-size airplane. Because of its performance, if you do not assemble and operate the PT-19 correctly, you could possibly injure yourself or spectators and damage property. **To make your R/C modeling experience totally enjoyable, we recommend that you get assistance with assembly and your first flights from an experienced, knowledgeable modeler.** You'll learn faster and avoid risk to your model before you're truly ready to solo. Your local hobby shop has information about flying clubs in your area whose membership includes qualified instructors.

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

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

## PRECAUTIONS

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

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

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

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

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

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

## PREPARATIONS

### REQUIRED ACCESSORIES

These are the items "not included" with your kit, that you will need to purchase separately. Items in parentheses (GPMQ3141) are suggested part numbers recognized by distributors and hobby shops and are listed for your ordering convenience.

**GPM** is the Great Planes® brand, **TOP** is the Top Flite® brand and **HCA** is the Hobbico® brand.

- ☐ 4 channel radio with 3 standard, 2 high torque and one quarter scale servo.
- ☐ Engine - 1.08 to 1.5 2-stroke or 1.2 to 1.6 4-stroke
- ☐ Engine mount and mounting hardware
- ☐ 16oz. Fuel tank (GPMQ4107)
- ☐ Standard fuel tubing (GPMQ4131)
- ☐ (2) 5" to 6" main wheels
- ☐ (1) 1-1/2" tail wheel (GPMQ4243)
- ☐ (4) 1/4" Wheel collars (DUBQ1200)
- ☐ (2) 1/8" Wheel collars (GPMQ4304)
- ☐ Top Flite® MonoKote® covering film (4 rolls) or Coverite™ 21 st Century® Fabric
- ☐ Paint for fuelproofing, the engine cowl and the windshields
- ☐ (1) OR (2) 1/3 Scale pilot(s)
- ☐ 1/4" Latex Foam Rubber (HCAQ1000)

### SUGGESTED SUPPLIES

These are the adhesives and supplies that you will need to build your Pt-19. We recommend Great Planes Pro™ CA and Epoxy

- ☐ 4 oz. Thin CA Adhesive - (GPMR6004)
- ☐ 2 oz. Thick CA Adhesive - (GPMR6015)
- ☐ CA Accelerator - (HCA3750)
- ☐ CA Applicator Tips - (HCA3780)
- ☐ 6-Minute Epoxy - (GPMR6045)
- ☐ 30-Minute Epoxy - (GPMR6047)
- ☐ 4 oz. Aliphatic Resin Glue (GPMR6161)



A flat, durable, easy-to-handle sanding tool is a necessity for building model airplanes. Great Planes makes a complete range of Easy-Touch™ Bar Sanders and replaceable Easy-Touch adhesive-backed sandpaper. On our workbench, we have four 11" Easy-Touch Bar Sanders, equipped with #50, #80, #150 and #220-grit sandpaper. This setup is all that is required for almost any sanding task. Custom sanding blocks can be made from balsa for sanding hard-to-reach spots. We also keep some #320-grit wet-or-dry sandpaper for finish sanding before covering.

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

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

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

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

## OPTIONAL ACCESSORIES

- ☐ Robart Oleo landing gear struts (ROBQ1600)
- ☐ Midwest scale instrument panel (MIDQ1105)

## BUILDING NOTES

**IMPORTANT:** During construction you will be using a number of balsa sticks to frame various assemblies. Ample material is included but you should study the plans, then make an effort to cut the longest pieces you will need first. Label the pieces as you cut them for later reference. By doing this now, you won't have to splice pieces together later.

## ADHESIVES

This kit is built with three types of glue.

**Cyanoacrylate:** CA glues cure almost instantaneously and are moderately strong. There are different viscosities of CA's intended for different conditions you will encounter when you build. Thin CA is great for "tack-gluing," for glue joints that fit well and for parts that are already joined but need to be permanently bonded. Medium CA is used for general construction where you apply glue to one part, then join it to another part. Thick CA is great for glue joints that don't fit perfectly or parts that require a little time for positioning before the glue cures. You will encounter many other conditions that require one or the other types of CA.

Always use CA in a well ventilated area. Open some windows or place a fan in the room to circulate the air. Do not lean directly over your work when you use CA and look away while it cures or "sets off." CA can cure immediately upon contact with skin so if you accidentally bond your fingers, do not use vigorous motion to separate them. Use CA Debonder (GPMR6039) or acetone (nail polish remover) or soak your fingers in warm water for a few minutes.

**Never** point the tip of a CA bottle toward your face and be especially careful when you unclog a CA tip. Hobbico CA Applicator Tips (HCAR3780) are highly recommended and will help keep the bottle from clogging. Keep paper towels or tissues close by to immediately absorb excess CA dropped on your model or work area. **Read all the warning labels on your CA bottle.** CA Accelerator is a chemical that you can spray over uncured CA to make it cure immediately. A mist spray of accelerator will do the job. **Do not** inhale the vapors! Some modelers "preprime" the parts to be glued with accelerator, join them, then add the CA. This way the CA is guaranteed to cure immediately. This prepriming is especially handy when you use thin CA because it will cure before all of the glue soaks into the wood away from the glue joint. We do not recommend you build your entire model with this method and use accelerator only when necessary. Often, overspray from accelerator used hours or even days earlier on nearby glue joints will cause the CA you use on the next step to cure prematurely and unexpectedly - so be careful!

**Aliphatic Resin** - Resin glues require that parts be pinned or clamped together while the glue dries- typically 15 - 30 minutes. Resin glues are very strong and work well with balsa and plywoods.

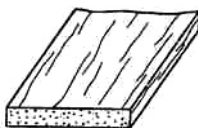
**Epoxy** - Epoxy glues are the strongest but require the most time to cure. Six-minute epoxy cures the fastest; it sets within six minutes but is not fully cured for one hour or more. Thirty-minute epoxy is the strongest as it allows the epoxy to soak into the wood thoroughly. While it sets within 30 minutes, it will not be fully cured for two or more hours.

## COMMON ABBREVIATIONS

Fuse = Fuselage  
Ply = Plywood  
" = Inches

Stab = Horizontal Stabilizer  
LE = Leading edge (front)  
TE = Trailing edge (rear)

## TYPES OF WOOD



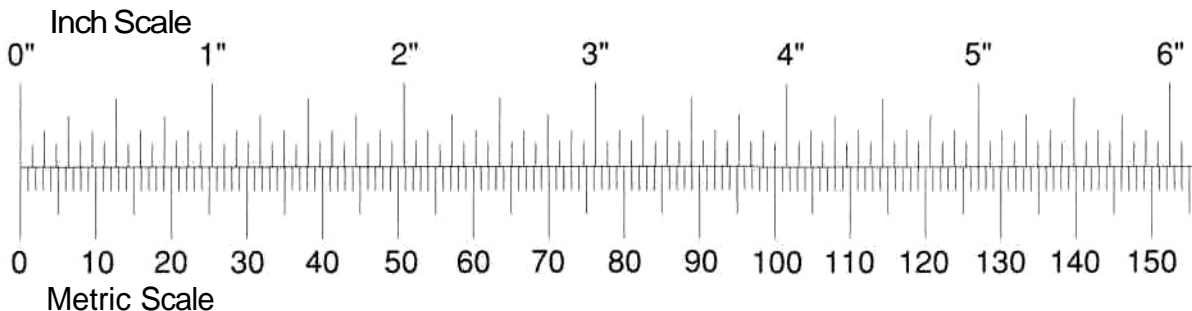
**Balsa**



**Basswood**



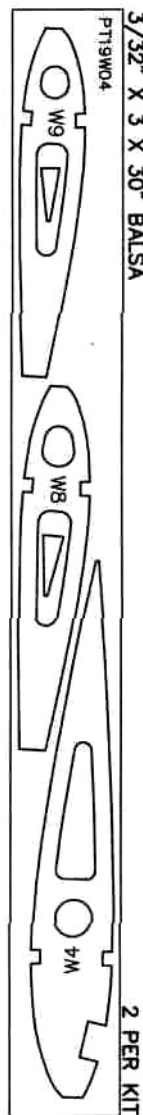
**Plywood**



# DIE PATTERNS

3/32" X 3 X 30" Balsa

PT19W04



3/32" X 3 X 30" Balsa



3/32" X 3 X 30" Balsa



3/32" X 3 X 30" Balsa

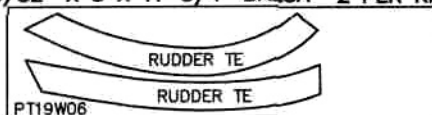


1/8" X 3 X 36" Balsa

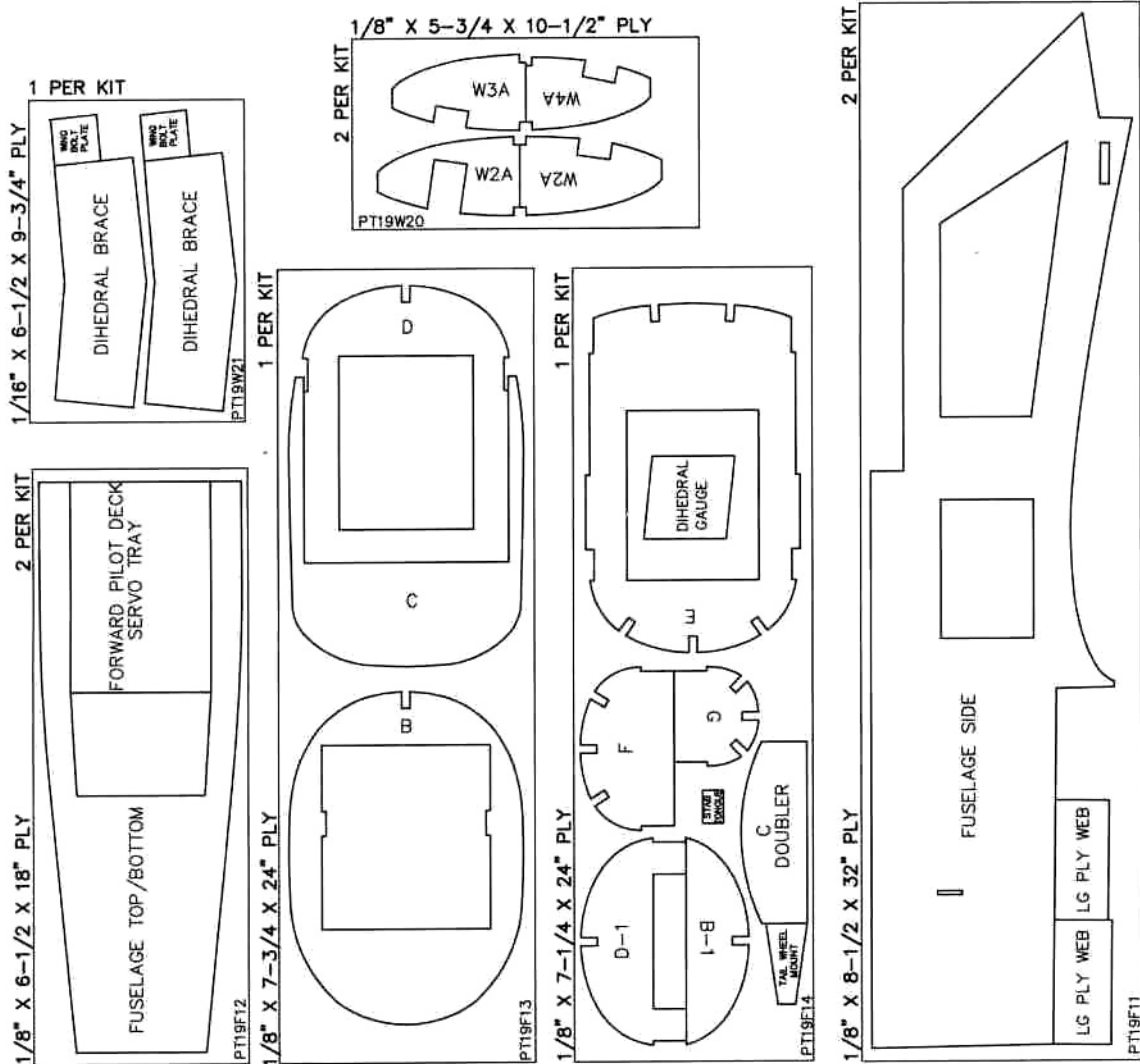
PT19W9



3/32" X 3 X 11-3/4" Balsa 2 PER KIT

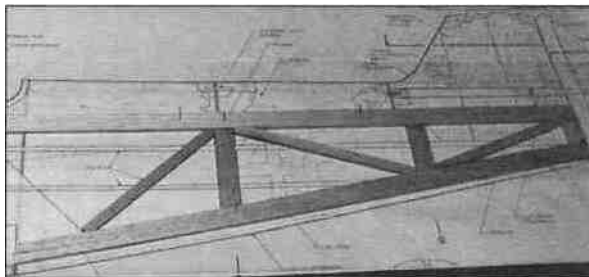


# DIE PATTERNS



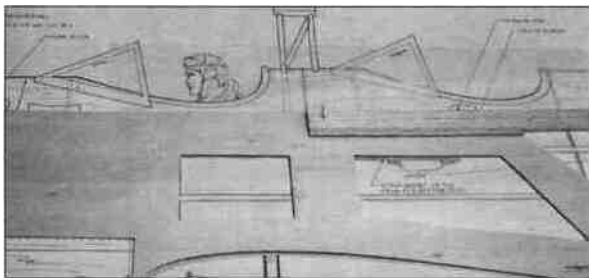
## BUILD THE FUSELAGE

❑ 1. Place the fuselage drawing on your workbench and cover it with wax paper from bulkhead D aft. Begin construction by building the right rear side structure.



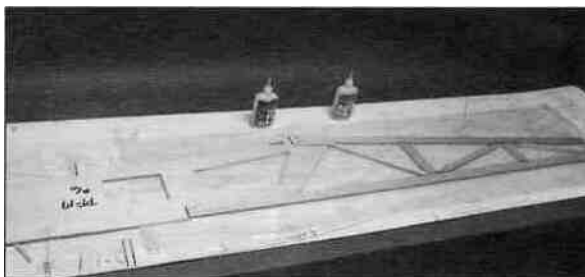
❑❑ 2. Using two 1/4" x 15/16" x 42" balsa sticks, cut and fit the rear side stringers. Cut the longest pieces first. Pin and glue the parts into position.

❑❑ 3. Cut the diagonals from a 1/4" x 1/2" x 30" balsa stick and glue into position.

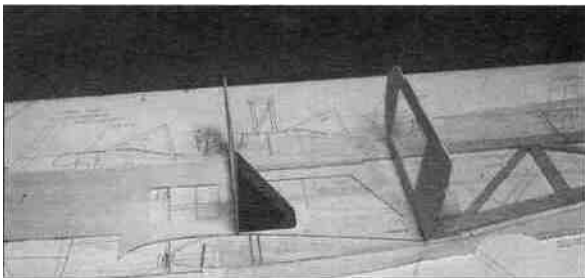


❑❑ 4. Fit the ply fuselage front to the fuse rear. Cut doublers for the two joints from a 1/8" x 1/4" x 30" balsa stick. When satisfied with the fit, glue them with 6-minute epoxy.

❑ 5. The left fuselage side is built over the right side. Remove the right side from your building board and turn it over. Use the leftover 1/8" x 1/4" stick to shim the forward ply side. Cover the side with wax paper. Follow steps 2, 3 and 4 to build the left side, aligning the parts over the right side.



❑ 6. Place the right fuselage side over the plans and mark the locations of bulkheads B, C, D, E, F, and G on the side. Place the left side over the right and transfer the marks to the left side. Next, mark each former at the center of the bottom edge. Place the fuselage plan on your building board and draw a line down the length of the plans along the fuselage center with a long straightedge. These marks and lines will be used to align the fuselage in the following steps.



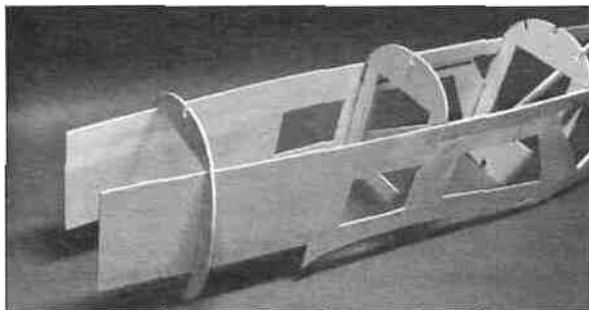
❑ 7. Glue bulkheads D and E to the right fuselage side using 6-minute epoxy. Be sure the bulkheads are at a 90 degree angle to the side. Epoxy will produce the strongest joint but you can use thin CA with accelerator if you are in a hurry.



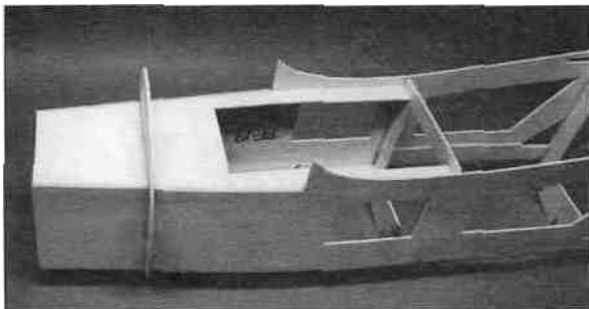
❑ 8. Glue the left fuselage side to bulkheads D and E using 6-minute epoxy. Align the side with the marks



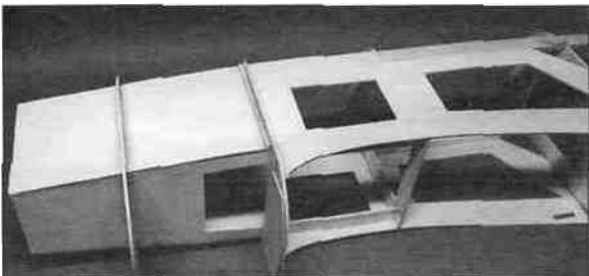
you made earlier. Before the glue cures, sight across the top of both sides to double check the alignment.



❑ 9. Slip bulkhead B over the outside of the fuselage. Do **NOT** glue until the next step.

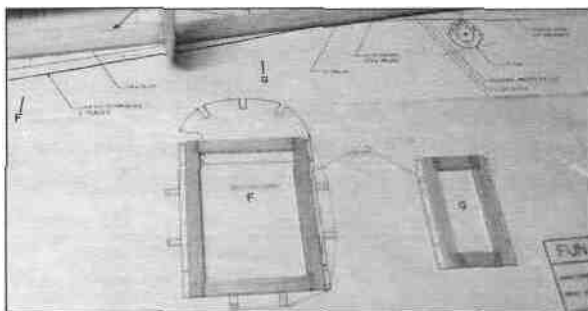


❑ 10. Glue the top and bottom deck into position with 30-minute epoxy. Also glue bulkhead B to the fuselage sides and both decks with 30-minute epoxy. Each deck spans from the firewall back to bulkhead D. The rear of the lower deck is installed 9/16" up from the bottom of bulkhead D. Use masking tape as needed to hold the assembly together while the epoxy cures. 30-minute epoxy is used to give enough time to position the parts and also for strength.



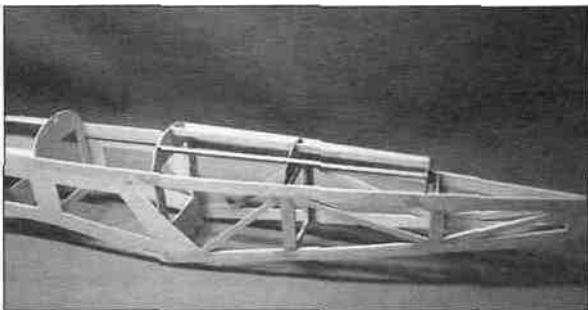
❑ 11. Glue the doubler to bulkhead C using the bottom curves to align the doubter.

❑ 12. Glue bulkhead C to the fuselage sides with 6-minute epoxy. The bulkhead is slightly large so as not to bind on the sides. Use leftover 1/8" x 1/4" balsa sticks to reinforce the bulkhead/fuselage joint as shown in the photo. The 1/8" x 1/4" stick above the lower deck is glued to the front of the bulkhead. The stick below the lower deck is glued to the aft side of the bulkhead and **INSIDE** the fuselage.



❑ 13. Build bulkheads F and G over the fuselage drawing using leftover 1/4" x 1/2" balsa sticks.

❑ 14. Pull the tail together and hold it in position with clothespins. Do **NOT** glue until later.



**Use this photo for the next four steps.**

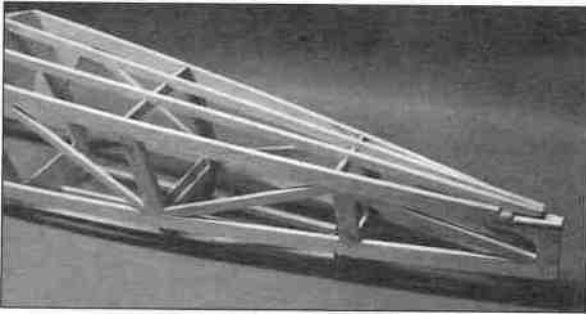
❑ 15. Lightly sand the sides of bulkheads F and G to match the taper of the sides. Install them in the sides and hold them in position with pins. Do **NOT** glue until later.

❑ 16. Place the fuselage upright over the fuselage drawing. Align the center mark on each bulkhead with the line you drew down the plan earlier. You will need to sight down from above the fuselage as it will not rest flat on the drawing. Adjust the tail, as

needed, to get the center of each bulkhead to align properly. When you are satisfied that everything is aligned properly, glue the tail together. Also glue bulkhead F and G to the fuselage sides.

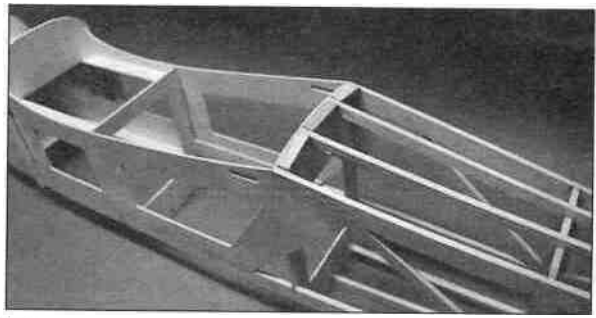
- ❑ 17. Glue the top ply part of bulkheads F and G into position. Note that the top part of F goes in front of the lower part of F. The rear of the top part of G goes 1/2" in front of the lower part of G.

- ❑ 18. Cut three 1/4" x 1/2" x 24" balsa sticks to a length of 19". Glue these top rear stringers to bulkheads E, F and G.



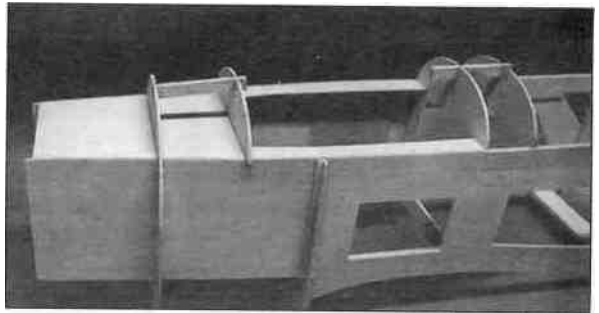
- ❑ 19. Notch the bottom stringers to accept the die-cut 1/8" ply tailwheel plate. The correct position for the bracket will allow the 1/4" x 1/2" stringers, added in the next step, to extend 1/4" below the bottom of the 1/4" x 15/16" side stringers. When satisfied with the fit glue the die-cut plate into position with 6-minute epoxy.

- ❑ 20. Cut two 1/4" x 1/2" x 30" balsa sticks to a length of 28-1/2". Fit and glue these bottom stringers into position. You will need to notch them at bulkheads F and G. They should extend 1/4" below the 1/4" x 15/16" side stringers. You can let them extend into the area where the tailwheel plate is mounted if desired.



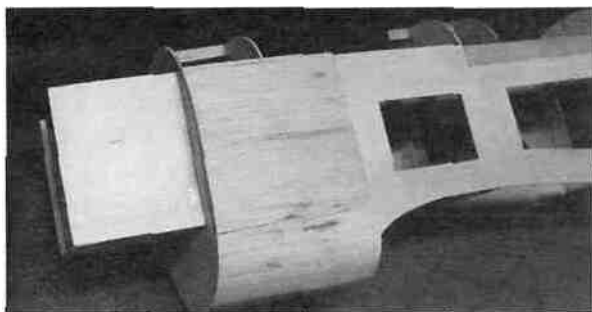
- ❑ 21. Use leftover 1/4" x 1/2" balsa sticks to frame between the bottom stringers at bulkhead E. Just tack glue them into position at this time as you may need to adjust them when the wing is fitted.

- ❑ 22. Glue the 1/4" ply wing hold down plate into place with 6-minute epoxy. Use some leftover 1/4" x 3/8" basswood sticks to reinforce above the ply plate.

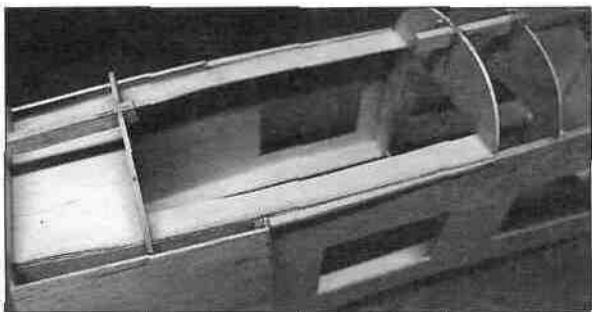


- ❑ 23. Roll the fuselage over and glue Bulkheads B-1 and D-1 into place. Bulkhead B-1 is glued 3-1/16" behind Bulkhead B and bulkhead D-1 is glued 2" behind bulkhead D.

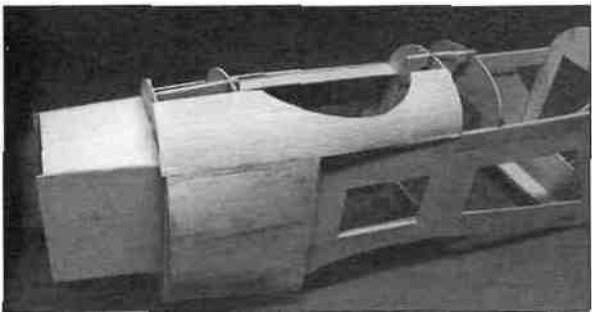
- ❑ 24. Cut and glue the stringers between bulkheads B and B-1 and between bulkheads D and D-1. Use leftover 1/4" x 1/2" balsa sticks.



25. Use 1/8" x 3" x 24" balsa to sheet between bulkheads B and C, from the top deck down. Soak the outside of the sheeting with water as needed to get it to bend around the curves. Thin CA works well on damp balsa.

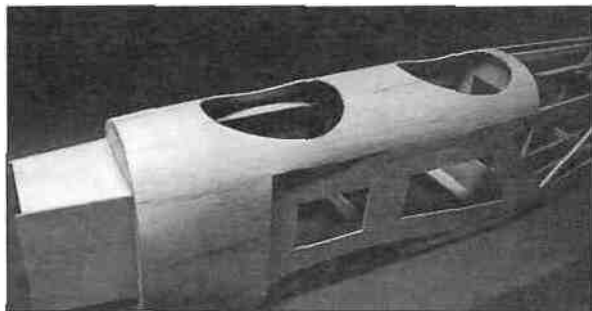


26. Use a leftover piece of 1/8" x 1/4" balsa stick to make a filler wedge between bulkheads C and D. Blend the stick from C to D. This creates a ledge, to which the top sheeting is glued.



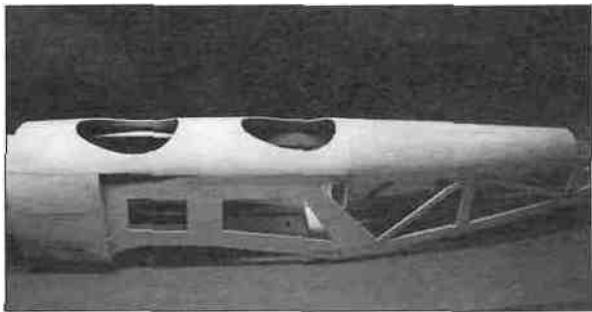
27. Caution - carefully read and understand this entire step before proceeding! Use 1/8" x 3" x 24" balsa to sheet the fuselage top from bulkhead B to . This will be done with three strips. Be careful when

cutting the sheeting to length as the leftover will be used in the next step. You will have to soak the sheeting with water to get it to bend properly. A small amount of ammonia or 50% alcohol added to the water will help to soften the wood fibers. Be patient, the best time to do the bending is when the balsa starts to dry to a damp state. After the side sheeting strips are glued into position, cut a rough cockpit opening as shown in the photo. This opening will relieve some of the stress in the sheeting and allow it to dry in the proper shape. There is a pattern for the exact opening in the center of this manual. Do not glue the center strip until step 29.

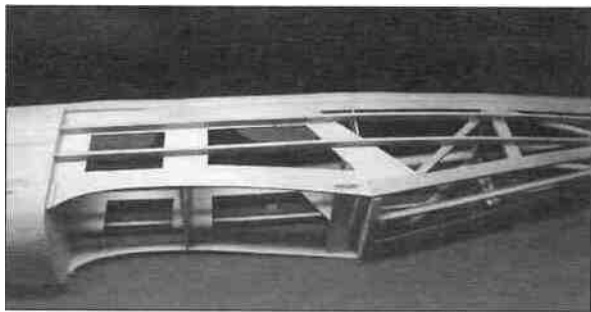


28. Sheet between bulkheads D and E using the leftover 1/8" x 3" balsa sheeting from above, just as you did in the previous step.

29. Fit and glue the center strip of sheeting.



30. Use 1/8" x 3" x 24" balsa to sheet from bulkhead E to G. This is a compound curve so go slowly and be patient. It won't be as hard as it seems. Just be sure the balsa sheeting is well soaked.



- ❑ 31. Glue the 1/4" x 1/2" x 42" balsa stringers to the fuselage sides.

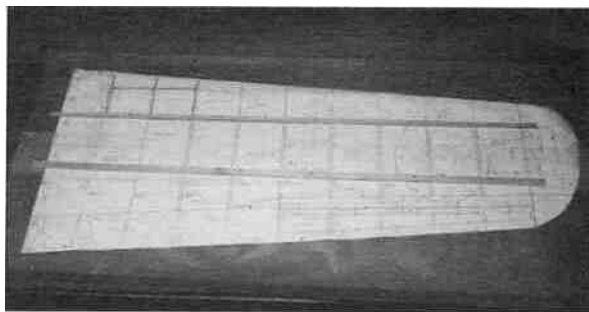
Set the fuselage aside until later. It will be completed after the wing and stabilizer are built.

If you have not done so already, now is a good time to obtain a mount for your engine. If you will be using a two or four stroke engine a Great Planes 60-120 mount (GPMG1091) will work well. If you will be using a chainsaw type engine you will probably need a spacer behind the mount.

## BUILD THE WING

- ❑ 1. Lay the RIGHT WING PLAN on your building board and cover it with wax paper.

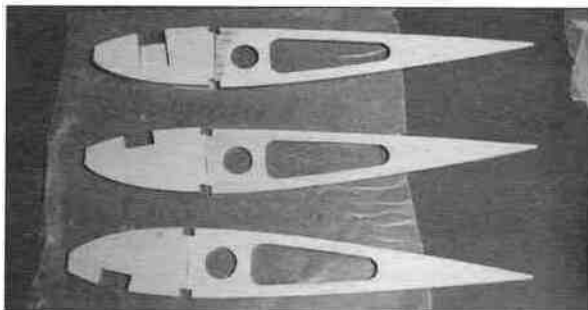
❑ 2. Prepare a leading edge skin. Locate one piece of 3/32" x 3" x 42" balsa sheet and one piece of 3/32" x 3" x 36" balsa sheet. Join them together so that the ends are even with each other on one side. Form a skin using your favorite method (we use masking tape to form a hinge and then join them with aliphatic resin glue). Sand the best side smooth with 150-grit sandpaper. Position the skin on the plan aligning the aft edge with the center of the spar. Mark the front of the leading edge on the skin at the root rib (W1) and the tip rib (W11). Use a long straightedge to trim the excess sheeting from the skin. Leave 1/4" extra to allow for the curvature of the ribs. Set this skin aside for use later. Save the piece that was trimmed off for the other wing panel and use it in place of the second 3/32" x 3" x 26" sheet.



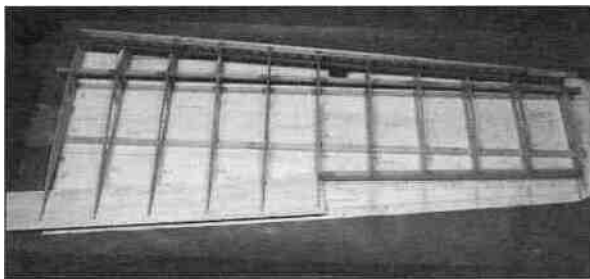
- ❑ 3. Pin the 1/4" x 3/8" x 42" basswood lower spar over the plan.

❑ 4. Pin the 3/8" x 1/2" x 42" balsa stick **on** the dashed lines called "shim stick." This will hold the rear of the ribs at the proper angle until there are enough pieces to hold the wing rigid.

❑ 5. Punch the ribs from their die-cut sheets, sanding the backs lightly if they do not come out easily. Number each rib as you do so; don't forget to number the aileron ribs as well. Check the fit of the spar to the spar notches in each rib.



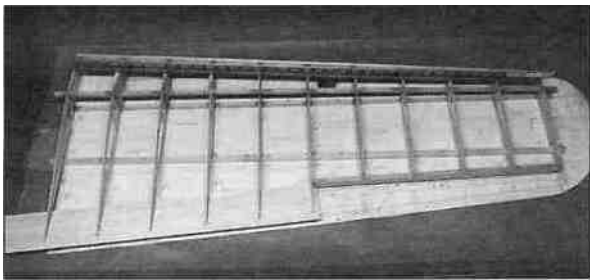
❑ 6. Glue the 1/8" die-cut ply landing gear doublers to ribs W2, W3 and W4 using 30-minute epoxy. Glue them to the sides shown on the plans. There are two doublers for W2. The one with the long cutout is glued to the side facing the wing tip. This cutout will lock in the landing gear stub (torque) block. Check the fit of the landing gear block and stub block in their cutouts.



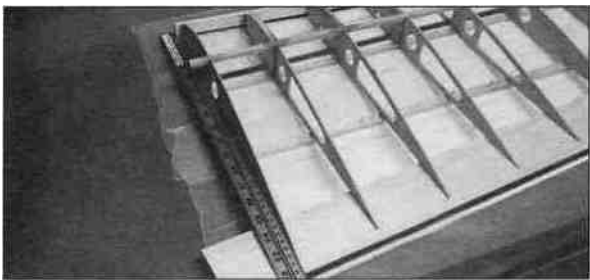
☐☐ 7. Glue ribs W2-W11 into place on the lower spar with a drop of CA. Pin the rear of each rib to the shim stick.

☐☐ 8. Use the dihedral gauge to obtain the proper angle (6 degrees) of W1. Glue W1 into place on the lower spar. Pin the rear of W1 to the shim stock. Use a long straightedge to insure that W1 is flat.

☐☐ 9. Glue the 1/4" x 3/8" x 42" basswood top spar to the ribs.



☐☐ 10. Cut a 3/8" x 3/4" x 24" balsa stick to the correct length and glue it to the rear of W7-W10. The ends are glued to W6 and W11. Glue the top flush with the top edges of the ribs.

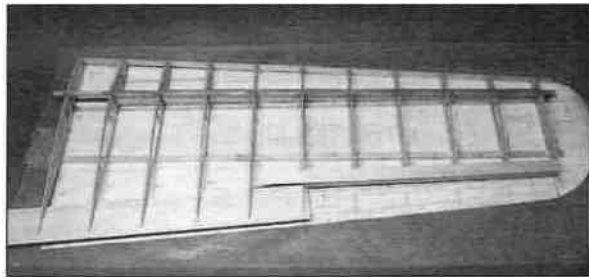


☐☐ 11. Glue the 1/4" x 3/4" x 42" balsa leading edge stick to the front of the ribs. Align the top of the

LE even with the tops of the ribs. Use a long metal straightedge to get the LE as straight as possible.

**IMPORTANT:** Use a straightedge along the sides of W1 and W11 to insure that they are straight and flat.

☐☐ 12. Glue the 3/32" x 3" x 24" balsa lower trailing edge sheet to ribs W1 -W6 using aliphatic resin. Use a long straightedge to insure that the ribs are even and straight and that W1 remains flat.



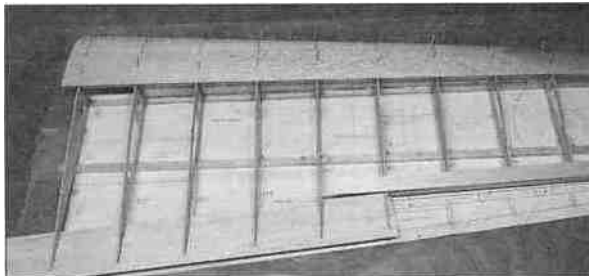
☐☐ 13. Use a 3/32" x 4" x 30" balsa sheet to prepare the shear webs. There is webbing from W2 to W11 glued to the front of the spars and from W2 to W7 glued to the rear of the spars. Start with the ribs that are spaced the widest first. Trim and sand the sheet to fit between the two ribs. Sand the bottom edge of the sheet to fit the angle of the lower spar, then mark and cut the sheet to the proper height. Continue trimming, sanding and cutting the sheet for all of the webbing. Be sure to remove any pins that will be hidden by the webbing before gluing it into position.

**NOTE:** The sheeting provided is ample to prepare all of the webs, but there is no extra material so work carefully.

☐☐ 14. Prepare the 3/8" x 3/4" TE that you installed in step 10 for sheeting. Carve and sand the TE to blend with the top of ribs W6-W11. If you are not a careful sander you may want to put some masking tape on the tops of the ribs so that you won't alter their shape.

☐☐ 15. Glue the 3/32" x 15/16" x 24" TE sheet to the TE and ribs using aliphatic resin. Note that the sheeting extends to W5 and is trimmed at an angle.

❑❑ 16. Prepare the 1/4" x 3/4" LE that you installed in step 11 for sheeting. Carve and sand the LE to blend with the tops of the ribs. Use masking tape on the ribs so that you don't alter their shape.



❑❑ 17. Glue the leading edge skin that you prepared in step 2 to the top spar, ribs and LE using aliphatic resin.

❑❑ 18. After the glue has **fully dried**, remove the wing from the building board.

❑❑ 19. Carve and sand the TE and LE to blend with the bottom of the ribs as you did in steps 14 and 16.

❑❑ 20. Trim the LE and TE sheeting and the spars even with ribs W1 and W11.

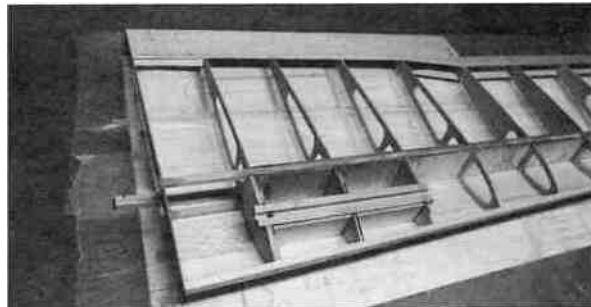


❑❑ 21. Glue the landing gear stub block to W2 using 30-minute epoxy. The block fits into the long **cutout in the 1/8" ply doubler**.

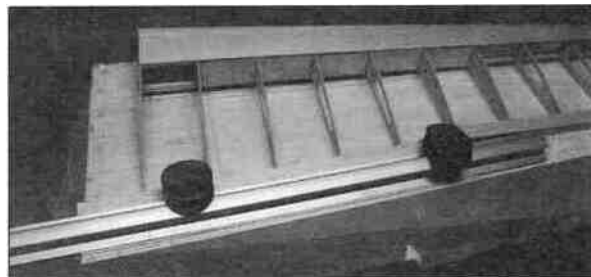
❑❑ 22. Check the fit of the landing gear block in ribs W2, W3 and W4. When satisfied with the fit, glue it in place with 30-minute epoxy.

❑❑ 23. Fit and glue the 1/8" die-cut ply webs to the front of the landing gear rail using 30-minute epoxy. The webs should fit tightly between the ribs, sheeting and landing gear rail.



❑❑ 24. Using a 1/4" bit, drill a hole through the landing gear block into the stub block. Radius the top of the hole to fit the bend in the 1/4" landing gear wire.





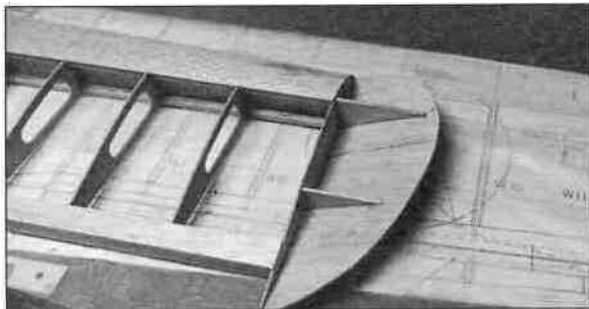
❑❑ 25. Using the 5/8" x 2" x 8" balsa block, cut and fit the TE filler block between W1 and W2. Glue the block into place with medium CA. Carve and sand the block to the contour of the ribs.







❑❑ 26. Prepare the trailing edge for sheeting. Taper the trailing edge of the 3/32" x 3" sheet that was installed in step 12 to blend with the contour of the ribs from W1 to W6. Use a 3/32" x 3" x 24" sheet to sheet the top of the trailing edge. Trim the sheet to fit the 3/32" x 15/16" sheet installed in step 15. Glue the sheet in place with aliphatic resin. Use a long T-bar sander and weights to align the ribs and hold the rear of the wing flat to the building board.



  27. After the glue has dried, turn the wing over and fit and glue a  $\frac{3}{32}$ " x  $\frac{15}{16}$ " x 24" sheet to the trailing edge between W5 and W11 with aliphatic resin. You will have to trim the  $\frac{3}{32}$ " x 3" sheet installed in step 12.

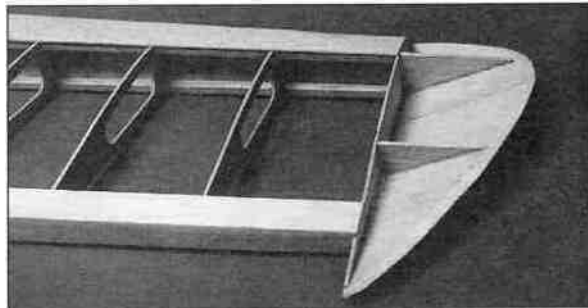
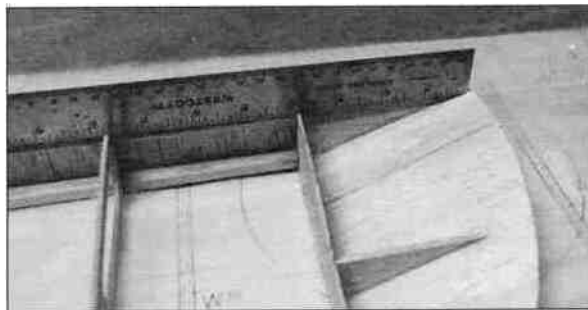
  28. Trim the LE and TE sheeting even with ribs W1 and W11. Sand the tip and root of the wing so that it is smooth and flat.







  29. Prepare the wingtip for sheeting. Fit and glue the  $\frac{1}{8}$ " die-cut balsa stiffeners to W11. The smaller stiffener should be positioned so that the top and bottom of the stiffener are flush with the top and bottom edges of rib W11. The larger stiffener should be flush with the bottom of the rib and the top surface of the top spar. Use a long straightedge to check that the top edge of the stiffeners are parallel to the top surface of the wing.

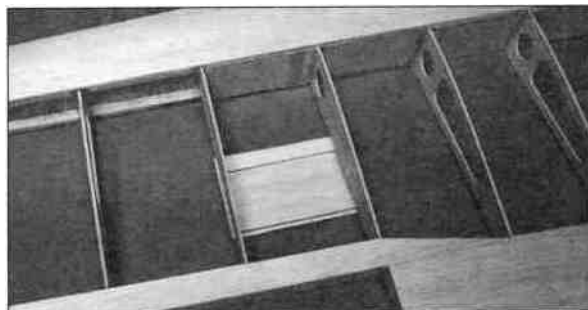
  30. Cut the wing tip pattern from the center of this manual. Use the soft  $\frac{1}{8}$ " x 3" x 36" balsa sheet to cut the pieces for the wing tip to match the pattern, noting the grain direction. Glue the pieces together and sand both surfaces flat and smooth.



  31. Fit and glue the tip to the bottom of W11 and the stiffeners. Fit and glue a filler block from leftover balsa to the wing tip at the leading edge.



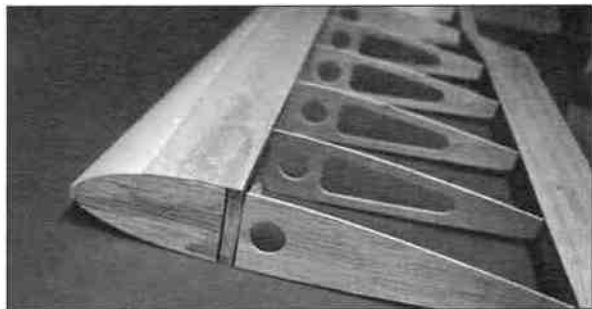
  32. Cover the tops of ribs W7-W11 with masking tape. Use a long T-bar sander to sand the top of the wing tip so that it is parallel to the top surface of the wing. See section A-A on the plans for clarification.

  33. Sheet the top of the wing tip using a  $\frac{3}{32}$ " x 3" x 30" balsa sheet.



  34. Build the servo mounts between ribs W6 and W7. Fit and glue the  $\frac{1}{8}$ " x  $\frac{1}{2}$ " x 4" ply servo rails. Space the rails to fit the servo you will be using. Sheet the area around the servo using leftover  $\frac{3}{32}$ " x 3" so the covering will have a place to adhere.

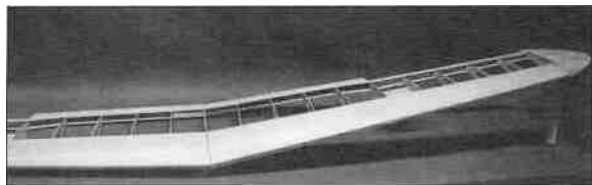
- ❑ 35. Build the left wing panel.



- ❑ 36. Prepare the wing panels for joining by cutting a 1/16" wide slot in front of and behind the spars on W1 as shown in the photo.

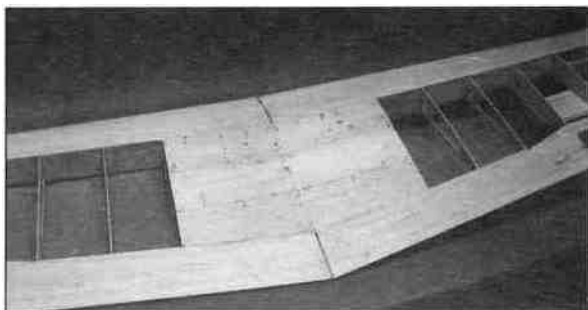


- ❑ 37. Test fit the 1/16" ply dihedral braces to the wing panels. Note that the shorter ply brace goes on the forward side of the spars. When satisfied with the fit, glue the braces to the right wing panel with 30-minute epoxy. Remove the left panel and clean off any epoxy that seeped out from the joint.



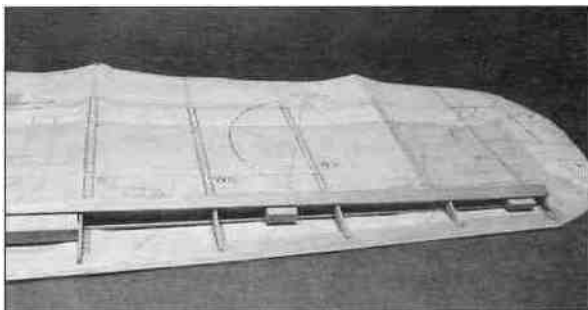
- ❑ 38. After the epoxy has cured, slide the left panel back into position. Position the right panel flat on your building board and prop the left tip off the building board. *Don't you wish your surface was longer!!*

- ❑ 39. Measure the distance under the left wing tip at the bottom of rib W11. If it is 8-3/4" you have exactly 6 degrees of dihedral in each panel. Don't be concerned if it is a little off as the dihedral angle is not at all critical. If it is off by more than 1/2" you might want to find out why, but you don't really need to fix it. When you are satisfied, glue the dihedral braces to the left wing panel with 30-minute epoxy.



- ❑ 40. Using 3/32" x 3" x 36" balsa, sheet the top center of the wing from W3 to W3. The strength of the center section is important so we recommend that you use aliphatic resin. Note in the photo that we used one continuous piece across the entire center section. This greatly increases the strength of the joint, but it is a bit harder to install this way.

## BUILD THE AILERONS



- ❑ ❶. Cover the right wing panel with wax paper. Cut the lower LE sheet from a 3/32" x 1/2" x 24" balsa stick and pin it to the plan.



☐ ☐ 2. Cut the lower TE sheet from a 3/32" x 3/4" x 24" balsa stick and pin it to the plan.

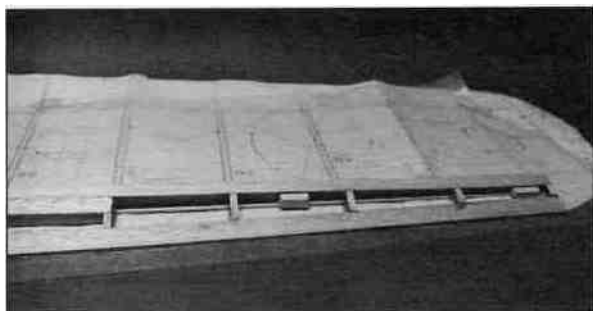
☐ ☐ 3. Cut the LE from a 1/4" x 3/4" x 24" balsa stick. Glue and pin it to the 3/32" x 1/2" LE sheet.

☐ ☐ 4. Glue ribs 6-11 into place.

☐ ☐ 5. Cut and glue two 1/4" x 3/4" doubler sticks where the aileron horn will mount.

☐ ☐ 6. Cut and glue hinge blocks into position from a 1/2" x 5/8" x 24" balsa stick.

☐ ☐ 7. Remove the aileron from the plan. Carve and sand the top of the LE to match the taper of the ribs. Taper the TE as well. Be careful as it is easy to sand into the ribs.



☐ ☐ 8. Glue the top 3/32" x 1/2" LE into place.

☐ ☐ 9. Glue the top 3/32" x 3/4" TE into place.

☐ ☐ 10. Fit and glue cap strips to the top and bottom of the aileron using 3/32" x 1/4" x 30" balsa sticks.

☐ ☐ 11. Sand the aileron to fit the wing. Mark the centerline of the aileron leading edge along its entire length. Using the cross section on the plans as a reference, sand the leading edge to the "V" shape shown. Make sure the "V" is large enough to allow for the full up and down movement of the aileron.

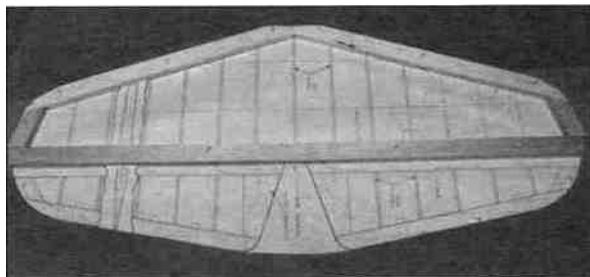
**NOTE: Do not** bevel the TE of the wing to the "V" shape shown on the plan (this was drawn in error.)

☐ 12. Repeat steps 1 - 11 to build the left aileron.

☐ 13. Cut six additional hinge blocks from the 1/2" x 5/8" balsa stick. Glue these into position along the inside edge of the TE of the wing opposite the position of the blocks in the aileron.

## BUILD THE STABILIZER AND ELEVATORS

☐ 1. Cut the stabilizer drawing from the wing plan and place it on your building board. Cover the plan with wax paper.

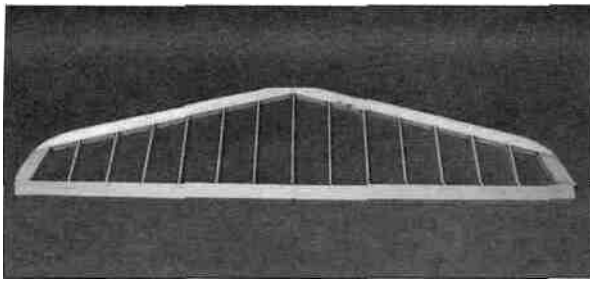


☐ 2. Cut the trailing edge from 1/2" x 15/16" x 36" balsa and pin it in place over the plan.

☐ 3. Cut both leading edges from 1/2" x 15/16" x 36" balsa and set them aside.

☐ 4. Cut the tips from leftover 1/2" x 15/16" balsa. Glue and pin them in place.

☐ 5. Glue and pin the leading edges in place.



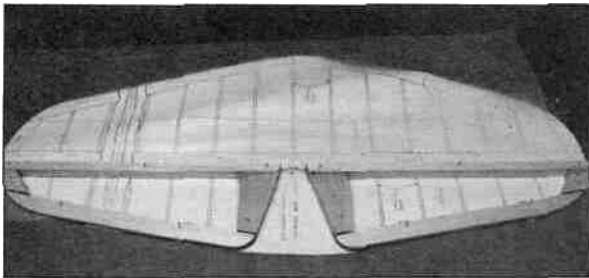
- ❑ 6. Cut and fit the ribs from  $1/8" \times 1/2" \times 30"$  balsa. Cut the longer ribs first. When satisfied with the fit, glue them into position.

**NOTE:** It **is** important that the ribs fit the LE and TE well. It is **not** important that each rib fit the exact location shown on the plan.

- ❑ 7. Remove the stab from the plan and rough sand it to the shape shown in the cross section.

- ❑ 8. Mark the centerline of the stab on the back of the TE. Place a mark  $5/8"$  on both sides of the centerline. Place another set of marks  $15"$  on both sides of the centerline. These marks **will** be used to position the elevators.

- ❑ 9. Sheet the stab with  $1/16" \times 3" \times 30"$  balsa on both the top and bottom. Do this with the stab flat on your building board and use care not to twist it as **you** glue the sheeting into place.



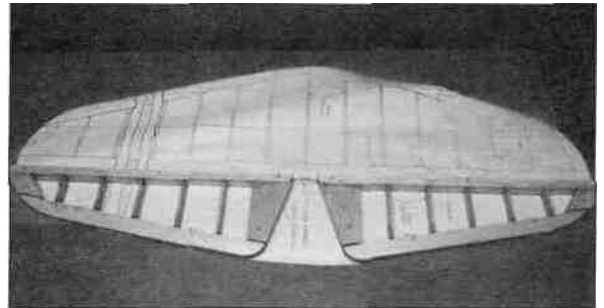
- ❑ 10. Build both elevators at the same time. Cut the leading edges from  $5/8" \times 1/2" \times 36"$  balsa and pin them to the plans. The leftover  $5/8" \times 1/2"$  balsa will be used later to shim the stab when it is mounted to the fuselage.

- ❑ 11. Cut the elevator tips from  $5/8" \times 15/16" \times 6"$  balsa. Glue and pin them into position.

- ❑ 12. Glue and pin the shaped balsa elevator roots into position.

- ❑ 13. Cut some shims from  $3/16" \times 3/8" \times 24"$  balsa and place them in position over the plan at the TE.

- ❑ 14. Cut the trailing edges from  $1/4" \times 3/4" \times 30"$  balsa. Glue and pin them into position on top of the shims.

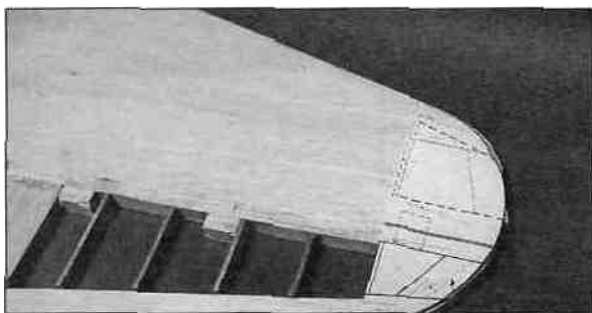


- ❑ 15. Cut and fit the ribs from  $1/8" \times 5/8" \times 30"$  balsa. Cut the longer ribs first. When satisfied with the fit, glue them into position.

**NOTE:** It **is** important that the ribs fit the LE and TE well. It is **not** important that each rib fit the exact location shown on the plan.

- ❑ 16. Remove the elevators from the plan and rough sand them to the shape shown in the cross section.

- ❑ 17. Tack glue the elevators to the stab using the reference marks you made previously.



❑ 18. Cut the tip shape from the plan and position it over the stabilizer. Use the 15" marks, LE and TE as a guide. Cut the stab and elevator tips to shape.

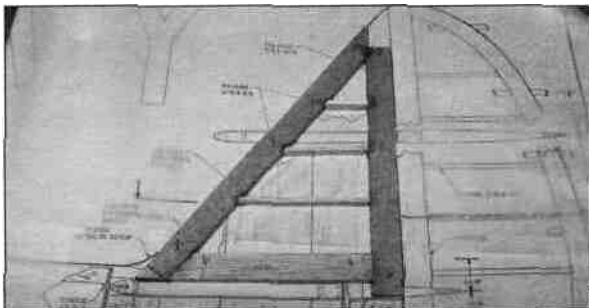
❑ 19. Sand the assembly to its final shape.

❑ 20. Separate the elevators from the stab. Sand the trailing edge of the stabilizer **flat**. Do not sand it to the "V" shape shown on the plan.

❑ 21. Mark the centerline of the elevator leading edges along their entire length. Using the cross section on the plans as a reference, sand the leading edges to the "V" shape shown. Make sure the "V" is enough to allow for the full up and down movement of the elevators.

## BUILD THE VERTICAL FIN AND RUDDER

❑ 1. Cover the fin/rudder drawing with wax paper.



❑ 2. Cut the fin leading edge from 3/8" x 15/16" x 30" balsa and pin it in place over the plan.

❑ 3. Cut the fin post (trailing edge) from 3/8" x 15/16" x 30" balsa and pin it in position.

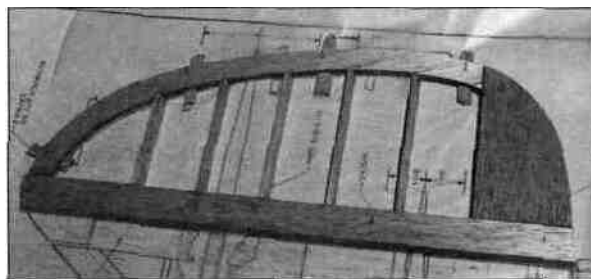
❑ 4. Cut the fin base from the 3/8" x 15/16" x 30" balsa and pin it into position. Glue all three pieces together.

❑ 5. Cut and fit the ribs from 3/16" x 3/8" x 24" balsa. Cut the longer ribs first. When satisfied with the fit, glue them into position.

**NOTE:** It is important that the ribs fit the LE and TE well. It is **not** important that each rib fit the exact location shown on the plan.

❑ 6. Remove the fin from the plan and rough sand it to the shape shown in the cross section.

❑ 7. Sheet the fin with 1/16" x 3" x 30" balsa on both sides. Do this with the fin flat on your building board and use care not to twist it as you glue the sheeting into place.



❑ 8. Cut the rudder leading edge from 1/2" x 15/16" x 36" balsa and pin it to the plans.

❑ 9. Cut the balance tab to shape from leftover 1/2" x 15/16" balsa. Glue and pin it into position.

❑ 10. Laminate the four die-cut rudder base pieces together with medium CA. Sand the edges flat and glue it into position.

❑ 11. The trailing edge is built up from four 3/32" die-cut pieces to create one 3/16" thick piece. Laminate the parts together using the plan as a reference.

☐ 12. Build three shims from leftover 3/32" and 1/16" balsa to create 5/32" thick shims. Place the shims into position over the plan and then glue and pin the TE into position.

☐ 13. Cut and fit the ribs from 3/16" x 1/2" x 30" balsa. Cut the longer ribs first. When satisfied with the fit, glue them into position.

**NOTE:** It is important that the ribs fit the LE and TE well. It is **not** important that each rib fit the exact location shown on the plan.

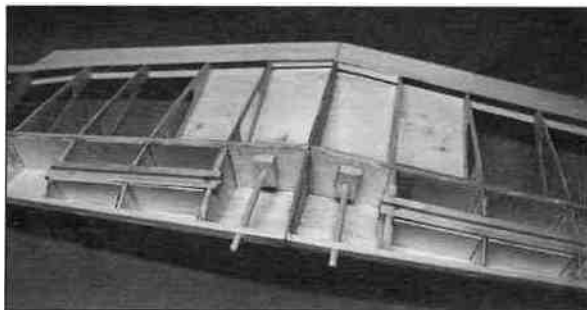
☐ 14. Remove the rudder from the plan and rough sand it to the shape shown in the cross section.

☐ 15. Tack glue the rudder to the fin.

☐ 16. Sand the assembly to its final shape.

☐ 17. Separate the rudder from the fin. Sand the trailing edge of the fin flat as shown on the cross section of the plan.

☐ 18. Mark the centerline of the rudder leading edge along its entire length. Using the cross section on the plans as a reference, sand the leading edge to the "V" shape shown. Make sure the "V" is enough to allow for the full left and right movement of the rudder.



☐ 2. Drill two 5/16" holes through the wing LE as shown on the plan and in the photo.

☐ 3. Cut two 1/2" x 15/16" x 1-1/2" balsa blocks from leftover sticks and drill a 5/16" hole in the center of both blocks.

☐ 4. Slide the 5/16" x 5-1/4" wing dowels through the holes in the LE and put a block on the end of each dowel. Align the blocks on the 1/16" ply dihedral braces so that the dowels are parallel to the wing centerline. Glue the BLOCKS ONLY to the dihedral braces with 6-minute epoxy. Remove the dowels before the epoxy sets.

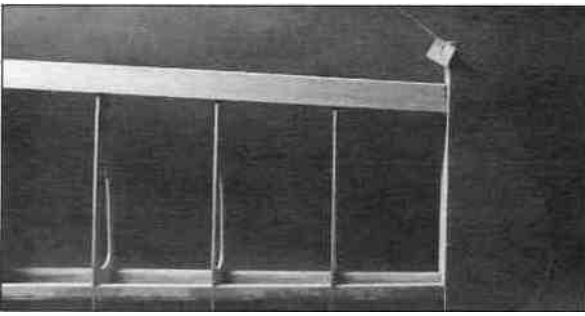
☐ 5. Fit the wing to the fuselage. Center the wing and mark the location of the dowels on bulkhead C. This is done by putting a pencil through the hole in the LE and marking the bulkhead.

☐ 6. Remove the wing and drill 5/16" holes into bulkhead C.

☐ 7. Put the dowels into the wing and fit the wing back onto the fuselage. Make any adjustments needed to get the dowels to fit properly into the holes in bulkhead C. When satisfied with the fit, glue the dowels into the wing with 6-minute epoxy. Use caution not to get any epoxy on the fuselage.

## MOUNT THE WING TO THE FUSELAGE

☐ 1. Find the eight 1/8" die-cut balsa wing saddle pieces. Glue four pieces together using medium CA to form one wing saddle. Glue the other four pieces together for the second saddle.

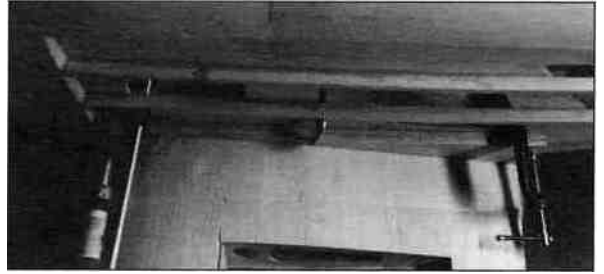


❑ 8. Align the wing squarely on the fuselage. This is easily done using a piece of string as a guide. Put a pin in the tail of the fuselage on the centerline. Tie a loop in the end of the string and place it over the pin. Move the other end of the string to one wing tip and put some masking tape around the string. Draw an arrow on the tape where it reaches the wing tip. Now swing the string over to the other wing tip. If the tip aligns with the arrow the wing is properly aligned. If not, adjust the wing's position and try again. Continue to adjust the wing until both wing tips are aligned with the arrow on the tape. Secure the wing exactly in this position.

❑ 9. Drill two pilot holes for the 1/4-20 wing bolts using a 13/64" bit. Drill the holes through the wing and into the ply wing bolt plate so that the holes will be centered fore/aft in the plate.

❑ 10. Remove the wing from the fuselage. Tap the holes in the ply plate for the bolts with a 1/4-20 tap. Apply a couple of drops of thin CA to the threads to harden them. After the CA has cured, run the tap through the threads to clean them up.

❑ 12. Enlarge the wing bolt holes in only the wing with a 1/4" drill, drilling through the 1/16" ply plates as well.

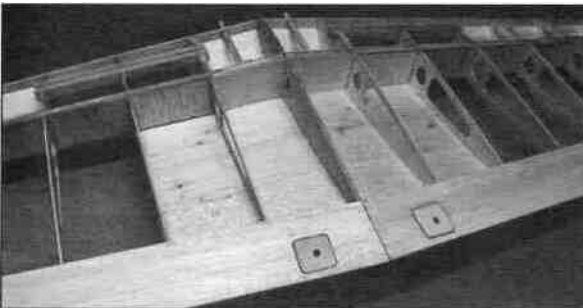


❑ 13. Put some wax paper on the center of the wing where it will touch the fuselage and bolt the wing to the fuselage with the 1/4-20 nylon bolts.

❑ 14. Fit a laminated wing saddle (that you built in step one) to each side of the fuselage. Sand it carefully so that it fits the top surface of the wing. When satisfied with the fit, glue each to the fuselage side with 30-minute epoxy. Do not use 6-minute epoxy as it will not allow you enough time to position the clamps.

❑ 15. While you are waiting for the epoxy to cure, make two more wing LE skins just as you did in step 2 of "BUILD THE WING."

❑ 16. Using leftover 1/4" x 1/2" balsa, glue a fairing strip to the fuselage at the rear of the wing saddle. This piece can be seen in the photo at step 22 on page 22.

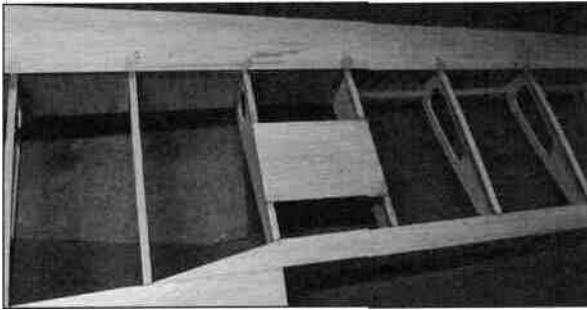


❑ 11. Fit the two 1/16" ply reinforcement plates for the wing bolt holes into the wing. Glue these into position over the holes with 6-minute epoxy.



❑ 17. When the epoxy has cured, remove the wing from the fuselage. Sheet the bottom LE of both wing panels.

- ☐ 18. Sheet the bottom center of the wing.



- ☐ 19. Attach a cap strip to the top and bottom of all the ribs using 3/32" x 1/4" x 30" balsa sticks. Cut the longer pieces first.

- ☐ 20. Rough sand the wing to shape.

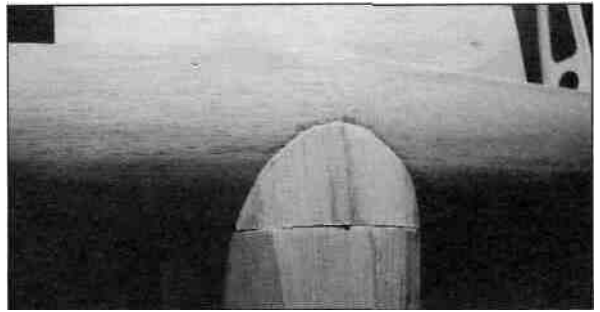
- ☐ 21. Fiberglass the center of the wing with 2" glass tape. Put a small patch around the wing dowels as well.

- ☐ 22. Mount the wing to the fuselage and bolt it into place. While doing so, place some wax paper at the leading and trailing edges.



- ☐ 23. Use leftover 1/8" ply to make fillers for the TE of the wing where it meets the fuselage. Glue them to the wing with CA.

- ☐ 24. Adjust the 1/4" x 1/2" fillers that you tack glued in step 21 of "BUILD THE FUSELAGE" as needed to fit the TE of the wing.



- ☐ 25. Use leftover 1/8" ply to make a bulkhead where the leading edge of the wing meets the fuselage. First fit it to the bottom surface of the wing, then use a pencil to draw the outline where it meets the fuselage. Now trim this former to shape allowing for the 3/32" sheeting that will be used to fair the wing to the fuselage.

- ☐ 26. Position the former on the wing. When satisfied with the fit, glue it to the WING ONLY.

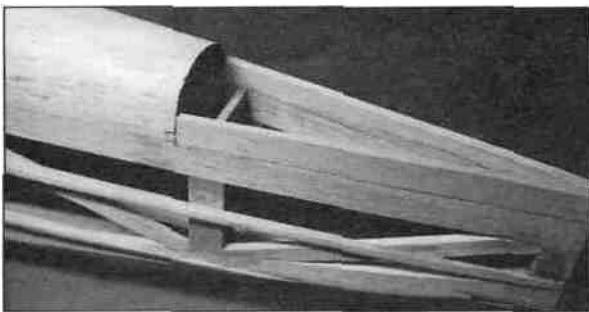
- ☐ 27. Cut and fit 3/32" sheeting from leftover wing sheeting to smoothly fair the wing to the fuselage. Glue the sheeting to the former and wing.

- ☐ 28. Remove the wing from the fuselage.

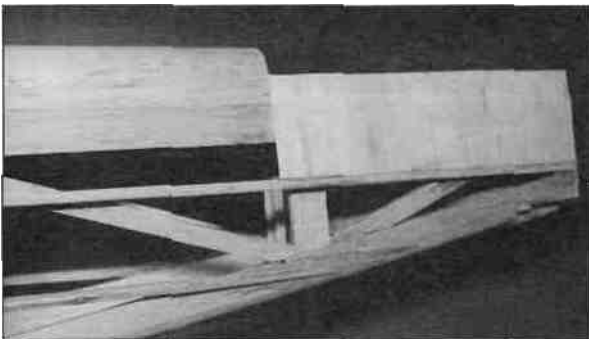
## FINAL ASSEMBLY

It's finally time to take all of these assemblies and fit them together to look like an airplane. We'll start with the fuselage.

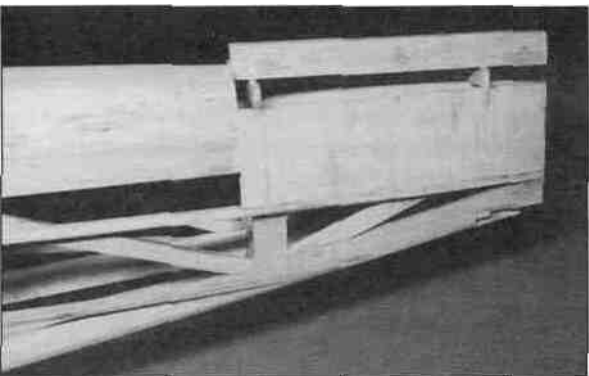
- ☐ 1. Carve and rough sand the stringers to blend into the fuselage. This is not extremely critical but will effect how the fabric lays.



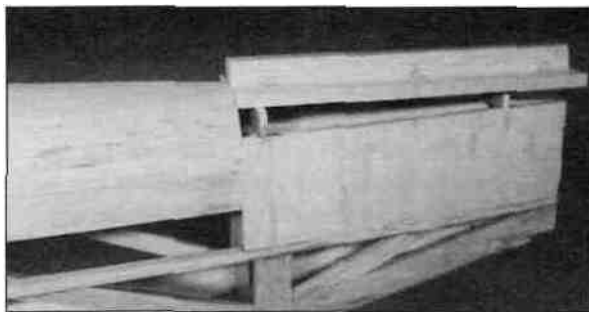
2. Cut the stab mounts from 1/4" x 3/4" x 20 balsa and glue them securely to the fuselage.



3. Use leftover 1/8" sheeting to sheet below the stab to the stringer with the grain running vertically. This is for the pushrod exit.



4. Before mounting the stab to the fuselage, you should first carve the fin fairing blocks. The photo shows some shim blocks that have been tack glued into position. The lower shims are from leftover 5/8" sticks used on the elevator LE. The top shim is from 1/2" wide wood from the stab. These shim blocks are to properly space the fairing blocks.



5. Cut two 10" pieces from a 3/8" x 3/4" x 24" balsa stick. These are the fairing blocks. Tack glue them into position on the shims and carve the assembly to shape. When you are satisfied with your work, remove the fairing blocks and shims from the fuselage. Clean up the stab mounting area.



6. Next, you will mount the stab to the fuselage, but before doing so you need to look more closely at it. As this is a large model, you should not depend on glue alone to hold the stab in place. The plan shows a 1/8" ply tongue that has been inset into the stab and is used to key the LE of the stab into former G in the fuselage. The photo shows two 1/8" dowels that are used for the same purpose. Either method works well but the dowels are probably easier to install. In addition, the rear of the stab has a piece of 1/8" x 1/2" x 2-1/2" ply that is inset into the TE and extends down into the fuselage.

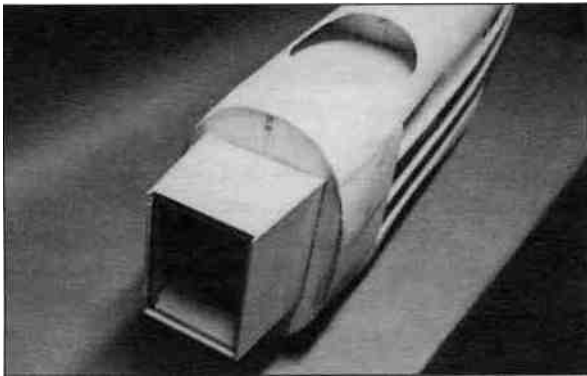
7. Bolt the wing to the fuselage. Fit the stab into position and adjust the stab mount as needed to make the stab level with the wing. Be careful not to change the incidence angle of the stab. Put a pin in the nose of the fuselage on the centerline. Use your string to align the stab just as you did for the wing. When satisfied with the alignment, glue the stab in position with 30-minute epoxy.

❑ 8. Glue the fin and fin fairing blocks into position with 30-minute epoxy. Be sure the fin is perpendicular to the stab and aligned with the fuselage centerline.

❑ 9. When the epoxy has cured, remove the wing. Fill in and blend any areas that need it with leftover wood and hobby filler.

❑ 10. Mount the tailwheel bracket to the fuselage with three #2 sheet metal screws. Use leftover wood and hobby filler to blend it to the fuselage.

❑ 11. Finish the cockpits. The cockpit area was designed to be structure free so you can add as much detail as desired. The simplest is to glue in cockpit decks as shown on the plans and add a couple of Williams Brothers pilots glued to the decks. Fourmost makes cockpit coaming that dresses up the openings nicely. The kit includes two instrument panel decals which can be positioned on the bulkheads, or you can purchase separate instrument panels from Midwest Products. The kit also includes 25" of 1/4" dowel to build the roll cage between the cockpits. Details in the cockpit area will really dress up the appearance of your model.



❑ 12. Time to mount your engine. Before you glue the firewall into position, you should add some reinforcing sticks to the inside of the fuselage as shown in the above photo. There should be ample leftover 1/4" x 3/8" basswood sticks for this purpose. Glue them into position with 30-minute epoxy. While you are waiting for the epoxy to cure you can mount **your** engine to the engine mount you have chosen.

Position the mount on the plans at the firewall then locate the engine on the mount to fit the front of the cowl properly. Check the position on the model to be sure blind nuts and bolts will clear the structure.

**NOTE:** If you will be using a chainsaw-type engine, such as the G-23, your engine will need to be spaced out from the firewall. On one of our prototypes we used a 1-1/2" block of wood that was bolted to the firewall with 10-32 x 2" bolts.

❑ 13. Glue the firewall to the fuselage with 30-minute epoxy. For added security you can pin the firewall to the fuselage if desired. Drill small holes through the sides of the fuselage into the firewall and epoxy in small dowels or toothpicks.

❑ 14. Once the epoxy has cured, install your engine and mount on the firewall.

❑ 15. Fit the cowl. The plastic cowl comes in halves and needs to be glued together. The kit includes a strip of plastic that is used to reinforce the joint on the inside. Thin CA works well for this. When you have glued the cowl together, cut a small hole where the prop needs to exit the front. Slip the cowl onto the fuselage. Enlarge the hole as needed to clear the engine thrust washer. As you continue to fit the cowl to the fuselage and engine you may need to remove and reinstall the engine several times. We have found that using a piece of cardboard taped to the side of the fuselage is the easiest way to locate the cutout for the engine. Tape the cardboard to the fuselage and cut an opening in it to fit your engine, remove the engine, install the cowl and transfer the cutout to the cowl. If you go slowly and remove a little material each time from the cowl you will be rewarded with a good looking cowl.

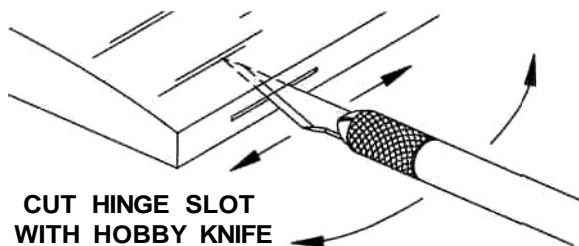
❑ 16. When you are satisfied with the fit of the cowl remove it and glue the four hardwood blocks into place on the fuselage. The blocks are of different sizes so a little fitting will be needed. They should be close to fitting from the engine box to the fuselage curve at "B." After the blocks are glued into position, sand them to blend to the curve of the cowl.



7. To drill the mounting holes in the cowl use the cardboard technique again. Tape some cardboard to the fuselage side and mark the center of the mounting blocks. Slip the cowl into position and mark the location of the holes. Drill  $3/32$ " holes through the cowl and blocks, then remove the cowl and enlarge the holes in only the cowl to  $1/8$ ". Mount the cowl with #6 x  $1/2$ " sheet metal screws.

18. Hinge the control surfaces. The kit includes a hinge strip from which you can cut CA hinges, or you can use other hinges of your choice. The following general guidelines will discuss hinging. We will discuss hinging the elevator but the same process is used to hinge the rudder and ailerons.

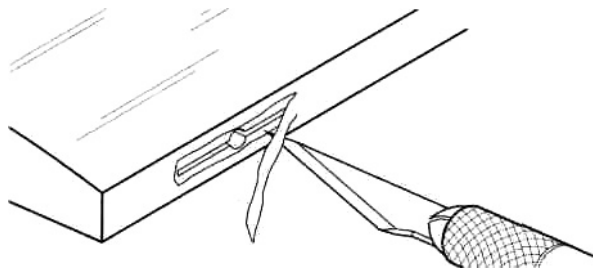
- A. If you have not already done so, mark the centerline of the TE of the stab.
- B. The LE of the elevators has already been sanded to a "V," so this will be used as the centerline.
- C. Using the plan as a reference, mark the locations of the hinges to be installed.



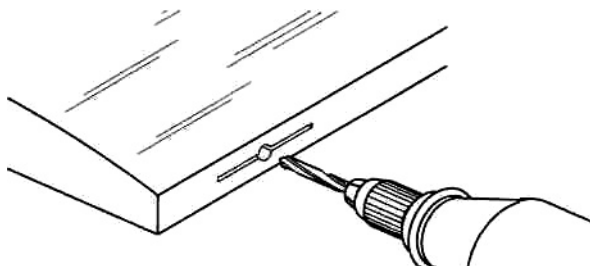
**CUT HINGE SLOT  
WITH HOBBY KNIFE  
AND No. 11 BLADE**

- D. Use a hobby knife with a #11 blade to make the hinge slots. The first cut should be a **shallow** slit to establish the hinge slot location. After the first cut, make several more cuts going slightly deeper each time. Move the knife from side to side and widen the slot as you cut.
- E. Test join the elevators to the stab with the hinges in place. **DO NOT** glue until later.
- F. Perform the same process for the rudder and for the ailerons.

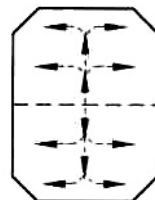
AFTER you have completely covered and finished your model, perform the following:



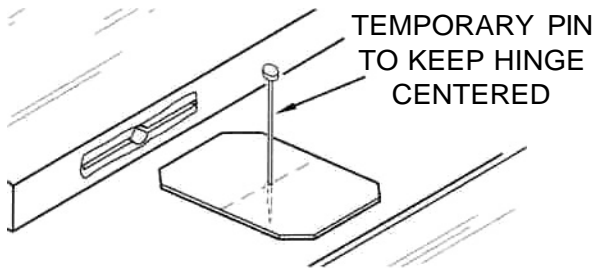
- A. Use your hobby knife and a sharp #11 blade to remove a small strip of covering from the hinge slots to expose them.



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



- B. Drill a  $3/32$ " hole in the center of all the hinge slots to allow the CA to fully penetrate. This is best done with a high-speed tool such as a powered hand tool. If you use a drill, remove slivers of balsa wood from the hinge slots with a hobby knife after you drill the holes.



## FINISHING

You may cover and finish your model now if you desire. We prefer to install the radio before finishing so we don't add any hanger rash to our finished model. Our radio installation consisted of the following:

- C. Join the elevator to the stab with the hinges. If the hinges will not stay centered, insert a pin through the center of the hinge, then join the surfaces and remove the pins.
- D. Confirm that the ends of the elevator align with the ends of the stab, that the hinges are centered and there is approximately a 1/32" gap between the TE of the stab and the LE of the elevator. A small gap is desirable so you do not inadvertently glue the elevator to the stab with residual CA.
- E. Carefully apply 6 drops of thin CA to each side of all the hinges. Keep a tissue handy to wipe away excess CA. If you spill a few drops of CA on the MonoKote film you can use CA Debonder (GPMR6039) to remove it. Or, wait until the CA fully cures, then carefully lift it off with a hobby knife blade.

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

- F. Let the CA fully cure, then flex the elevator several times to check the movement.
- G. Use the same procedure to hinge the rudder and ailerons.

- A. One S-148 size servo for each aileron. IMAA rules may require higher torque servos.
- B. One high torque servo for each elevator, with a separate pushrod for each.
- C. One quarter-scale servo for the rudder, with a pull-pull system.
- D. One S-148 size servo for the throttle.
- E. We used a 1200 Mah battery pack to allow for the additional servo drain.

While this is a large aircraft, it does not fly very fast. We have found that the above installation has worked very well.

This model will go into uncontrollable fits of sadness if it isn't covered with fabric. Fortunately, Coverite 21st Century prepainted fabric will eliminate this tendency and looks great! You will need 15 feet of Cub Yellow (COVQ0304), 15 feet of Mid Blue (COVQ0412), 2 feet of Light Red (COVQ0302), 2 feet of White (COVQ0301) and 3 feet of Black (COVQ0310).

After you have finished covering, finish the hinge installation as covered previously.

To install your windshields, cut and fit them to the fuselage. Cut the covering where they will be glued to the fuselage so that the windshields can be adhered to the wood. Use tape or paint to detail the panel lines.

Install your fuel system. We used a 16 oz. tank (GPMQ4107) and a refueling valve (GPMQ4160). Don't forget to fuelproof the engine and tank area.

- ☐ 19. Fit and install the landing gear.

## SET THE CONTROL THROWS

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

**We recommend the following control surface throws:**

**Elevator** 1 - 1/8" up and down

**Rudder** 2" left and right

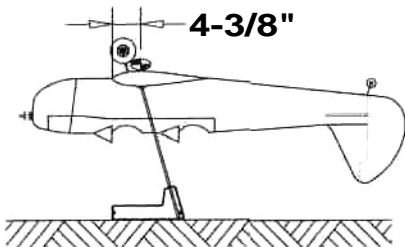
**Ailerons** 3/4" up and down

**Throttle:** Set the throttle so that at "high stick" the carburetor barrel is fully open and at low stick with full to half throttle trim, the carburetor barrel is nearly closed. At this position the engine should run reliably at a low RPM (idle). To shut the engine off, decrease the throttle trim tab.

## BALANCE YOUR MODEL

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

❑ 1. Check the balance point with all components installed in the model and the fuel tank **empty**. Attach the wing to the fuselage, then accurately mark the balance point on the top of both wing halves **next to the fuselage**. The balance point is shown on the plan and is 4-3/8" (111 mm) aft of the leading edge.



❑ 2. Lift the model with your fingers at the balance point or use the Great Planes CG Machine

(GPMR2400). If the tail drops, shift the receiver and/or battery pack forward (if possible) to balance the model. If the nose drops, shift the receiver and/or battery pack aft. If possible arrange the battery pack and receiver to achieve balance but make sure they remain secure in the fuselage so they cannot shift during flight or a rough landing. If you must add additional weight to the nose or tail of the PT-19 to achieve balance use Great Planes adhesive lead weights (GPMQ4485). An alternate to stick-on nose weight (if your model is tail heavy) is a Great Planes brass spinner nut (GPMQ4640). It has 1/4-28 threads so it will fit most engines.

## PREFLIGHT

## AT HOME

### Balance Your Propellers

Balancing the propeller seems like one of those things that you can skip, but many problems are the result of vibration caused by an unbalanced propeller. Nuts and bolts can vibrate loose and vibration can damage delicate radio components inside your receiver and servos. Vibration can even damage the delicate glow plug element which could result in an engine that is difficult or impossible to start. Purchase a Top Flite Precision Magnetic Balancer™ (TOPQ5700) or a Great Planes fingertip prop balancer (GPMQ5000) to accurately balance your propellers.

### Charge Your Batteries

Follow the battery charging instructions in the instruction manual that came with your radio control system. You should **always** charge your batteries the night before you fly.

### Ground Check Your Model

Inspect all nuts, screws and wheel collars. **Make sure you install the screw that holds the servo arm onto the servos** and the servo cords are securely connected to the receiver. If you are not thoroughly familiar with R/C models, ask an experienced modeler to inspect your radio installation and make

sure the control surfaces respond correctly. The engine must be "broken-in" according to the engine manufacturer's recommendations for break-in. Refer to the **Engine Safety Precautions** on the next page before you start your engine. After you run the engine on the model make sure all screws remain tight, the hinges are secure and the prop is on tight.

## AT THE FLYING SITE

### Range Check Your Radio

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

Repeat this test with an assistant holding the model and **the engine running at various speeds.** If the control surfaces do not always respond correctly, **don't fly!** Find and correct the problem first. Look for loose servo connections or corrosion, loose fasteners that may cause vibration, a defective on/off switch, low battery voltage or a defective cell, a damaged receiver antenna or a receiver crystal that may have been damaged from a previous crash.

## ENGINE SAFETY PRECAUTIONS

**NOTE:** Failure to follow these safety precautions may cause severe injury to yourself and others.

Store model fuel in a safe place away from high heat, sparks or flames. Do not smoke near the engine or fuel as it is very flammable. Engine exhaust gives off a great deal of deadly carbon monoxide so **do not run the engine in a closed room or garage.**

Get help from an experienced modeler when you learn to operate engines.

Use safety glasses when you operate model engines. Do not run the engine near loose gravel or sand; the propeller may throw loose material in your face or eyes.

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

Keep loose clothing, shirt sleeves, ties, scarfs, long hair or loose objects away from the prop. Be conscious of pencils, screwdrivers or other objects that may fall out of your shirt or jacket pockets.

Use a "chicken stick" or electric starter and follow the instructions to start your engine.

**Ask an assistant to hold the model from the rear** while you start the engine and operate the controls.

Make all engine adjustments from **behind** the rotating propeller.

The engine gets hot! Do not touch the engine during or immediately after you operate it. Make sure fuel lines are in good condition so fuel will not leak onto a hot engine and cause a fire.

To stop the engine, close the carburetor barrel (rotor) or pinch the fuel line to discontinue the fuel flow. Do not use your hands, fingers or any body part to stop the engine. Never throw anything into the prop of a running engine.

## FLYING

### FIND A SAFE PLACE TO FLY

The best place to fly your R/C model is at an AMA (Academy of Model Aeronautics) chartered club field. Ask your hobby dealer or the AMA if there is a club in your area and join it (the address and telephone number for the AMA is listed on page 3 of this instruction book). Club fields exist to make your **R/C**

flying safe and enjoyable. We recommend that you join the AMA and a local club so you may have a safe place to fly and insurance in case of a flying accident.

**If** a club flying site is not available, find a large, grassy area at least 6 miles away from houses, buildings, streets and other R/C activity like boats and cars. Avoid flying R/C models near traffic or areas such as parks, school yards, office building lawns, etc. that may attract unrestrained observers (wild kids). If you are a beginner, you are busy enough concentrating on your model without having to answer lots of questions and performing crowd control.

We highly recommend that you get an experienced modeler to assist you with your flight training. An experienced modeler can take your PT-19 up for the first time and make sure it performs correctly, then give you valuable flight instruction. He can hand you the transmitter when the PT-19 has climbed to a safe altitude or connect your transmitter to his if both of your systems have trainer cord or "buddy box" capability. Assistance from an experienced modeler will make your modeling "career" progress faster (and cheaper). We do, however realize that some modelers are determined to learn on their own or are not in a location where an instructor or flying club is available. Therefore, we have provided the following information to give you an idea of what to expect on your first flight with your PT-19. Both flyers who plan to set out on their own **and** fliers who will have the help of an instructor should carefully read the following information.

## TAKEOFF

First flight attempts should be reserved for calm days when the wind speed is less than five mph. Always takeoff (and land) into the wind. Check the operation of all controls just before takeoff. This will eliminate the possibility of overlooking reversed or disconnected controls (it happens). Your PT-19 is a model of the full size flight training aircraft, which was a low powered, gentle and forgiving aircraft. Your model flies much like the full size aircraft it is modeled after. It performs in a very scale-like manner with the recommended engines. Do not expect it to fly like sport models you may have flown previously.

As you apply power on takeoff you will need to apply a slight amount of right rudder to compensate for engine torque and propeller "P" effect. The tail will rise almost immediately, indicating that the tail surfaces have gained effectiveness. Allow the model to continue to accelerate until it has reached flying speed. Use as much of the available runway as you can. Then, gently apply some up elevator. Your PT-19 should slowly lift from the runway. Continue straight ahead until you have accelerated to a safe flying speed. Your first turn will show that this model does indeed fly much like the full size trainer as the roll rate is intended for new pilots learning to fly.

## FLIGHT

The full size PT-19 was a trainer for Army Air Corps Pilots. It was designed to teach takeoffs, landings, turns, stalls, spins and gentle aerobatics. Being relatively low powered, it does not have a high rate of climb and has poor vertical performance. To gain airspeed for a loop it was necessary to dive for a brief period. Barrel rolls were slow, teaching roll coordination. If you fly your model in the same way you will be very pleased with it's performance.

## LANDING

Before attempting your first landing you should first try some slow flight and stalls to become familiar with the PT-19's slow speed characteristics. You will probably find the model slows down quicker and requires more power than you are used to. Expect to carry some power on final approach as the model will quickly loose speed with a nose high attitude. Remember that aircraft of the PT-19's era had limited low speed control effectiveness, especially for the ailerons. The rudder is very effective however. Continue to carry power and speed until you initiate the flare, then reduce power and allow the model to gently settle to the ground. If you must go around, add power and accelerate straight ahead. Do not attempt to climb or turn until you have accelerated to a save flying speed.

We hope you enjoy the realistic **looks and performance of your PT-19.**

*Here is a short list of terms and definitions so you'll know what they're talking about at the flying field.*

**Ailerons** -Hinged control surfaces located on the trailing edge of the wing, one on each side, which provide control of the airplane about the roll axis. The control direction is often confusing to first time modelers. For a right roll or turn, the right hand aileron is moved upward and the left hand aileron downward, and vice-versa for a left roll or turn.

**Angle of attack** -The angle that the wing penetrates the air. As the angle of attack increases so does lift and drag, up to a point.

**ARF -A prefabricated model - Almost Ready to Fly.**

**Buddy Box** -Two similar transmitters that are wired together with a "trainer cord." This is most useful when learning to fly—it's the same as having dual controls. The instructor can take control by using the "trainer switch" on his transmitter.

**CA** -Abbreviation for "Cyanoacrylate." An instant type glue that is available in various viscosities (Thin, Medium, Thick, and Gel). These glues are ideal for the assembly of wood airplanes and other materials.

**NOTE:** Most CA glues will attack styrofoam.

**Carburetor** -The part of the engine which controls the speed or throttle setting and lean/rich mixture via setting of the needle valve.

**CG** -"Center of Gravity"- For modeling purposes, this is usually considered the point at which the airplane balances fore to aft. This point is critical in regards to how the airplane reacts in the air. A tail-heavy plane will be very snappy but generally very unstable and susceptible to more frequent stalls. If the airplane is nose heavy, it will tend to track better and be less sensitive to control inputs, but will generally drop its nose when the throttle is reduced to idle. This makes the plane more difficult to land since it takes more effort to hold the nose up. A nose heavy airplane will have to come in faster to land safely.

**Charge Jack** -The plug receptacle of the switch harness into which the charger is plugged to charge the airborne battery. An expanded scale voltmeter (ESV) can also be plugged into it to check battery voltage between flights. It is advisable to mount the charge jack in an accessible area of the fuselage so an ESV can be used without removing the wing.

**Charger** -Device used to recharge batteries and usually supplied with the radio if NiCd batteries are included.

**Chicken Stick** -A hand-held stick used to flip start a model airplane engine.

**Clunk** -A weighted fuel pick-up used in a fuel tank to assure the intake line is always in fuel.

**Dead Stick** -A term used to describe unpowered flight (glide) when the engine quits running.

**Dihedral** -The V-shaped bend in the wing. Typically, more dihedral causes more aerodynamic stability in an airplane, and causes the rudder to control both the roll and yaw axis. This is why some trainers and sailplanes require only 3 channels of radio control.

**Ding** -Minor dent or damage to the structure. Also, a nick in a prop. Dinged props must be replaced.

**Down thrust** -Downward angle of the engine relative to the centerline of the airplane. Down thrust helps overcome the normal climbing tendency of flat bottom wings.

**Electric Starter** -A hand-held electric motor used for starting a model airplane engine. Usually powered by a 12-volt battery.

**Elevator** -Hinged control surface located at the trailing edge of the horizontal stabilizer, which provides control of the airplane about the pitch axis and causes the airplane to climb or dive. The correct direction of control is to pull the transmitter elevator control stick back, toward the bottom of the transmitter, to move the elevator upward, which causes the airplane to climb, and vice versa to dive.

**Epoxy** -A two-part resin/hardener glue that is extremely strong. It is generally available in 6 and 30-minute formulas. Used for critical points in the aircraft where high strength is necessary.

**Expanded Scale Voltmeter (ESV)** -Device used to read the battery voltage of the on-board battery pack or transmitter battery pack.

**Field charger** -A fast battery charger designed to work from a 12-volt power source, such as a car battery.

**Flaps** -Hinged control surface located at the trailing edge of the wing inboard of the ailerons. The flaps are lowered to produce more aerodynamic lift from the wing, allowing a slower takeoff and landing speed. Flaps are often found on scale models, but usually not on basic trainers.

**Flare** -The point during the landing approach in which the pilot gives an increased amount of up elevator to smooth the touchdown of the airplane.

**Flight Box** -A special box used to hold and transport all equipment used at the flying field.

**Flight Pack** -or Airborne pack - All of the radio equipment installed in the airplane, i.e., Receiver, Servos, Battery, Switch harness.

**Flutter** -A phenomenon whereby the elevator rudder, or aileron control surface begins to oscillate violently in flight. This can sometimes cause the surface to break away from the aircraft and cause a crash. There are many reasons for this, but the most common are excessive hinge gap or excessive "slop" in the pushrod connections and control horns. If you ever hear a low-pitched buzzing sound, reduce throttle and land immediately.

**Fuel Pick-Up Line** -The fuel line in the fuel tank through which fuel travels to the carburetor. Typically a flexible tube with a weight or "Clunk" on the end which allows it to follow the fuel with changes in aircraft attitude. This is the line through which the tank is filled.

**Fuselage** -The body of an airplane.

**Glow Plug** -The heat source for igniting the fuel/air mixture in the engine. When starting the engine a battery is used to heat the filament. After the engine is running, the battery can be removed. The wire filament inside the plug is kept hot by the "explosions" in the engine's cylinder.

**Glow Plug Clip/Battery** -A 1.2-volt battery, which is connected to the glow plug on a model airplane engine for starting. The battery is removed once the engine is running steadily.

**Hit (or to be hit)** -Sudden radio interference which causes your model to fly in an erratic manner. Most often caused by someone turning on a radio that is on your frequency, but can be caused by other radio sources miles away.

**Horizontal Stabilizer** -The horizontal tail surface at the back of the fuselage which provides aerodynamic pitch stability to the airplane.

**Lateral Balance** -The left-right or side-to-side balance of an airplane. An airplane that is laterally balanced will track better through loops and other maneuvers.

**Leading Edge (LE)** -The very front edge of the wing or stabilizer. This is the edge that hits the air first.

**Muffler** -A device attached to the exhaust stack of the engine to reduce noise and increase back-pressure which helps low speed performance.

**Note:** Most R/C Clubs require the use of mufflers.

**Needle Valve** -Adjustment on a carburetor used to set proper fuel/air mixture. Some carburetors have separate needle adjustments for low and high throttle. Typically, turning the needle clockwise (screwing in) leans the mixture (less fuel), and vice versa. However, there are a few exceptions—refer to the engine manufacturer's instructions.

**NiCd** -Nickel Cadmium battery. Rechargeable batteries which are typically used as power for radio transmitters and receivers.

**Nitro** -Nitromethane, a fuel additive which increases a model engine's ability to idle low and improves high speed performance. Ideal nitro content varies from engine to engine. Refer to the engine manufacturer's instructions for best results. Nitro content in fuel is indicated by the percent of the fuel.

**Ni-starter** -A self-contained battery and glow plug clip, used when starting the engine.  
See "*glow plug clip*."

**Power panel** -12-volt distribution panel that provides correct voltage for accessories like glow-plug clips, fuel pumps and electric starters. Usually mounted on a field box and connected to a 12-volt battery.

**Prop** pitch -Props are designated by two numbers, for instance 10 - 6. The first number is the prop's length, 10". The second number is the pitch or angle of the blades. The 6 represents the distance the propeller will move forward in one revolution, in this case 6".

**Receiver** (Rx) -The radio unit in the airplane which receives the transmitter signal and relays the control to the servos. This is somewhat similar to the radio you may have in your family automobile, except the radio in the airplane perceives commands from the transmitter, while the radio in your car perceives music from the radio station.

**Rudder** -Hinged control surface located at the trailing edge of the vertical stabilizer, which provides control of the airplane about the Yaw axis and causes the airplane to Yaw left or right. Left rudder movement causes the airplane to Yaw left, and right rudder movement causes it to Yaw right.

**Servo** -The electro-mechanical device which moves the control surfaces or throttle of the airplane according to commands from the receiver. The radio device which does the physical work inside the airplane.

**Slop** -Unwanted, excessive free movement in a control system. Often caused by a hole in a servo arm or control horn that is too big for the pushrod wire or clevis pin. This condition allows the control surface to move without transmitter stick movement.  
A/so, see "*flutter*."

**Solo** -Your first totally unassisted flight that results in a *controlled* landing.

**Spinner** -The nose cone which covers the hub or the propeller.

**Sport Airplane** -A model which possesses some attributes of many of the specialty airplanes and are best for general flying as they are the most versatile and durable.

**Stall** -What happens when the angle of attack is too great to generate lift regardless of airspeed. (Every airfoil has an angle of attack at which it generates maximum lift — the airfoil will stall beyond this angle).

**Trainer Airplane** -A model designed to be inherently stable and fly at low speeds, to give first-time modelers time to think and react as they learn to fly.

**Trailing Edge** (TE) -The rearmost edge of the wing or stabilizer.

**Transmitter** (Tx) -The hand-held radio controller. This is the unit that sends out the commands that you input.

**Vertical Fin** -The non-moving surface that is perpendicular to the horizontal stabilizer and provides yaw stability. This is the surface to which the rudder attaches.

**Wheel Collar** -A small, round retaining device used to keep a wheel from sliding off an axle.

**Z-Bend** -A simple Z-shaped bend in the wire end of a pushrod, which is used to attach the pushrod to a servo output arm.