PT-60™

the perfect trainer

INSTRUCTION MANUAL

WARRANTY

Great Planes Model Manufacturing Co. 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 Great Planes' liability exceed the original cost of the purchased kit.** Further, Great Planes reserves the right to change or modify this warranty without notice.

In that Great Planes 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 buyers are not prepared to accept the liability associated with the use of this product, they are advised to return this kit immediately in new and unused condition to the place of purchase.

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

GREAT PLANES® MODEL MANUFACTURING COMPANY

P.O. Box 788 UrbanaJL 61801 (217) 398-8970

PT60P03 2/95 V.1

TABLE OF CONTENTS

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

Your PT-60 is not a toy, but rather a sophisticated, working model that functions very much like an actual airplane.

Because of its realistic performance, the PT-60, if not assembled and operated correctly, could possibly cause injury to yourself or spectators and damage property.

To make your R/C modeling experience totally enjoyable, we recommend that you get experienced, knowledgeable help with assembly and during your first flights. You'll learn faster and avoid risking your model before you're truly ready to solo. Your local hobby shop has information about flying clubs in your area whose membership includes qualified instructors.

You can also contact the national Academy of Model Aeronautics (AMA), which has more than 2,300 chartered clubs across the country. Through any one of them, instructor training programs and insured newcomer training are available.

Contact the AMA at the address or toll-free phone number below.

AMA SINCE 1936

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN 47302-9252
(800) 435-9262
(317)287-1256

INTRODUCTION

Thank you for purchasing the Great Planes PT-60, the Perfect Trainer, for possibly your first step into the exciting world of R/C flying. We are sure that you will find a great deal of modeling satisfaction while building and flying this new version of the classic trainer that has helped tens of thousands of newcomers to successfully get off the ground and into the sky.

The PT family of trainers has been around since 1986. As just about any old pro will tell you, no other trainer model offers so many of the important features most needed by a novice. While R/C flying can be learned by practically anyone, it does require a fair amount of eye-hand coordination-a skill that can only be learned by quality "stick time." This is where the PTs shine. They are all designed to be rugged, stable, self-recovering and able to fly slowly enough to allow you time to think about your next maneuver.

For your tricky first flights, altitude is your friend. Our newest member of the family, the PT-60, has a relatively large 71" wingspan so it is easy to see, even when flying a few hundred feet above the ground. Once a PT has been trimmed for straight and level flight (hopefully by an experienced pilot) you will be able to get out of most bad situations by simply letting go of the sticks on your transmitter. The PT will normally level its own wings and resume stable flight within 50-100 feet. This feature alone has helped many student pilots master the basics in the shortest possible time.

The PT-60 is designed for either 3 or 4 channel operation By this we mean that you can start with just rudder, elevator and throttle control, then add a fourth servo for the ailerons when you want to refine your skills The ailerons are designed to be locked in the neutral position after the wing is assembled, but can be activated with only a few minutes of work and an additional servo We recommend the three channel setup for beginners Due to the dihedral (upward angle of the wing) built into the wing and generous rudder size, the turn and bank response is almost identical to using ailerons When you are ready to move up to advanced maneuvers such as crosswind landings and basic aerobatics, you will need to hook up the ailerons

If you are already an experienced pilot who is just looking for a sport model for those lazy summer afternoons, we provide the necessary information to build the wing with less dihedral and less washout to allow more responsive flight characteristics

Due to its rugged construction and light wing loading, the PT-60 can be powered by a wide range of engines We flew our prototype with several engines, from a high performance 61 two-stroke to a 48 four-stroke Every engine we tried exhibited exceptionally fine performance for a trainer.

We have written this instruction manual with the novice in mind and have tried to include enough information, expert tips and practical suggestions to help get you on the right track (or should we say runway) from the start Our goal is for you to experience the fun and satisfaction that thousands of modelers the world over enjoy, without the mistakes that have spoiled the hobby for some

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 and 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 calling.

DECISIONS YOU MUST MAKE

Engine selection

There are several engines that will work well in the PT-60. We recommend an O.S.® brand .46SF to .60FP or a SuperTigre™ GS-45 or S-61K 2-stroke engine. In the 4-stroke category, try an O.S. .48 or .70 Surpass. Your choice of 2-stroke or 4-stroke engine will determine the location of the throttle servo and pushrod exit, so plan ahead.*

The engines at the high end of the scale will allow you to use the same engine in other large or high performance models once you have mastered the basics, without having to purchase a new one.

*You may ask "what is the best engine?" We'd have to say that the O.S. .60FP is the perfect match for this airplane.

Wing configuration

As mentioned in the introduction, we provide instructions for modifying the wing to allow for more sporty flight characteristics. But, if this is **your first trainer** or you are still learning to fly, we strongly urge you to **build the standard trainer version** without modification.

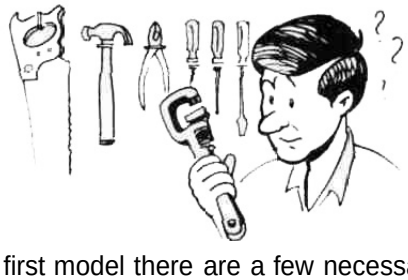
Bolts or **rubber bands** can be used to attach the wing to the fuselage, and we furnish the hardware for both in the kit. If this is your first kit we recommend that you choose the rubber band method. **Rubber bands offer *two advantages*** over bolts–first, the model is easier to build, and second (this is the important one), they allow the wing to move if you hit a wing tip (or obstacle) on takeoff or landing. Bolts are less forgiving in this respect, and even a minor whack can cause enough damage to send the PT back to the shop for repairs.

PREPARATIONS

Other Items Required

- D 4 Channel radio with 3 or 4 servos
- D Engine 45 - 61 2-stroke
  48 - 70 4-stroke
- D Propeller (Top Flite Power Point") Refer to your engine's instructions for proper size
- D 12 oz Fuel tank (Great Planes GPMQ4105)
- D 12" Medium fuel tubing (Great Planes GPMQ4131)
- D (2) 3" Wheels - mains (Great Planes GPMQ4225)
- D (1) 2-3/4" Wheel - nose (Great Planes GPMQ4224)
- D (6) 3/16" Wheel collars (Great Planes GPMQ4308)
- D 2-3/4" Spinner (Great Planes GPMQ4525)
- D (3) Rolls covering film (Top Flite MonoKote)
- D 1/2" Latex foam rubber padding (Hobbico® HCAQ1050)
- D 1/16" Foam wing seating tape (Great Planes GPMQ4422)
- D #64 Rubber bands - for optional wing mounting (Hobbico HCAQ2020)

Setting Up Shop

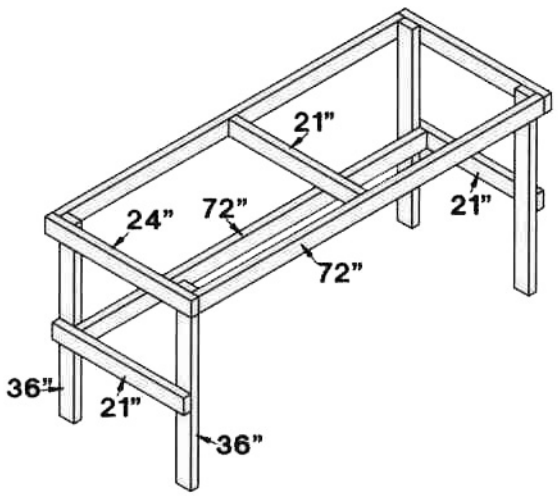


If this is your first model there are a few necessary supplies and tools that you should gather before going any further The single most important item that is required for any modeling project is a **flat** work surface No, the kitchen table is not a good idea This is closely followed by a space

where you can work, leave stuff out, make a mess, spill glue and paint without worry, and has adequate ventilation. Hey, the garage sounds like a good place!

A workbench can be as simple as a solid flat table or a bench made from some two-by-fours and a solid core door. Hollow core interior doors work fine, but the cheaper ones are prone to warping.

Here is a suggested approach for building an inexpensive workbench. You will need (7) 6' two-by-fours of good quality pine or fir, a 30" x 82" door, some 16d nails, a hand saw and a hammer.



WORKBENCH FRAME

Assemble the workbench as follows:

1) Cut one 2 x 4 into three sections, two 24" long and one 21" long.
2) Nail the 24" pieces to the two ends of two straight **6'** pieces to make the frame for the top. Nail the 21" piece in between the two 6' pieces across the center of the frame.
3) Cut two two-by-fours in half to make four 36" legs. Nail (or bolt) the four legs to the frame with the 2" side facing the long sides of the frame.
4) Cut two 21" side rails from one of the remaining boards. Nail the two boards to the sides of each pair of legs.
5) Nail the last 6' board to the front side of the back legs, level with the two side pieces. (1 x 3 Cross braces may be nailed to the back legs for more rigidity.)
6) Center the door on the frame and either glue or use double-sided, foam back sticky tape to hold it in position.

You will need to cover your work surface with something you can push pins into. The back side of a 2' x 4' sheet of ceiling tile makes a great building surface, or if you want to cover a larger area you can buy a 4' x 8' sheet of Celotex® insulation board from your local building supply store.

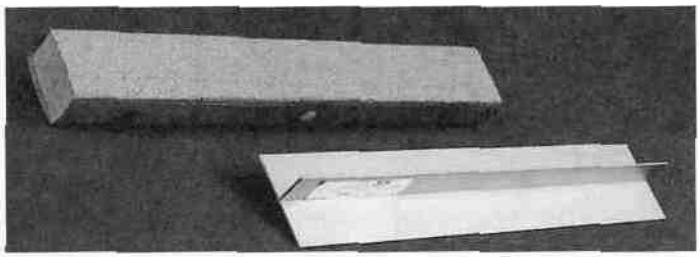
Most of the tools listed below can probably be found around the house. A few items like a razor saw, hobby knife, sealing iron, heat gun, and glues can be purchased from your local hobby dealer. As you get more involved with the hobby you will probably want to add a few power tools such as a Dremel® Moto-tool®, belt sander and a scroll saw, but in the case of the PT-60 everything you need is listed below.

Suggested Supplies and Tools

We recommended Great Planes **Pro™** CA and Epoxy.

- **D 2 oz. CA** adhesive-Thin (Great Planes GPMR6003)
- D 2 oz. CA+ adhesive-Medium (Great Planes GPMR6009)
- D 1 oz. CA- adhesive-Thick (Great Planes GPMR6014)
- D 6-Minute Epoxy (Great Planes GPMR6045)
- D 30-Minute Epoxy (Great Planes GPMR6047)
- D Epoxy brushes (Great Planes GPMR8060)
- D Epoxy mixing Sticks (Great Planes GPMR8055)
- D CA Applicator tips (Hobbico HCAR3780)
- D Hand or electric drill
- D Drill Bits: 1/16", 5/64", 3/32", 1/8", 5/32", 3/16", 13/64", 1/4", 17/64", 5/16"
- D Sealing iron (Top Flite)
- D Heat gun (Top Flite)
- D Hobby saw (X-acto® Razor Saw)
- D Hobby knife, #11 Blades
- D Pliers
- D Wire cutters
- D Screwdrivers (Phillips and flat blade)
- D Round file (or similar)
- D T-Pins
- D String
- D Straightedge with scale
- D Masking tape (required for construction)
- D Sandpaper (coarse, medium, fine grit)
- D T-Bar sanding block (or similar)
- D Waxed paper
- D Lightweight Balsa Filler such as Hobbico HobbyLite™
- D Isopropyl rubbing alcohol (70%)
- D Drafting triangle or carpenters square
- D Dremel Moto-Tool® or similar (optional)

On our workbench, we have four 11" T-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 handy for finish sanding before covering.



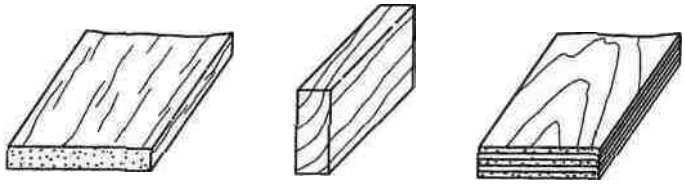
T-Bar sanding tools are made from light-weight extruded aluminum and can be found at most hobby shops. A 2" x 11" strip of sandpaper is attached to the T-Bar by gluing it on with rubber cement. Apply the rubber cement to both the bottom of the T-Bar and the back of the sandpaper. When both surfaces are dry, press the sandpaper firmly onto the T-Bar. Spray adhesive can be used for this purpose but it's harder to remove the sandpaper when you need to replace it.

Wooden sanding blocks can be made from 11" lengths of 1" x 2" scrap lumber. Start on one side, then wrap a sheet of sandpaper completely around the wood, ending on the same side as the one you started on. Push 3 or 4 thumbtacks into this edge, then trim off the excess material.

Common Abbreviations Used In this Manual and on the Plans

Fuse = Fuselage
Stab = Horizontal stabilizer
Fin = Vertical fin
LE = Leading edge (front)
TE = Trailing edge (rear)
LG = Landing gear
Ply = Plywood
" = Inches

Types of Wood



Balsa **Basswood** **Plywood**

The What and How of Adhesives

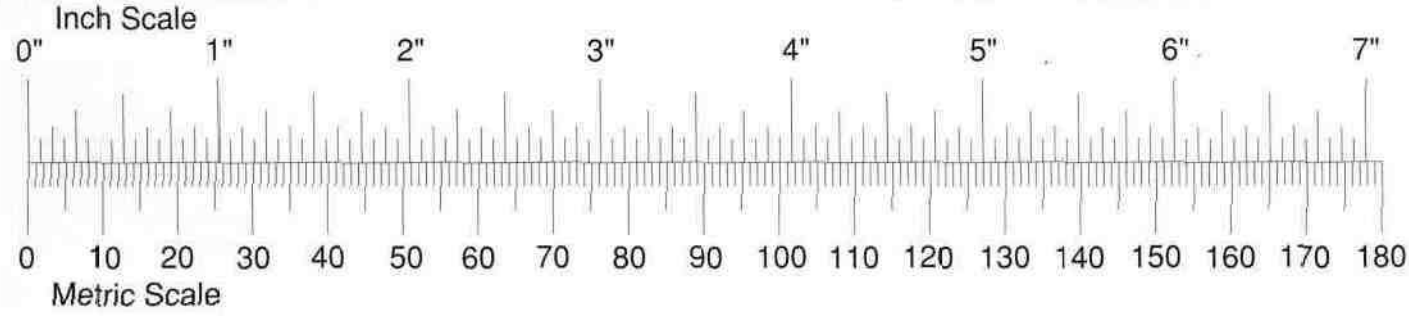
Cyanoacrylate or CA glue has changed the way models are built more than any other advance in modeling technology. In the good ol' days, model cement like Ambroid, Duco, Comet, and Sigment were the glues of choice. They all had a strong odor that could cause dizziness, dried slowly (compared to CA) and became brittle with age. CA, on the other hand, is stronger, works almost instantly, and is bottled in three different viscosities (thicknesses). CA is used for most glue joints, except where epoxy is specified. CA does emit rather strong fumes (some say it's like tear gas) as it cures, so rule number one is **to work in a well ventilated area. All CA glues work best if the joints are smooth and fit well.**

Thin CA is also known simply as **CA.** This is the instant variety, used for most initial assembly and tack gluing. Thin CA is usually "wicked" into a tightly fitting joint by putting a few drops on the seam, then holding the parts together while the CA penetrates and bonds the parts. When gluing plywood or hardwood, a mist of accelerator (see next page) will help the CA work a little better.

CA+ is also known as **medium** or **gap filling** CA. **CA+** is used for surface gluing, filling small gaps between poorly matched parts, and for general purpose applications. It cures slower than thin CA, allowing you to apply a bead to two or three parts before assembly. Curing time without accelerator is 20-30 seconds.

CA- or **thick** CA is used when extra positioning time is needed. CA- is a great gap filler and is also used to make fillets when a little extra strength is required. Curing time is about 1-2 minutes.

Metric Conversions



Accelerator is a liquid chemical that comes in a spray bottle for use in speeding up the cure time of all CA types. It should be misted on, not sprayed heavily on the joint. Accelerator may cause exposed CA to bubble and sometimes change color. A drawback to accelerator is that the CA cures before it has time to fully penetrate the wood, so it should only be used sparingly-when absolutely necessary.

A word about CA safety!
After applying CA, don't stand directly over the work, to avoid the puff of vapors. All CA glues will bond skin almost immediately. If this should happen, CA Debonder (available from your hobby dealer) or acetone fingernail polish remover will dissolve the CA if allowed to soak into the bond for a few minutes. Don't use vigorous means to separate a skin bond. **Never, Never** point the CA applicator tip toward your face! Be especially careful when opening a clogged tip. In case of eye contact, flush thoroughly with water then seek medical attention, **but don't panic. Please, keep CA (and all other modeling chemicals) out of the reach of children!**

Epoxy
Great Planes has two Epoxy formulations available for the modeler. Both offer exceptional strength and convenient working times. Use epoxy when the joint requires exceptional strength, such as when installing the firewall, when joining the wing panels, and when installing wing hold-down blocks. As with most epoxies, you mix equal parts of resin and hardener, stir well, then apply a thin film to each part. Parts should be clamped, pinned, taped or weighted in place until fully cured. Before the epoxy cures, clean off any excess with a paper towel. A word of caution about mixing epoxy-don't **use extra hardener** in the hopes of making the mixture harder or work faster. Just about all epoxies work best with **exactly** a 50/50 mix. When you increase the amount of hardener you run the risk of causing the cured epoxy to become either brittle or rubbery-neither being as strong as a properly mixed batch.

6-Minute epoxy is used for simple, small gluing applications-where elaborate alignment is not required. Working time (before it's too gooey to use) is about 5 minutes, handling time 15 minutes and it's fully cured in about 1 hour.

30-minute epoxy is used for extra strength (because it can penetrate longer) and where several parts must be aligned and checked before it cures. Working time is about 25 minutes, handling time 2 hours, and it's fully cured in 8 hours.

Great Planes Pro Wood Glue is an Aliphatic resin glue that works well on all types of wood. It is non-toxic, virtually odorless, and dries clear. Some people are sensitive to the fumes and sanding dust caused by CA, so this is a good alternative for general modeling use. Its only drawback is that it is slow to cure, requiring the parts to be securely clamped, pinned or taped while the glue dries.

Okay, you've got your work space ready, your tools are at hand, and you know how to choose and use the right glue for the job. Let's get started!

Get Ready to Build

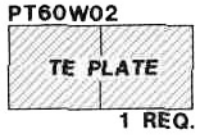
D 1. Unroll the plan sheets. Reroll the plans inside out to make them lie flat.

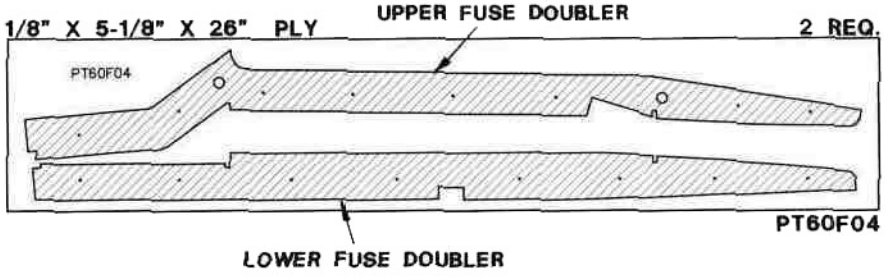
D 2. Remove all parts from the box. As you do, figure out the name of each part by comparing it with the plans and the parts list included with this kit. Using a felt tip or ball point pen, lightly write the part name or size on each piece to avoid confusion later. Use the die-cut patterns shown on pages 7 and 8 to identify the die-cut parts and mark them before removing them from the sheet. Save all scraps. If any of the die-cut parts are difficult to punch out, do not force them! Instead, cut around the parts with a hobby knife. After punching out the die-cut parts, use your T-Bar or sanding block to lightly sand the edges to remove any die-cutting irregularities.

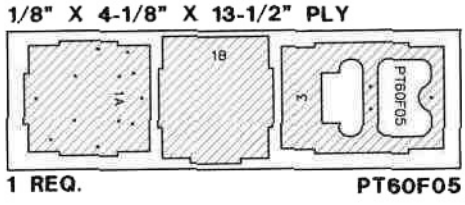
D 3. As you identify and mark the parts, separate them into groups, such as fuse (fuselage), wing, fin, stab (stabilizer) and hardware.

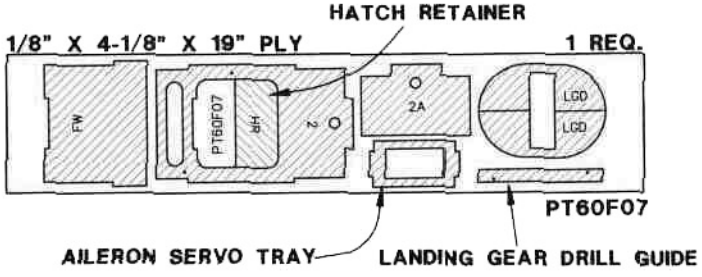
Zipper-top food storage bags are handy to store your parts as you sort, identify and separate them into sub-assemblies.

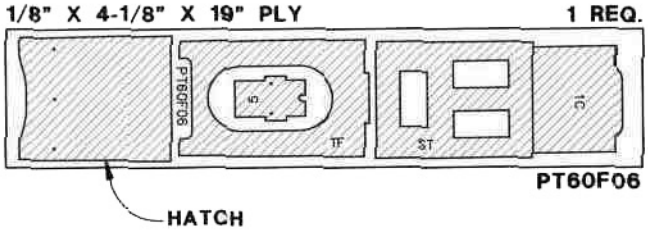
DIE-CUT PATTERNS

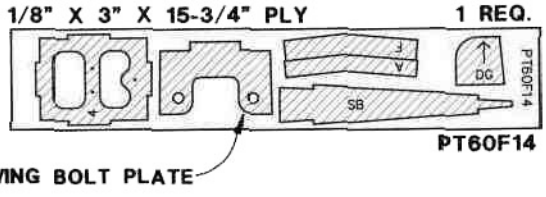


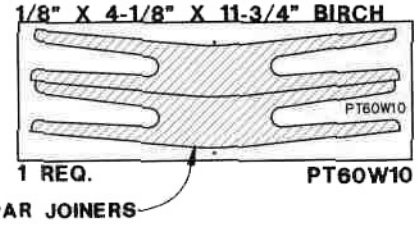


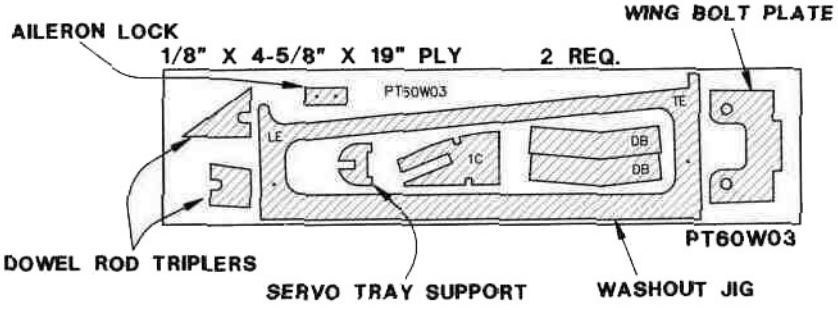


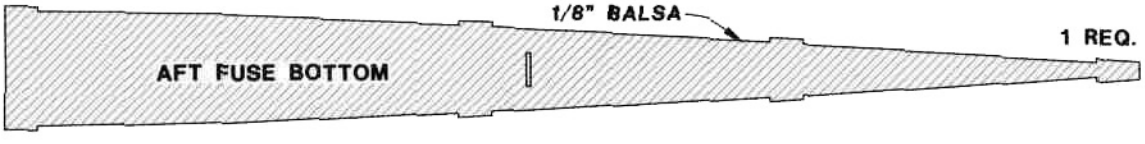






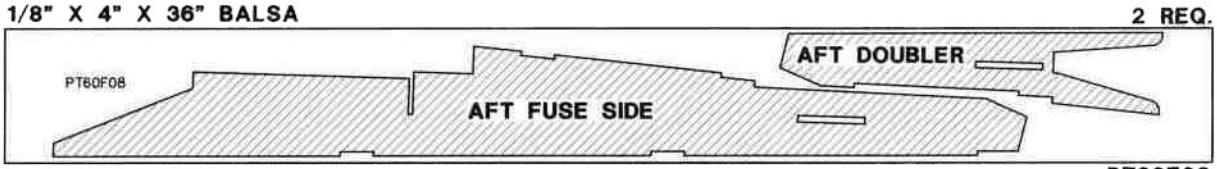






DIE-CUT PATTERNS

1/8" X 4" X 36" BALSA — 2 REQ.

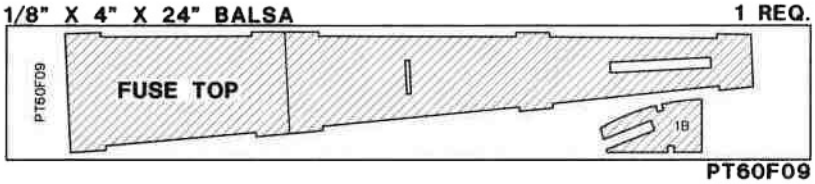


PT60F08

1/8" X 4" X 15" BALSA — 1 REQ.

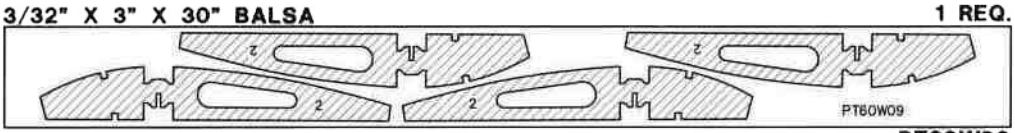
PT60F10

1/8" X 4" X 24" BALSA — 1 REQ.



PT60F09

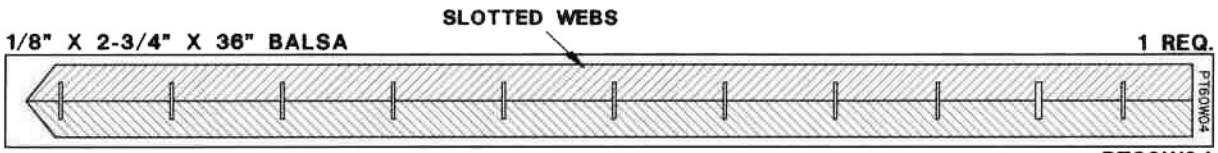
3/32" X 3" X 30" BALSA — 1 REQ.



PT60W09

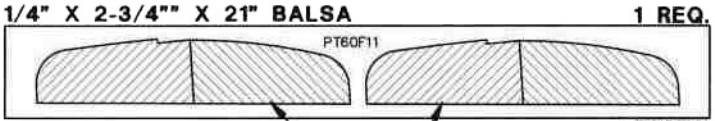
SLOTTED WEBS

1/8" X 2-3/4" X 36" BALSA — 1 REQ.



PT60W04

1/4" X 2-3/4"" X 21" BALSA — 1 REQ.

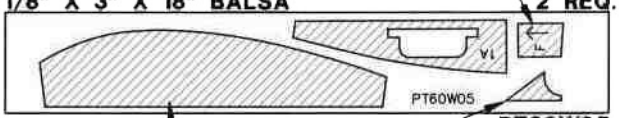


PT60F11

UPPER AND LOWER NOSE BLOCKS

FORWARD FILLER

1/8" X 3" X 18" BALSA — 2 REQ.

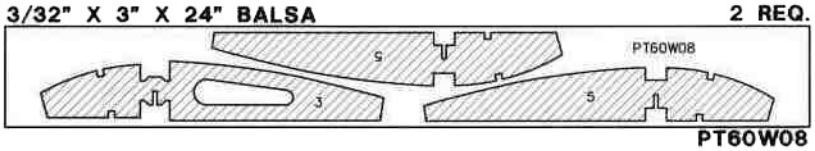


PT60W05

WING TIP

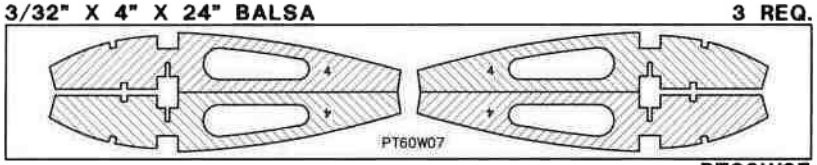
CABIN FILLER

3/32" X 3" X 24" BALSA — 2 REQ.



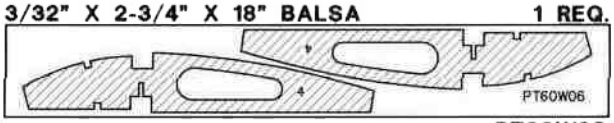
PT60W08

3/32" X 4" X 24" BALSA — 3 REQ.



PT60W07

3/32" X 2-3/4" X 18" BALSA — 1 REQ.

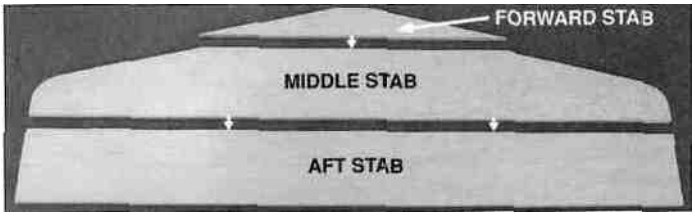


PT60W06

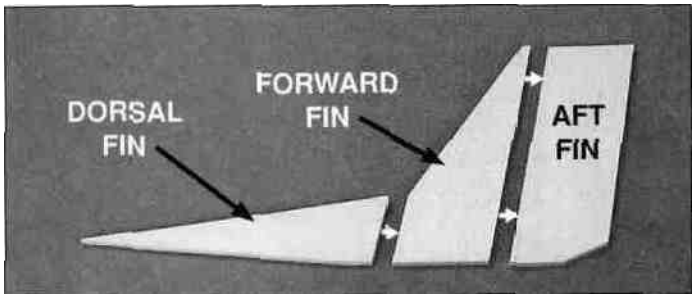
BUILD THE TAIL SURFACES

Build the Stabilizer and Fin

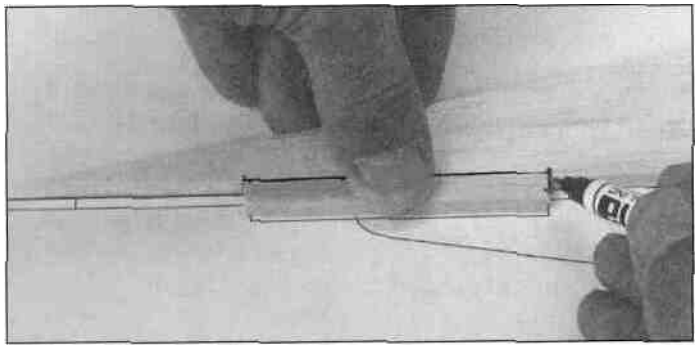
Work on a **flat** surface over the plans covered with waxed paper. Refer to the plans to identify the parts and their locations.



D 1. Locate the shaped 5/16" balsa **forward, middle and aft stab** parts. Check their fit and sand the mating edges as needed. Glue the three parts together by applying a light bead of medium CA to the edges, then press the parts together. Wipe off any excess from the surface before it cures.

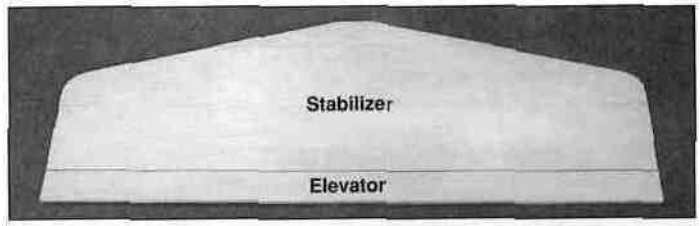


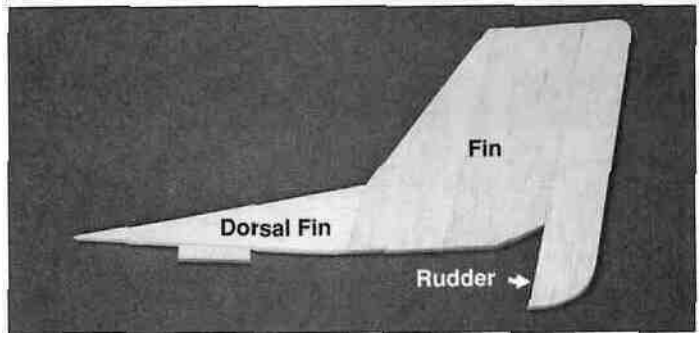
D 2. Locate the shaped 5/16" balsa **dorsal, forward and aft fin** parts. Check their fit and sand the mating edges as needed. Work over the plans (don't forget the waxed paper), then glue the three parts together with a thin bead of medium CA. Wipe off any excess from the surface before it cures.



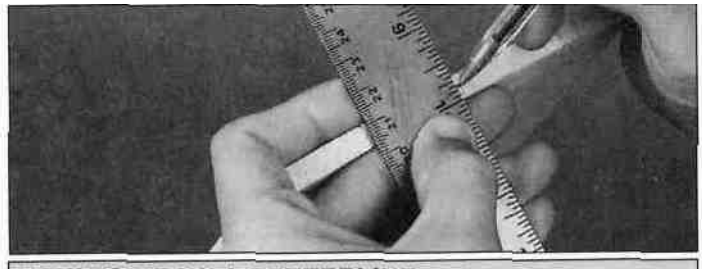
D 3. Position the 5/16" x 5/16" x 3" balsa **dorsal fin tab stick** over the plans under the dorsal fin, then mark its location on the **bottom edge** of the dorsal fin. Glue the tab to the dorsal fin with medium CA.

D 4. Sand the seams of the stab and fin smooth with sharp, 220-grit sandpaper and a sanding block.



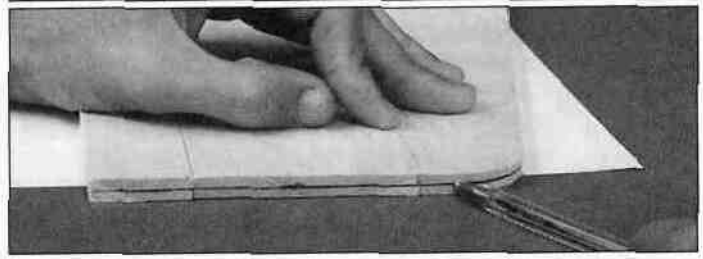


D 5. Temporarily join the 5/16" x 1-1/4" x 27" balsa **elevator** to the stab and the 5/16" shaped **rudder** to the fin with masking tape. Draw a centerline (see Expert Tip below) around the outside edges of both assemblies. Use a sanding block loaded with 150-grit sandpaper to round the perimeter edges of both assemblies to match the plans. **Do not** roundoff the bottom edge of the **fin.** Refer to the plans for the exact shape. The centerline will help you to keep the shape symmetrical.



HOW TO DRAW A CENTERLINE.

A. Measure and mark the **exact center** of the edge(s) that need a centerline. For example, if your wood is 5/16" thick, measure in 5/32" and mark the spot.

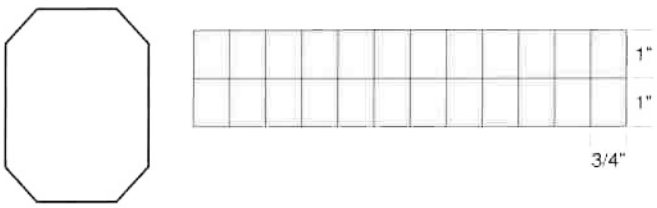


B. Place the part on a flat surface, then position a ball point pen (a Bic Stic works well for this trick) flat on the surface with the point at the location of the center mark. If the pen's point is above the mark, use a few sheets of

paper under the **part** to raise the mark to the same level as the pen's point. If the pen is too low, raise it with paper shims (or playing cards) to the right height.

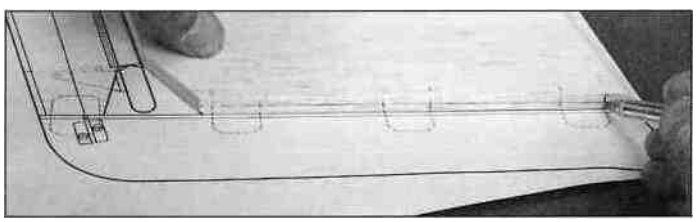
C. Now, depending on which is shimmed (the part or the pen), rotate the un-shimmed component around the perimeter to draw the line.

Hinge the Elevator and Rudder



D 6. With reference to the above sketch, cut 18 **hinges** from the supplied 2" x 9" composite hinge material and cut the corners as shown. You will need five hinges for the elevator and four for the rudder. Store the remaining hinges for use later during construction.

D 7. Separate the elevator and rudder from the stab and fin. Draw a centerline on the TE of the stab and the LE of the elevator. Do the same for the fin and rudder.

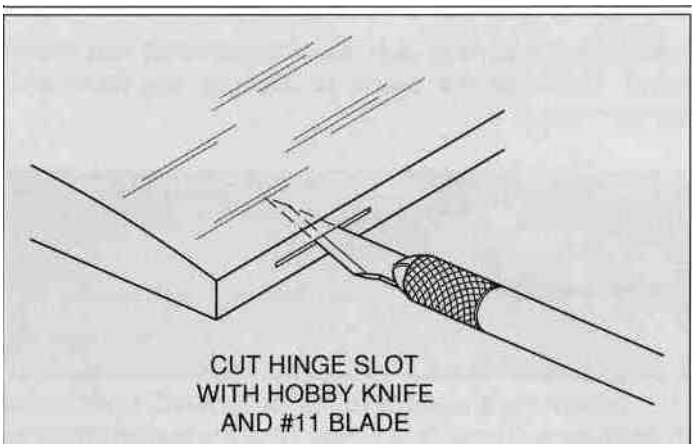


D 8. Use the plans as a guide to mark the locations of the hinges on all tail components-fin, rudder, stab, and elevator. Refer to the Expert Tip that follows, then cut matching hinge slits in all four parts.

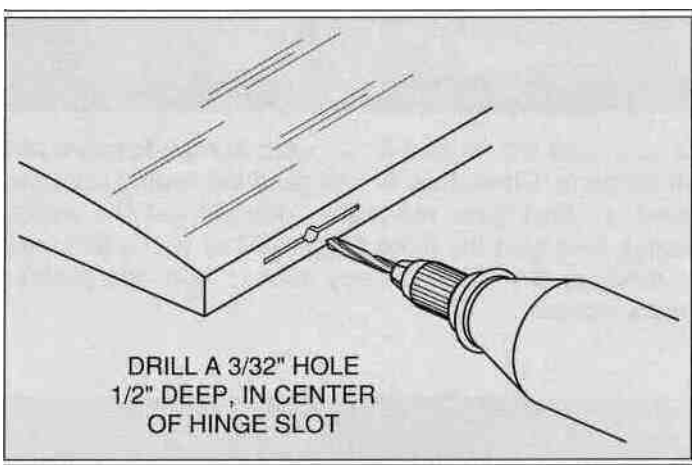
EXPERT TIP

The hinge material supplied in this kit consists of a 3-layer lamination of mylar and polyester. It is specially made for the purpose of hinging model airplane control surfaces. Properly installed, this type of hinge provides the best combination of strength, durability and ease of installation. We trust even our best show models to these hinges, but **it is essential to install them correctly.** Please read the following instructions and follow them carefully to obtain the best results. These instructions may be used to effectively install any of the various brands of CA hinges.

The most common mistake made by modelers when installing this type of hinge is not applying a sufficient amount of glue to fully secure the hinge over its entire surface area; or, the hinge slots are very tight, restricting the flow of CA to the back of the hinges. This results in hinges that are only "tack glued" approximately 1/8" to 1/4" into the hinge slots. The following technique has been developed to help ensure thorough and secure gluing.



A. Cut the hinge slot using a #11 blade in a standard #1 knife handle. Begin by carefully cutting a **very shallow slit** at the hinge location. This first cut is to establish your cut in the right place, so concentrate on staying on the centerline and **don't cut too deep!** Make three of four more cuts in the same line, **going slightly deeper each time.** As you make these additional cuts, work on going straight into the wood. Continue this process while **"wiggling"** the knife handle forward and backward until the blade has reached the proper depth for the hinge.

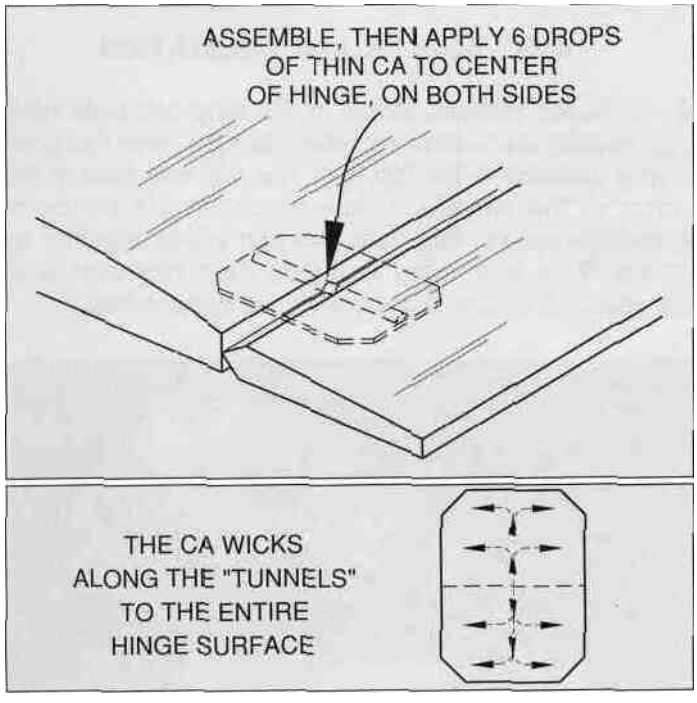


B. Drill a 3/32" hole, 1/2" deep, in the center of the hinge slot. If you use a Dremel Moto-Tool® for this task, it will result in a cleaner hole than if you use a slower speed power or hand drill. Drilling the hole will twist some of the wood fibers into the slot, making it difficult to insert the hinge, so you should reinsert the knife blade, working it back and forth a few times to clean out the slot.

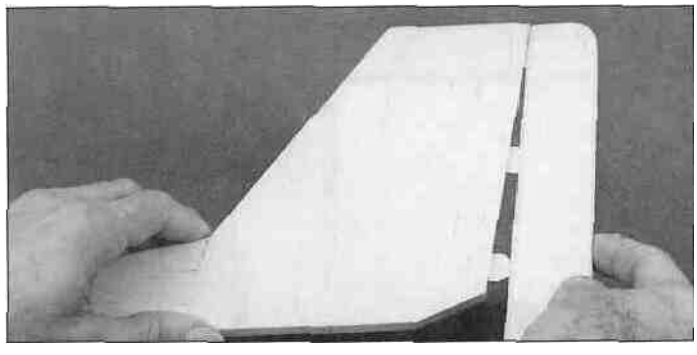
C. Trial fit the hinges into the slots and temporarily attach the control surface, to verify the fit and operation.

IMPORTANT: DO NOT GLUE THE HINGES IN PLACE UNTIL THE MODEL IS COVERED! YOU WILL BE INSTRUCTED WHEN TO GLUE THE HINGES.

D. Insert the hinges and install the control surface. Verify the left-right positioning of the control surface, and close up the hinge gap to 1/32" or less. It is best to leave a very slight hinge gap, rather than closing it up tight, to help prevent the CA from wicking along the hinge line. Make sure the control surface will deflect to the recommended throws without binding. If you have cut your hinge slots too deep, the hinges may slide in too far, leaving only a small portion of the hinge in the control surface. To avoid this, you may **insert a small pin** through the center of each hinge, before installing. This pin will keep the hinge centered while installing the control surface. Remove the pins before proceeding.



D 9. Sand the LE of the **elevator** and **rudder** to a "V" shape as shown on the plans, but leave the TE of the stab and fin squared off.

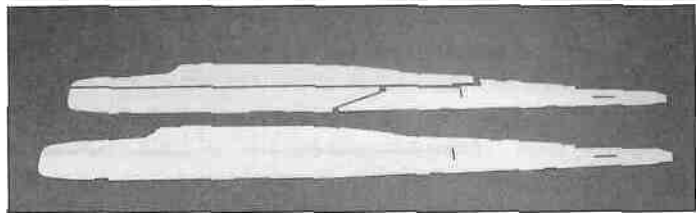


D 10. Test fit the elevator and rudder.

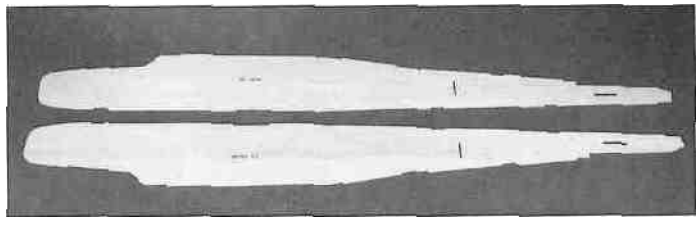
Congratulations! You made it through the first stage and should be proud of yourself. You should also have learned a few "tricks of the trade" as used by the guys that designed this kit. Remember, all us modelers are just "plane folks" and we like to help where we can...

BUILD THE FUSELAGE

Preparation

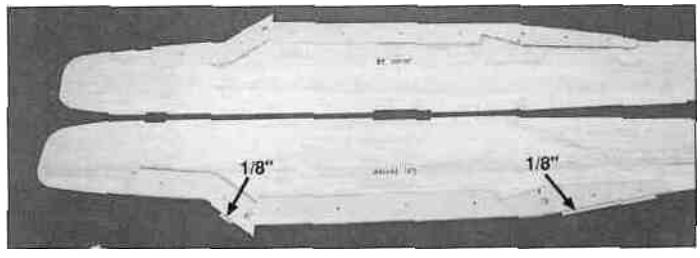


D 1. Lightly sand the edges of the three die-cut 1/8" balsa **fuse side** pieces. Test fit the **upper, lower** and **aft** sections as shown in the photo. When satisfied with the tit, make a fuse side using thin CA to glue the three parts together over waxed paper covered plans. Make a second fuse side in the same manner. Use fresh, 220-grit sandpaper on a sanding block to go over all joints to make sure they are smooth.

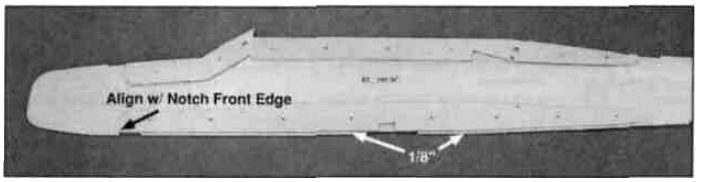


D 2. Examine the two fuse sides for blemishes, then position them on your workbench **exactly** as shown in the photo, with the "bad" sides facing up if possible. You need to build a **right and a left side** so be sure that the sides are mirrored as you look at them. Mark the inside surfaces with "right" and "left."

D 3. Lightly sand the edges of the die-cut 1/8" ply upper and lower **fuse doublers** (See the Die-Cut patterns on page 7.) Drill a 1/16" hole at each of the punch marks on all the fuse doubler parts. These holes allow CA to wick into the center portions of the doublers when you glue them to the fuse sides.

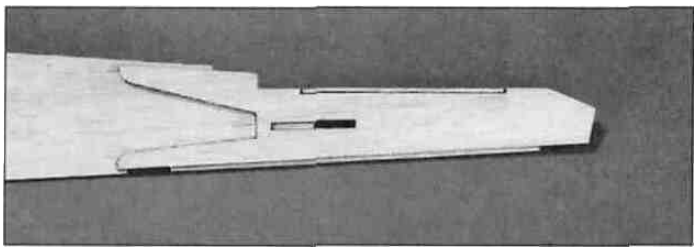


D 4. Align the **top edge of the top doubler** with the **top of the fuse side** at the wing saddle. Slide it back and forth until the front edge of the windshield and rear end are aligned as shown in the photo. **The balsa side behind the wing saddle protrudes above the doubler by 1/8".** Take your time as this is a crucial step in building a straight fuse. When the doubler is positioned, wick thin CA between the doubler and the fuse side, around all edges and also through the holes you drilled. While holding the doubler in position, wipe away any excess CA with a tissue or paper towel before it cures.



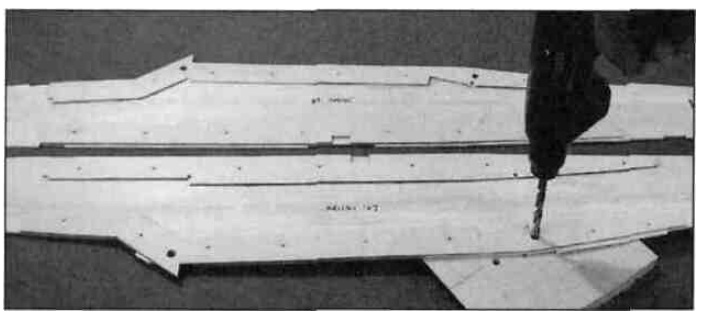
D 5. Align the **lower doubler** as shown, with the front edge even with the front edge of the bottom notch and the landing gear block notch flush with the "indented" location on the fuse side. **There should be 1/8" of balsa showing below the doubler when it's properly aligned.** Glue the lower doubler in position with thin CA the same way as the upper doubler.

D 6. Repeat steps 4 and 5 to glue the doublers to the second fuse side. **Be sure to build a right and a left side.** (See the photo at Step 8.)



D 7. Align the die-cut 1/8" balsa **aft fuse doubler** even with the rear end of the fuse. Position the doubler so that **1/8" of the side sheet protrudes along the bottom edge** and also at the location of the stab as shown, then glue it in position with thin CA. The pushrod exit slots are intentionally staggered to allow the pushrods to angle smoothly through the fuse. Repeat for the other side.

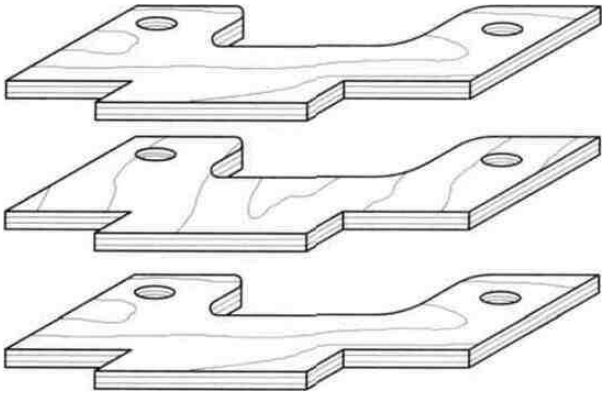
Skip step #8 if you will be using bolts to mount your wing.



LI 8. If you will be installing the dowels for rubber band wing attachment, you need to drill 5/16" holes through the fuse sides at each die-cut location in the upper doublers. Use a backup block of scrap wood under the fuse side **to** prevent splitting the balsa as the drill bit goes through.

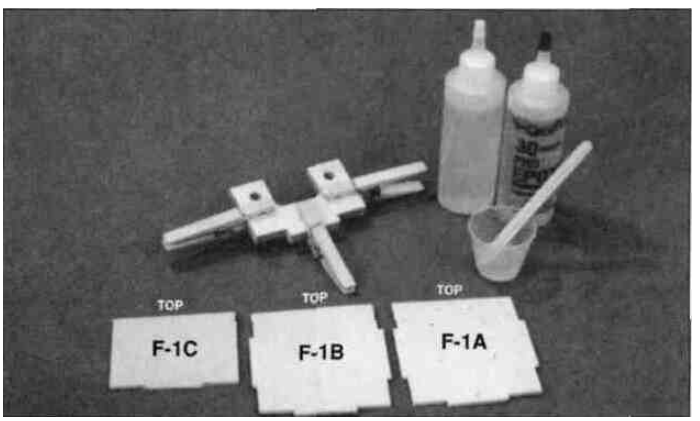
D 9. Locate the three die-cut 1/8" ply firewall parts **F-1A, F-1B** and **F-1C** and the three die-cut 1/8" ply **wing bolt plates.**

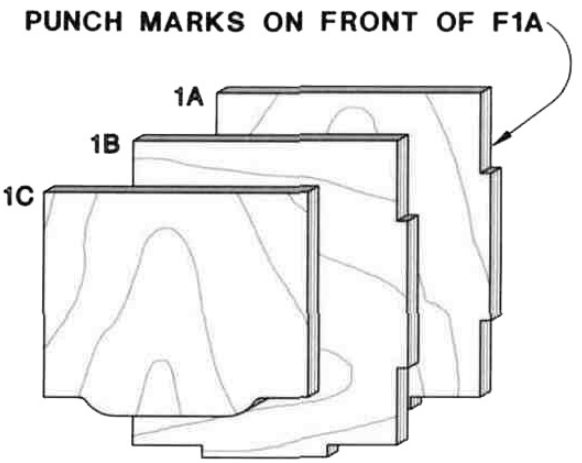
Note: you need the wing bolt plates for strength even if you will be using rubber bands to attach the wing.



WING BOLT PLATE LAMINATION

D 10. Notice that two pieces of the wing bolt plate have grain running in one direction while the third piece has grain running opposite to the first two. The odd one goes in the center of the sandwich. Mix up about 1/4 ounce of **30-minute epoxy,** then glue the bolt plates together as shown. This assembly must be held together with clothespins or weighted down while the epoxy cures.

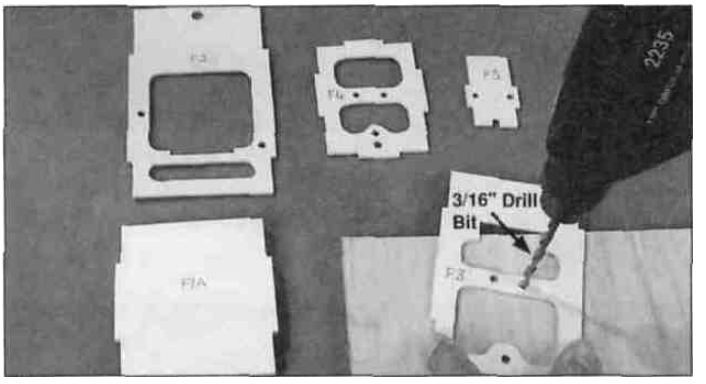




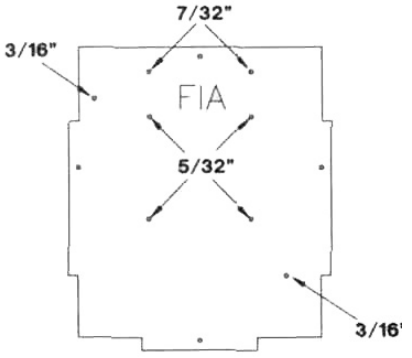
FIREWALL LAMINATIONS (VIEWED FROM THE REAR)

D 11. Use the remaining **30-minute epoxy** to glue F-1A, F-1B and F-1C together. Be sure that F-1A (the one with the punch marks) is on top of the stack with the punch marks facing outward, that the locking tabs are aligned and

that F-1C is flush with the top edge of the assembly (see sketch) This assembly must be held together with clothespins or weighted down while the epoxy cures



D 12 Now you need to get out your drill and a 3/16" drill bit to prepare the formers for pushrods Position each former over a piece of scrap wood, then drill a 3/16" hole through each of the punch marks in the die-cut 1/8" ply formers **F-2 through F-5. Do not drill** the F-1 assembly during this step



FIREWALL HOLE SIZES

The top and bottom 3/16" holes are for the standard 2-stroke engine installation These may have to switch sides if using a 4-stroke engine (See sketch at Step 2 on page 34)

D 13 Refer to the sketch, then drill 3/16" pushrod tube holes through the firewall where indicated Change your bit size to 7/32" (or better, 15/64") and drill the two fuel tube holes through the top of the firewall Finally drill four 5/32" holes in the firewall for the engine mount blind nuts

D 14 Insert a **6-32 blind nut** into one of the holes in the back of the firewall (F-1C) then tap it gently with a hammer to start it into the hole Now you can either squeeze the blind nut all the way into the firewall with a vise or finish seating it with your hammer Put a drop of thin CA on the outer edge of the flange to secure the blind nut in position Repeat this operation for the other three blind nuts.

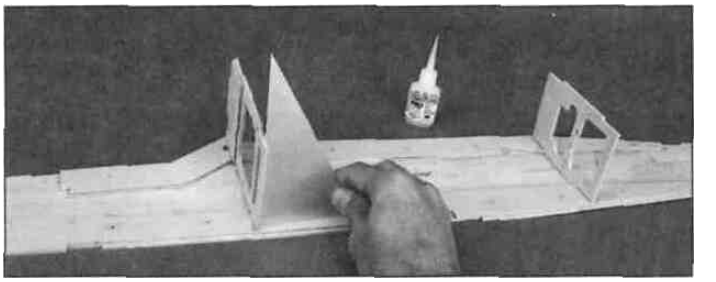
CONSTRUCTION NOTE:
Perform this step ONLY if you are building the bolt-on wing version.

D 15 Insert a 5/16" wing dowel through the hole at the top of F-2 Slide the die-cut 1/8" ply former F-2A onto the dowel from the front of F-2 (that's the side with the punched number) to check the fit Glue F-2A in position with medium CA but don't glue the dowel to the formers as it's only being used for alignment Carefully remove the dowel before the CA cures

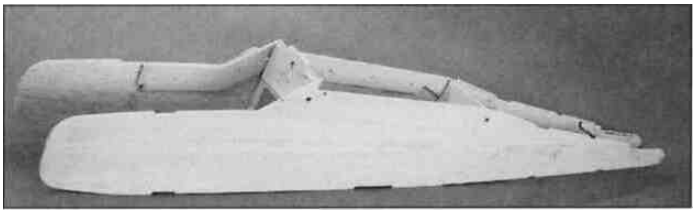
D 16 Examine your work Clean up any "fuzz" from around the holes you drilled and also the edges of the formers with a sanding block and 220-grit sandpaper

Assemble the Major Fuse Parts

IMPORTANT: Position all of the formers with the embossed numbers facing the front of the model

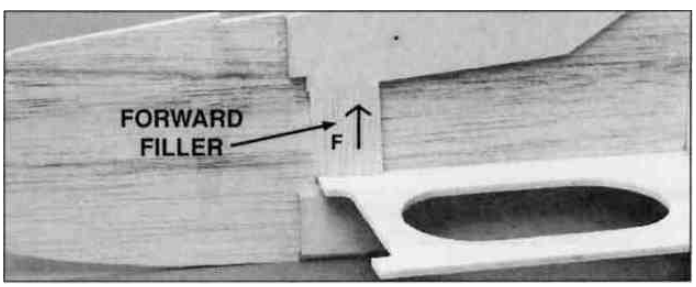


D 1 Test fit the die-cut 1/8" ply **F-2** and **F-3** formers in position on the **right fuse side** When you test fit the formers, be sure they line up with the bottom edge of the lower doubler If you will be **bolting** on your wing the **F-2A** former must face toward the front of the model If you will **not** be bolting on your wing, former F-2A is not needed Glue both parts to the fuse side as shown with medium CA Hold the parts vertical with a triangle or carpenter's square while the CA cures

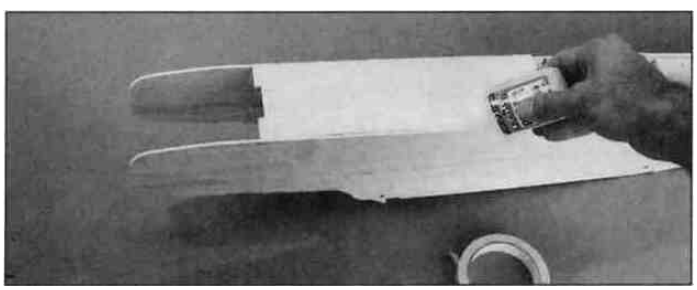


D 2. Glue the **left fuse side** to formers F-2 and F-3.

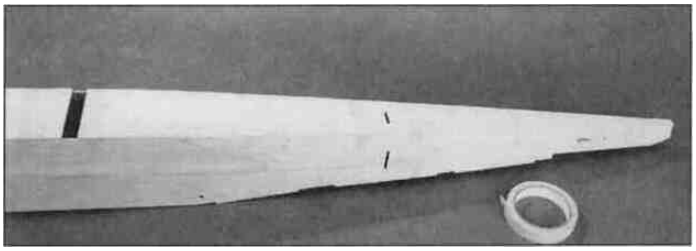
D 3. Insert the die-cut 1/8" ply **tank floor** between the fuse sides. The tab at the rear end should fit into the notch at the bottom of F-2 and the bottom of the tank floor should fit on top of the lower fuse doublers. Squeeze the fuse sides to the tank floor, then glue the tank floor in position with medium **CA.**



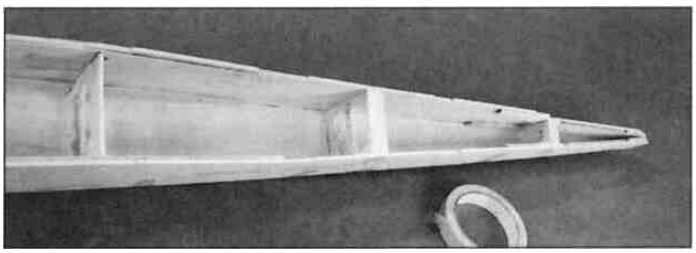
D 4. Fit the two die-cut 1/8" balsa **forward fillers** between the tank floor and top doublers. The front edge of the filler must be flush with the front edge of the tank floor and the back edge of the doubler notch.



D 5. Test fit the die-cut 1/8" balsa **front fuse bottom** into the notches and recess on the bottom of the fuse. When satisfied with the fit, wick thin CA along both outside edges. Turn the fuse over, then wick thin CA into the inside joints between the bottom and the formers. Follow with medium or thick CA in any open joints.



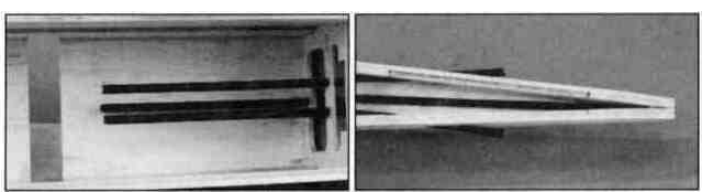
D 6. Test fit the die-cut 1/8" balsa **aft fuse bottom** between the fuse sides. Temporarily hold the bottom in position with a few strips of masking tape-do not glue yet!



D 7. Install the die-cut 1/8" ply formers F-4 and F-5 in the notches of the fuse sides and bottom. Be sure that the antenna tube hole is toward the bottom of the fuse. Use more masking tape to hold the formers **tightly** in position. When you are satisfied that everything **looks square and true,** place the fuse on a length (at least 36") of waxed paper, then wick thin CA into the joints (from the inside) between the fuse sides, bottom, and the formers. Press down on the framework as you do the gluing to hold the frame square.

D 8. Apply medium CA along all inside joints to permanently secure the framework.

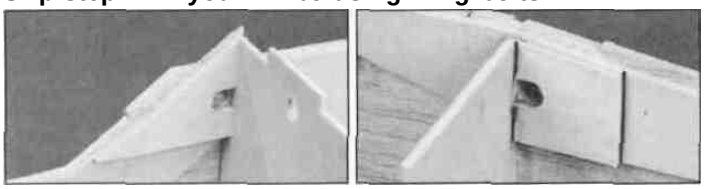
D 9. Cut one of the 36" plastic **outer pushrod tubes** to 32". This will be used for your **antenna tube.** Cut two more pushrod tubes to 30". These will be used to contain the elevator and rudder pushrods.



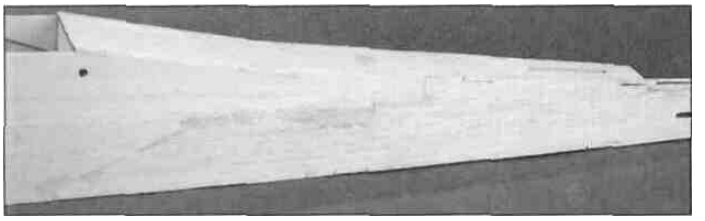
D 10. Lightly sand the outside of the pushrod tubes with 150-grit sandpaper to make them "receptive" to glue. Slide the **32" antenna tube** through the **bottom hole** in formers F-3,F-4 and F-5 all the way to the tail. Slide the other two pushrod tubes through the **upper holes** in the same formers and out through the exit slots at the rear of the fuse. These tubes should **protrude about 1/2"** past the rear end of the slots.

D 11. Use medium CA to glue the pushrod tubes to each former and the inside of the exit slots.

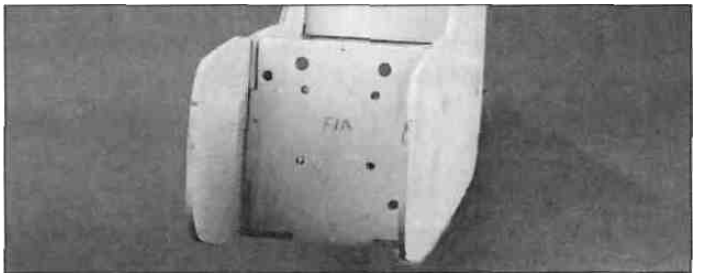
Skip step 12 if you will be using wing bolts!



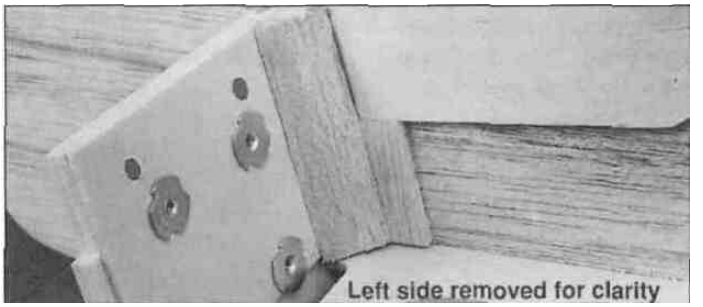
D 12. Glue the die-cut 1/8" ply **front** and **rear dowel triplers** in position with medium CA as shown in the photos and on the plans.



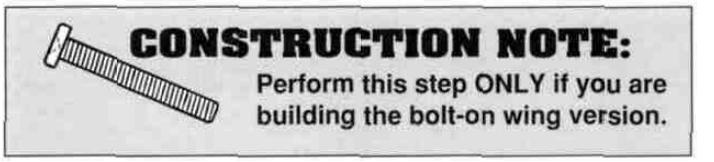
D 13. The die-cut 1/8" balsa **fuse top** has a partially die-cut score across the width at the wide end. If necessary deepen the score with a hobby knife. With the score facing up, align the score with the edge of your work table and then **gently "crack"** the wood along the line. **Do not break the part in two.** Turn the fuse top over so that the score is facing down, then test fit the fuse top. Wick thin CA into the joint between the top, former tabs and the sides. Follow with medium CA to fill in any gaps.

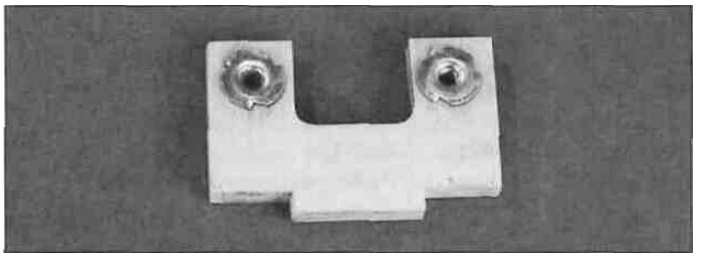


D 14. Test fit the **firewall assembly** in the front end of the fuse. Clean up the edges with a sanding block and 150-grit sandpaper if required. Use **6-minute epoxy** to glue the firewall assembly into the notches at the front of the fuse doublers and to the front edge of the fuel tank floor. Be sure that the **bottom lock tab** points toward the bottom of the fuse. Use masking tape or #64 rubber bands to hold the fuse sides together until the epoxy has cured.

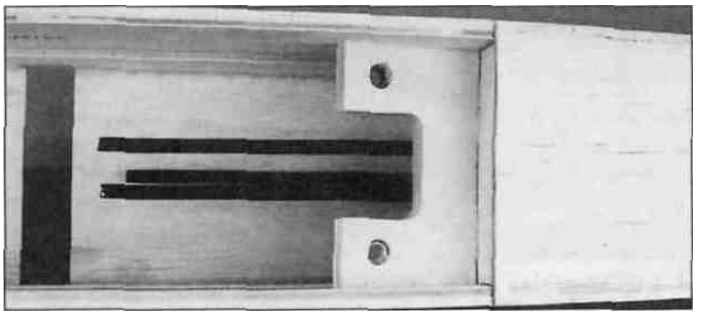


D 15. Cut two **firewall reinforcements** from the 1/2" x 20" **triangular balsa stick.** The triangular stock fits behind the firewall, on top of the fuel tank floor. Use **6-minute epoxy** to glue one piece in each corner. Sand the top end flush with the top of the fuse.

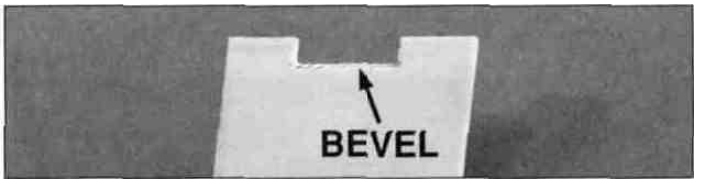




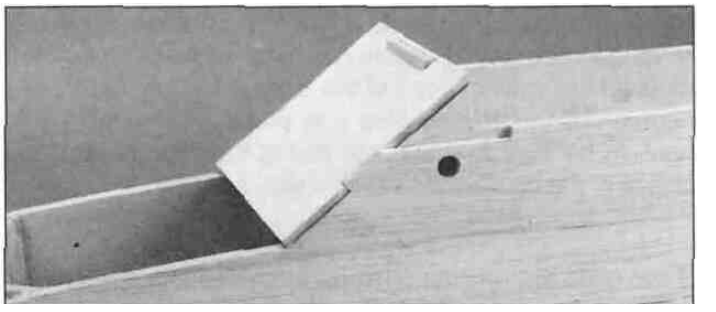
16. If you will be using bolts to attach your wing, install two **1/4"-20 blind nuts** in the **laminated wing bolt plate.** Use a hammer or vise and thin CA like you did when installing the blind nuts in the firewall.



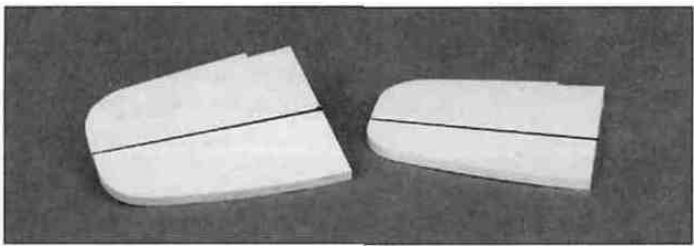
D 17. Use 6-minute epoxy to glue the wing bolt plate into the notches of the ply doublers and F-3.



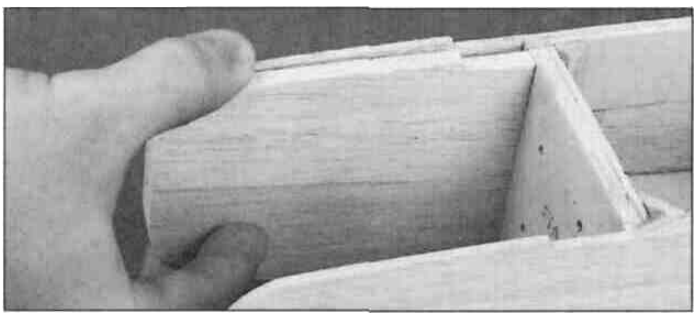
D 18. Carefully sand or cut a bevel along the bottom edge of the notch at the top of the die-cut 1/8" ply **windshield.** This bevel will allow the windshield to fit flush against F-2. If you will be bolting on your wing, F-2A has already been glued to F-2. In this case you will need to **increase the depth of the notch by 1/8"** to allow for the additional former thickness. Create the bevel after you enlarge the notch.



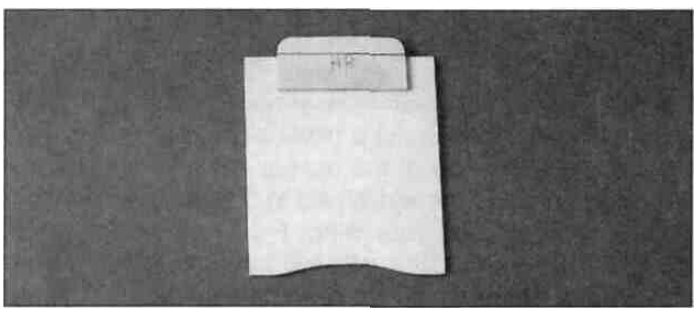
D 19. When the windshield fit looks good, glue it in position with medium CA. Sand the top portion of F-2 (A) flush with the front surface of the windshield. Sand the rear windshield overhang flush with the back of F-2.



D 20. Edge glue the two die-cut **1/4" upper and lower nose blocks** together. Sand the outside edges lightly to clean them up. Test fit the nose blocks in the engine compartment to make sure that the top rear notches line up. Sand the rear edge of the blocks until a good fit is obtained.

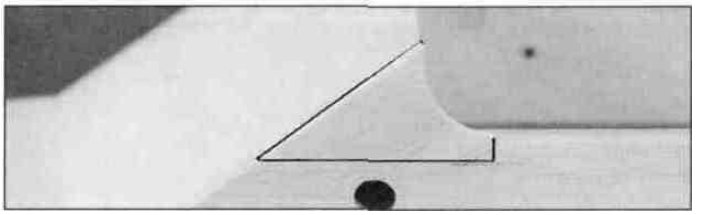


D 21. Glue the nose blocks to the inside surfaces of the engine compartment and the front of F-1A with 6-minute epoxy. Sand the outside edges flush with the fuse sides.

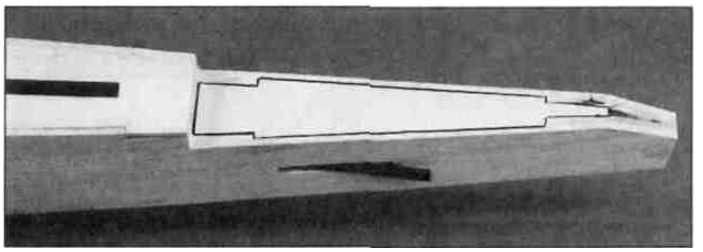


D 22. Locate the die-cut 1/8" ply **hatch retainer** (HR). *Hopefully you didn't throw away this part as it came from the* **center of former F-2.** Draw a line 3/8" from the edge with the rounded corners. Position the hatch retainer so that the line is on the straight edge of the die-cut 1/8" ply **hatch** and is centered. Before you glue it in place with medium CA, check to be sure that you are gluing it to the un-punched surface of the hatch-the next step explains why.

D 23. Slide the retainer **(HR)** under the bottom edge of the windshield and seat the hatch in the nose block notches. Tape the hatch in position or hold it firmly while you drill 1/16" holes through the hatch into the firewall at the three punch marks. Remove the hatch, then enlarge the holes in **only the hatch** with a 3/32" drill bit.



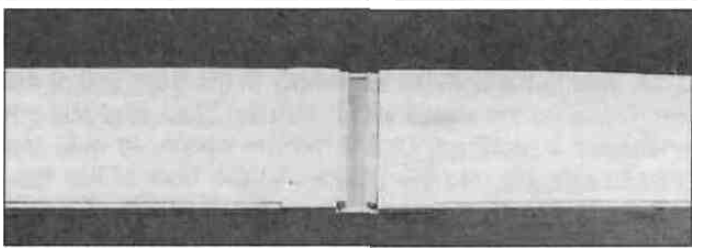
D 24. Glue the two die-cut 1/8" balsa **cabin top fillers** in the notches on both sides of the windshield.



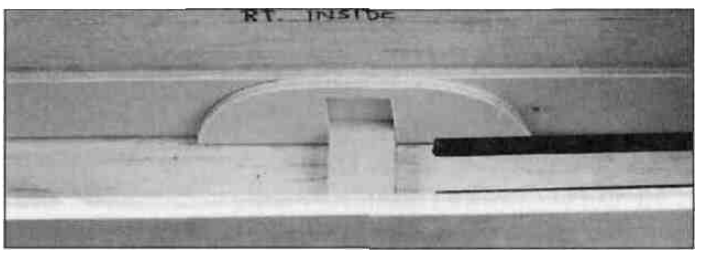
D 25. Test fit the die-cut 1/8" ply stab **base** (SB) into the recess at the rear end of the fuse. It should fit flush with the top edge of the fuse sides. Glue the stab base in position with medium CA when satisfied with the fit.

If you will be using wing bolts, skip this step.
D 26. Test fit the two 5/16" x 6" dowels through their holes in the fuse then **remove them until the model is covered.** It's usually easier to insert the dowels if the ends are slightly chamfered or rounded off. **After** the model has been covered you will reinstall the dowels using epoxy.

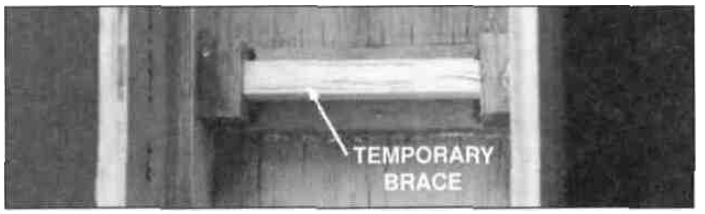
Install the Main Landing Gear



D 1. Test fit the 1/2" x 3/4" x 3-1/2" grooved hardwood **landing gear** (LG) **rail** in the slot on the bottom of the fuse. It should fit snugly between the ends of the balsa bottom sheeting and the notches in the fuse sides. Remove the landing gear rail, then use 6-minute epoxy around all points of contact to glue it in position.

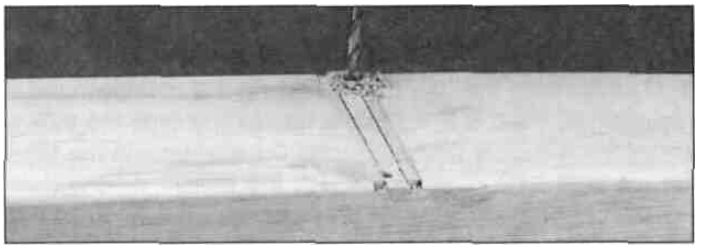


D 2. Use medium CA to glue the two die-cut 1/8" ply **landing gear doublers (LGD)** to the inside of the fuse to make a bridge across the LG rail.

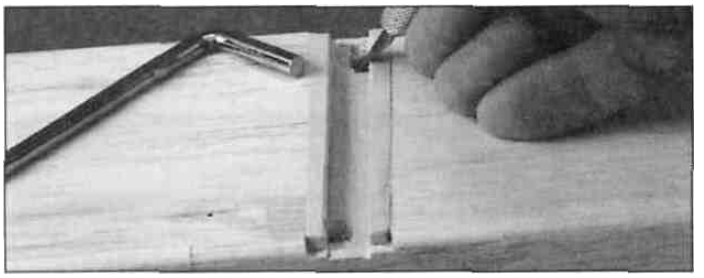


D 3 Use 30 minute epoxy to glue the 3/4" x 3/4" x 1/2" hardwood **landing gear blocks** to the fuse sides and LG rail in the recesses created by the landing gear doublers A scrap balsa stick should be wedged between the blocks to hold them in position while the epoxy cures

Note: You may work on the next section (engine & fuel tank) while waiting for the epoxy to fully cure



D 4 After allowing the LG assembly to cure for a few hours (overnight is best) fit the die cut 1/8 ply **landing gear drill guide** into the groove in the rail flush with the fuse sides as shown Drill a 3/32" pilot hole through the rails and underlying blocks at each of the punch marks on the guide Use care to make the holes as perpendicular to the fuse bottom as possible Check the inside of the fuse to make sure that the holes are straight and clearly in the hardwood LG blocks then redrill the holes with a 3/16" bit, making angular adjustments if necessary

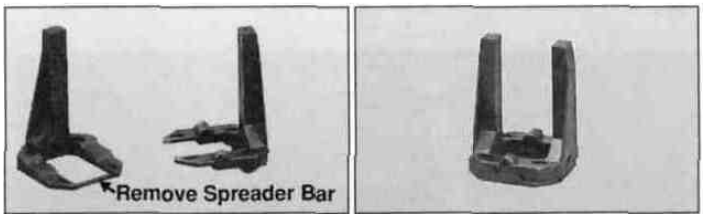


D 5 Test fit the **main landing gear.** You need to carve a **small radius** in the LG rail holes toward the center of the fuse to allow the LG wire to fully seat in the holes Also, it is helpful to file off the sharp edges at the ends of the LG wire After fitting the LG in position, the LG may be removed and set aside until final assembly.

NOTE: If you will be installing a 4 stroke engine you need to plan ahead for servo location and pushrod routing Refer to the sketch on page 34 and the fuselage plans for the 2 stroke/4 stroke servo and pushrod setup

Install the Engine and Fuel Tank

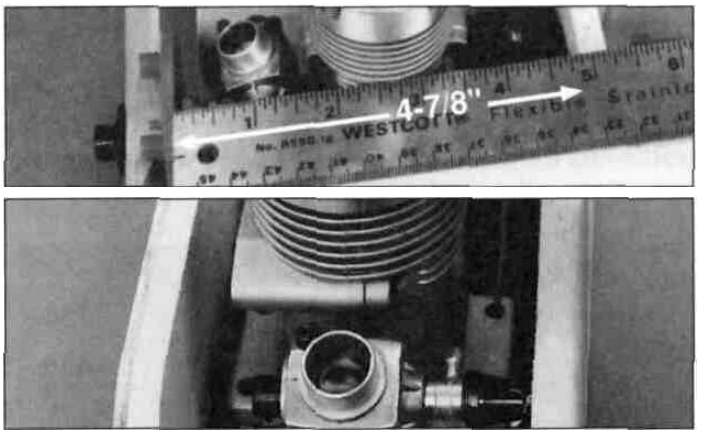
The Great Planes **adjustable engine mount** is simple and convenient to use It may be used to mount most 40 60 two stroke and 40 70 four stroke engines Nose gear bearings are incorporated in the mount Because the nose gear bearing holes are prednlled for 5/32" wire, you will need to enlarge the holes by drilling them out with a 3/16" or 13/64" bit If you have a numbered drill bit set the #11 bit is perfect If you use a 3/16" bit wiggle the bit around to create a slightly loose fit or the nose gear wire will be tight **Caution:** Don't overdo the enlargement process!



D 1 Cut or break the spreader bar from each mount half Carefully trim any extra material left by the spreader **bar** from each mount half as the surface where the spreader bars were attached must be smooth to allow the mount halves to fit together Trim the flashing from any rough edges if necessary Assemble the mount halves as shown

D 2 Temporarily install the engine mount on the firewall using four #6 **flat washers** and four **6-32 x 1"** machine screws Don't tighten the screws completely until after the engine has been positioned

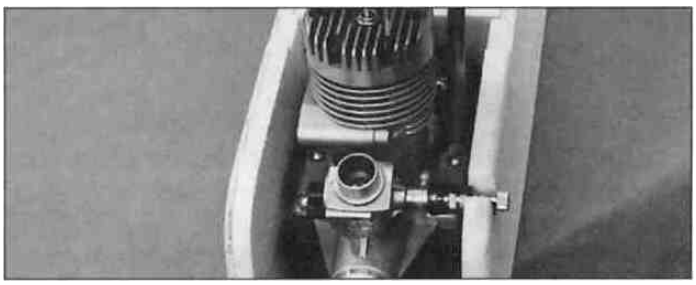
D 3 Remove the needle valve from the engine, then position the engine on the engine mount Slide the engine mount halves apart until the **engine mounting lugs** will sit flat on the rails Adjust the mount until the firewall centerline is centered **between** the "tick" marks on the mount Tighten the 6-32 screws to hold the mount firmly in position against the firewall



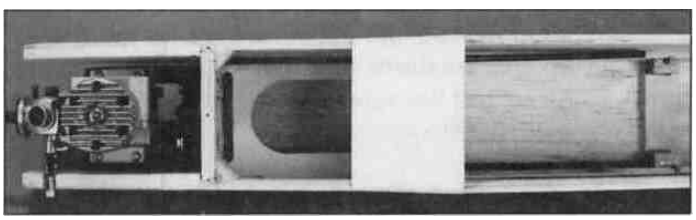
D 4 Position the engine so that the backplate of a spinner will be 4-7/8" (124mm) in front of the firewall **Carefully mark the engine mounting holes** on the rails with a sharpened piece of wire or a pencil lead **NOTE:** If installing an 0S 70 4 stroke engine the engine will have to be slightly forward of the recommended position to allow for the choke mechanism This will **not** cause a balance problem and is quite acceptable

D 5. Remove the engine and engine mount from the fuse. Use a centerpunch or sharpened nail to "dimple" the marks on the rails, then drill a 7/64" hole through the rails at each punch mark. If you have access to a drill press, this is the best tool for the job. However, if you are using a hand-held electric drill, try to keep the bit perpendicular to the rails.

D 6. Reinstall the engine mount and position the engine over the holes in the rails. Mark the location of the needle valve on the inside of the nose blocks. Use a hobby knife and round file to shape the needle valve access in the fuse side (See next photo.) Redrill the throttle and steering pushrod holes with a 3/16" bit to puncture the tri-stock.

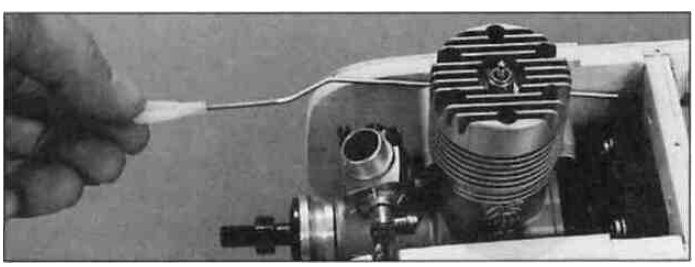


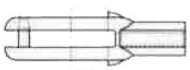
D 7. Install the engine with four #6-32 x 3/4" **sheet metal screws** that have been provided with this kit.



D 8. Cut **two 12"** long pieces of **outer pushrod tube** from the remaining 36" tube, then roughen the outside surface with 150-grit sandpaper. Insert the pushrod tubes through the throttle and nose wheel steering pushrod holes in the firewall and F-2, leaving about 1/16" of both tubes protruding past the firewall. Glue the pushrod tubes in place.

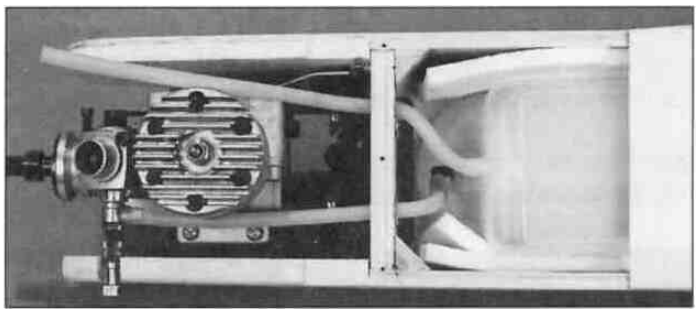
D 9. Cut a **36" threaded wire pushrod** in half to make two 18" pieces. The wire with threads on one end is for the **throttle** and the plain piece is for the **nose wheel steering** pushrod. Save the steering pushrod for later use.





.....Nylon Clevis (1)

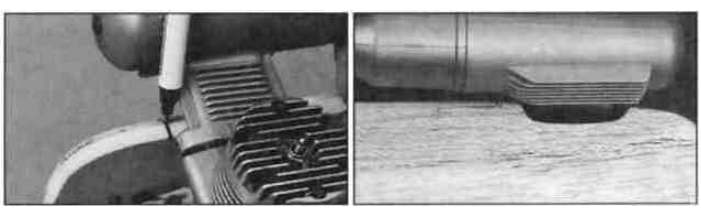
D 10. Screw a nylon clevis 14 revolutions onto the 18" length of **threaded** pushrod wire. Insert the pushrod through the throttle pushrod tube into the radio compartment. You will need to make a couple of bends in the pushrod so that the clevis will engage the throttle arm on the engine without binding. Install a silicone retainer around the clevis when satisfied with how the wire is bent, then "snap" the clevis onto the throttle arm.



D 11. Assemble the fuel tank following the manufacturer's instructions*. Push a 6" length of fuel tubing onto the tank's vent and fuel supply nipples. Install the fuel tank in the fuse with the vent tube passing through the firewall on the right and the fuel supply tube on the left (as viewed from the back of the firewall). Check for kinks and fix any problems before proceeding.

***Note:** We used a 12 oz Great Planes tank (GPMQ4105) in our prototypes. By using the supplied right-angle fuel supply tube, the fuel can be routed to the top of the firewall without the risk of kinking the tube.

D 12. Cut some strips of 1/4" latex foam rubber to pack under and around the tank (see photo for step 11). The foam rubber holds the tank in place and helps prevent fuel "foaming" caused by engine vibration.

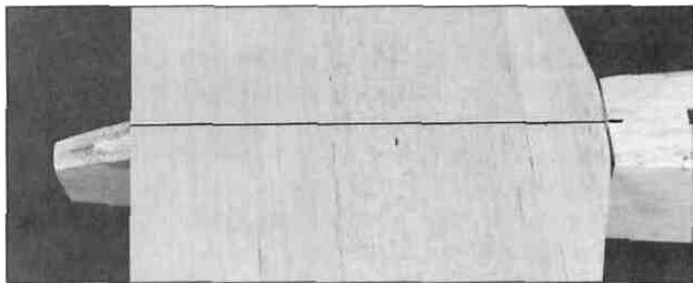


D 13. Hold the muffler in position and, if it touches the top of the nose block, mark the area that will need trimming. Remove the engine, then cut the muffler clearance with a razor saw and hobby knife. Shape the bottom corners with a round file for a neat appearance. Attach the muffler to the engine before testing the fit. There should be a gap of 3/32"-1/8" around the muffler header.

Well, we're making progress. The fuse assembly is about 99% finished, the stab and fin are done, the engine and tank are nicely installed. Have a soda. clean up your workbench, then let's start putting the pieces together.

Attach the Stab and Fin

Preparation



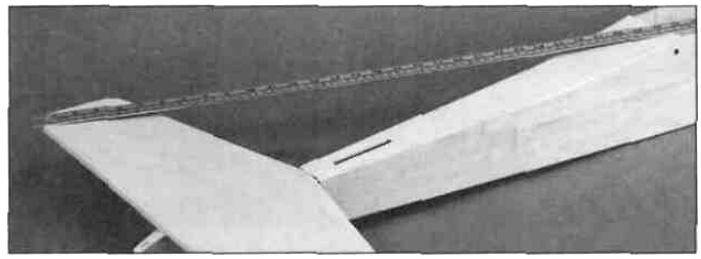
D 1 Measure the total width of the stab (approximately 25") and make a mark at the exact midpoint of the TE. Use a drafting triangle or a carpenter's square to draw an accurate **centerline** on the top of the stab, starting at the mark on the TE and extending to the LE.

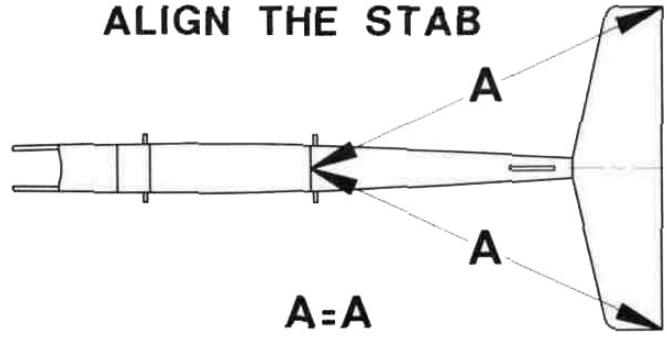
D 2 Accurately measure the width of the fuse at the top **of** F-3 and just in front of the stab base Mark the exact center of the fuse top at **both** of those locations Lightly draw a **centerline** between these two marks Stick a pin into the fuse top at the F-3 centerline mark.

Now proceed to align and attach the stab and fin as follows:

D 3 Lay the stab in place on the stab base and center it as well as you can using the marks you made above Pin it in place Lay a 36" straightedge (yardstick) on edge, across the front of the wing saddle on top of the fuse, as shown in the photo. Hold the straightedge in place by clipping a couple of clothespins to the fuse sides behind the straightedge

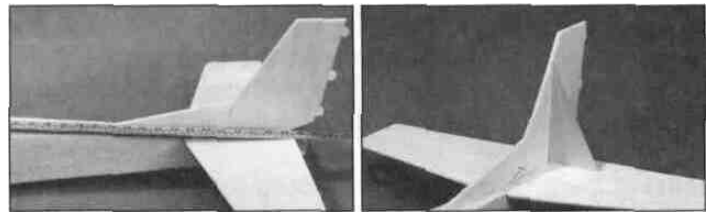
D 4. Check the alignment of the stab by standing 6 to 10 feet behind the airplane and crouch down until the stab TE and the bottom of the straightedge are very close together If the stab TE is not exactly parallel with the straightedge, remove the stab and sand the stab base carefully with a sanding block, then replace the stab and recheck its alignment Note that you do not have to sand much to make a big change in the stab angle Keep doing this until the stab lines up very closely with the straightedge



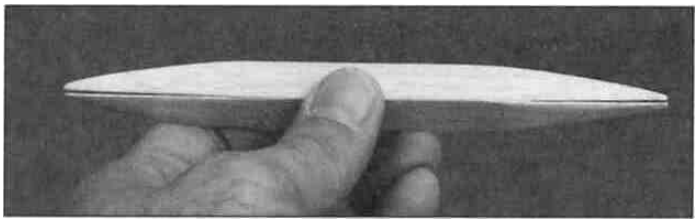


D 5 Now check the stab alignment by measuring from the pin at F-3 to the stab TE at both tips Adjust the alignment of the stab (while keeping the stab centered on the fuse) until these measurements are **equal** Once you have the stab pinned in correct alignment, make a couple of **reference marks** on the stab and the fuse, so you can quickly realign the stab during the gluing operation.

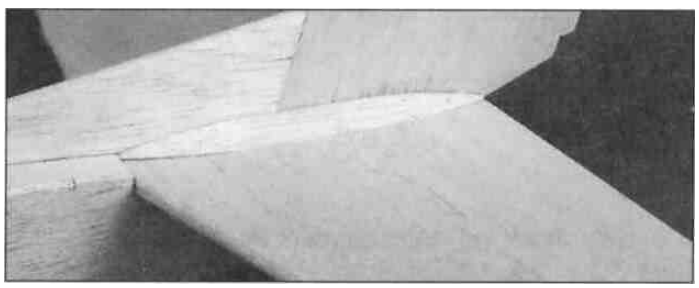
D 6 Remove the stab from the fuse Mix up a batch of 30-minute epoxy and apply it to the stab base Lay the stab in place and pin it back in correct alignment using your reference marks Carefully remove any excess epoxy that squeezes out of the Joint under the stab **Recheck the stab alignment carefully before the epoxy cures.**



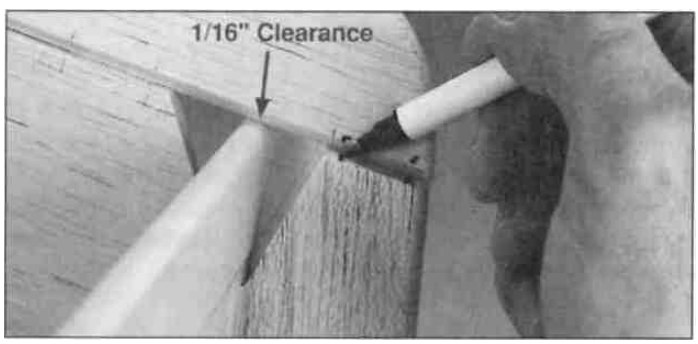
D 7 Position the fin on the fuse top and stab with the bottom of the **"angled"** rear edge **even with the TE of the stab,** then pin it in place Check its alignment with the centerline of the fuse with a long straightedge held against the side of the fin The straightedge must be parallel to the fuse top centerline Use thick CA to glue the fin in position while holding a triangle against it and the stab to maintain vertical alignment



D 8. Locate the remaining piece of 1/2" balsa tri-stock and cut two 7" pieces from it These will be used to reinforce the fin Hold the 1/2" dimension of both pieces together (back-to-back), then shape both parts simultaneously as shown in the photo and on the plans



D 9 Use thick CA to glue the shaped **fin reinforcements** to the stab and fin Sand the front half of the fin reinforcement to blend with the fuse top Also, **add** lightweight balsa filler to blend the stab to the fuse top.



D 10. Temporarily install the elevator and rudder with a couple of hinges but still without using any glue Test their operation If necessary, trim the LE of the rudder (where shown in the photo) to clear the elevator by 1/16" Mark the rudder s bottom hinge location on the fuse Remove the rudder, then carefully cut the slit for the hinge in the tail end of the fuse Reattach the rudder to check the hinge alignment

Hang in there You only have to build the wing before you start covering

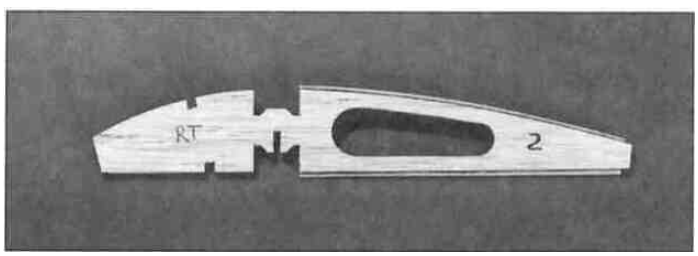
BUILD THE WING

Preparation

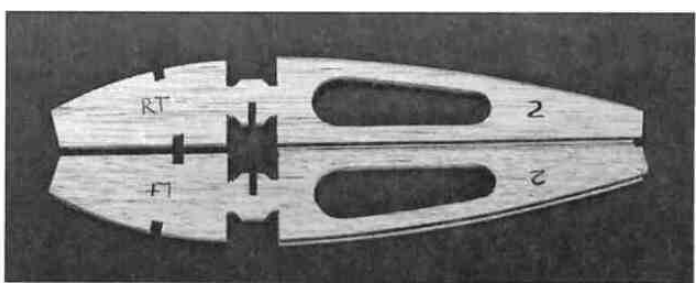
Building the wing for the PT-60 is pure fun Even if this is your first kit you won t have any trouble building a beautiful wing that is true **The secret is not to use any glue until instructed to do so.** You will soon see that the structure just about holds itself together without any help, giving you the opportunity to make sure that everything fits perfectly before making an 'irreversible oops[1]

We mentioned at the front of this manual that you have a choice in the type of wing to build — trainer or sport If this is your first R/C model, we strongly (read that **STRONGLY)** recommend that you build the trainer version Aside from the fact that you will need to make some of your own parts to build the *sport* wing, you will also lose the full benefit of the self-recovery features of this model — features that will help you solo faster and more safely *Nuf said*

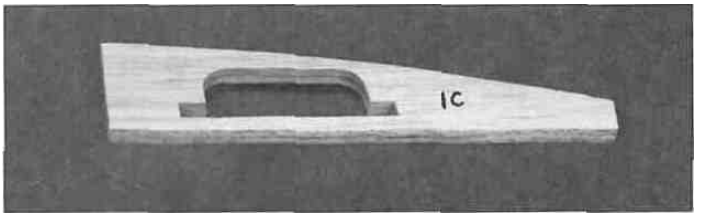
D 1 Carefully press out all the die-cut 3/32" balsa **wing ribs, R-1** through **R-5** and the die cut 1/8" balsa **wing tips, R-6** Remove any die-cutting fuzz by lightly sanding each part with 220-grit sandpaper.



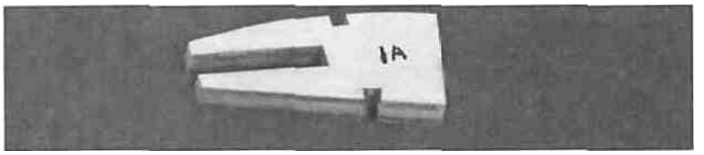
D 2 Locate two **R-2 ribs** and two **R-3 ribs** Hold an R-2 and R 3 rib together and you will notice that the R-2 rib is longer and narrower than R-3 Without gluing, align the die-cut "lightening holes and spar notches then look at the rear section of the ribs The R-2 rib should be *inside* the R-3 rib by 3/32", along the top and bottom edges, from the spar notches back



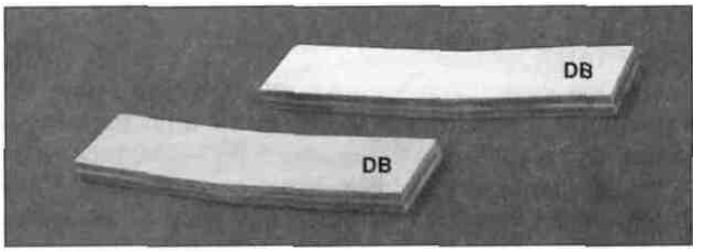
D 3 Use thin CA to **glue only one set** together but make sure they are properly aligned before applying the CA. Position the second R-3 rib on your workbench exactly as shown — with both of the straight edges touching Glue the other R-2 rib in position on top of R-3 with thin CA. *The object of this fussy way of doing this simple operation is to be certain that you make one **right** and one **left** pair of ribs.*



D 4. Glue the two die-cut 1/8" balsa **rear center ribs R-1C** to each other with thin CA.



D 5. Locate the two die-cut 1/8" ply **front center ribs R-1A** and the die-cut 1/8" balsa **front center rib R-1B.** Glue these together using 6-minute epoxy, with the **balsa rib** sandwiched **between** the two ply ribs.

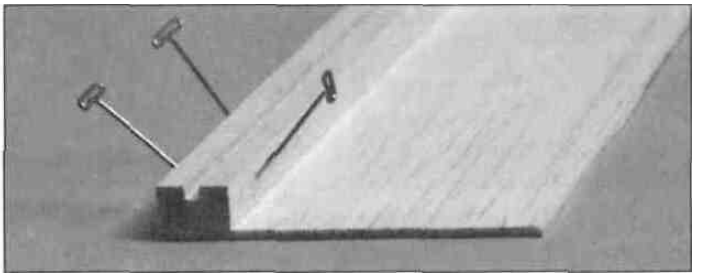


D 6. Locate the four die-cut 1/8" ply **dihedral braces.** Use 6-minute epoxy to glue **only two** of the parts together—then make a second **pair.**

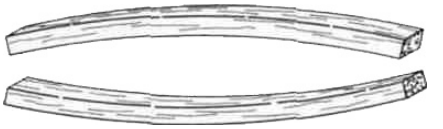
Assemble the Wing Panels

Both wing panels are built directly over the plans. Don't forget to cover the plans with waxed paper before starting. Build the right wing panel first so that your progress will look the same as our photos. **Note:** For photographic clarity we took the photos of the framework removed from our building board, even though we too build over the plans.

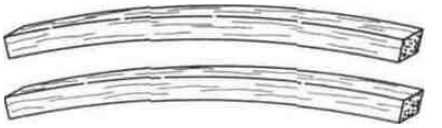
D D 1. Cut one **3/32" x 4" x 36" balsa sheet** lengthwise along both edges to make it **exactly 3-9/16"** wide. It's best to cut both edges to be sure the sides are parallel. Square off what will be the outboard end with a sanding block, then trim the root end (inboard) so the sheet will be exactly **33-7/8"** long. Pin it over the plans, flush with the **rear edge** of the main spar and the outer edge of R-5.



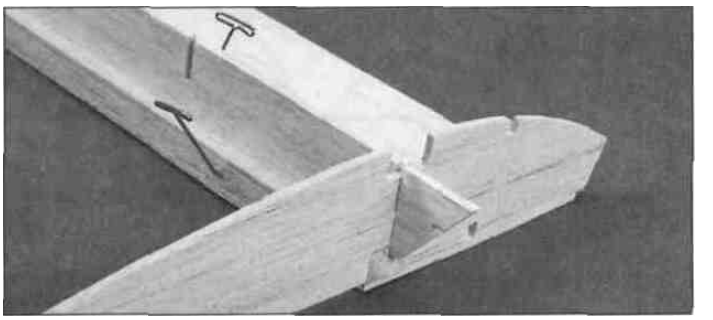
TWO WARPED SPARS INSTALLED THIS WAY WILL RESULT IN A STRAIGHT WING



TWO WARPED SPARS INSTALLED THIS WAY WILL RESULT IN A WARPED WING

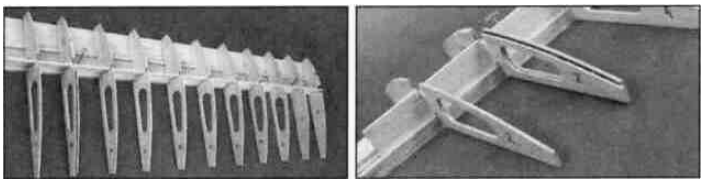


D D 2. Examine the four grooved 3/8" x 5/8" x 36" **main spars** for warps. Refer to the sketch above, then divide them into pairs. Cut **only one** of the spars to 33-7/8". Without gluing, pin the spar **on top of the balsa sheet** flush with the **rear and outer edges.** Use the pinning method shown above at enough locations to hold the spar straight over the plans.

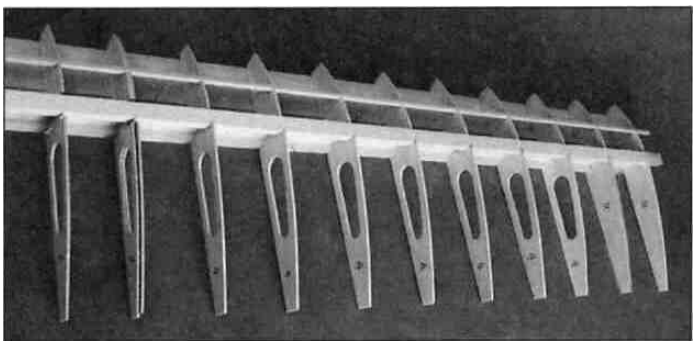


D D 3. Insert the die-cut 1/8" balsa **slotted web** into the spar groove. The pointed end is at the outboard R-5 with the slots pointing upward. Insert an R-5 into the end slot, then slide it (and the slotted web) until the rib is flush with the spar end. **Remember, don't reach for the glue bottle until *"Simon says."***

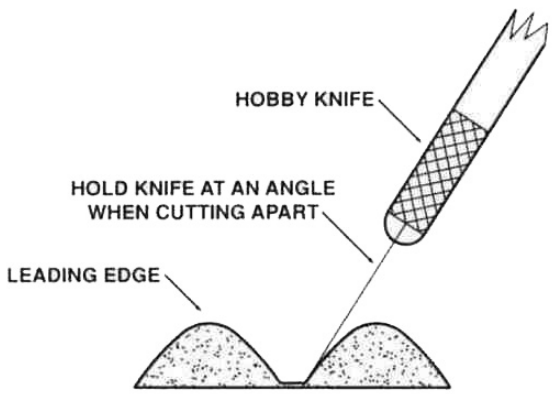
D D 4. Cut two 3/16" x 3/16" x 36" balsa **forward spars** to **33-7/8".** Insert one of the forward spars into the square notch on the bottom of R-5. Align the end of this spar with the end of the balsa sheet. (See the next photo for reference.)



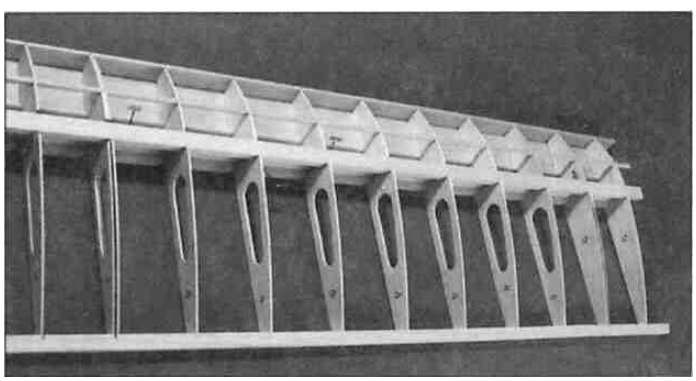
D D 5. Install all remaining ribs from R-2 through R-5. Be sure that the R-2/R-3 laminated rib assembly has the R-2 rib **facing the center of the wing.** Check that all ribs are fully seated and touching the bottom sheeting.



D D 6. Cut a grooved 3/8" x 5/8" x 36" *top* **main spar** to 35-1/8". Carefully press the **top** grooved **main spar** and 3/16" **forward top spar** into position. The outer end of **only the top main spar** should **extend past the outboard R-5 rib by 1-1/4".**



D D 7. Separate the shaped 36" balsa **leading** (LE) and **trailing edges** (TE) with a sharp hobby knife as shown in the sketch.



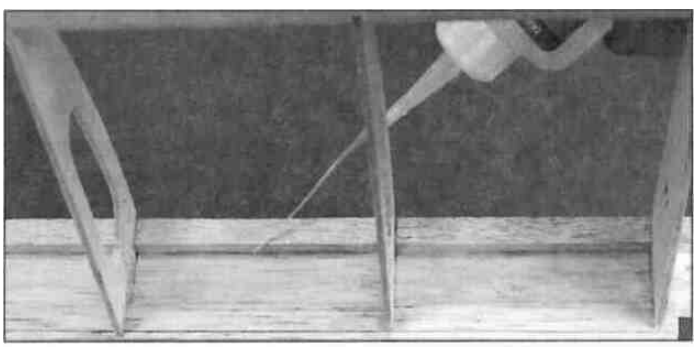
D D 8. Notice that the notches on the LE and TE are closer to one end than the other. The **shortest** distance is positioned toward the R-5 ribs. Carefully fit the LE and TE onto the ribs.

D D 9. Center the R-2 and R-5 ribs vertically between the top and bottom of the TE. A scrap of 3/32" balsa can be used as a shim under the rear portion of these ribs to raise them to the correct height. Press the LE down to the building board.

D D 10. Look the frame over carefully to be sure everything is **fully pressed into position** and **aligned** with the plans. We are about to start gluing so now is the time to fix any problems.

IMPORTANT:
Follow the gluing sequence **exactly** and **don't glue the sheeting to the bottom of the ribs until after the wing is joined and installed in the washout jig** — just **tack** glue it to the bottom spar and LE in **three or four** places. Tack gluing means that you only use a **tiny drop** of CA to hold the part in position.

D D 11. Okay, "Simon says, **GLUE!"** Use thin CA for **all** points of contact **(except the bottom sheeting)** starting with the notches along the **TE.** Press or hold all of the parts in position as you apply the CA. Move on to the **main spar** and **slotted web,** the **rib/spar joints** and the **LE.**



D D 12. Remove the pins holding the wing panel to your building board. Hold it with the LE pointing down, then wick thin CA into the top main spar / slotted web joint from both sides of the web. Notice that we use a tubular CA applicator tip (Hobbico HCAR3780) on our CA bottle. Applicator tips help control thin CA placement and are a cheap and handy item to have around the shop.

D D 13. Use a razor saw and sanding block to trim the inboard end of the LE and TE even with the centerline on the plans.

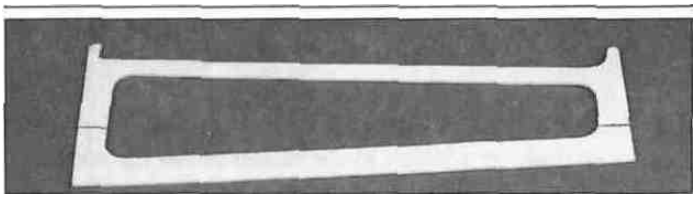
That's one wing panel down and looking mighty sassy I might add! Don't just sit there admiring your handiwork, you still have work to do. Slap some waxed paper on the other half of the wing plan, then ***repeat steps 1 -13 to*** *build the left wing panel. You can rest later.*

Join the Wing Panels

IF YOU ARE BUILDING THE TRAINER VERSION, SKIP THIS INSTRUCTION AND PROCEED TO STEP1.

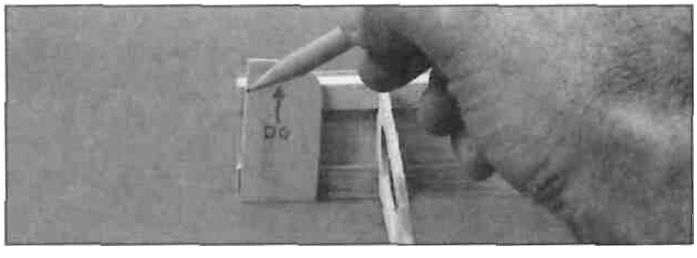
If you are building the Sport Wing, use the patterns on the wing plan to cut two new spar joiners, four dihedral braces, LE and TE joiner and a dihedral angle gauge. Materials for these parts are specified on the plans but are not included in this kit. Follow exactly the same steps **but substitute your new parts** for the die-cut ones.

Modify the washout Jigs for only the sport wing as follows:

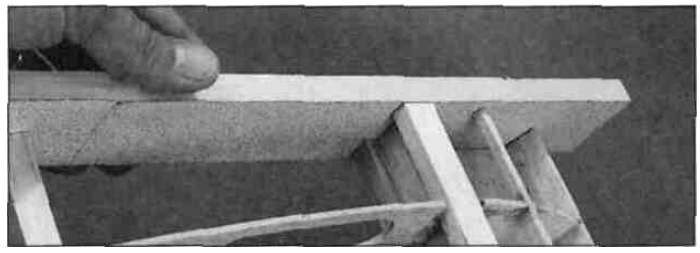


Draw a straight line through the punch marks on the die-cut 1/8" ply **washout jigs,** then cut off the bottom portion of the jigs on the lines. Hold both of the top halves together to make sure they are **identical.** If not, use a sanding block to even them up.

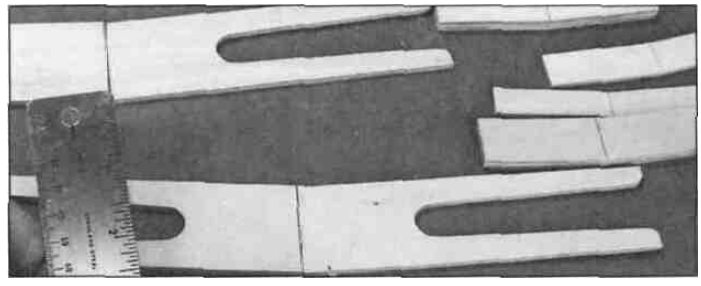
The wing panels need to be realigned on the plans and pinned to the building board for the next step.



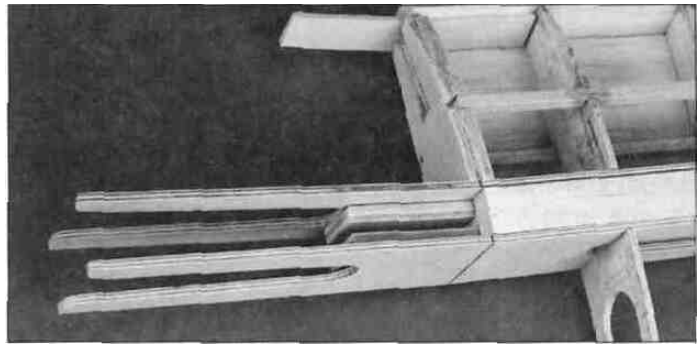
D 1. Working over the plans, hold the die-cut 1/8" ply **dihedral gauge (DG)** in contact with the LE, spars, and TE, with the **"arrow" pointing up** and the **rounded corner toward rib R-2.** The bottom outside corner must be even with the bottom outside corner of each part as shown in the photo. Mark the dihedral angle on each part. Repeat for the other wing panel. Remove the wing panels from the board.



D 2. Sand the root (inboard) edges of both wing panels to match the dihedral angle you drew. It's helpful to make an oversized sanding block for this operation, so that you will sand each part simultaneously and evenly. When you check the fit at the center of the wing you must raise one wing tip 6-1/2" for the "Trainer wing" or 4" for the "Sport wing". Support the tip on a stack of books to be sure everything will line up and fit flush. Take your time and try **to** get all the parts sanded to the correct length and angle, so they all butt together when the wing is joined.



D 3. Draw a centerline on each of the dihedral braces, LE and TE joiners and the center joiners.

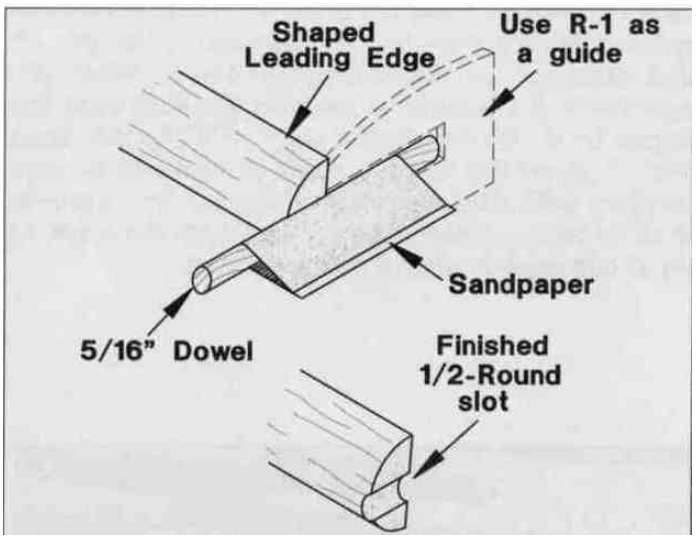


D 4. Without glue. test fit the dihedral braces on each side of the slotted web, the spar joiners on both sides of the spars, the front rib assembly, and the LE joiner. Carefully plug the other wing panel into the first wing assembly. Examine the joint carefully. There should be no gaps between any of the parts, **especially the main top and bottom spars.** If necessary, make small corrections with a sanding block, checking progress regularly to avoid "over correcting."

CONSTRUCTION NOTE:

Perform this step ONLY if you are building the bolt-on wing version.

IF YOU WILL BE INSTALLING WING BOLTS YOU NEED TO MAKE THE LE DOWEL HOLE NOW. Do this as follows:



A Put the R-1 rib assembly in position between the spars and the LE of one wing panel Draw two lines on the end of the LE to match the spacing and angle of the slot in the R-1 ribs.

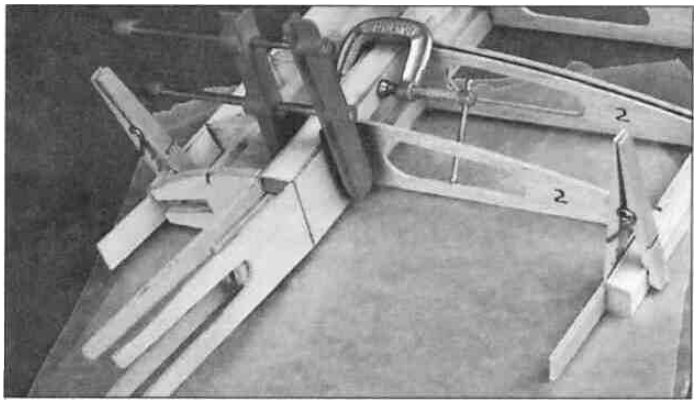
B Wrap a piece of 150-grit sandpaper around one of the 5/16" dowels included in this kit, then sand **half** the diameter of the dowel hole in the end of the LE.

C. Repeat steps A and B for the other wing panel.

D 5. You will need several small C-clamps (or modeling clamps) and a few clothespins for the next few steps Clear a space long enough to accommodate the soon to be joined wing.

IMPORTANT: Dry fit the entire joiner assembly before actually repeating the operation with epoxy. Test fit the clamps and clothespins so you will know where to put them.

Remember, the bottom sheeting should still only be tack glued in position.



Refer to this photo when doing steps 6-9

D 6. Mix about 1/4 ounce of 30-minute epoxy Coat one side of a dihedral brace with epoxy, then install it between the spars, against one side of a web The centerline you drew should be even with the edges of the spars and web. Repeat for the other dihedral brace on the opposite side of the web.

D 7 Coat one side of a spar joiner with epoxy, then slide it into place Once again the centerline should be aligned with the ends of the spars Install the other spar joiner in the same manner Clamp the spar joiners in position and recheck the alignment.

D 8. Coat one half of one side of the LE and TE joiners, then clamp them in position to the inside of the LE and TE.

D 9 Apply epoxy to the front, bottom and rear edges of the front center rib assembly, R 1 Insert it between the two 3/16" spars over the sheeting Be sure that it is centered so that it will overlap the other wing panel's sheeting.

D 10 Apply epoxy to the inside ends of the spars and also the LE and TE Carefully slide the second wing panel all the way into position Raise one tip 6-1/2" (4" for the sport wing) and support it on books while you clamp the wing panels together Check to make sure that the LE and TE are aligned, then pin them to each other to hold their position Check the bottom of the wing to be sure that the bottom sheeting matches.

D 11 Clean off any epoxy "messes" with a paper towel moistened with rubbing alcohol before it has a chance to cure Even though it can be handled sooner, it's best to let the wing cure overnight before removing the clamps and weights.

*Here's your chance to get some **sleep, so rest while you** can There s still lots more to do*!

EXPERT TIP

HOW TO MAKE "SOFT WEIGHTS"

Weights are needed for a variety of purposes during the model building process, especially when setting wing washout or if you need an extra pair of hands We made some 2 and 3 pound "soft weights" for use in our shop as follows:

A. Obtain four small, but sturdy plastic bags (freezer bags work well), four old tube socks (preferably laundered), and 10 pounds of buckshot, available at sporting goods or gun stores Sand can also be used, but the weights become pretty bulky.

B Use a scale to measure out two 2lb bags and two 3lb bags of shot (or sand) Seal the bags with masking tape, without compressing the contents Soft weights work best if they are floppy like bean-bags.

C Put the sealed bags into the tube socks, then tie a knot in the socks to prevent them from leaking all over your bench.

Sheet the Wing

D 1 Use 6 minute epoxy to install the **laminated center rib R-1A** on the centerline of the wing between the spar joiner and the TE joiner.

CONSTRUCTION NOTE:
Perform this step ONLY if you are building the bolt-on wing version.

After the epoxy has cured, use the hole you sanded in the LE ends as a guide to drill through the ply LE joiner with a 5/16" bit Test fit the dowel fully into the slot in the R-1A rib assembly.

D 2 Trim off the protruding end of the top spar to match the angle of the slotted web as shown, or sand it flush with 80-grit sandpaper and a sanding block.

D 3 Follow the expert tip shown below to join three **3/32" x 2-3/4" x 36"** balsa sheets together to make an 8-1/4" wide skin.

EXPERT TIP

HOW TO MAKE A BALSA SKIN

A. True up the edges of the sheets with a metal straightedge and a sharp knife or a long sanding block.

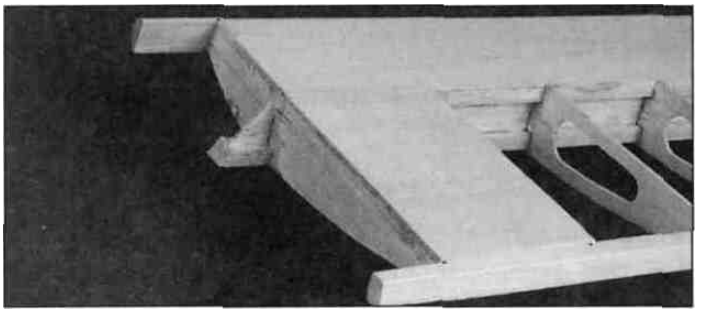
B. Test fit the sheets together to make sure they match well.

C. METHOD "A": Edge glue the sheets together with thin CA over a flat surface covered with waxed paper. A quick wipe of the joint with a fresh paper towel will remove excess glue and make sanding easier Mark the poorest surface that you think should be the *inside* of the sheet with an "I".

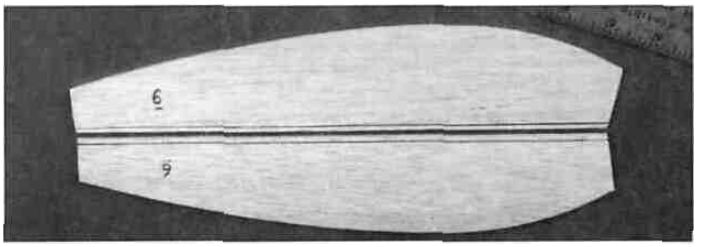
METHOD "B": Edge glue the sheets together with Great Planes Pro Wood Glue Smear the glue lightly along an edge with your finger, then join the sheets over a flat (waxed paper covered) building board Pin the sheets to the board to hold them together Wipe off any excess glue before it dries Pro Wood Glue is easier to sand and won't leave a ridge at each seam, as CA is prone to do.

D. Place the skin on a large flat surface and sand it with a large, flat sanding block and fresh, sharp 220-grit sandpaper Use light pressure and a brisk **circular** motion.

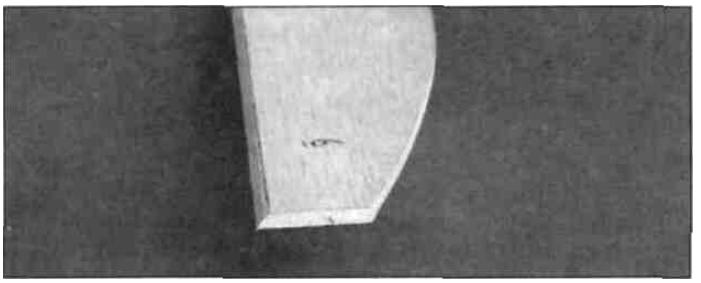
E. Trim the perimeter of the sheet to square things up



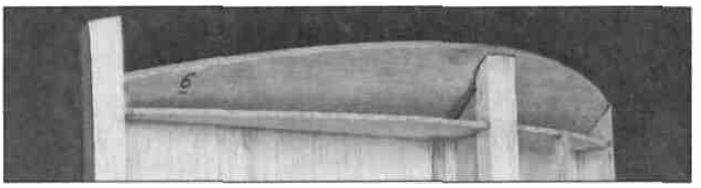
D 4. Cut two 3-1/2" x 8-1/4" pieces from the "skin" you just made. The wood grain must run in the 3-1/2" direction. Turn the wing upside down (so that you are looking at the bottom side), then trim the two skins to fit **between the spar and the TE,** covering the two R-5 ribs at both wing tips. One edge of the skin should be flush with the outboard side of the outer R-5 rib. Glue the skins in place with medium CA.



D 5. Locate the two die-cut 1/8" balsa **R-6 wing tips,** position them as shown (to make a right and a left), then draw a line 3/16" from the straightedge as shown.

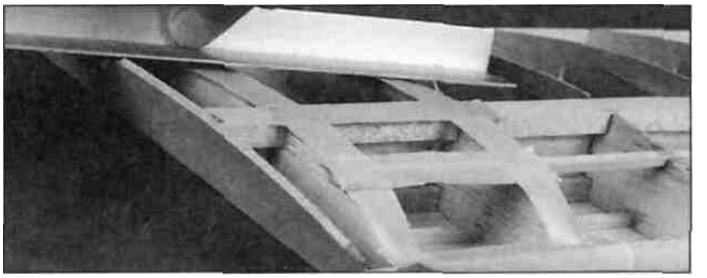


D 6. Sand a bevel on both R-6s from the bottom corner of the straight edge to the line.

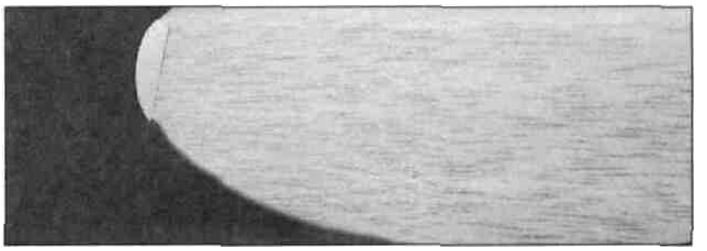


D 7. Check the fit of the R-6 wing tips. Glue the R-6s in position with thin CA, flush with the bottom edge of the wing sheeting. It won't hurt anything if the front bottom sheeting gets glued in the process.

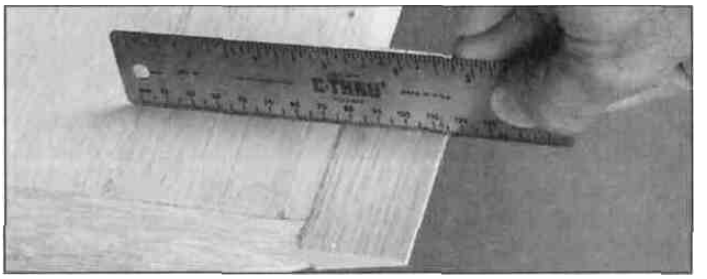
D 8. Important: Apply two thicknesses of masking tape on the **top edge of both R-5 ribs.** This will help prevent them from being sanded during the next step.



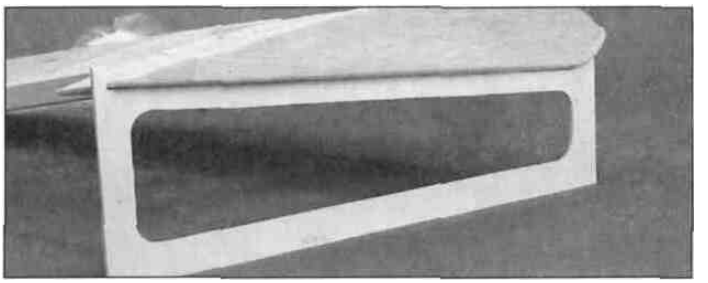
D 9. Use a sanding block and 150-grit sandpaper as shown, to sand a bevel on the top edge of the R-6 wing tip to match the height of the top of the R-5 ribs. Keep light pressure on the R-5 ribs but don't sand through the masking tape. **NOTE:** The R-6 wing tips must be 3/32" below the top edge of the LE and TE, just like the R-5 ribs.



D 10. Cut and sand the LE and TE tips to match the angle of the wing tip.



D 11. Locate the two **1-1/2" x 36" wedge shaped ailerons.** Cut **one 3-1/4"** piece from **each** aileron to use as **TE tips.** Check that the bottom surface of each TE tip is flush with the bottom sheeting when the TE tip is pressed against the wing tip. If necessary, lightly sand the forward edge of the TE tip to correct the problem. Glue the TE tips to the TE with medium CA. Sand the outboard ends flush with the angle of the wing tips.

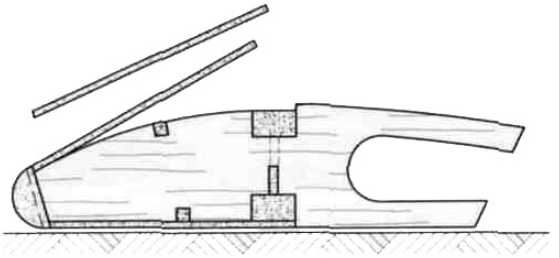


D 12. Tack glue (remember, only a couple drops of thin CA) the die-cut 1/8" ply **washout jigs** under both wing tips at the location of the outboard R-5 ribs. Turn the wing right side up, then add enough weights to hold the washout jigs and wing firmly on your workbench. (Read the explanation of "washout" on page 47.)

D 13. Wick **thin** CA under only the **bottom spars** and the bottom edge of the **ribs** from one end of the wing to the other, gluing the bottom sheeting from the inside of the structure. Gently press up on the sheeting from underneath the wing to keep it in contact with the ribs. Glue the sheeting to the **LE** from the inside with **thick CA.**

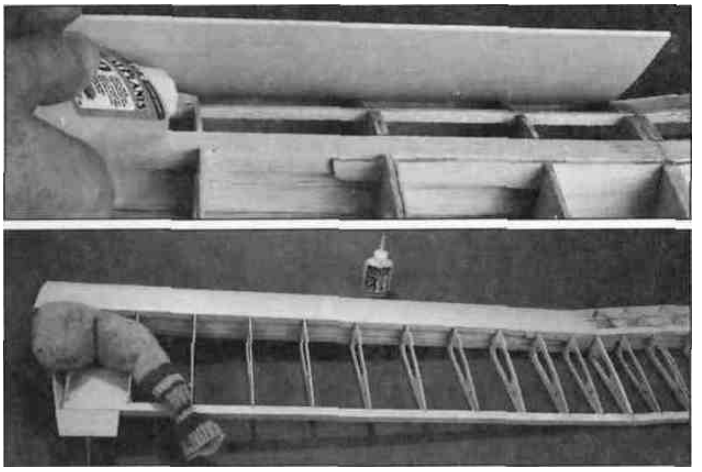
D 14. If necessary, lightly sand the tops of the wing ribs to even them up. Make sure there are no glue bumps or imperfections that will prevent the sheeting from fitting well.

BEVEL THE SHEETING AS SHOWN



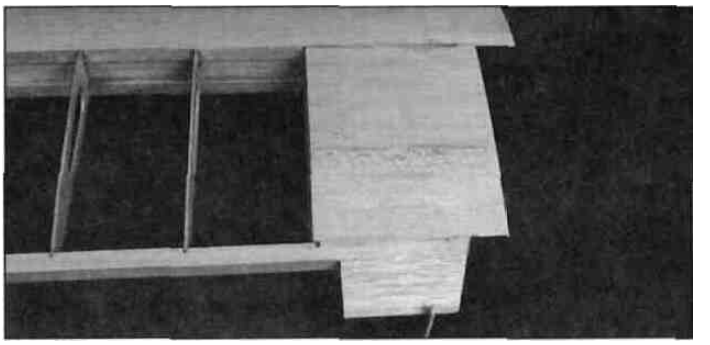
D 15. Trim a 3/32" x 4" x 36" balsa **top LE sheet** to **3-7/8"** wide. Sand a slight bevel along one edge, then test fit the sheet (beveled end forward) between the LE and the rear edge of the top spar. Sand the root end of the sheet to fit evenly on the centerline of R-1.

D 16. Hold the sheet tightly against the LE, then wick thin CA into the joint along its full length. Wipe off any excess **CA** before it cures.

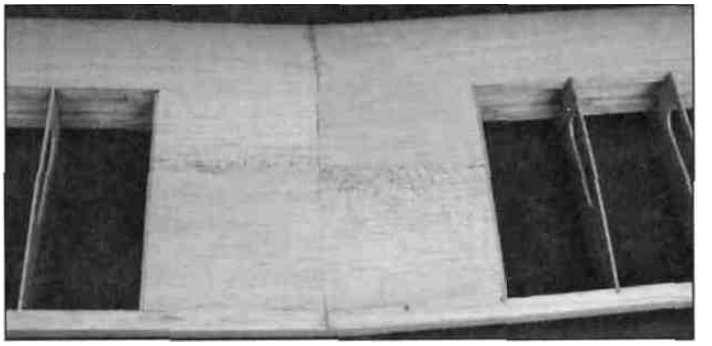


D 17. Gently lift up on the sheeting. Then, working quickly, apply a bead of **thick** CA to the top of each rib and the spars. Roll the sheet into position and hold it there, applying even pressure with a 36" straightedge until the CA cures.

D 18. Cut and fit the sheeting for the LE of the other wing panel. Try for a nice butt fit at the center by careful sanding and testing. Glue the sheet in position as you did in steps 16 and 17.



D 19. Cut two 5" x 8-1/4" pieces from the sheeting skin you made earlier. The grain runs across the 5" width. Cut these skins to fit between the spar and the TE on top of the R-5 ribs. Glue them to the ribs and wing tips with medium CA, leaving 1/8" overhanging both R-5 and R-6. Trim and sand the sheeting flush with the R-6 tips.

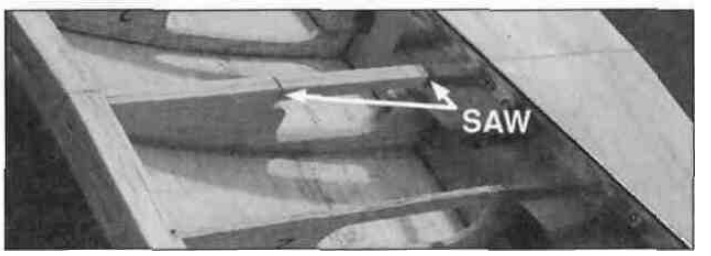


D 20. Cut two 4-9/16" x 8-1/4" pieces from the sheeting skin. The grain runs across the 4-9/16" width. Cut these skins to fit the **top** center of the wing, from the "ledge" at R-2 / R-3 to the center of R-1 C. Work carefully with a sanding block to obtain a neat joint at the center. Glue the skins in position with medium CA.

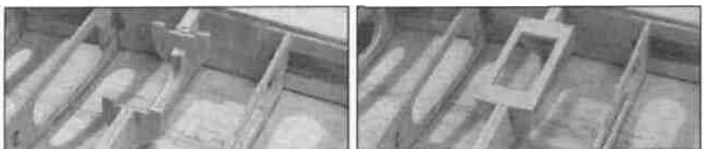
D 21. Remove the wing from the wing tip jigs and sand off any glue residue.

D 22. Referring to the plans for the shape, round off the LE to blend nicely with the tip.

Install the Aileron Servo Tray

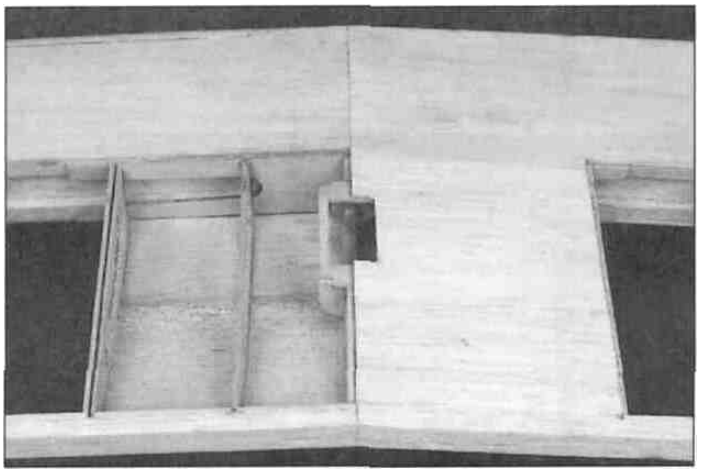


D 1. Saw through the thin portion of the bottom of **R-1 C** and remove the piece.



D 2. Test fit the two die-cut 1/8" ply **servo tray supports** to the notched front and rear of R-1 C. Insert the die-cut 1/8" ply **aileron servo tray** into the shallow notches on the top end of the supports. The tray must be flush with the top of the rib.

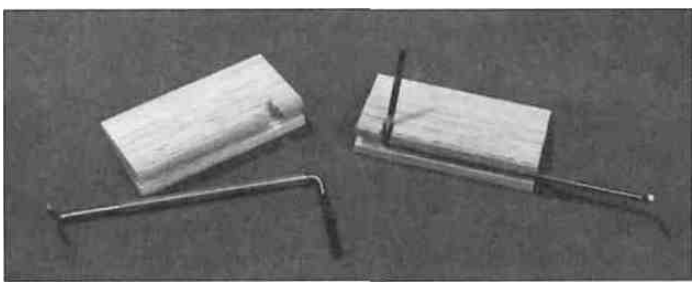
D 3. When satisfied with the fit, glue the parts in position with medium CA.



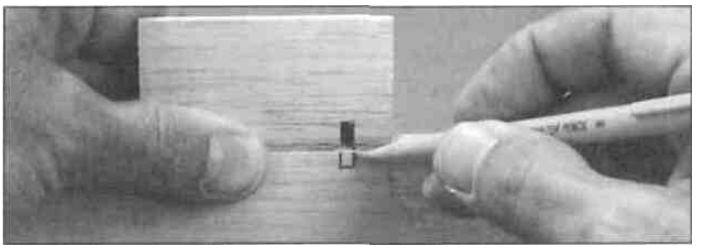
D 4. Cut two 4-5/8" x 8-1/4" pieces from the remaining sheeting skin. The grain runs across the 4-5/8" width. Cut these skins to fit the bottom center of the wing, from the "ledge" at R-2/R-3 to the center of R-1 C. Work carefully with a sanding block to obtain a neat joint at the center. Glue one skin in position with medium CA, then cut "half" of the opening for the servo. Glue in the other half of the sheeting, then finish cutting the servo opening. Remove about 1/4" of balsa sheeting from the front and rear ends of the servo openings to allow the servo to fit flat on the ply tray.

Wing Completion

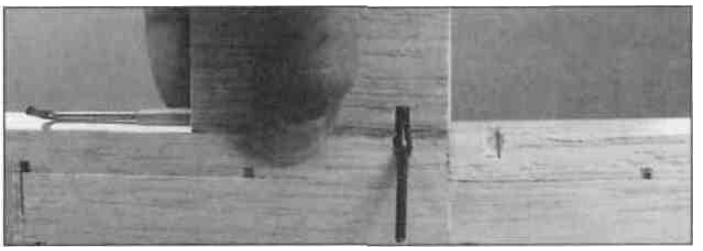
Perform the following steps to complete both wing panels.



D 1. Position the tapered and grooved 1-1/2" x 2-3/4" balsa **wing center TE** pieces over the plans and mark the location of the aileron torque rod exits. Cut a notch in the **bottom forward** edge of each piece as shown in the photo.

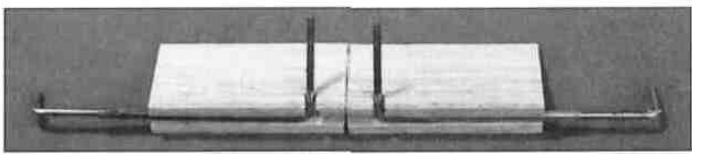


D 2. Hold the wing center TE against the aft edge of the wing, aligned with the wing's centerline. Mark the torque rod notches on the **bottom** of the wing.



D 3. Cut shallow notches on the bottom rear edge of the wing to allow the torque rods to move freely.

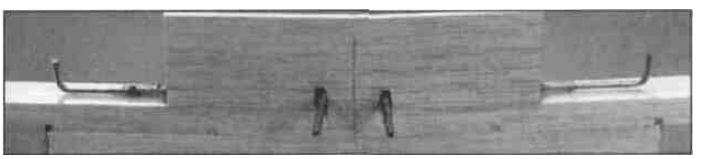
D 4. Sand a slight angle on the inboard edge of the two wing center TE to permit the two pieces to fit flush when matched to the dihedral angle.



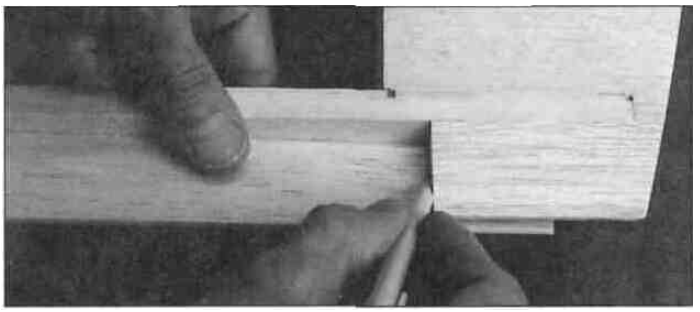
D 5. Sand the nylon surface of both torque rod tubes with coarse sandpaper to roughen them up for better glue adhesion.

D 6. Slide the nylon torque rod tubes as far as they will go toward the threaded end of the wire torque rods.

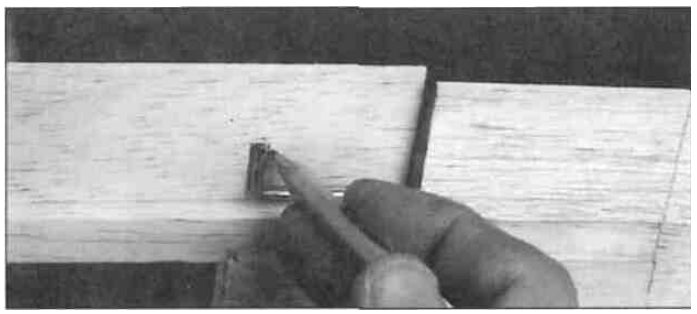
D 7. Using a toothpick, apply a small amount of petroleum jelly (Vaseline, etc.) around the torque rods where they enter and exit the nylon tubes. This procedure will help prevent the torque rod from "locking up" during the next step.



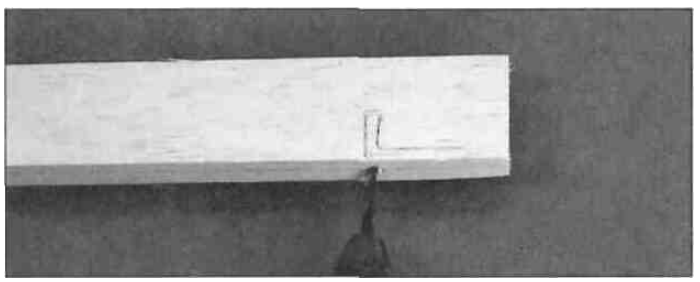
D 8. Apply some 30-minute epoxy to the nylon tubes, staying clear of the tube's ends. Insert the tubes into the grooves of the wing center TE. Using a tissue, wipe off any epoxy that may squeeze out. Apply epoxy to the forward and inboard edges of the wing center TE pieces, then glue them in position as shown. Use masking tape to hold the wing center TE in position while the epoxy cures.



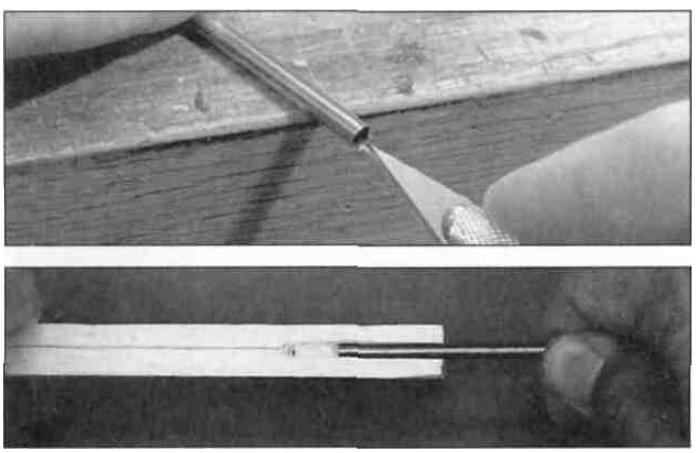
D 9. While holding an aileron against the inside edge of the wing center TE, draw a line on it that matches the inside edge of the wing tip TE. Cut the aileron 1/8" shorter than the TE opening to allow for covering material.



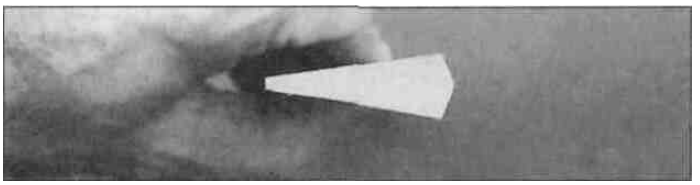
D 10. Hold the aileron in position, centered in the aileron opening, then mark the location of the torque rod arms. Extend your marks to the front edge of the aileron.



D 11. Draw a centerline along the entire front edge of the aileron. Drill a 1/8" hole 3/4" deep into the center of your "torque rod" mark to accept the torque rod arm.

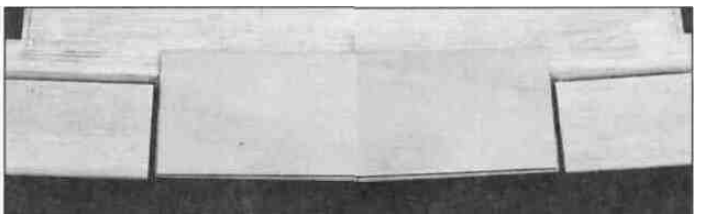


D 12. Cut a groove from the hole you drilled to the inboard edge of the aileron. **HINT:** Using a hobby knife, sharpen the inside of one end of a 1/8" diameter brass tube, then use it to cut the groove in the leading edge of the aileron.

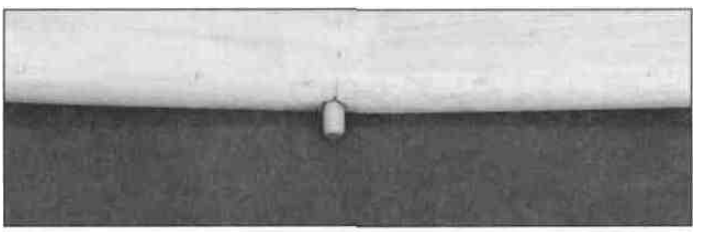


D 13. Sand the forward edges of the ailerons to a "V". **Refer** to the cross section of the wing on the plans for the desired angle.

D 14. **Refer to the plans,** then mark the location of the aileron's hinges. **Without using glue,** temporarily install the hinges using the same method as when you installed the rudder and elevator.



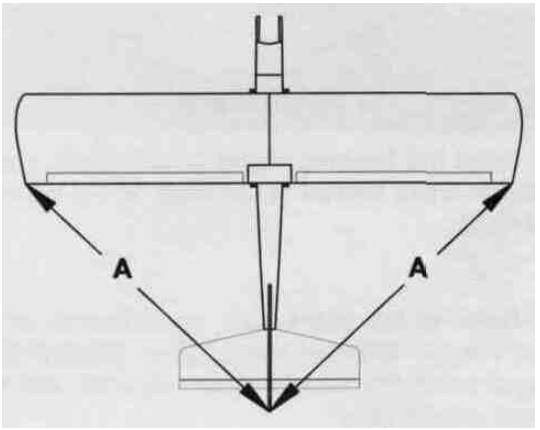
D 15. Carefully **"crack"** the die-cut 1/16" ply **TE plate** along its scored centerline. Try **not to break** the piece in two. Fit the TE plate on top of the wing at the TE on the centerline. If needed, sand the edges to fit flush with the sides and rear of the center wing TE. Use 6-minute epoxy to glue it in position.



D 15. Cut a 2-1/2" long **LE wing dowel** from one of the 5/16" x 6" hardwood dowels. Round off both ends **slightly.** Use a thin stick to apply 6-minute epoxy to the inside of the slot in rib R-1 and the hole in the LE. Insert the wing dowel through the LE into the slot in R-1 and allow the epoxy to cure.

D 16. Use a 5/16" drill to angle the hole in F-2 downward to match the angle of the wing dowel. Test fit the wing in the wing saddle. It must sit flat on top of the fuse — if not, elongate the hole in F-2 slightly, until a good fit is obtained.

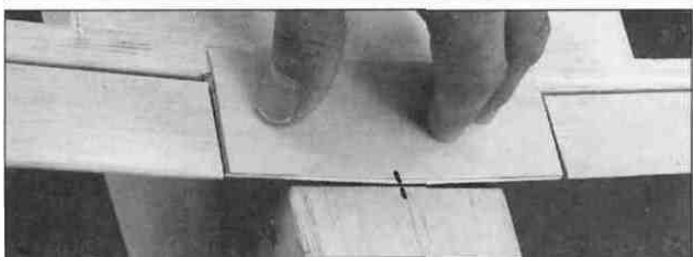
ALIGN THE WING



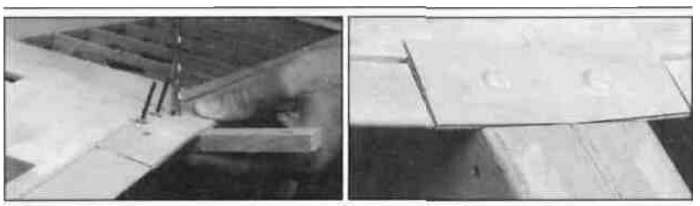
A=A
(FROM WINGTIP TO FIN)

D 17. Align the wing by using a string or tape measure to equalize the distance from each wing tip to the TE of the fin. Once aligned, lightly draw matching reference marks on the ply TE plate and the fuse top (See photo at step 19.) Remove the wing.

D 18. Sharpen the tips of both nylon wing bolts to a point as shown. Screw the bolts through the blind nuts from **underneath** the wing bolt plate. The points should be 1/8" above the height of the wing saddle.



D 19. Plug the wing dowel into F-2 and **gently** lower the TE. After the wing is aligned with your reference marks, press down on the TE to mark the bolt hole locations by "dimpling" the TE with the sharpened wing bolts.



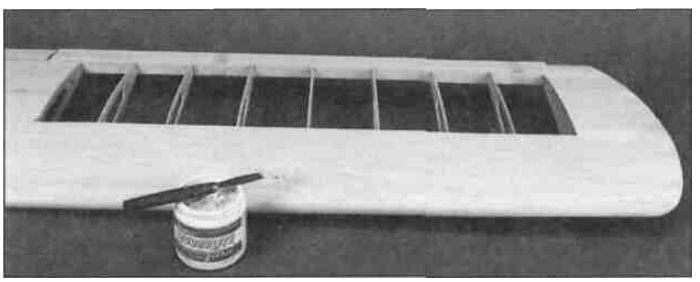
D 20. Remove the wing, then drill 1/4" (or 17/64" if you have that size bit) holes through the TE at both marks, while holding the drill so the bit is perpendicular to the **top surface** of the wing. Use a hardwood "backup" to prevent the ply TE plate from splintering.
CAUTION: Keep your fingers out of the way and stop drilling as soon as you feel the drill cut through the TE plate. Enlarge the holes with a round file if needed, then test fit the wing using the bolts.

Well, you are through the framing stage and you've given life to a box of balsa. Looks pretty neat, eh? Time to clean up your workbench once again, have a soda, and forge ahead to the "finishing" stage.

FINISHING

REPAIRING SURFACE "DINGS"
Many surface blemishes on a framed model are caused by bumps and balsa chips on the work surface. This type of ding is best repaired by applying a drop or two of window cleaner or tap water to the blemish, then running a **hot** sealing iron over the spot to expand the wood fibers. After the surface has dried, sand the *expanded* area smooth.

Final Sanding



D 1. Fill any scuffs, dings and the forward end of the pushrod tube exit slots with balsa filler (Hobbico HobbyLite HCAR3401 recommended). After the filler has hardened, cut and sand the pushrod tubes flush with the fuse sides, then sand the entire structure with progressively finer grades of sandpaper, ending with 320-grit. When you think the job looks good, sand some more to make it better. You'll be glad you did.

Fuelproofing

Fuelproofing may be done either before or after covering.

D 1 Fuelproof the engine and fuel compartments by painting them with K&B Superpoxy paint or 30 minute epoxy Pay special attention to the firewall **Prevent** paint or epoxy from **clogging the blind nuts** by first packing the holes with petroleum jelly applied with a toothpick Be sure to **clean** off any external petroleum jelly messes with rubbing alcohol before fuel proofing.

Balance the Airplane Laterally

SPECIAL NOTE: 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 you have the basic airframe nearly completed, this is a good time to balance the airplane **laterally** (side-to-side) Here is how to do it.

D 1 Temporarily attach the wing, engine (with muffler), and landing gear to the fuselage.

D 2 With the wing level, lift the model by the engine propeller shaft and the fin (this may require two people) Do this several times.

D 3. If one wing always drops when you lift the model, it means that side is heavy Balance the airplane by gluing a weight to the **inside** of the other wing tip

NOTE: An airplane that has been laterally balanced will track better in loops and other maneuvers

Cover the Structure

The PT-60 does not require any painting to obtain the scheme shown on the box, as all of the finish is done with **Top Flite MonoKote Covering** The only painting that is required is the engine compartment if you so choose

Make sure the structure is smoothly sanded with **320-grit** sandpaper Remove all dust from the structure with a vacuum cleaner and **Top Flite Tack Cloth** so the MonoKote will stick well

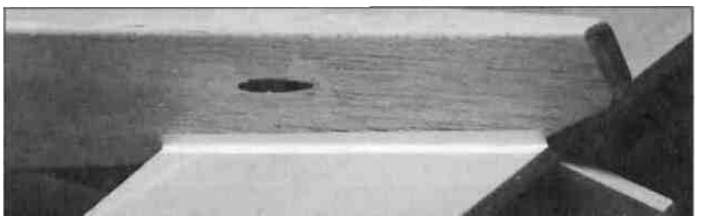
Cover the aircraft with MonoKote covering using the sequence that follows Make sure the film is thoroughly adhered to the structure and all of the edges are sealed. Use a **Top Flite MonoKote Hot Sock"** on your covering iron to avoid scratching the surface of the covering.

EXPERT TIP

Expert Tip COVERING TECHNIQUE

You can practically eliminate wrinkles in MonoKote covering that sometimes occur when the model is left out in the sun or in the back of your car by following this technique used in the **Great Planes** model shop

A. Cover your sealing iron shoe with a **Top Flite Hot Sock** and turn the heat about 3/4 of the way to the high setting **Note:** If this is not hot enough to make the covering stick well, increase the heat

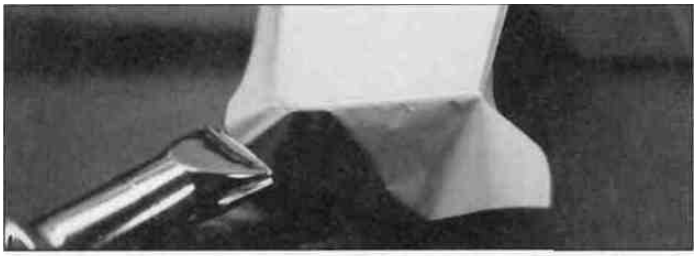


B When covering areas that involve sharp junctions, like the tail section, cut narrow strips (3/8" to 1/2") and apply them in the corners **before** covering the major surfaces The larger pieces of MonoKote will overlap and capture these smaller pieces This technique also bypasses the need to cut the MonoKote in these areas after it has been applied **DO NOT, under any circumstances, attempt to cut the covering material after it has been applied to the fin and stab, except around the leading and trailing edges and the tip.** Modelers who do this often cut through the covering and part-way into the balsa stab This can weaken the stab to the point where it may fail in flight'

C For example here is how to cover the Stab cut a piece of MonoKote film about 2" larger all around Strip off the backing and position the film flush with the fuse side, over the MonoKote corner strip Tack the film down at the center of the stab/fuse junction

D. Pull (as in stretch) the film toward the stab tip, sealing it to the balsa from **the fuse outward,** the width of your sealing iron Work out any **wrinkles and air pockets** as you proceed with a **back and forth motion**

E. Stretch the MonoKote covering **toward the four corners, sealing it down as you proceed.** The trick is to shrink out any wrinkles before you seal the film to the surface



F Use a heat gun to heat and stretch the film around curved surfaces like the stab and rudder tips, while pulling on the excess material You may need to pull **hard** to get out all of the wrinkles, so wear a glove if you need to Trim off the excess, then follow-up with your sealing iron to secure the bond The idea behind this approach (which can be applied to any part of the model) is to **pre-stretch** the covering as it's applied, and remove the air pockets that can expand later which cause the sags and wrinkles

Recommended Covering Sequence

D 1. Tail Junction Strips as described above
D 2 Rudder left side
D 3 Rudder right side
D 4 Bottom of elevators
D 5 Top of elevators
D 6 Stab bottom
D 7 Stab top
D 8 Fin left side
D 9 Fin right side
D 10 Fuse bottom
D 11 Fuse sides
D 12 Fuse top
D 13 Ends of ailerons
D 14 Bottom of ailerons
D 15 Top of ailerons
D 16 TE surfaces of wing
D 17 Bottom of left wing panel
D 18 Bottom of right wing panel (overlap covering 1/4" at the center)
D 19 Top of left wing panel (overlap covering 1/4" at wing LE)
D 20. Top of right wing panel (overlap covering 1/4" **at** the LE and at the center)
D 21 Tank Hatch

Applying windows

Use the patterns on the fuse plan to cut the window shapes from a black self-adhesive MonoKote Trim Sheet After cutting the pieces to size, wipe the area to be covered with soapy water A couple of drops of dish detergent to a cup of water is sufficient Peel the backing from the MonoKote Trim Sheet, then 'float' it into position Wrap a paper towel around a credit card (or something similar), then squeegee over the area to remove the water Only work in one direction, blotting moisture after each pass.

FINAL HOOKUPS AND CHECKS

Install the Control Surfaces

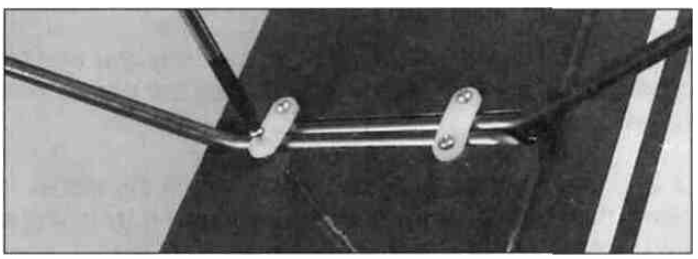
D 1 Attach the elevator to the stab with five hinges and thin CA using the technique described in the Expert Tip section on page 11, step "D" After the CA has cured, flex the elevator to check for free movement.

D 2 Install the rudder using four hinges and thin CA.

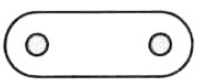
D 3 Roughen the aileron torque rod "arm" with coarse sandpaper for better glue adhesion Clean the arm with rubbing alcohol to remove skin oils or any leftover petroleum jelly.

D 4 Use a toothpick to pack the torque rod holes in the ailerons with 30-minute epoxy, then install the ailerons using four hinges and thin CA Be sure to clean off any excess epoxy from the hinge line with a paper towel moistened with rubbing alcohol

Install Landing Gear



.....*#2* x 3/8" Sheet Metal Screw (4)



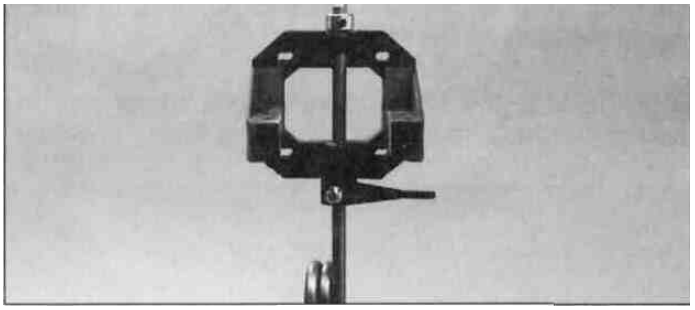
.....Nylon Landing Gear Strap (2)

D 1 Seat the wire landing gear in the groove on the bottom of the fuse Use a **nylon landing gear strap** as a guide to drill 1/16" pilot holes for the screws Secure it with two nylon straps and four **#2 x 3/8" sheet metal screws**

D 2 Enlarge the wheel hub axle holes of all three wheels with a 13/64" (or #9) drill bit and electric drill

.....3/16" wheel collar (4)
(Set screw and wheel collar not included)

D 3 Install the two 3" wheels (not included) on the main landing gear using four 3/16" wheel collars (not included). Grind or file a flat spot in the landing gear wire at the point of set screw contact for each of the outer collars This provides a better area for the set screw to *bite* and helps keep the wheels in place



(Refer to this photo when performing the following steps.)

D 4 Slide the **3/16" steering arm** over the top end of the **nose gear wire.**

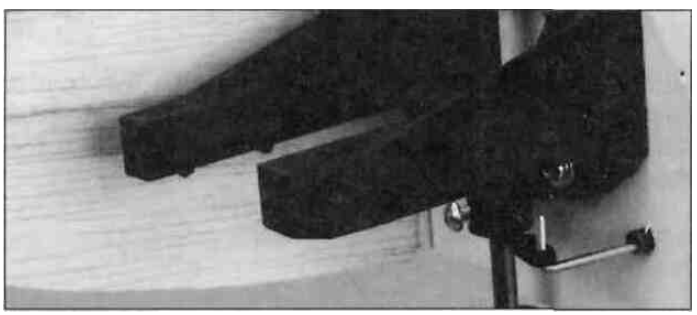
D 5 Insert the nose gear wire into the bottom hole of the engine mount, and out through the top hole

D 6 Slide a **3/16" wheel collar** onto the top end of the wire.

D 7 Check that the nose gear spring coil **clears** the bottom of the fuse, then tighten the wheel collar and steering arm on both sides of the engine mount as shown in the photo This will lock the nose gear in position **NOTE: After** the radio has been installed and the **nose gear aligned,** you will need to file or grind a **flat spot** (see page 40 for Expert Tip on Flat Spots) on the wire to prevent the steering arm from moving from its "set" position.

D 8 Install the 2 3/4" nose wheel with two 3/16" wheel collars (not supplied).

D 9 Enlarge the **outer hole** in the steering arm by drilling with a 5/64" bit.

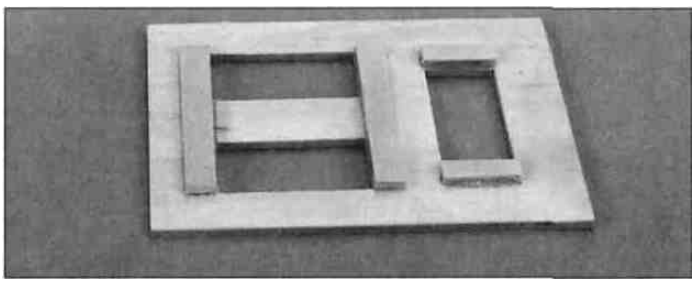


D 10 Make a 90 degree bend in the **unthreaded** nose wheel steering **pushrod wire** 3/8" from one end Insert the straight end of the pushrod into the outer tube, then work the bent section into the enlarged hole in the steering arm.

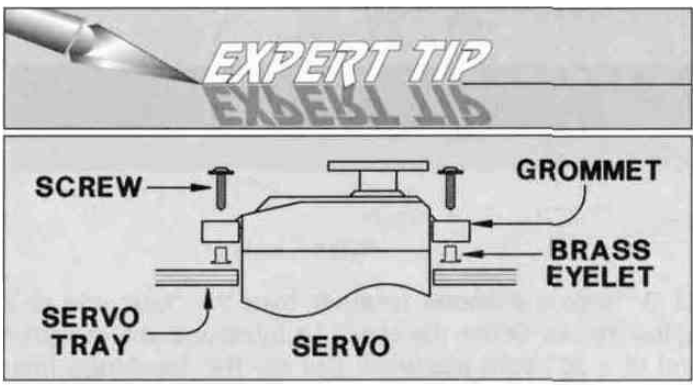
D 11 Position the nose wheel straight ahead and the axle perpendicular to the fuse centerline Loosen the steering arm Then, while holding the nose wheel straight, rotate the steering arm slightly ahead of the nose gear axle centerline **Refer to the top view of the fuse plan for the required angle.** This position will enable you to *turn left,* as well as right Test the linkage for free movement

D 12 Install the engine and muffler, prop, spinner, and tank *Don't worry about putting the prop and spinner on permanently at this stage* Install the tank hatch cover with three #2 x 3/8" screws

Preliminary Radio Installation



D 1 Cut four servo tray doublers from scrap ply left over from the die-cut sheets Make two 3/8" x 2-1/2" and two 3/8" x 1" Glue these to the servo tray with medium CA as shown in the photo.



MOUNTING SERVOS

The proper way to mount a servo is as follows'

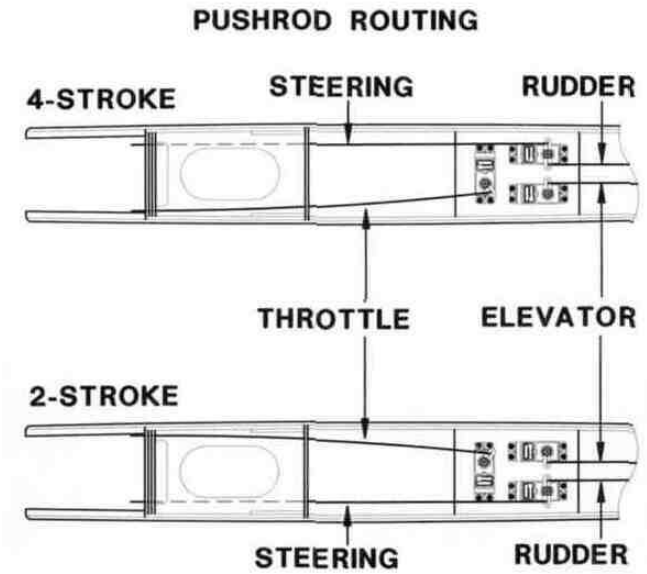
A. Insert a rubber grommet into each of the four servo notches

B Insert a metal eyelet from the **bottom** of the rubber grommet This way the wide portion of the eyelet will be in contact with the servo tray when mounted

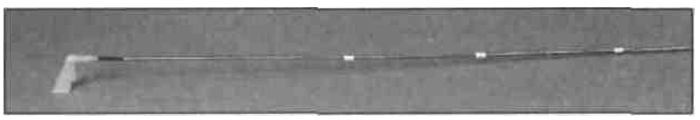
C. Test fit the servo in the tray, and enlarge the openings so the servo will not touch the tray The rubber grommets will isolate the servo from the hard vibration of the airplane's structure

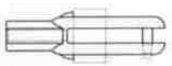
D. Position the servo, then mark the location of the mounting holes Drill pilot holes with a 1/16" bit at each mark

E. Use the servo screws supplied with your radio to mount the servo(s) in the servo tray Tighten the screws until they **are secure against** the top of the metal eyelets, but without crushing the eyelets



D 2. Mount three servos in the die-cut 1/8" ply **servo tray** following the manufacturer's recommendations. **Position them as shown in the sketch for the type of engine you will be using.** Install "cross" style horns on all servos. Place the servo tray on the lower ply fuse doublers toward the rear of the cabin. Lay your receiver and battery on the "floor" toward the front of the cabin. **Do not glue** anything into position yet, as we want to be able to move things around to balance the model.





.....Nylon Clevis (1)

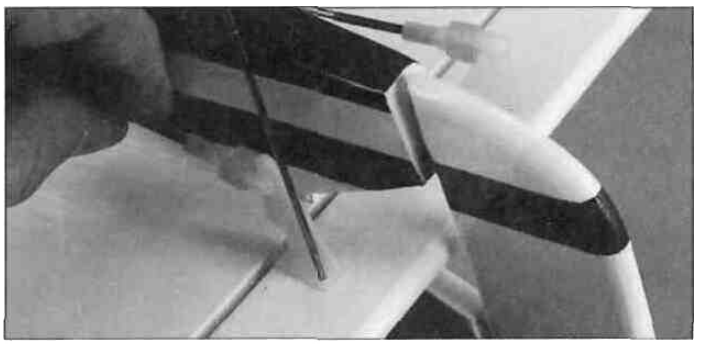
D 3. Slide a **silicone retainer** over the "hex" end of **a nylon clevis.** Screw the clevis 14 turns onto the threaded end of a **36" wire pushrod.** Cut six **1/4" bushings** from the plastic inner pushrod tube provided in the kit. Slide the bushings on the wire pushrod, spacing them as shown on the plans. **Do not shorten the pushrod** wires yet, as you may need to move the servo tray forward of the location shown to balance the model. Be sure that the bushings on each end are **"in"** far enough so that they **won't come out of the pushrod tubes** and cause the control to lock in position. If they are too loose, put a drop of thin CA on the pushrod wire at each bushing to hold them in place. Make sure the CA is **fully hardened** before inserting the pushrods into the tubes.

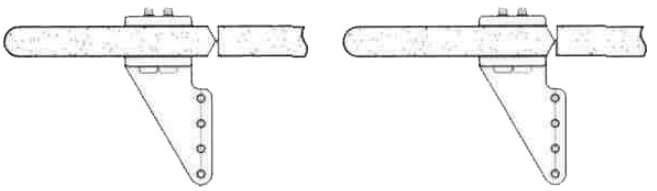
2-56 x 5/8" machine screw

.....Nylon Control Horn (2)

D 4. Trim the backing plate from a **nylon control horn,** then clip the clevis to the outer hole of the horn (refer to the photo for step 3). Make a second pushrod assembly exactly the same as the first.

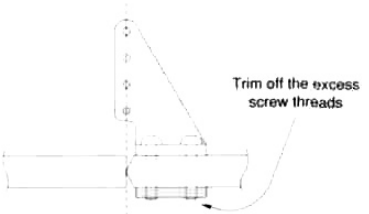
D 5. Refer to the plans to determine which side the elevator and rudder pushrods will exit the fuse.



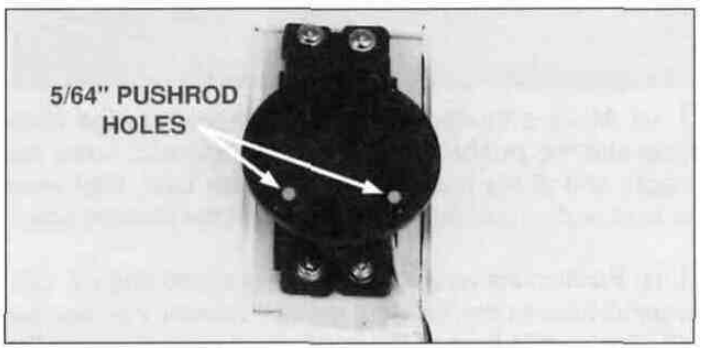


INCORRECT **CORRECT**

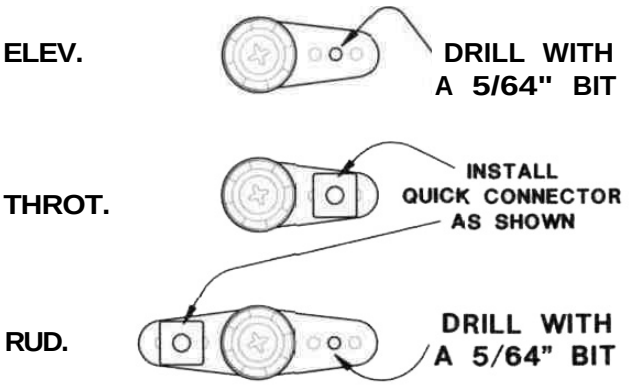
D 6. Insert the pushrods into the tubes in the fuse, then hold a horn in position on either the elevator or rudder (see sketch above for correct alignment). The pushrod should not be bent and should slide easily in the tube. Mark the location for the horn screws on the control surface.



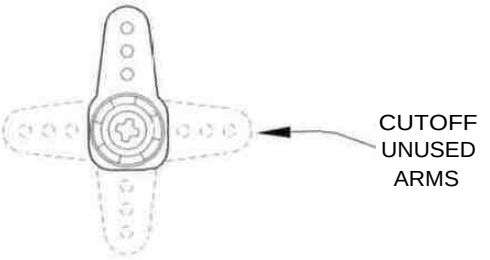
D 7. Drill 3/32" horn screw holes through the control surface, then screw the horn in place with two 2-56 machine screws and the backing plate. Repeat for the other control surface.



D 8. If you will be using one, test fit the aileron servo in the bottom of the wing. Remove about 1/4" of balsa sheeting from both ends of the servo opening to allow the servo to fit flat on the ply servo tray.



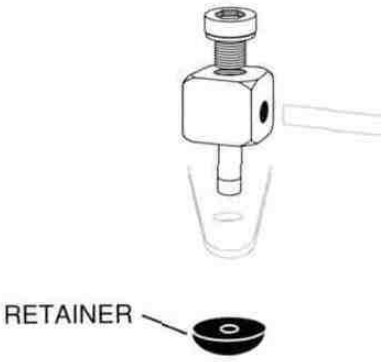
SERVO HORN GUIDE



D 9. Prepare **three** "cross" style servo horns as follows:

A. Cut three arms from **two** horns These two single arm horns will be used for the elevator and throttle

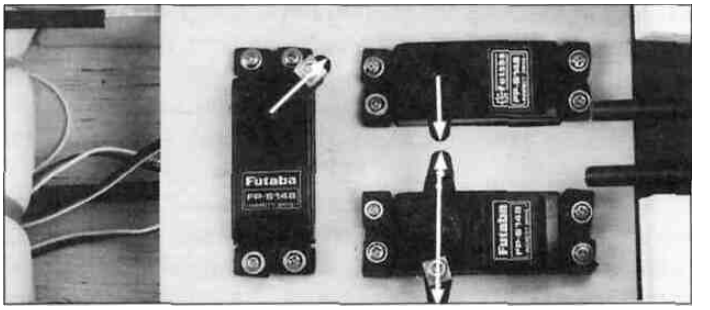
B. Drill a 5/64" hole through the second hole from the outer end of the **elevator** servo horn.



C. Install a screw lock pushrod connector in the second hole from the outer end of the **throttle** servo arm. **Don't install the retainer** until the throttle's operation has been tested.

D Cut two **opposite** arms off the third servo horn to make one "long" arm.

E Drill a 5/64" hole through the second hole from the outer end for the rudder pushrod Install a screw lock pushrod connector, **including** the retainer, on the **opposite arm** in the **second hole** from the outer end Your nose wheel steering pushrod will attach to this connector.



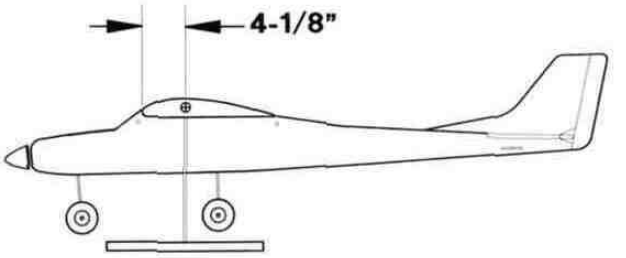
D 10. Connect the receiver to the servos, switch, and battery Turn on your transmitter and receiver, then center the elevator, rudder and aileron servo trim levers on the transmitter This will center the splined servo output shafts. Install the three servo horns you prepared on the servos in the fuse Put them on the splined servo output shafts, in the positions shown in the photo. Turn the radio off-receiver first, then the transmitter.

*Because it's helpful to be able to move the servo tray when balancing the model we'll stop installation of the radio **at** this point, then resume after the model is balanced*

Note: Although you have not yet trimmed the pushrod wires to their final length, they should be temporarily installed in the fuselage while balancing the model in the next steps.

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.



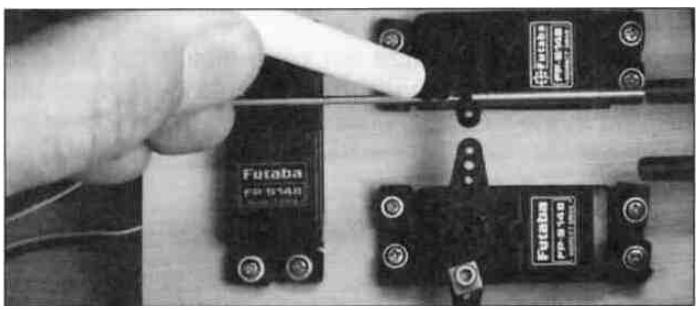
D 1. Install the wing with rubber bands or bolts Accurately mark the **balance point** on the **bottom** of the wing on both sides of the fuselage The balance point is shown on the plan and is located **4-1/8" (105 mm) back from the leading edge.** This is the balance point at which your model should balance for your first flights Later, you may wish to experiment by shifting the balance up to **1/4" forward or back** to change the flying characteristics Moving the balance **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 balance **aft** makes the model **more agile** with a lighter and snappier feel In any case, **please start at the location we recommend and do not at any time balance your model outside the recommended range.**

D 2. With the wing attached to the fuselage and an **empty** fuel tank, lift the model at the balance point. If the tail drops when you lift, the model is "tail heavy" and you must move weight toward the nose to balance. If the nose drops, it's "nose heavy" and you must move weight toward the tail to balance.

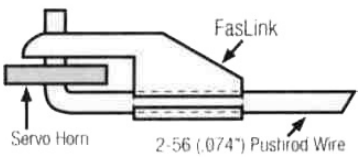
Balance the model by changing the position of the **servo tray, receiver battery, and receiver, then re-testing.** When balance is obtained, **securely glue the servo tray to the fuse doublers.** Cut off the rudder and elevator pushrod tubes 2" - 3" short of reaching the servos. Note the location of the battery and receiver for permanent installation later in the finishing process.

IMPORTANT: After the model is 100% complete, recheck the balance. Move the battery, if needed, to balance the model before flight.

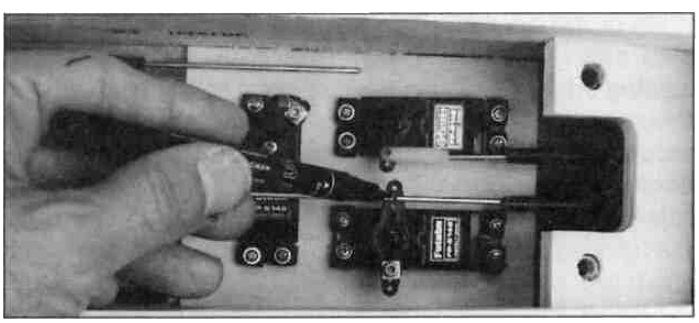
Final Radio Hook Up



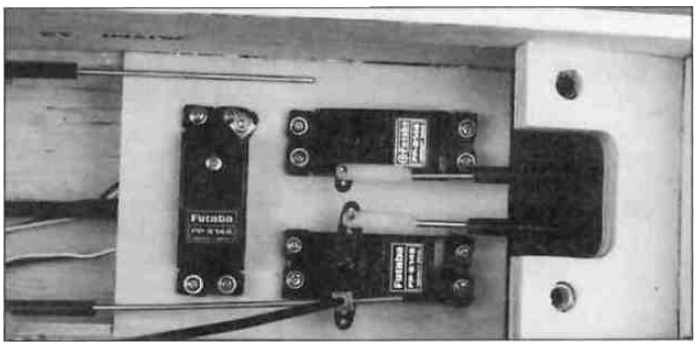
D 1. Center the **elevator,** then mark the pushrod where it crosses the enlarged servo horn hole.



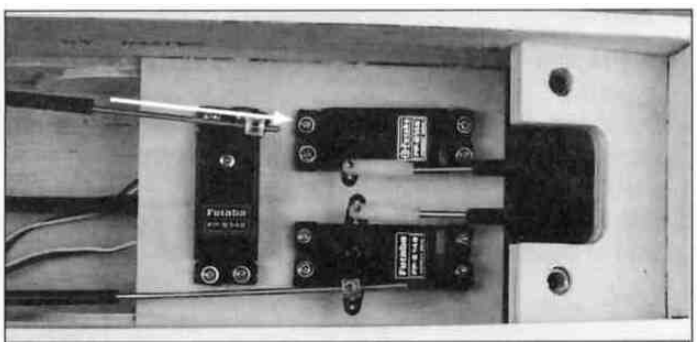
D 2. Make a 90-degree bend in the pushrod on your mark, then insert it through the enlarged hole. Secure it in place with a **nylon Faslink** as shown in the sketch. Cut off any excess wire 1/8" above the Faslink. **Caution:** Wear safety glasses **whenever** you cut wire!



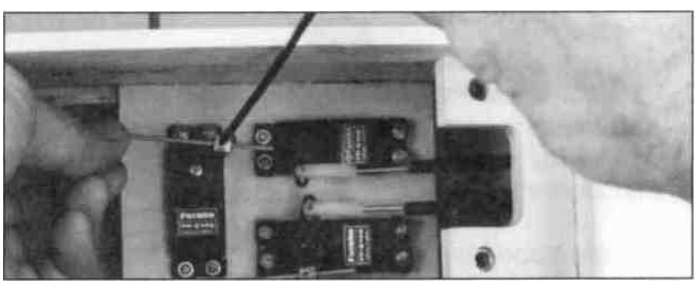
D 3. Repeat steps 1 and 2 for the **rudder. NOTE:** If you will only be using **three channels,** plug the **rudder servo into the aileron socket** in your receiver (usually channel 1). This way you will develop the *feel for* flying as you would with ailerons, using the right-hand control stick for most of your control.



D 4. Insert the nose wheel **steering** pushrod into the screw lock pushrod connector, then center the nose wheel. Install and tighten down the socket head screw and test the steering. When the rudder moves to the right, the nose wheel should also move to the right. Make sure the nose gear steering arm does not bind against the firewall when the rudder stick is pushed fully to the left.



D 5. Pull the **throttle** control stick **and trim lever** on your transmitter to the fully "back" or closed position. Hook up the throttle using the pushrod you made earlier. Insert the pushrod through the screw lock pushrod connector, then install the horn on the servo so that it points toward the tail of the model at about a 30-degree angle as shown. Don't install the locking screw yet.

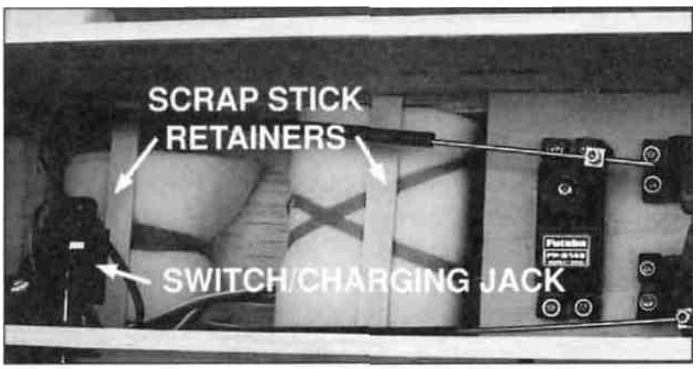


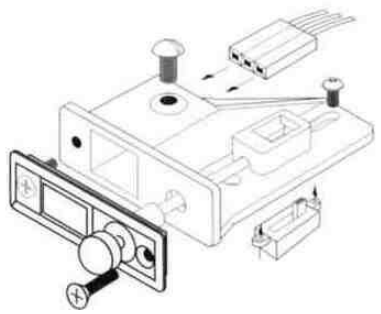
D 6. Pull the throttle pushrod toward the tail **to fully close the throttle.** Install the locking screw in the connector, tightening it slightly. Move the throttle trim lever and watch the carburetor to see if it opens slightly. If the servo does not move (just sits there buzzing), you need to flip the "Servo Reversing Switch" on your transmitter. If it works properly,

open the throttle all the way with the main control stick. If the throttle opens all the way but the pushrod bends (or the servo buzzes), move the **connector toward** the center of the servo horn to decrease the amount of throw. When the throttle works properly, install the retainer on the bottom of the connector post to secure it in position. Tighten the connector screw, and install the servo horn screw.

D 7. Wrap your receiver with 1/4" thick foam rubber. Secure the foam with a couple of rubber bands. The foam rubber acts as a shock and vibration absorber. Position the receiver where it was when you balanced the model, then glue a scrap of ply over the top of it to hold it in position. Follow the same procedure to mount the battery.

D 8. Route the receiver **antenna** through the antenna tube along the bottom of the fuse. If there is excess antenna length, it should exit the back end of the fuselage and trail behind.

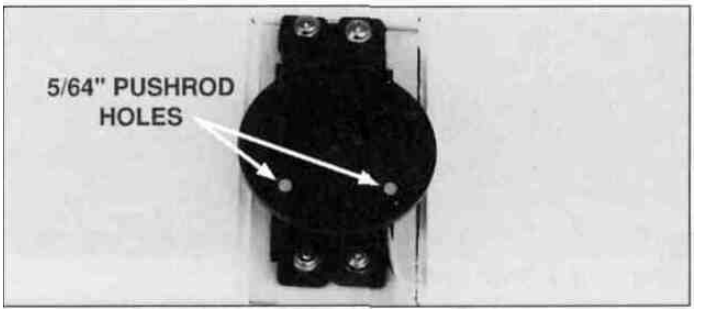




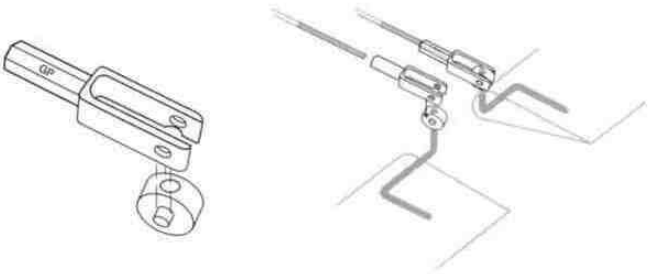
Great Planes **switch/charging jack mount** (GPMM1000). (Not included.)

D 9. Mount the receiver switch and charging jack through the fuselage on the opposite side of the fuse from the muffler exhaust. We suggest using a Great Planes **switch/charging jack mount** (GPMM1000) because of its ease of installation and tidy appearance.

NOTE: *If you will be only using 3 channels without functional ailerons, skip ahead to step* 15.

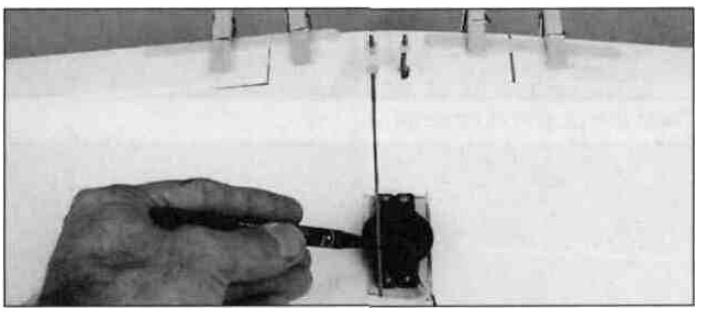


D 10. Drill two 5/64" holes in a large round servo horn as shown on the wing plan for use with the ailerons. The odd placement of the holes will cause the ailerons to have "differential" travel. This means that they won't move down as much as up—an aid to making smooth turns. Take a minute to read the explanations of "Adverse Yaw" and "Differential Throw" on pages 44 and 45.

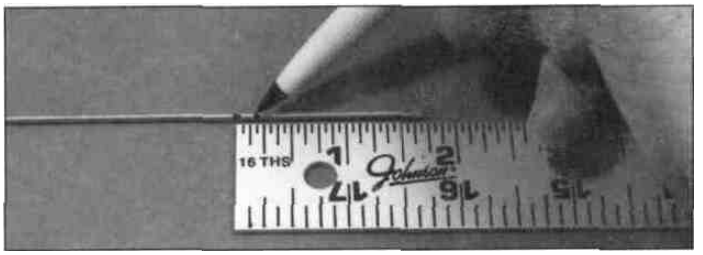


D 11. Screw a 6" threaded pushrod 14 revolutions into a nylon **swivel clevis.** Screw a nylon **swivel** onto one of the aileron torque rods so that the centerline of the swivel is 3/4" from the surface of the wing. Snap the swivel clevis onto the swivel. Repeat this operation for the other torque rod.

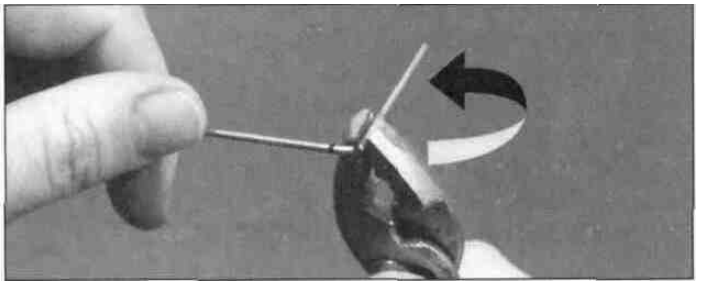
D 12. Plug the aileron servo into your receiver, then center it and the round servo horn as you have done with the other controls.



D 13. Center the ailerons, then mark both pushrods directly over their respective holes in the servo horn. Remove the pushrods by unsnapping the clevises. Use the following sequence of photos to make a Z-bend in each pushrod or use a Z-bend pliers.

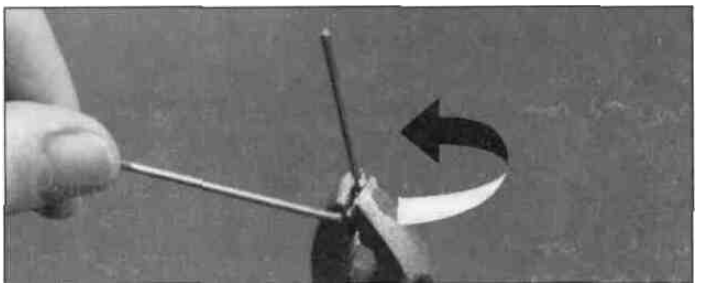


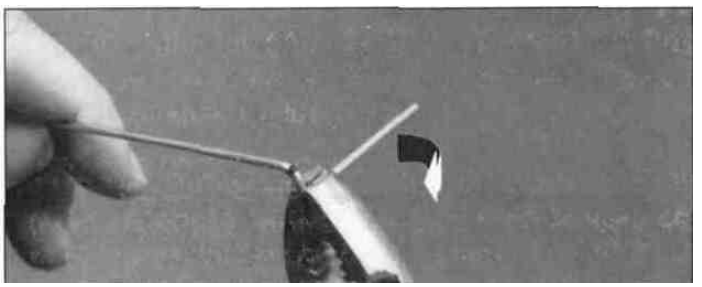
Make a mark 3/16" from the first mark.



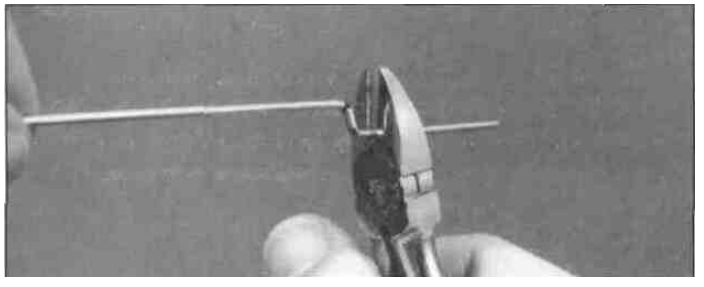
Make a 90 bend at the outside mark.

Make a 90 degree bend at the inside mark.

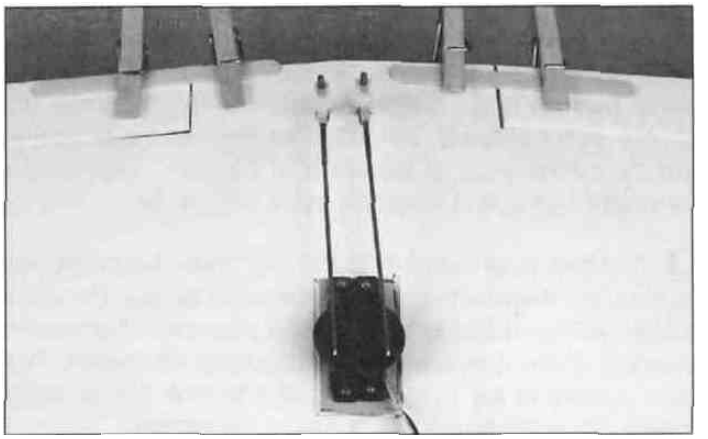




Twist the pushrod straight.



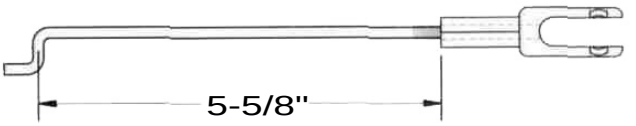
Cut any extra wire off the ends and sand or file the **burrs off** of the ends to prevent scratching yourself later.



D 14. Insert the Z-bends into the servo horn and reattach the swivel clevises. Mount the horn on the servo and test the aileron's operation.

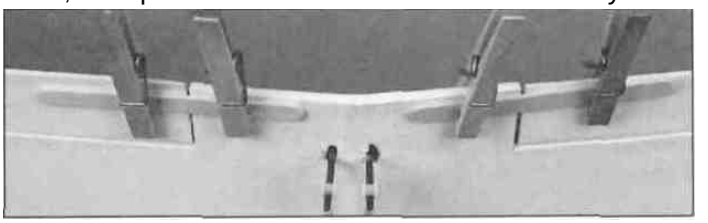
Aileron Lock for 3-Channel Operation

D 15. Screw a 6" threaded pushrod 14 revolutions into a nylon **swivel clevis.** Screw a nylon **swivel** onto one of the aileron torque rods so that 1/4" of thread protrudes above the top of the swivel. Snap the swivel clevis onto the swivel. Repeat this operation for the other torque rod.

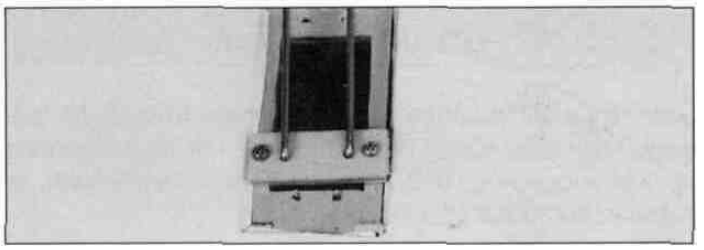


D 16. Mark both wire pushrods exactly 5-5/8" from the back end of both clevises. Use the instructions at step 13 to make Z-bends at the mark on both pushrods or use a Z-bend pliers.

D 17. Drill two 5/64" holes through the punch marks on the die-cut 1/8" ply **aileron lock.** Insert the Z-bends into these holes, then position the aileron lock on the servo tray.



D 18. Temporarily lock both ailerons in position with popsicle sticks and clothespins as shown. Drill a 1/16" hole through both ends of the aileron lock into the side rails of the servo tray. Enlarge the holes in **only** the aileron lock with a 3/32" drill bit.



D 19 Use two #2 x 3/8" screws to secure the aileron lock in position Remove the popsicle sticks and clothespins If you decide to install a servo at a later date, simply install the servo in place of the aileron lock The location of the Z-bends should work with most servos to provide the correct setup as described in steps 10-14 of this section

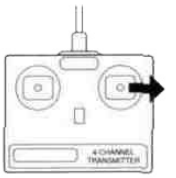
D 20 **Go back and check your installation.** Be sure that all servo screws, horns and other components are secure

D 21 Apply a strip of 1/16" thick foam **wing-seating tape** (Great Planes GPMQ4422 recommended) to the top edges of the wing saddle area of the fuselage This tape provides a positive seal against dirt and exhaust oil, and cushions the wing from vibration

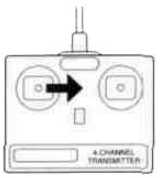
D 22 Check the direction of all control functions They must all move in the direction shown in the following sketches If not, change the position of the reversing switches on your transmitter

4-CHANNEL RADIO SET-UP
(STANDARD MODE 2)

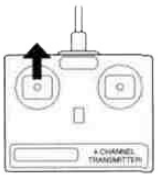
ELEVATOR MOVES UP



RIGHT AILERON MOVES UP
LEFT AILERON MOVES DOWN

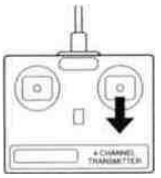


RUDDER MOVES RIGHT
NOSE WHEEL TURNS RIGHT

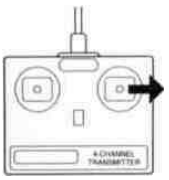


CARBURETOR WIDE OPEN

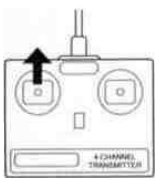
3-CHANNEL RADIO SET-UP
(STANDARD MODE 2)



ELEVATOR MOVES UP



RUDDER MOVES RIGHT
NOSEWHEEL MOVES RIGHT



CARBURETOR WIDE OPEN

Control Surface Throws

We recommend the following control surface throws:

NOTE: Control throw (movement) is measured at the **widest part** of the elevator, rudder and ailerons Hold a ruler vertically on your workbench or block it up on books to perform these measurements:

SINGLE RATE TRANSMITTER
The following throws* are for a transmitter that does **not** have **Dual Rates.**

ELEVATOR:	1/2" up	1/2" down
RUDDER:	3/4" right	3/4" left
AILERONS:	7/16" up	5/16" down

DUAL RATE TRANSMITTER

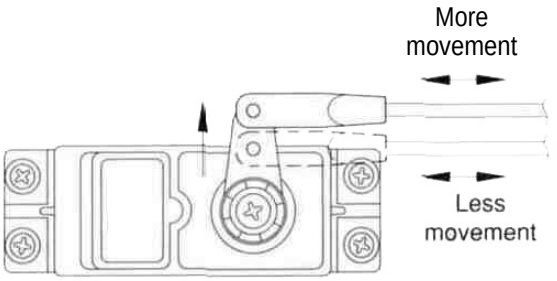
"Dual Rate" is a feature on some radios which allows you to switch the control surface throws in flight This lets you change the responsiveness of your model with regard to the maneuvers you are doing

The following throws* are for a transmitter equipped for **Dual Rate** servo control.

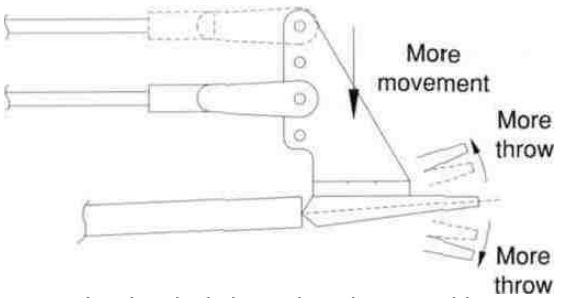
ELEVATOR:	(High Rate)	5/8" up	5/8" down
	(Low Rate)	3/8" up	3/8" down
RUDDER:	3/4" right	3/4" left	
AILERONS:	(High Rate)	1/2" up	3/8" down
	(Low Rate)	3/8" **up**	1/4" down

*The elevator and rudder throw can be adjusted as shown below.

NOTE: The balance and surface throws for this aircraft have been extensively tested. We are confident that they represent the settings at which the PT-60 flies best. Please set up your aircraft to the specifications listed above. If, after a few flights, you would like to adjust the throws to suit your taste, that's fine. Remember, *"more is not better."*



Moving the clevis outward on the servo arm results in more pushrod movement.

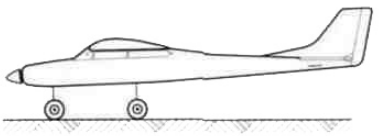


Moving the clevis inward on the control horn results in more throw

Ground Stance

D 1 "Eyeball" the side of the fuselage from 6-10 feet away Adjust the height of the nose by raising or lowering the nosegear wire so that your model will sit nearly level, as shown in the Good Stance sketch

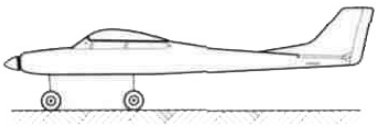
NOSE TOO LOW



May be difficult to rotate on takeoff.

Sticks to the runway after landing.

GOOD STANCE



Will lift off easily on takeoff.

Lands predictably and stays put on runway.

NOSE TOO HIGH

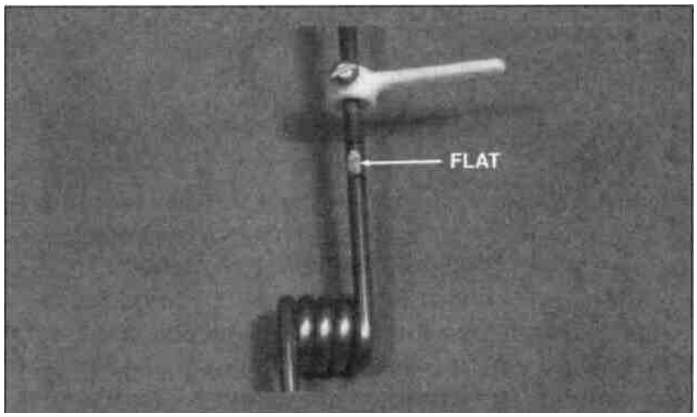
Tends to lift-off automatically on takeoff.
May bounce and become airborne during landing.

D 2 Once the correct ground stance is established, grind or file a 'flat spot on the nosegear wire to lock the steering arm in position (See below.)

NOSE GEAR FLAT SPOT

When everything is aligned and the model sits correctly, tighten the 6-32 x 3/16" machine screw on the steering arm tight enough to leave a **mark** on the nose gear wire Remove the nose gear from the engine mount and remove the steering arm assembly

As mentioned, a flat spot or "flat" is required on the nosegear wire This flat allows the nose gear steering arm to positively lock onto the nose gear wire, providing a "no-slip" steering linkage



Remove the steering arm from the nose gear wire and locate the mark left by the 6-32 x 3/16" machine screw Now, with the mark facing up, clamp the nose gear in a vise and use the side of a flat file or a Dremel™ Moto-Tool with a narrow grinding wheel, to make a flat spot at the mark

Reassemble the nose gear and install it into the engine mount Tighten the steering arm screw directly over the flat Your nose gear steering will always remain positive, even on the roughest of surfaces.

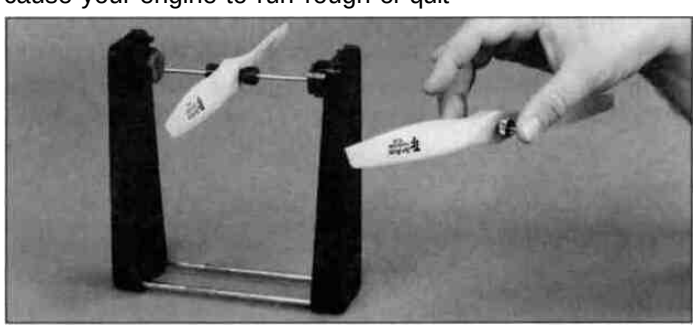
Pre-Flight

Charge the 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

Balance the Propeller

Balance your propellers carefully before flying An unbalanced prop is the single most significant cause of damaging vibration Not only will engine mounting screws and bolts vibrate out, possibly with disastrous effect but vibration will also damage your radio receiver and battery Vibration will cause your fuel to foam, which will, in turn, cause your engine to run rough or quit



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

Find a safe place to fly

The best place to fly your R/C model is an AMA (Academy of Model Aeronautics) chartered club field Ask your hobby shop dealer if there is such a club in your area and join Club fields are set up for R/C flying and that makes your outing safer and more enjoyable The AMA also can tell you the name of a club in your area We recommend that you join AMA and a local club so you can have a safe place to fly and have insurance to cover you in case of a flying accident (The AMA address is listed on page 2 of this instruction book)

If a club and its flying site are not available, you need to find a large, grassy area at least 6 miles away from any other R/C radio operation, like R/C boats and R/C cars and away from houses, buildings and streets A schoolyard may look inviting but it is too close to people, power lines and possible radio interference.

Ground check the model

If you are not thoroughly familiar with the operation of R/C models, ask an experienced modeler to check to see that you have the radio installed correctly and that all the control surfaces do what they are supposed to The engine operation also must be checked and the engine broken in on the ground by running the engine for at least two tanks of fuel **Follow the engine manufacturer's recommendations for break-in.** Check to make sure all screws remain tight, that the hinges are secure and that the prop is on tight

Range check your radio

Wherever you **do** fly, you need to check the operation of the radio before every time you fly First make sure no one else is on your frequency (channel) 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 someone help you Have them stand by your model and, while you work the controls, tell you what the various control surfaces are doing

Repeat this test **with the engine running** at various speeds with an assistant holding the model If the control surfaces are not always acting correctly, **do not fly!** Find and correct the problem first

Engine Safety Precautions

NOTE: 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 the 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 as 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 items such as these away from the prop loose clothing shirt sleeves ties scarfs long hair or loose objects (pencils screw drivers) that may fall out of shirt or jacket pockets into the prop

Use a chicken stick device or electric starter follow instructions supplied with the starter or stick 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 after operation Make sure fuel lines are in good condition so fuel will not leak onto a hot engine, causing a fire

To stop the engine cut off the fuel supply by closing off the fuel line or follow the engine manufacturer s recommendations Do not use hands, fingers or any body part to try to stop the engine Do not throw anything into the prop 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

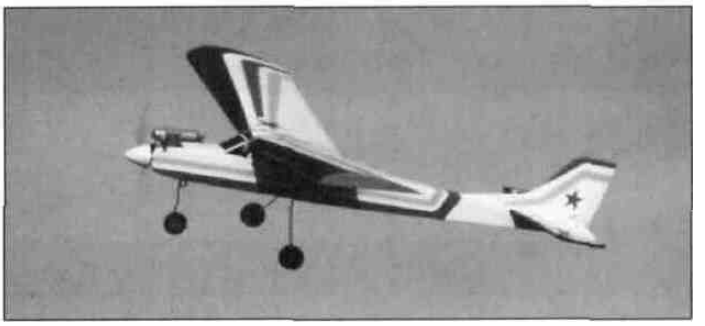
1 I will have completed a successful radio equipment ground check before the first flight of a new or repaired model

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 .

FLYING



The moment of truth has finally arrived You've put a lot of effort into building your PT 60 and it looks great' Protect your investment by following a few simple tips

1. If possible have an experienced modeler look over your work before you head out to your flying field Its easier **to** fix problems in the workshop instead of on the flightline

2 Become familiar with starting your engine, and break it in before going for your first flight **Be sure the engine will stop when the trim lever is pulled all the way back.**

3 Assemble a simple flight kit (a shoe box is fine to start with) which should include a starting battery and glo-plug clip (or ni starter) chicken stick for flipping the prop fuel and a means of filling the tank a couple of small screwdrivers #64 rubber bands (or wing bolts) spare prop and glo plug 6 adjustable wrench and a pair of needle nose pliers In addition to tools you should also take along some paper towels and spray window cleaner to remove residue after each flight.

4 When you load up to go to the flying field be sure that the batteries have charged for at least 14 hours and that you have your fuselage wing transmitter and flight box And, most important, you have your AMA license

5. Range check the radio' See page 41.

EXPERT TIP

USING RUBBER BANDS

If you are using rubber bands to attach your wing, the rule of thumb is to use two #64 rubber bands per pound of model weight If your model tipped the scales at 7 pounds, you need 14 rubber bands It doesn't matter how many run straight across the wing or how many are criss-crossed, so long as the last two are criss-crossed This trick stops the other bands from popping off Do not use oily rubber bands for more than a few flying sessions Check each rubber band before using it and watch out for cracks Rubber bands can be conditioned by storing the oily ones in a zip-top storage bag partially filled with talcum powder or corn starch Both products will absorb the oil

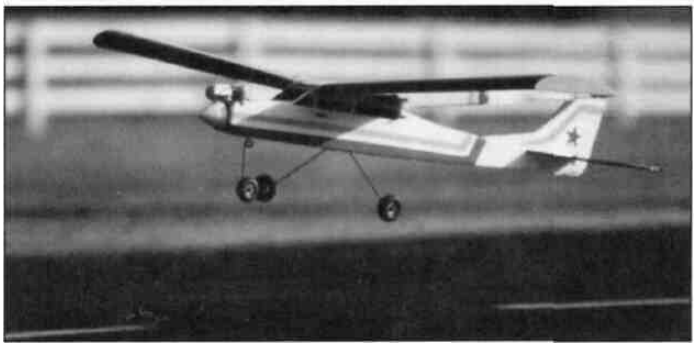
Taxiing

Start the engine and set the throttle trim for a slow steady idle Have your instructor or a helper hold the plane while you work the controls Upon release advance the throttle slightly to start rolling then back-off the power to prevent going too fast and possibly taking off Stand behind the plane as it taxies away from you and note the direction it turns as you move the rudder control One thing to keep in mind with R/C models (whether it be cars boats, or planes) is that the steering controls may seem to reverse when the model is moving toward you For example, if you are flying toward yourself and you give a **right** control input (ailerons or rudder) the model will move off to **your left** The fact of the matter is, of course, that the controls are not reversed and the aircraft did actually enter a right turn The plane does move off to your left from your vantage point, but if you imagined yourself in the cockpit you would realize the plane turned to the right as commanded All it takes is a little practice to maintain proper orientation of your aircraft, but that s why we recommend finding an instructor

When you feel comfortable advance the throttle a little while standing behind the plane to get the feel of a takeoff roll but pull back on the power before the PT lifts off Try this several times adding a little more power each time If the plane starts to veer off, immediately cut the power to prevent a mishap

Although many R/C pilots have taught themselves to fly, we strongly recommend that you find an instructor to help get you started Although the PT series of trainers offer the greatest opportunity of success for the self-taught, there is a high probability that you will crash your airplane on the first flight Protect your investment of time and money-obtain the assistance of an experienced R/C pilot.

Takeoff



Your first flights should be made in little or no wind If you have dual rates on your transmitter set the switches to low rate for takeoff Taxi into position pointing directly into the wind Although this model has good low speed characteristics, you should always build up as much speed as your runway will permit before lifting off as this will give you a safety margin in case of a flame-out Advance the throttle smoothly to the wide open setting When the plane has sufficient flying speed (you won't know until you try) lift off by smoothly applying a little up elevator (dont Jerk it off to a steep climb'), and climb out gradually trying to keep it straight and the wings level The PT-60 will climb at a 20 or 30 degree angle under full throttle Climb to about 100 feet before starting a VERY gentle turn by moving the aileron stick Apply a little more back pressure on the elevator stick as the PT turns Stop the turn by moving the aileron stick in the opposite direction until the wings are level, then return the stick to the neutral position Pull the power back to 1/3 throttle

Flying

We recommend that you take it easy with your PT-60 for the first several flights and gradually get acquainted with this great plane as your engine becomes fully broken-in The PT-60 is designed to fly level with neutral elevator trim at approximately 1/4 to 1/3 throttle (using a 60 size engine) — this is the best speed for learning to fly On later flights, if you want the PT 60 to maintain level flight at full throttle, you will need to give it a little down trim

Your first flights should consist of mostly straight and level flight with gentle turns to keep the model over the field These flights will give you practice at coordinating your control inputs and maintaining the proper orientation of the airplane As mentioned earlier turns are accomplished by banking the aircraft with the ailerons (rudder will accomplish this on a 3-channel airplane) then gently adding some back stick (up elevator) Enough back stick should be held in to keep the aircraft at a constant altitude To stop turning apply opposite aileron (or rudder) to level the wings, then release the sticks. There is a memory aid that may help keep you out of trouble when the plane is **flying toward you** — put the stick under the low wing In other words, move the stick in the direction of the low wing to **raise** that wing When you are comfortable flying the aircraft, you can practice using the rudder along with the ailerons to 'coordinate the turns — usually, a small amount of rudder applied in the direction of the turn will keep the tail following the exact same track as the nose

The most common mistake when learning to fly is "over control" Think of *pressure* instead of large movements of the control sticks Remember, all PTs will recover from almost any over control situation within 50-100 feet if you simply **let go of the sticks.**

Add and practice one maneuver at a time, learning how your PT-60 behaves in each one For ultra-smooth flying and normal maneuvers, we recommend using the "low rate" settings as listed on page 40 High rate control throws will give your PT-60 enough control for loops, barrel rolls, and many other basic aerobatic maneuvers.

After you have several flights on your PT-60, it's time to reward yourself with your first aerobatic maneuver — **a loop** Climb to a safe altitude and turn into the wind Apply full throttle, level the wings, then slowly pull back on the elevator stick to about 1/2 to 3/4 up elevator (depending on your throws) and hold this control input After you *go over the top* and start down the back side of the loop, pull the throttle back to about half This will keep the stresses on the airplane low and the airspeed relatively constant Keep holding up elevator until the plane is level then slowly release the sticks Maneuver complete' It's really that easy!

CAUTION (THIS APPLIES TO ALL R/C AIRPLANES)- If, while flying, you notice any unusual sounds, such as a low-pitched "buzz", this may be an indication of 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 will indicate which surface fluttered), and make sure all pushrod linkages are slop-free If it fluttered once it will probably flutter again under similar circumstances unless you can eliminate the slop or flexing in the linkages Here are some things which can result in flutter Excessive hinge gap, Not mounting control horns solidly, Sloppy fit of clevis pin in horn, Elasticity present in flexible plastic pushrods, Side-play of pushrod in guide tube caused by tight bends, Sloppy fit of Z-bend in servo arm, Insufficient glue used when gluing in the elevator joiner wire or aileron torque rod, Excessive flexing of aileron, caused by using too soft balsa aileron, Excessive "play" or "backlash" in servo gears, and Insecure servo mounting

Landing

APPROACH TOO STEEP

Apply up elevator.

TOO MUCH FLARE

Danger of stalling!

Release elevator.

GOOD LANDING FLARE

Hold this angle until touchdown.

When it's time to land, fly a normal landing pattern and approach as follows Reduce the power to about 1/4 and fly a downwind leg far enough out from the runway to allow you to make a gentle 180 degree turn As you make the turn into the wind for your final approach, pull the throttle back to idle The PT-60 has a lot of lift so you will need a slow reliable idle in order to achieve a nice, slow landing Allow the plane to keep descending on a gradual *glide slope* until you are about 3 feet off the runway Gradually apply a little up elevator to *flare* for landing You should apply just enough up elevator to hold the plane just off the runway while the excess speed bleeds off The PT-60 should settle onto the runway for a slow, slightly nose-high landing.

Good luck and have fun flying your PT-60, but always stay in control and fly in a safe manner.

Some Modeling Terms and Trivia

...so you'll know what they are talking about at the flying field.

Adverse Yaw - The tendency of an airplane to yaw in the opposite direction of the roll For instance, when right aileron is applied, the airplane yaws to the left, thus opposing the turn Adverse yaw is common in trainer airplanes having flat bottom wings, and is most noticeable at slow speeds and high angles of attack such as during takeoffs and when stretching a landing approach Caused by the unequal drag of the upward and downward deflecting ailerons, this undesirable trait can be minimized by setting up the ailerons with "Differential Throw," or by "coordinating the turns, using aileron and rudder control simultaneously (See "Differential Throw).

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

Boring holes in the sky -Having fun flying an R/C airplane, without any pre-determined flight pattern

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.

Differential Throw -Ailerons that are set up to deflect more in the upward direction than downward are said to have "Differential Throw" The purpose is to counteract "Adverse Yaw"

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—i e , having no ailerons

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.

Frequency Control -The FCC has allowed the 72MHz band to be used for R/C aircraft operations This band is divided up into many different channels in which you can choose a radio system You should be aware that certain areas have frequencies in which there is pager interference This is why it is always a wise move to check with your local hobby shop to find out any channels that may be troublesome in the area you wish to fly.

Fuel Overflow Line (Vent) -The fuel line is either open to atmospheric pressure or attaches to the muffler pressure nipple to pressurize the fuel tank for better fuel flow to the engine This is the line through which the fuel will overflow when the tank is full.

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.

Glitch -radio problem that never happens unless you are over trees or a swamp

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 See next heading and Idle Bar" plug.

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.

Grease-in -A very smooth, gentle landing without a hint of a bounce.

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

Idle Bar plug -This type of glow plug has a "bar" across the tip to help prevent raw fuel from being splashed onto the glow element Too much raw fuel will cool the plug and prevent it from igniting the fuel/air mixture An idle bar is a help in obtaining a low idle speed.

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

Muffler Baffle -A restnctor plate inside the muffler which reduces engine noise. This plate can be removed to increase power, but only if there are no noise restrictions where you fly.

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 engines ability to idle low and improves high speed performance Ideal nitro content varies from engine to engine Refer to the engine manufacturers 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 "*

One-point landing (or a figure 9) -Synonymous with "stuffing it in Something we hope you never do.

Pitch Axis -The airplane axis controlled by the elevator. Pitch is illustrated by holding the airplane at each wingtip Raising or lowering the nose is the pitch movement This is how the climb or dive is controlled

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 props 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".

Re-Kitting your airplane -Changing your finished model back into a kit, as a result of 'stuffing it in."

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.

Roll Axis -The airplane axis controlled by the ailerons Roll is illustrated by holding the airplane by the nose and tail Dropping either wingtip is the roll movement This is used to bank or turn the airplane Many aircraft are not equipped with ailerons and the Roll and Yaw motions are controlled by the rudder This is one reason why most trainer aircraft have a larger amount of dihedral.

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

Servo Output Arm -The removable arm or wheel which bolts to the output shaft of a servo and connects to the pushrod.

Shot down -A "hit" that results in a crash landing. Sometimes caused by radios miles away

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
Also, see flutter

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

Spinner -The nose cone which covers the hub of 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)

Tachometer -An optical sensor designed specifically to count light impulses through a turning propeller and read out the engine RPM

Tip stall -The outboard end of one wing (the tip) stops developing lift, causing the plane to roll suddenly in the direction of the stalled wing This situation is not fun when you are only a few feet off the runway trying to land

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

Touch-and-go -Landing and taking off without a pause. Often confused with a good bounce

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

Washout -An intentional twist in the wing causing the wing tips to have a lower angle of attack than the wing root In other words the trailing edge is higher than the leading edge at the wing tips Washout helps prevent tip stalls and helps the PT family of trainers recover, hands-off, from unwanted spiral dives

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

Wing Loading -This is the amount of weight per square foot that has to be overcome to provide lift It is normally expressed in ounces per square foot This specification can be easily calculated as follows If you know the square inches of the wing simply divide by 144 to obtain square feet Divide the total weight (in ounces) of the airplane by the wing area (in square feet) This information is valuable when deciding on which airplane to build next Planes with high wing loading numbers must fly faster to stay in the air These are generally performance airplanes Conversely, planes with lower numbers do not need as much air flowing around the wing to keep it flying Gliders and trainer airplanes fall into this category because slow, efficient flight is desirable

Wing Root -The centerline of the wing, where the left and right wing panels are pined.

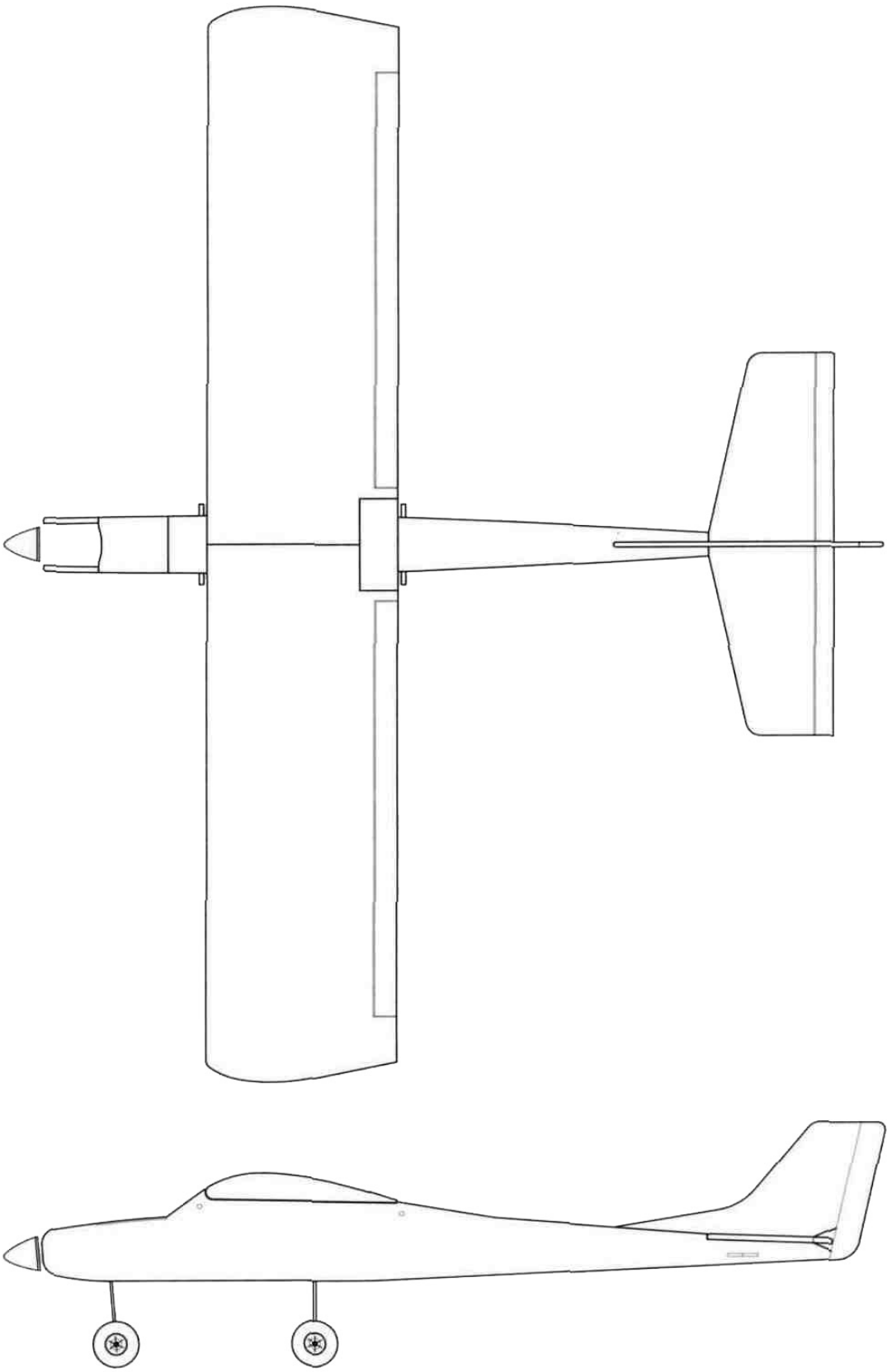
Yaw Axis -The airplane axis controlled by the rudder Yaw is illustrated by hanging the airplane level by a wire located at the center of gravity Left or right movement of the nose is the Yaw movement

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

Z-Bend Pliers -A plier type tool used for easily making perfect Z-bends

TWO-VIEW DRAWING

Photocopy this two-view drawing and use the copy to plan your trim scheme



PRINTED IN USA