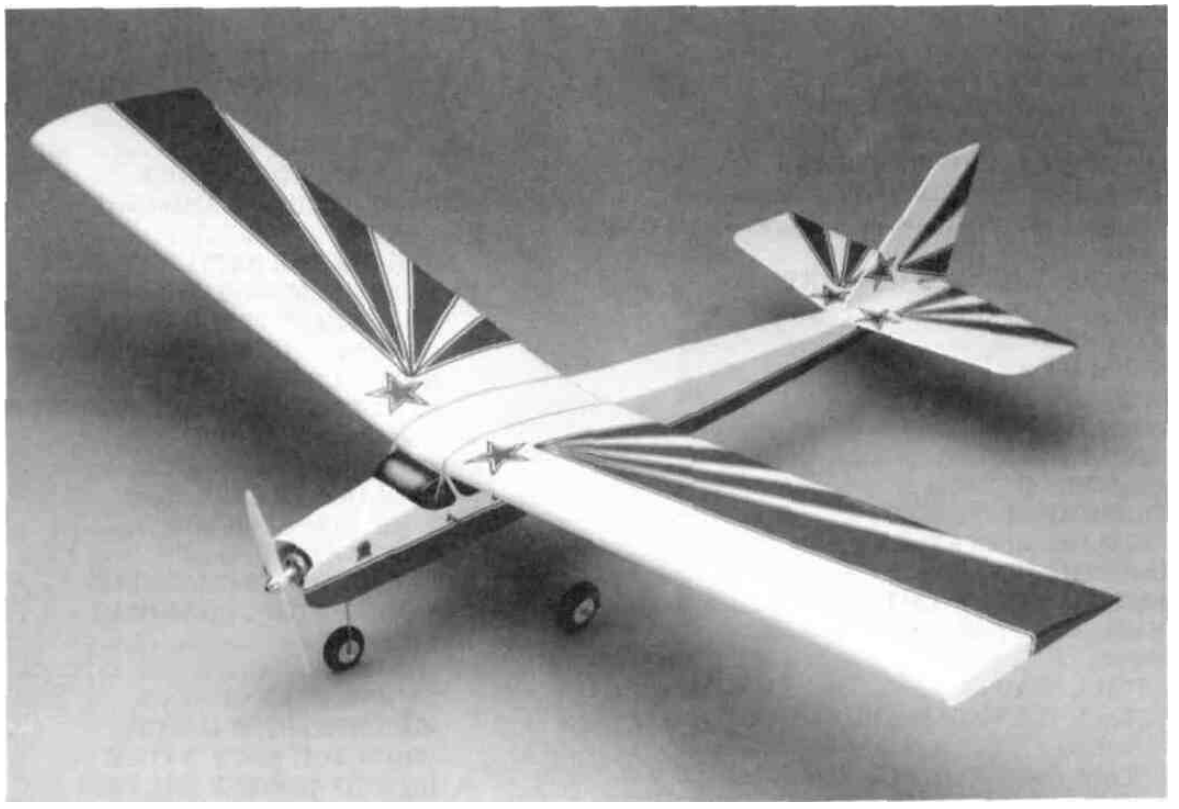
PT-Electric™

Instruction Book



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

WARNING!

This R/C kit and the model you will build is not a toy! It is capable of serious bodily harm and property damage. **IT IS YOUR RESPONSIBILITY AND YOURS ALONE —** to build this kit correctly, properly install all R/C components and flying gear (engine, tank, pushrods, etc.) and to test the model and fly it *only* with experienced, competent help in accordance with all safety standards and common sense as set down in the Academy of Model Aeronautics Safety Code. It is suggested that you join the AMA and become properly insured before you attempt to fly this model. IF YOU ARE JUST STARTING R/C MODELING, CONSULT YOUR LOCAL HOBBY SHOP OR WRITE TO THE ACADEMY OF MODEL AERONAUTICS TO FIND AN EXPERIENCED INSTRUCTOR IN YOUR AREA.

Academy of Model Aeronautics
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GREAT PLANES
MODEL MANUFACTURING COMPANY
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INTRODUCTION

Hello' My name is Jim Schrmdt On behalf of Great Planes Model Manufacturing thank you for choosing the **PT-Electnc** I will show you step by-step how to build this airplane Follow these instruc-tions as they are written and you will end up with a great flying airplane, plus you will have learned the basics of R/C model building

I'll try to make your building experience as enjoyable and "snag free as possible **If you have any questions about building or flying this airplane, please call us at** (217) **398-8970 and we'll be glad to help.**

Jim Schmidt

PRECAUTIONS

1 You must build the plane **according to the plans and instructions.** Do not alter or modify the model as represented by the plans, as doing so may result in an unsafe or unflyable model.

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

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

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

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

6. You must fly the model only with competent help from a well experienced R/C pilot if you are not already an experienced and knowledgeable R/C pilot at this time.

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

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

KEEP IT LIGHT!

Because the electric motor and motor battery **are** relatively heavy, and because electric motors do not produce as much thrust as glow engines (when compared to their weight), it is essential that the basic structure of the airplane be kept as light as possible In doing so, you will help insure that the finished airplane will not be too heavy to fly well

One way to prevent excess weight build- up is **to use only as much glue as needed for good glue joints.** Do not apply extra "fillets" of glue thinking that it will make your plane stronger' All that extra glue adds ounces to the weight of your plane, and will detract from the performance.

The finished PT-Electnc, ready to fly, should weigh-in right at **3 lbs** (48 ounces) as an ideal weight It will, however, perform quite well at weights up to 3-1/4 lbs We have successfully flown the PT-Electnc at 3-1/2 lbs , but the performance was marginal

We will give you tips throughout this book on how to keep the structure light, and we urge you to follow them

RADIO SELECTION

If you are a beginner, we recommend that you purchase a radio system that has a built-in Trainer System If you do, you will be able to receive training for your first flights using the "buddy box" system, in which two transmitters (yours and your instructor's) are connected with a "trainer cord"

Because weight is an important factor in the PT-Electnc, the **ideal** radio system is one that employs a small 225 mAh battery pack, a miniature receiver and 2 or 3 "micro" servos, such as Futaba's S-33 servos We have, however, done most of our test flying using 3 standard Futaba S-38 servos and a 225 mAh battery pack, and this combination has proven to be satisfactory

If you already have a radio, we encourage you to use it, rather than purchasing a new one just to save a couple of ounces, however, we do recommend that you use a 225 mAh battery pack rather than the 550 mAh pack that comes standard with most radios Be aware, however, that a smaller battery pack means fewer flights between charging.

Please make sure you select a radio system that is on a frequency (channel) designated" for aircraft use only", and one that meets current FCC standards.

BATTERY SELECTION

The PT-Electnc was designed to fly with a standard 6-cell 7 2 volt 1200 mAh battery pack for motor power, and it does so very well' If you want additional power and a super climb rate, you may wish to use a 7-cell 84 volt 1200 mAh pack ("flat" type) The Thrustmaster switch harness uses a connector that is made to fit batteries with **"Kyosho"-type** connectors We think the best all-around battery for the PT-Electnc is the **Kyosho 6-cell** 1200 **mAh Racing Battery.**

BATTERY CHARGER SELECTION

You may use any of the commercially available battery chargers that are designed for charging 6 or 7 cell nicad battery packs Some chargers have a "peak detector" which sense when the battery is fully charged and automatically shut off at the right time Some chargers operate from 110 volt house current, 12 volt DC (automobile battery), or both

PROPELLER SELECTION

The propeller type size and pitch seem to affect the performance of the PT-Electnc more than any other single factor For use with the Thrustmaster and similar motors we recommend the **Grish** 8 x 4 **Nylon Propeller** over any others we tested in direct

drive operation You may wish to experiment with various other prop sizes in nylon and wood, to best match your motor, but the Gnsh 8 x 4 is the best place to start

SELECTION OF WHEELS

Because weight is such an important factor in electric powered models, we strongly recommend that you purchase lightweight wheels, such as Dave Brown "Lite Flite" wheels or Zinger lightweight wheels

GLUES (ADHESIVES)

If you look at the "ITEMS NEEDED" list you will see that we recommend only two basic types of glue for building the PT-Electnc.-.CA **glue** and **epoxy.**

CA (Cyanoacrylate) glues are great for model building because they set **fast** Rather than pinning glued joints together and waiting for hours while the glue dries, CA glues will harden in a few **seconds** while you hold the parts together **Thin CA** runs right into a good fitting joint, so you can assemble the parts first, then apply thin CA **Thick CA** is more like syrup and it will not harden until you press the two parts together squeezing the glue out to a thin layer A related and very handy product is **CA Accelerator spray** (Zip Kicker or Hot Shot), and is used to instantly harden CA glue When using CA glues " **trial fit" the parts to make sure they fit well before gluing** because they don't give you a second chance The most common mistake made by new modelers is using too much CA glue Rather than squeezing the bottle, it is usually sufficient to touch the tip of the applicator spout to the joint being glued and allow a few drops of CA to flow into the joint.

If you need time to position glued pieces correctly or need extra strength, use **epoxy** glue Epoxy is normally used in the firewall and motor mount area and when gluing the two wing panels together. **Five minute epoxy** starts to harden in 5 minutes) is great for most applications If you need longer time use 15 or 30 **minute epoxy** You need not use large amounts of epoxy Squeeze out the amounts of epoxy and hardener that your particular brand requires. For example, some epoxies use equal amounts and some use a 1 to 2 mixture Mix these together Coat one piece with epoxy, squeegee the excess glue off with scrap wood The epoxy glue will work better if there isn't too much oozing out at the edges of the glued piece Wipe off any of this excess glue with a tissue.

In any case, glue is never a substitute for a good-fitting joint, once the Joint is formed, use a minimum amount of glue and wipe off the excess with a tissue Clamp, pin or hold the Joint while the glue is drying.

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

OTHER ITEMS REQUIRED

General:

Radio, Batteries (See above comments on these items)
2- 2" Diameter Main Wheels
1- 1-3/4" Diameter Nose Wheel
6- 1/8" Wheel Collars
Iron-on Covering Material (Super Monokote **or** Similar)
Roll of 1/8" x 1/4" self-adhesive foam wing seating tape (Rocket City #38, or Sonictronics #232)
Foam Rubber Padding, 1/4" thick (Goldberg #291 FR25 or similar)

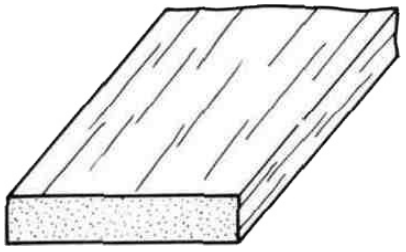
SUPPLIES AND TOOLS NEEDED

2 oz - Thin CA Adhesive
1/2 oz - Thick CA Adhesive
Instant Glue Accelerator (optional)
2 5 oz - 30 Minute Epoxy
Hand or Electric Drill
Drill Bits 1/16", 5/64", 3/32", 7/64". 1/8", 11/**64",** 1/4")
Sealing Iron (for covering)
Heat Gun (optional, for shrinking covering)
Hobby Saw (X-Acto Razor Saw)
X-Acto Knife, #11 Blades
Pliers
Screw Drivers
Flat File
T-Pins
Straightedge 01 Ruler
Masking Tape
Sandpaper (100 grit and 220 grit)
T-Bdi Sanding Block, or Similar
Waxed Paper
Lightweight Balsa Filler

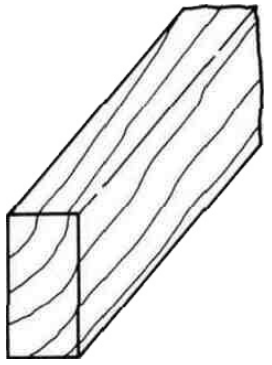
COMMON ABBREVIATIONS USED IN THIS BOOK AND ON THE PLANS:

Elev = Elevator
Fuse = Fuselage
LE = Leading Edge (front)
LG = Landing Gear
Lt = Left
Ply = Plywood
Rt = Right
Stab = Stabilizer
TE = Trailing Edge (rear)
" = Inches

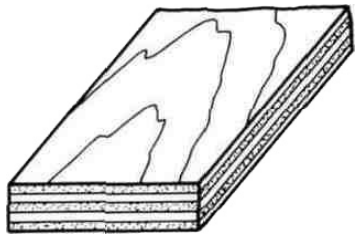
TYPES OF WOOD



BALSA

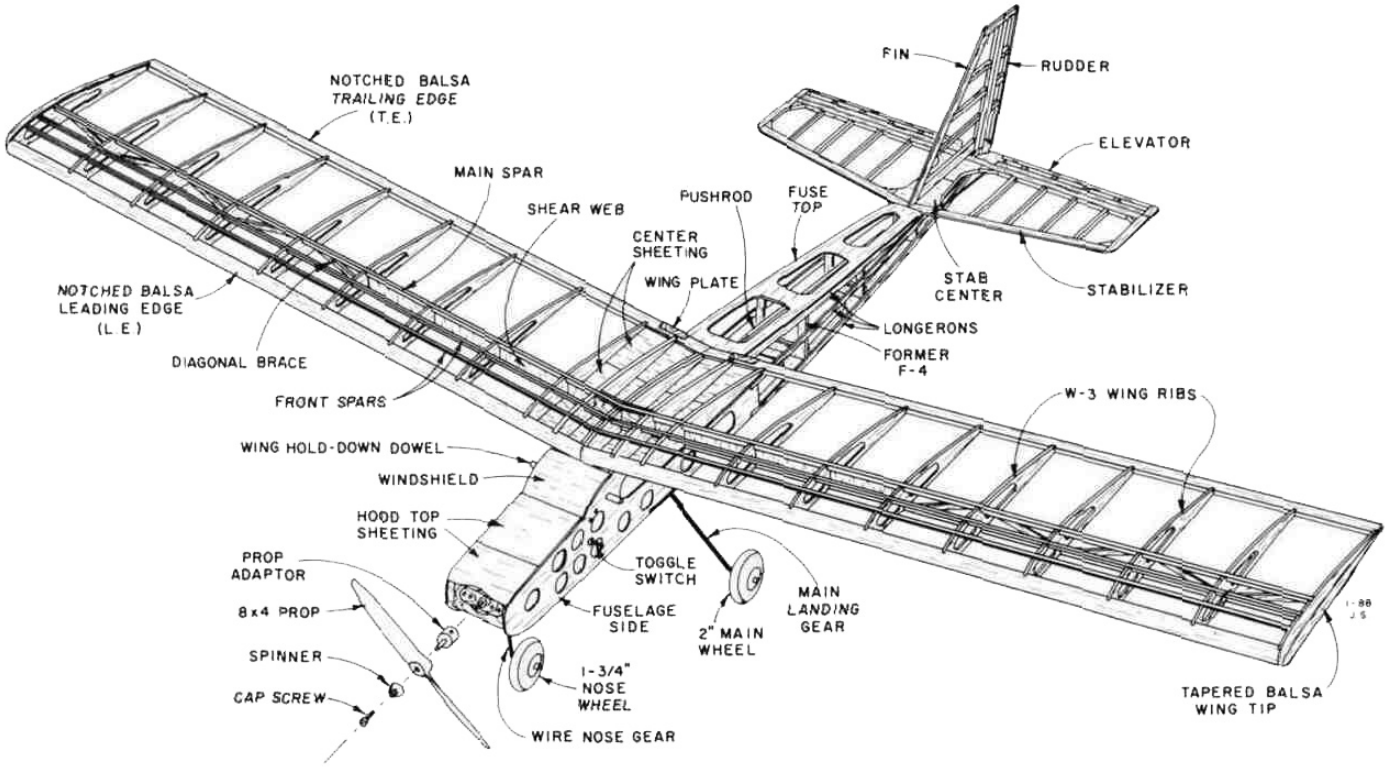


BASSWOOD



PLYWOOD

Study this perspective drawing to become familiar with the parts of the PT-Electric.



GET READY TO BUILD

D 1. Unroll the plan sheet. Re-roll it inside out to make it lie flat. Note: The fuselage plan is printed on Side 1 and the wing plan is printed on Side 2.

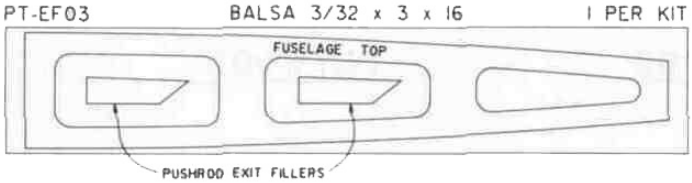
D 2. Remove all parts from the box. As you do, figure out the name of each part by comparing it with the plans and the parts list. Using a felt tip pen, write the part **name** or **size** on each piece to avoid confusion later. Be especially careful to identify the **sticks** correctly, as there are several sticks having the same width but differing thicknesses. Use the die cut patterns shown below to identify the die cut parts and mark them **before** punching out. Save all scraps. If any of the die-cut parts are difficult to punch out, do not force them! Instead, first cut around the parts with an Xacto knife.

NOTE: 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.

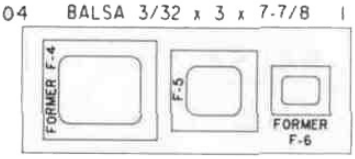
D 3. As you identify and mark the parts, separate them into groups, such as **fuse** (fuselage), **wing, fin & stab** (stabilizer), and **hardware.**

DIE PATTERNS

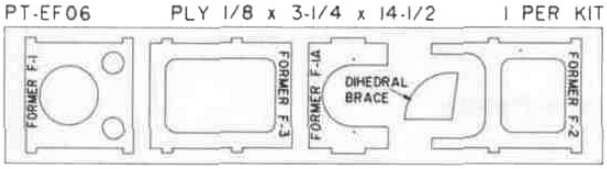
PT-EF03 BALSA 3/32 x 3 x 16 1 PER KIT



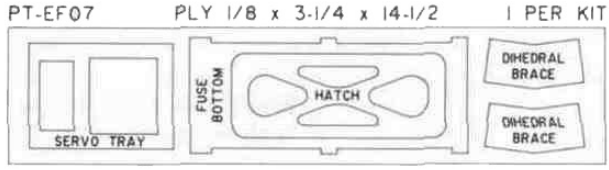
PT-EF04 BALSA 3/32 x 3 x 7-7/8 1 PER KIT



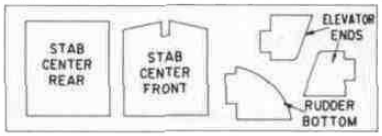
PT-EF06 PLY 1/8 x 3-1/4 x 14-1/2 1 PER KIT



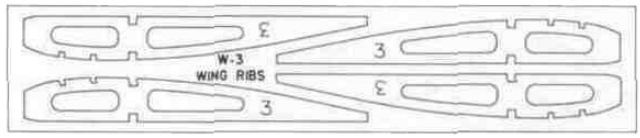
PT-EF07 PLY 1/8 x 3-1/4 x 14-1/2 1 PER KIT



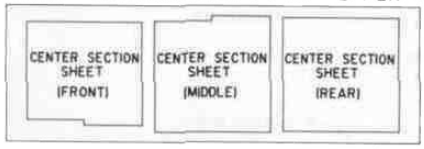
PT-ES06 BALSA 3/16 x 3 x 8-7/8 1 PER KIT



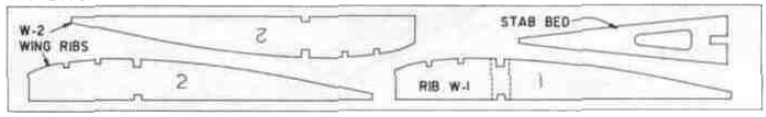
PT-EW05 BALSA 1/16 x 3 x 15 4 PER KIT



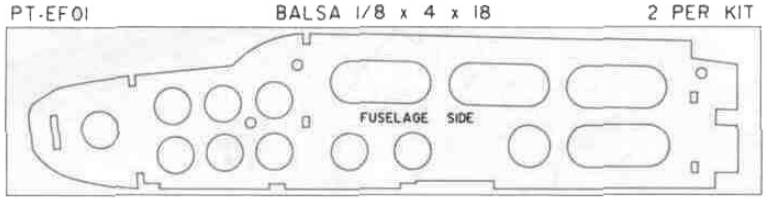
PT-EW06 BALSA 1/16 x 3-1/4 x 9-7/8 2 PER KIT



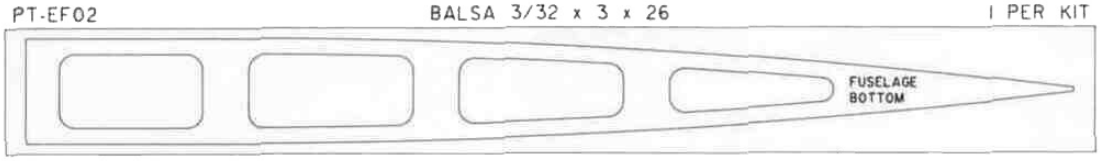
PT-EW04 BALSA 3/32 x 2-1/2 x 18 2 PER KIT



PT-EF01 BALSA 1/8 x 4 x 18 2 PER KIT

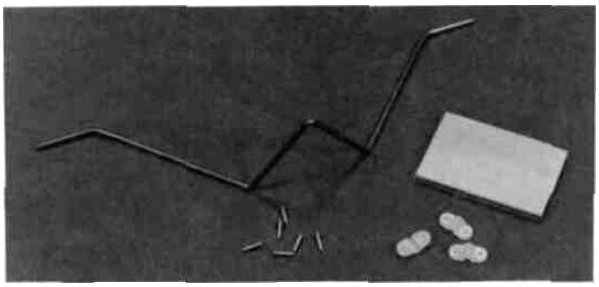


PT-EF02 BALSA 3/32 x 3 x 26 1 PER KIT



FUSELAGE

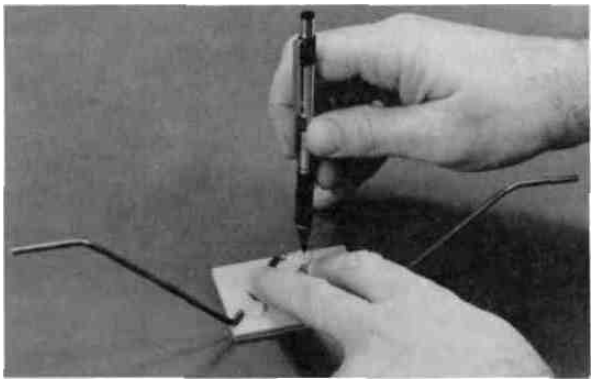
PREPARE THE LANDING GEAR PLATE



D 1. Find the following items: 3/16" x 1-27/32" x 2-3/4" plywood landing gear plate, three nylon landing gear brackets, six #2 x 3/8" screws, and the 1/8" wire main landing gear.

#2x3/8" SCREW

LANDING GEAR STRAP (NYLON)

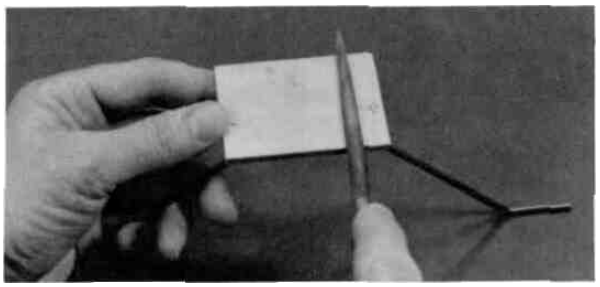


D 2. Hold the **landing gear** on the **ply plate** in the position shown on the plan and put the **nylon brackets** in place. While holding, use a pencil down through the bracket holes to mark the screw hole locations.

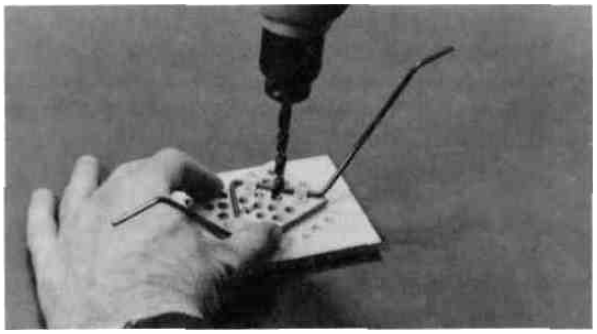
D 3. Drill 1/16" pilot holes at the above locations.

TIP: Anytime you drill a hole in wood, use a T-pin to start the hole (for accuracy), and use a scrap wood backing underneath. This will prevent splitting out the back side of the wood and will protect your work surface. The landing gear screws will go in easier if you lightly scrape the screws on a bar of soap to lubricate the threads.

D 4. Temporarily attach the landing gear to the ply plate using the *#2* x 3/8" screws and nylon straps.



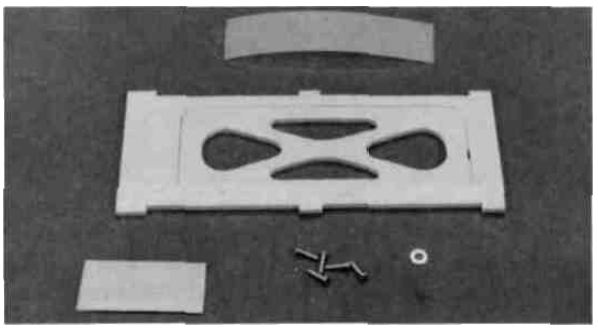
D 5. File the screws off flush with the surface of the landing gear plate to prevent damage to the battery **pack.**



D 6. Drill several 1/4" holes in the landing gear plate as shown on the plan. These holes are for lightness, and provide cooling air exit for the battery compartment.

D 7. Remove the landing gear and sand the ply plate smooth. Set the 6 screws aside in a bag marked "LG SCREWS".

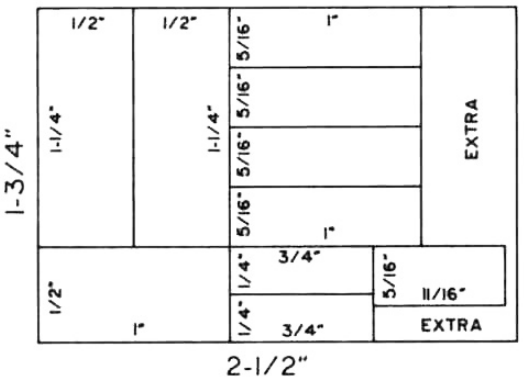
PREPARE THE HATCH



D 1. Find the following items 4 length of hinge strip material, Die-cut 1/8" ply fuse bottom and hatch, 1/32" x 1- 3/4" x 2" ply, five #2 x 3/8" screws, and the #2 washer.

#2x3/8" SCREW

1/32" PLY CUTTING PATTERN

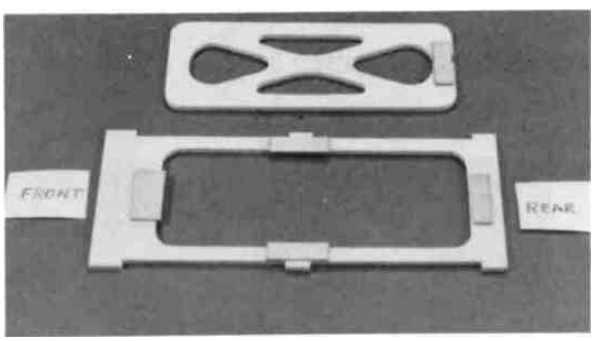


D 2. Using the pattern given here, mark the 1/32" x 1-3/4" x 2" ply plate for cutting. Cut out the small pieces with a scissors or Xacto knife. The two 1-1/4" x 1/2" pieces are the **wing plates.** Set them aside until later. The two 1/4" x 3/4" pieces will be used in the "PREPARE F-l" section.

D 3. From the 1/32" x 5/16" x 11/16" ply piece that you previously cut, make the **hatch locking tab** according to the following sketch: (be sure to drill into a wood backing to prevent splitting).

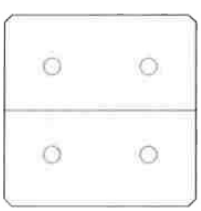
HATCH LOCKING TAB

1/32 PLY

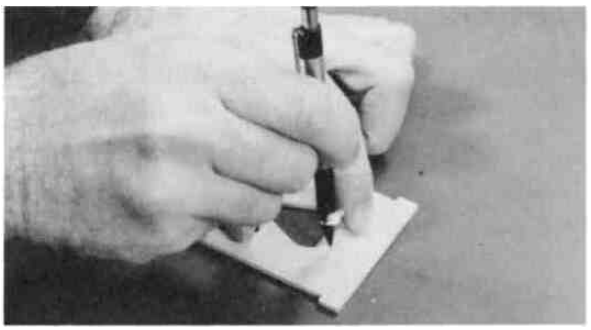


D 4. Using thin CA, Glue the remaining 1/32" ply pieces to the 1/8" ply hatch and fuse bottom in the locations shown on the plan. Note that the two side pieces and the front piece extend 1/16" into the hatch opening.

D 5. Cut off a 1" length of **hinge strip** material and drill four 3/32" holes as shown in the following sketch.

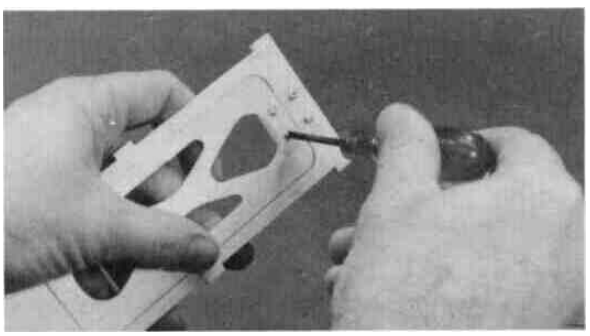


HATCH HINGE

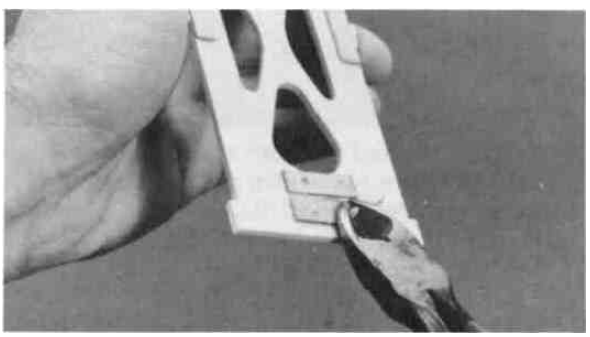


D 6. Lay the 1" hinge in place on the hatch and fuse bottom, and mark the locations of the screw holes.

D 7. Drill 1/16" pilot holes at the marked locations.

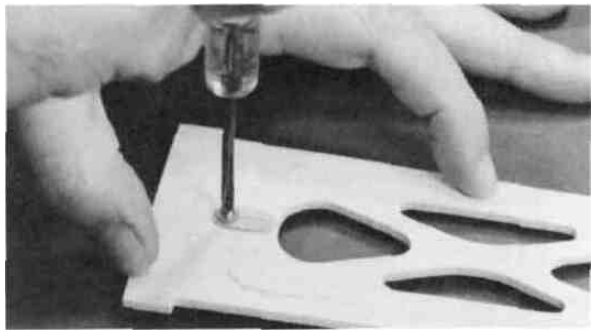


D 8. Attach the hinge with four #2 x 3/8" screws.



D 9. Cut or file off the portion of the screws that would protrude into the battery compartment. **NOTE:** Protect your eyes from flying metal when cutting off screws.

D 10. Drill a 1/16" pilot hole in the fuse bottom for the hatch locking tab, at the location shown on the plan.



D 11. Temporarily mount the 1/32" ply **hatch locking tab** using a #22 x 3/8" screw and the #2 washer, and cut off the portion of the screw that protrudes into the battery compartment.

D 12. Check the operation of the hatch Sand the edges of the hatch slightly to provide a close but non-binding fit.

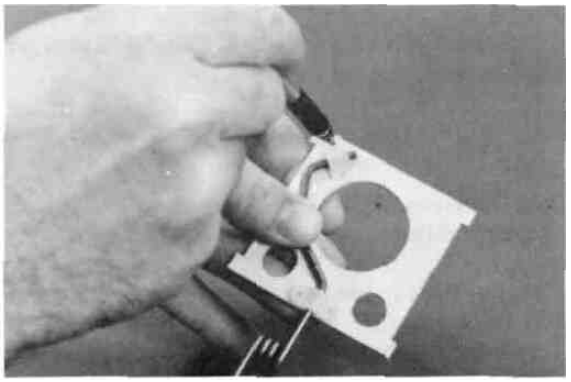
D 13. Disassemble the above and set the hatch, hinge, locking tab and screws aside until later.

PREPARE F- 1

NOTE: The PT-Electric has a "fixed" (non-steering) nose gear which you will rigidly attach to Former F-l. At first you may be thinking that it will not be possible to steer the airplane on the ground with this setup We just want to assure you at this time that it actually does steer quite well' Because there is very little weight on the nose wheel, the wind moving past the tail of the airplane enables the rudder to turn the airplane almost as if the nose wheel were steerable.

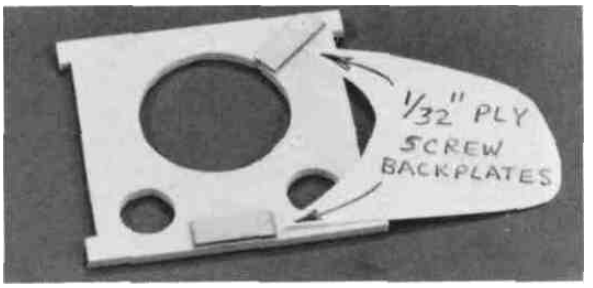
D 1. Find the die- cut 1/8" ply former **F-l,** two nylon **landing gear brackets,** four #2 x 3/8" screws, the 1/8" wire **nose gear,** and the two 1/32" x 1/4" x 3/4" ply pieces which you previously cut.

#2x3/8" SCREW



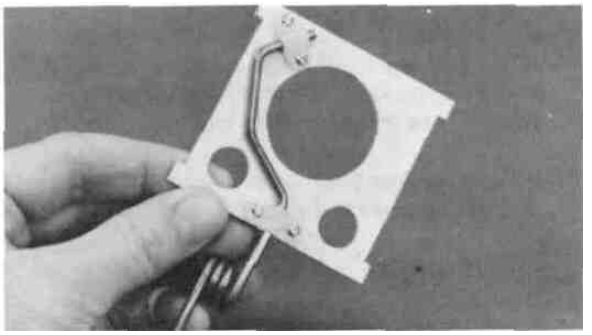
D 2. Study the detail drawing of F-l on the plan, and position the nose gear and nylon brackets While holding them in place, mark the locations of the **screw** holes.

D 3. Drill 1/16" pilot holes at the marked locations.



D 4. Glue the 1/32" ply **screw backplates** to the back of F-l, using the pilot holes you previously drilled to determine where to locate the ply backplates.

D 5. Now re-drill the pilot holes.



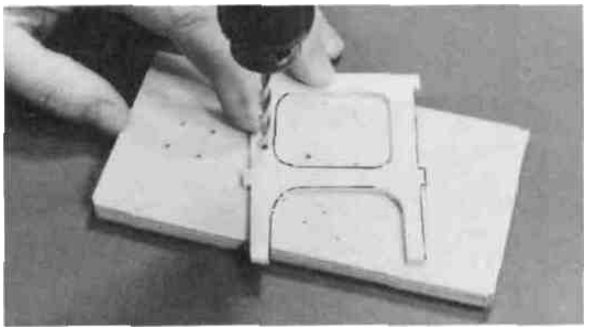
D 6. Temporarily mount the nose gear to F-l using the nylon brackets and screws.

D 7 Disassemble the above parts, and set the nose gear, brackets and screws aside until later.

PREPARE F-2

D 1. Find the die cut ply former **F-2.**

D 2. From the detail drawing of F-2 determine the location of the on-off switch pushrod.

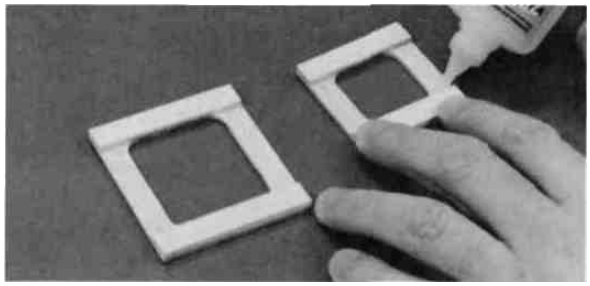


D 3. Drill an 11/64" hole in F-2 at the above location.

PREPARE F-4 AND F-5

D 1. Find the die-cut 3/32" balsa formers **F-4** and **F-5,** and the two 3/32" x 3/8" x 17-7/8" balsa sticks

D 2. Cut a 9-1/8" length from each of the 3/32" x 3/8" x 17-7/8" sticks, mark them **"Wing Saddle Doubler", and** set them aside.

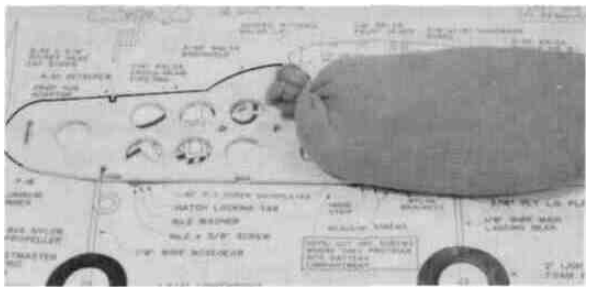


D 3. From one of the remaining 3/32" x 3/8" balsa sticks, cut **cross-braces** for F-4 and F-5. Glue these cross-braces to the formers with thin CA as shown on the plan. **Use only a few drops of glue to avoid excess weight build-up.**

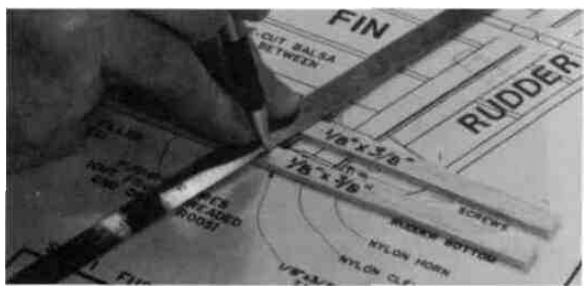
MAKE THE FUSE SIDES

D 1. Find the 1/8" die- cut balsa **fuse sides** and the 1/8" x 3/8" x 23-7/8" balsa sticks. Inspect the balsa sticks and pick out the four **straightest** ones which you will use for the middle and lower longerons.

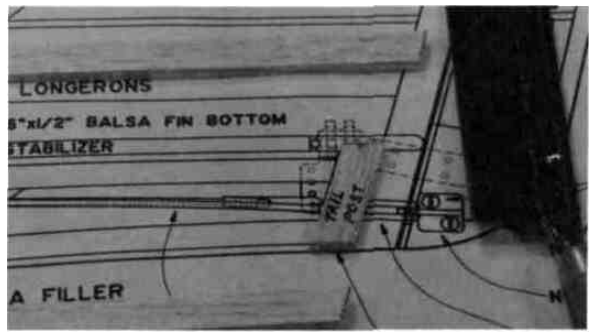
D 2. Tape the fuse plan to your flat work surface, then tape a piece of waxed **paper** over the fuse side view.



D D 3. Accurately position one of the 1/8" balsa fuse sides on the plan and hold it firmly in place with a heavy book or with "shot bags" (A handy shot bag can be made by partially filling a sock with lead shot **or** BB's).

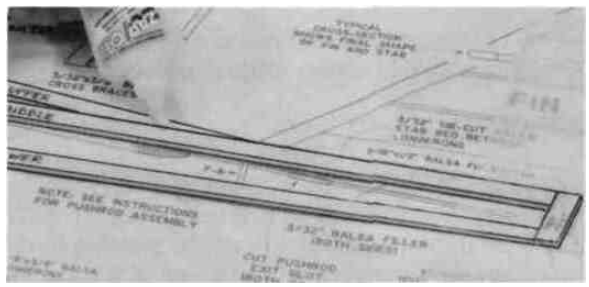


D D 4. Lay the middle and lower "longerons" (1/8" x 3/8" sticks) in place and draw a straight line at the **front of the tail post.** Cut the longerons off at these lines using a razor saw.

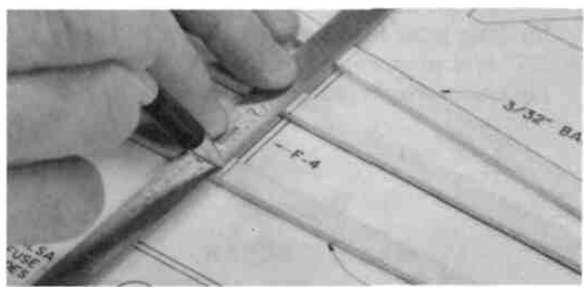


D D 5. From one of the remaining short 1/8" x 3/8" sticks, cut the **tail post** to match the plan.

D D 6. Hold or pin the parts accurately in place on the plan, then glue the middle and lower longerons to the fuse side and to the tail post using thin **CA.**



D D 7. Cut a third 1/8" x 3/8" balsa stick to match the **upper longeron** on the plan (the upper longeron extends back to the rear edge of F-6), and glue it to the fuse side and to the middle longeron.

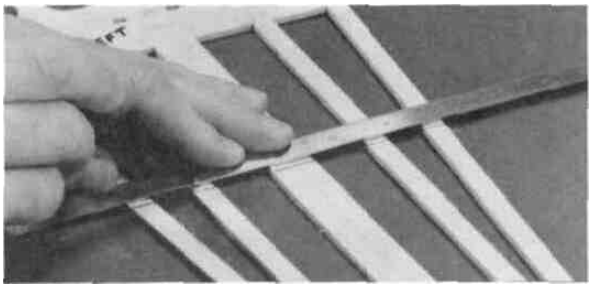


D 8. While the fuse side is still in place on the plan, use a straightedge and a pen to mark the locations of formers **F-4, F-5** and **F-6.** (Skip this step when building the second fuse side.)

D D 9. Sand the fuse side smooth using a T-bar sander with 100 grit sandpaper.

D 10. Now repeat steps 3 - 7 and 9 to build another **identical** fuse side.

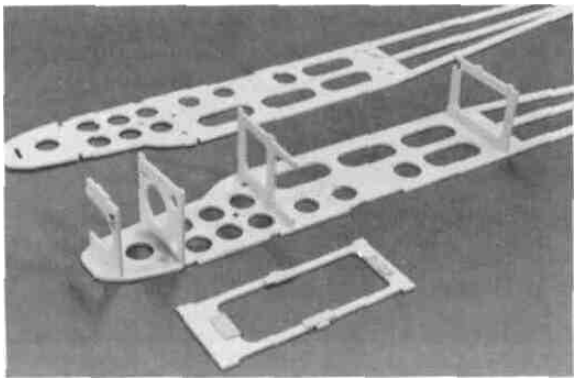
D 11. Put the two fuse sides together and line them up at the front and the bottom edges. Then check to make sure they are exactly the same all the way around. Sand the edges as necessary until the two fuse sides match. It is especially important that the overall **length** be the same, so sand the tail post as necessary.



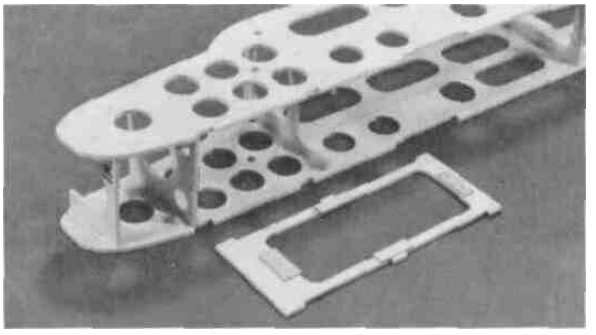
D 12. Lay the two fuse sides flat on the table, with the bottom edges touching. Then, using a straightedge and a pen, extend the former location lines onto the fuse side that does not have them.

ASSEMBLE THE FUSELAGE

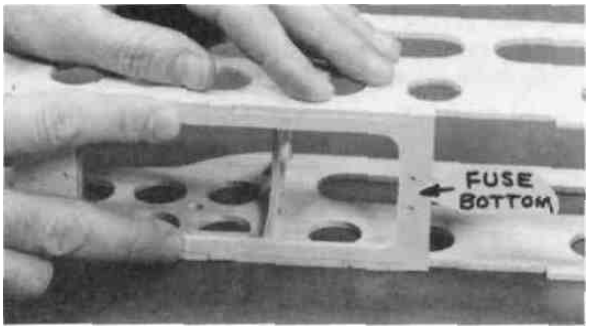
D 1. To begin, you'll need the following parts: The two fuse sides you just built, Formers F-1A, F-l, F-2, F-3, and the 1/8" ply fuse bottom.



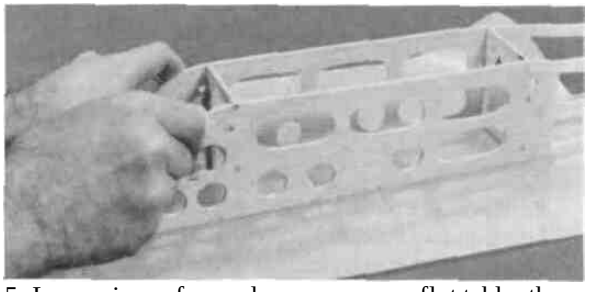
D 2. Lay one of the fuse sides down flat on the table. Insert the tabs of formers F-1A, F-l, F-2 and F-3 into the slots in the fuse side. Check the plans and make sure the formers are right side up. **(Do not glue).**



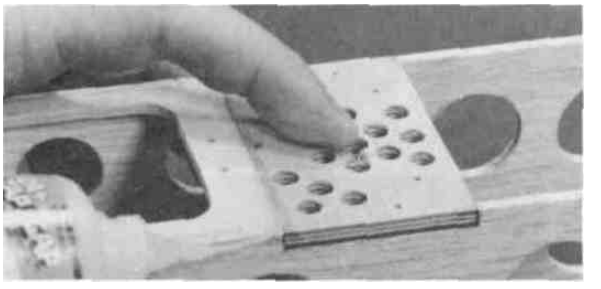
D 3. Lay the left fuse side in place on the formers, working the tabs into the notches. (Do not glue).



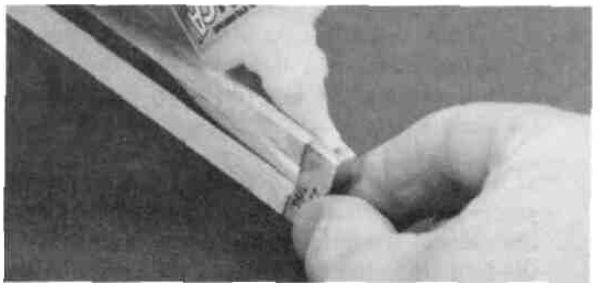
D 4. Press the 1/8" **ply fuse bottom** in place. Notice that the interlocking parts automatically square-up and align the front portion of the fuselage.



D 5. Lay a piece of waxed paper on your flat table, then set the fuse assembly upright on the waxed paper. **Make sure that all tabs are fully seated into the slots and notches.** While holding the assembly together, apply thin CA glue to all joints.

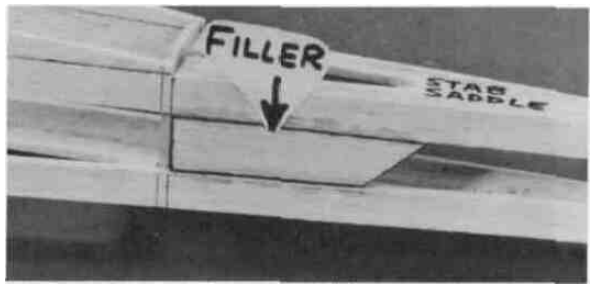


D 6. Turn the fuse upside down, and glue the 3/16" ply **landing gear plate** in place in the notches in the fuse sides (sand the ply plate, if necessary, for a good fit). Add thick CA glue to the joint between the LG plate and the 1/8" ply fuse bottom.

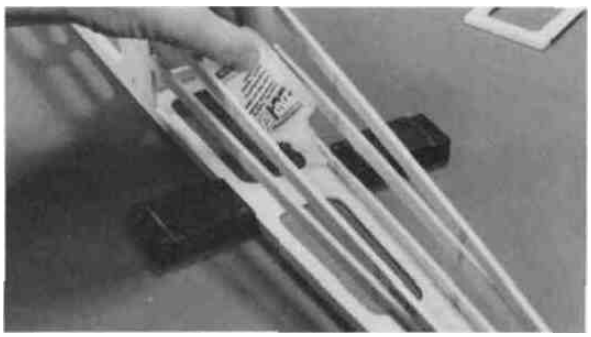


D 7. Turn the fuselage right side up, pull the tail posts together, and apply thin CA glue to the tail posts.

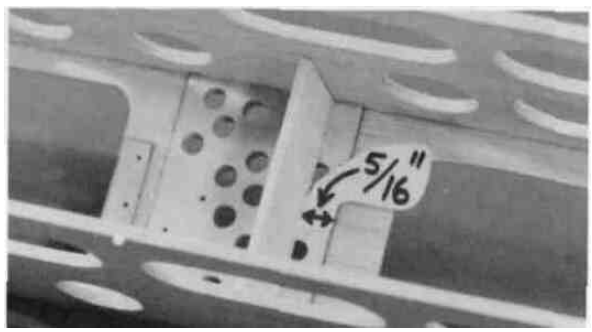
D 8. Now get the following parts together: Die-cut 3/32" balsa **fuse bottom,** formers **F-4, F-5** and **F-6, and** the die-cut 3/32" balsa **stab saddle.**



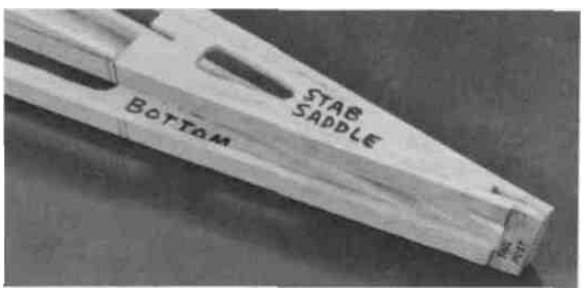
D 12. Find the two die-cut 3/32" balsa **pushrod exit fillers,** sand them to fit between the middle and lower longerons just behind F-6. Glue them in place, flush with the outside edge of the longerons.



D 9. Work the **3/32" balsa fuse bottom** into place between the bottom longerons. The front of the fuse bottom must touch the rear of the landing gear plate. With the fuse upright on a piece of waxed paper, **make sure the fuse bottom is even with the bottom edge of the fuse sides and bottom longerons,** then apply thin CA glue along the bottom joints, pulling the bottom longerons together. Note: If you have small hands and are unable to hold the stringers together, you may use books or other square weights to hold the longerons together.



D 13. Find the 3/32" x 1-1/4" x 2-1/2" balsa **battery box rear,** and glue it to the landing gear plate, **5/16" forward** of the rear edge of the landing gear plate.



D 10. Slide the 3/32" balsa **stab saddle** into place between the middle longerons. The front edge of the stab saddle must line up with the marks you made for the rear edge of F-6. **Make sure the top edge of the stab saddle is even with the top of the longerons,** and glue it in place with thin CA.

D 11. Install formers **F-4, F-5** and F-6 at the locations you previously marked. Note: you may have to sand the sides of the formers **slightly** for a good fit. Glue the formers to the fuse bottom, then pull the longerons together and glue them to the formers.

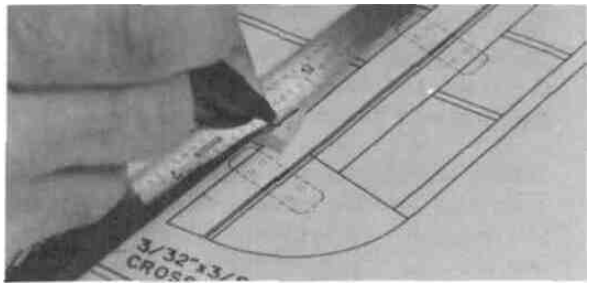
D 14. Find the 3/32" x 2-1/2" x 4-1/16" balsa **battery box top.** Position it so the bottom front edge is even with the bottom edge the cross-brace on F-2. Glue it to F-2, the fuse sides and to the battery box rear.

D 15. Find the two 3/32" x 3/8" x 9-1/8" balsa sticks which you previously marked **"Wing Saddle Doubler".** Sand the ends of these pieces slightly, to fit between F-2 and F-3. Glue these doublers in place with the edge flush with the top edge of the fuse sides.

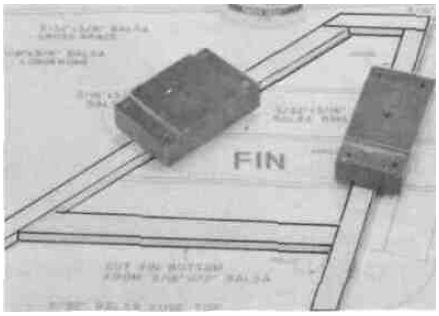
NOTE: This completes the fuselage assembly for now. Leaving off the top sheeting will make it easier to install the other components later.

BUILD THE FIN

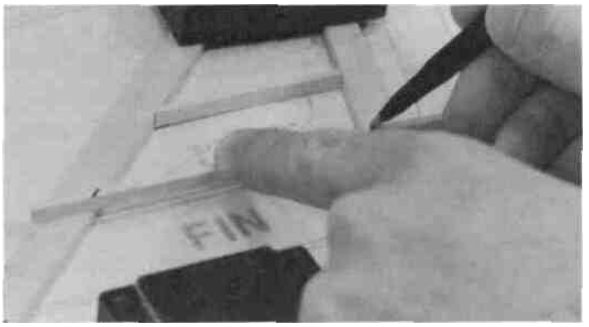
1. Find the following parts: 3/16" x 1/2" x 5-1/2" balsa stick, five 3/16" x 3/8" x 24" balsa sticks, and a 3/32" x 3/16" x 24" balsa stick. Select the straightest 3/16" x 3/8" x 24" balsa stick and set it aside for later use as the stabilizer trailing edge.



D 2. Working over the separate **FIN** drawing on the plan, mark and cut the balsa sticks to make the **outer framework** of the fin.Begin by laying one of the sticks in place, then use a straightedge to mark the cut-off lines. Cut the stick off with a razor saw, then proceed to the next part.



D 3. Hold or pin the parts over the plan and glue the outer framework pieces together with thin CA, working on waxed paper to prevent gluing to the plan.

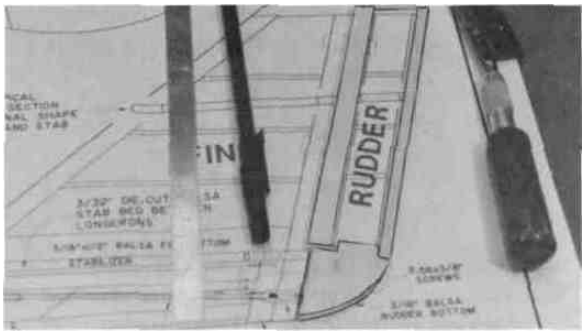


D 4. From the 3/32" x 3/16" x 24" balsa stick cut **ribs** to fit between the framework, as shown on the plan. Glue the ribs to the framework.

D 5. Sand both sides of the fin smooth using your T-bar and 100 grit sandpaper. Sand the leading edge and top of the fin to a **rounded** shape as shown in the typical cross-section.

BUILD THE RUDDER

D 1. You'll need the following parts: Die-cut 3/16" balsa rudder bottom, 3/16" x 3/8" x 24" balsa stick, 3/16" x 3/16" x 24" balsa stick, and a 3/32" x 3/16" balsa stick.

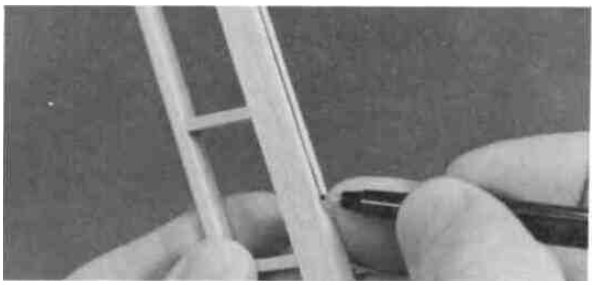


D 2. In the same manner as the fin, cut the outer framework pieces for the rudder.

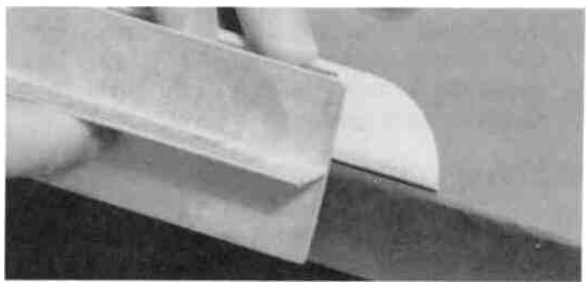
D 3. Glue the outer framework and the **rudder bottom** together with thin CA. Be sure to work on waxed paper to avoid gluing the parts to the plan!

D 4. From the 3/32" x 3/16" balsa stick, cut **ribs** to fit between the rudder leading edge and trailing edge. Glue the ribs in place.

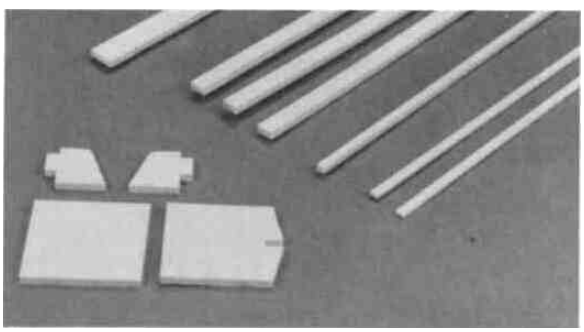
D 5. Sand both sides of the rudder smooth and flat. Sand the upper rear corners of the rudder to a round shape as shown on the plan. Sand the **trailing edge** and rudder bottom to a **rounded** shape as shown in the typical cross-section.



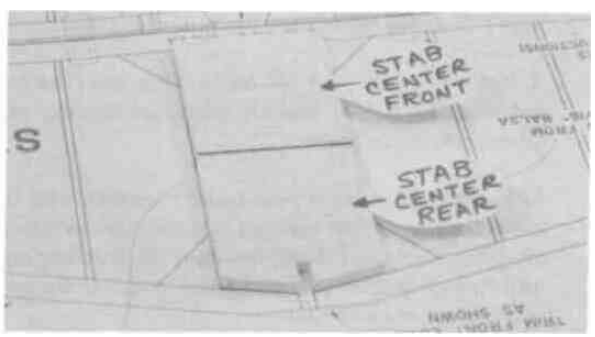
D 6. Draw a **centerline** down the full length of the rudder leading edge, then use your T-bar sander to sand the leading edge to a "V" shape as shown in the typical cross-section.



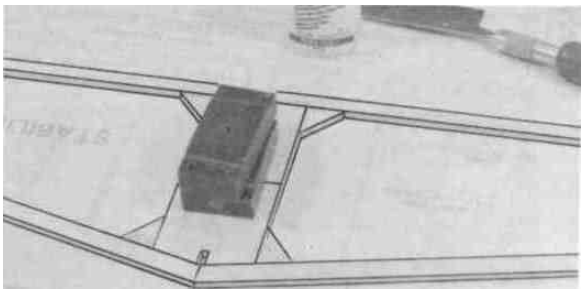
BUILD THE STABILIZER



D 1. Get the following items together: Die-cut 3/16" balsa **stab center front and stab center rear,** 3/16" x 3/8" x 24" balsa sticks, 3/32" x 3/16" x 24" balsa sticks, and the 3/16" x 5/8" x 7" balsa stick. (Note: The photo also shows the elevator parts).



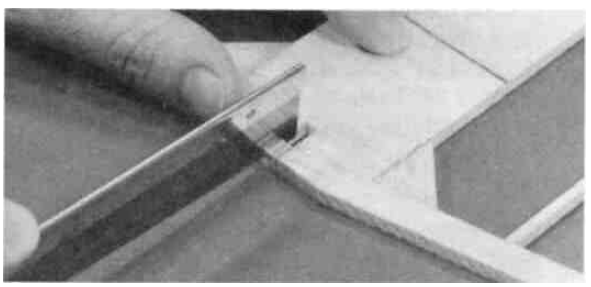
2. Tape a piece of waxed paper over the separate **STABILIZER** drawing on the plan, then lay the die-cut **3/16" balsa stab center pieces** on the plan and pin in place. **NOTE:** These die-cut pieces may have irregular edges, so you should sand the edges with your T- bar first, until they fit the plan exactly. Edge glue these stab center pieces together with thin **CA.**



D 3. From 3/16" x 3/8" balsa sticks, cut the **outer framework** pieces and glue them together. **Note:** The **straightest** 3/16" x 3/8" balsa stick should be used for the trailing edge.

D 4. Cut the triangular **corner braces** from the 3/16" x 5/8" x 7" balsa stick and glue them in place.

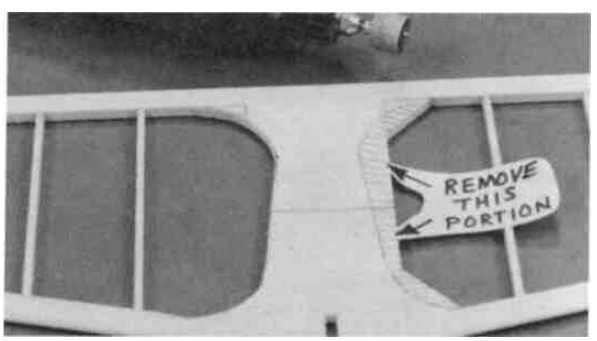
D 5. Cut the stabilizer **ribs** from the 3/32" x 3/16" balsa sticks and glue them in place.



D 6. Cut out the fin notch in the leading edge, and trim the front edge as shown on the plan.

D 7. Sand both sides of the stabilizer smooth with your T-bar, then sand the stabilizer leading edge and ends to a rounded shape as shown in the typical cross-section.

NOTE: If the 3/16" balsa stab center pieces supplied in your kit are soft balsa (easily dented with your fingernail), do not perform the next step.

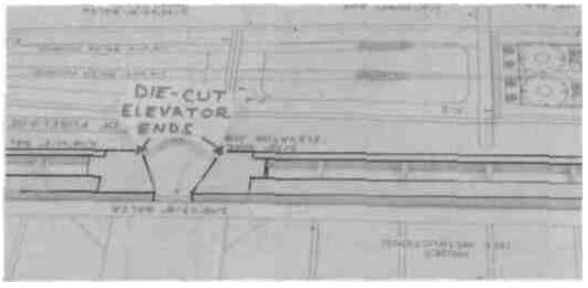


D 8. Now you may **lighten** the stabilizer by trimming the stab center along the dashed line as shown on the stabilizer drawing. Use your ruler to transfer the trim lines from the plan to your stabilizer, then use a Dremel Moto Tool sanding drum or a piece of sandpaper wrapped around a dowel to sand away the excess balsa.

BUILD THE ELEVATORS

D 1. You'll need the following parts: Die-cut 3/16" balsa **elevator ends,** 3/16" x 3/8" x 24" balsa stick, 3/16" x 3/16" x 24" balsa stick, the remaining 3/32" x 3/16" balsa stick, and the 3/32" wire **elevator joiner.**

ELEVATOR JOINER WIRE



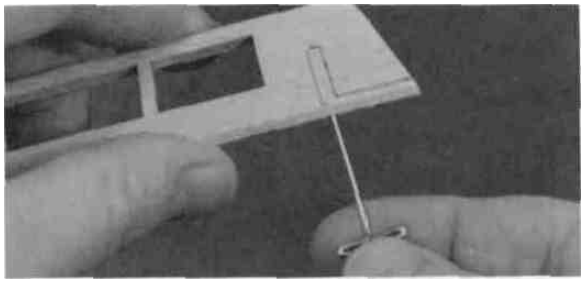
D 2. Working on waxed paper over the plans, cut the **outer framework** pieces and glue them together **and** to the die- cut elevator ends.

D 3. Cut the elevator **ribs** from the 3/32" x 3/16" balsa stick, and glue in place.

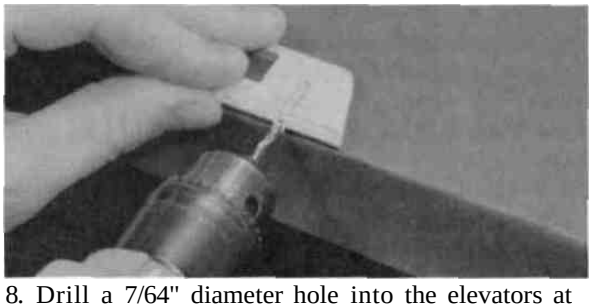
D 4. Sand both sides of the elevators smooth with your T-bar, then sand the trailing edge and ends to a **rounded** shape as shown in the typical cross-section.

D 5. Draw a **centerline** down the full length of the elevator leading edge, then use your T-bar to sand the leading edge to a "V-shape as shown on the typical cross-section.

D 6. Position the elevators over the plans and lay the 3/32" wire **elevator joiner** on top of the elevators. Then use a pen to mark the outline of the wire on the elevators.

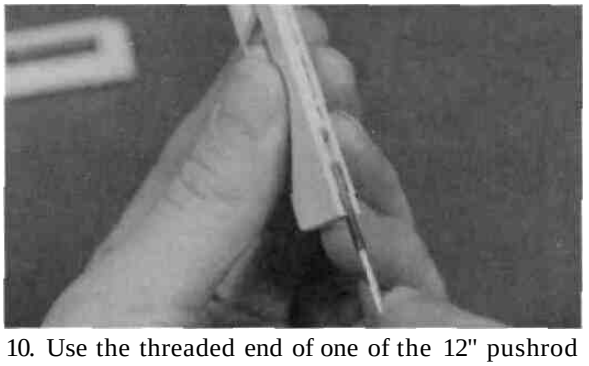


D 7. Use a pin to start a **pilot hole** in the elevator leading edge (on the centerline you previously marked). The hole will be located in the middle of the wire outline you drew in the above step. (See photo).

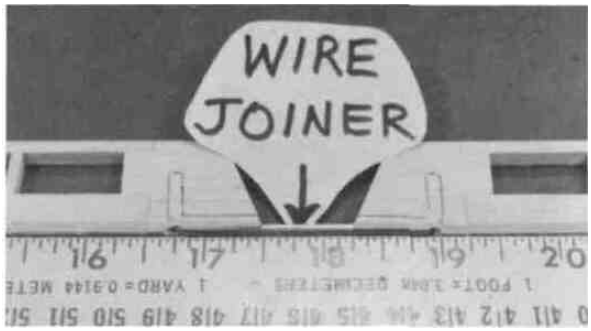


D 8. Drill a 7/64" diameter hole into the elevators at the holes you started in the above step. (Drilling slightly oversize will permit some adjustment when joining the elevators).

D 9. Clean all oily residue from the wire **elevator joiner** using a tissue dampened with alcohol or a degreasing solvent. Then roughen the wire with coarse sandpaper (so the glue will stick to the wire).



D 10. Use the threaded end of one of the 12" pushrod wires to "file" a groove in the elevator leading edge. Make the groove deep enough to fully accept the joiner wire.



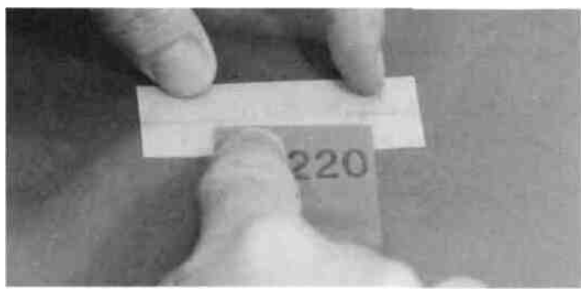
D 11. Insert the joiner wire into both elevator halves, then lay the assembly down on a piece of waxed paper on a flat surface. Place a straightedge along the leading edge of both elevators.

D 12. When you have the elevators lying flat on the surface and both leading edges in a straight line, apply thin CA glue where the joiner wire enters the elevators and hold until the glue has set.

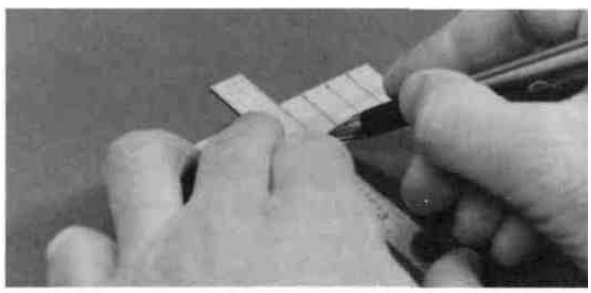
D 13. Inspect the assembly and apply thick CA to any gaps around the joiner wire.

MAKE THE HINGES

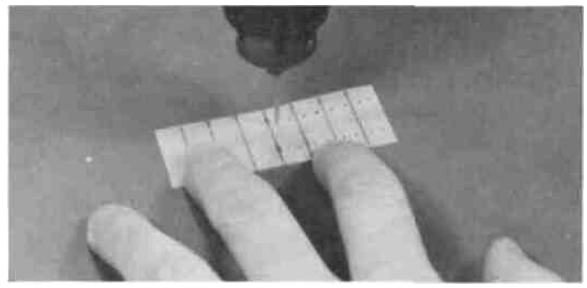
D 1. You'll need the following: The remaining piece of **hinge strip** material, a piece of 220 grit sandpaper, a ruler, scissors and a 1/16" drill.



D 2. Take the strip of hinge material and roughen both sides with 220 grit sandpaper. This is best done with a small piece of sandpaper held with your fingers, rather than a sanding block. **Do not sand the centerline of the hinge material.**

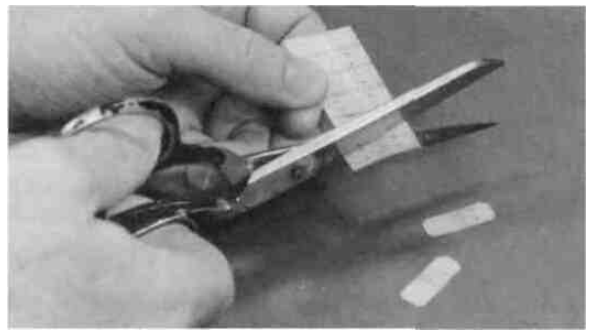


D 3. Using a ruler and a ball point pen, draw lines dividing the hinge material into seven **3/8"-wide** segments.

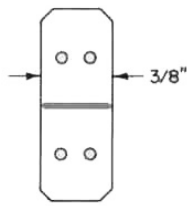


D 4. Drill four 1/16" holes in each of the hinge segments as shown on the plan. **Use a wood block as a backing when drilling these holes.** After drilling, lightly sand the hinges again to remove any **rough** edges caused by drilling.

D **5. Fold** the hinge material back and forth a few times to "condition" the hinges.



D 6. Cut the hinges apart with a scissors on the lines you previously drew. Also snip off a **small** piece of each corner.

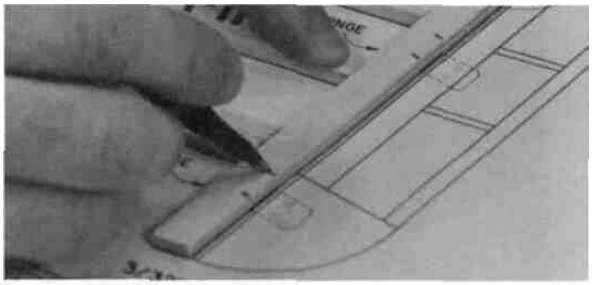


HINGE

TEMPORARILY INSTALL HINGES (Do not glue the hinges at this time).

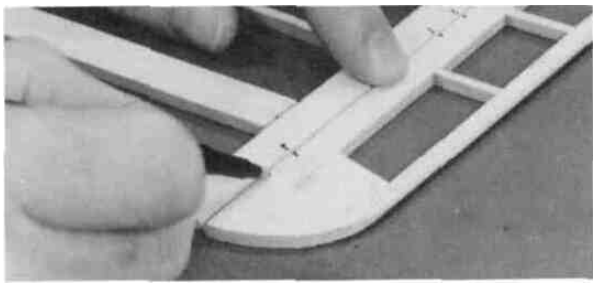
D 1. You'll need the seven hinges you just made, plus an Xacto knife with a No. 11 blade.

D 2. Draw an accurate **centerline** on the trailing edge of the fin and stabilizer.

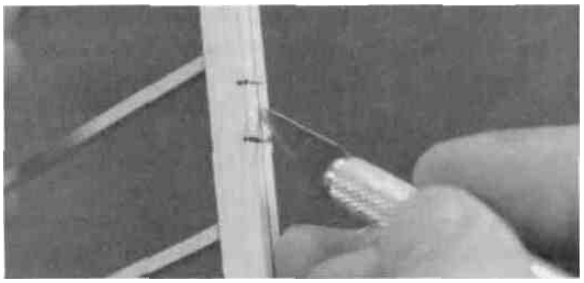


D 3 Lay the fin and stabilizer on the plan and mark the **hinge locations** on the trailing edges.

D 4 Now, while holding the elevators in place against the stabilizer trailing edge, transfer the hinge locations over to the elevator leading edge **Repeat this process to mark the hinge locations on the rudder.**

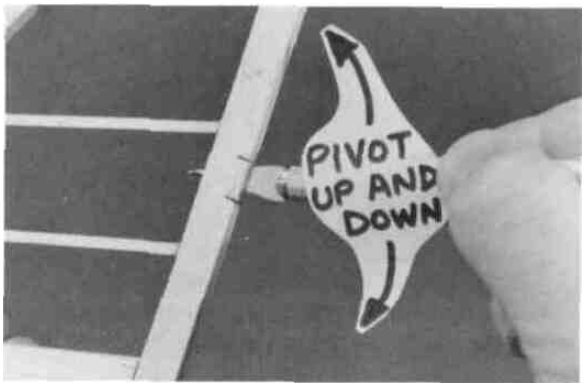


NOTE: The hinges supplied with this kit are thin enough that they can be inserted into a slot made with an Xacto knife Most other hinges require you to use a hinge slotting tool The following steps describe how to easily cut the hinge slots with an Xacto knife.



D 5. Begin by carefully cutting a **very shallow slit** in the fin trailing edge 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!**

D 6 Make three or 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.



D 7 After you have cut about halfway into the wood, you can push the blade all the way through, while **"wiggling"** the knife handle back and forth Continue to pivot the knife while moving the blade to both ends of the hinge location.

D 8 Trial fit the hinge into the slot If the hinge is difficult to push in, re-insert the knife and move it back and forth in the slot a few times to enlarge the slot.

D 9 Repeat the above process to cut slots at all the hinge locations in the fin, rudder, stabilizer and elevators.

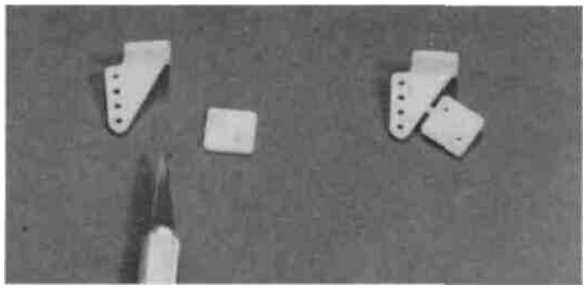
D 10 Assemble the rudder to the fin and the elevators to the stabilizer **(DO NOT GLUE),** and check the operation of the hinges

D 11 Cut off the portion of the **bottom rudder hinge** that protrudes in **front** of the 3/16" x 3/8" fin trailing edge **Note:** Be sure to use this hinge in the same location later when making the final assembly

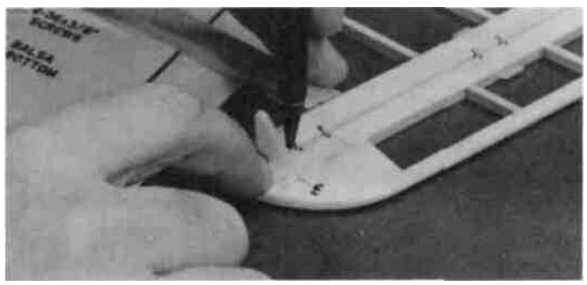
TEMPORARILY MOUNT CONTROL HORNS

D 1 You'll need Two **nylon control horns,** four 2-56 x 3/8" machine screws, a 3/32" drill and a small screwdriver

2-56 SCREW **NYLON HORN AND NUT PLATE**

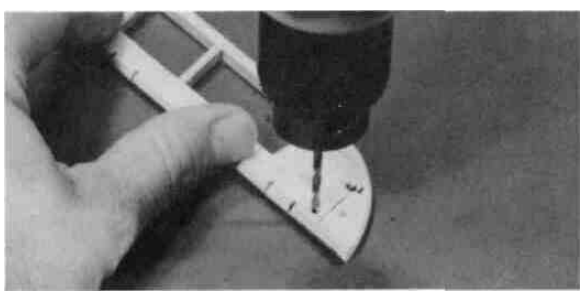


D 2 Use an Xacto knife to separate the nylon **screw backplates** from the nylon horns.



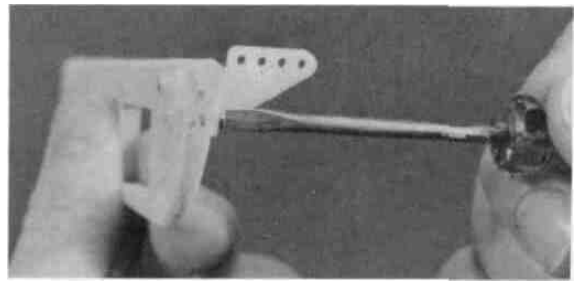
D 3. Lay the rudder on the fuselage plan side view and determine where the nylon control horn should be located Holding one of the nylon horns in place on the **left** side of the rudder, use a pencil to mark through both holes in the horn

D 4. Remove the rudder from the fin, and remove the hinges.



D 5. Start pilot holes with a pin at the **marked locations,** then drill the holes with a 3/32" drill

D 6. **Harden** the balsa in the control horn area by putting a drop of thin CA into each hole After the glue has set, re-drill the holes and sand the surface smooth.



D 7. Insert two **2-56 screws** through the nylon horn and through the holes you drilled Then screw them into the nylon nutplate which originally came attached to the horn Tighten the screws until they are snug, but **do not crush the wood by overtightening.**

D 8. Repeat the above process to install the nylon control horns on the **elevator. NOTE: When marking the locations for drilling, you must hold the nylon horn on the BOTTOM of the elevator!**

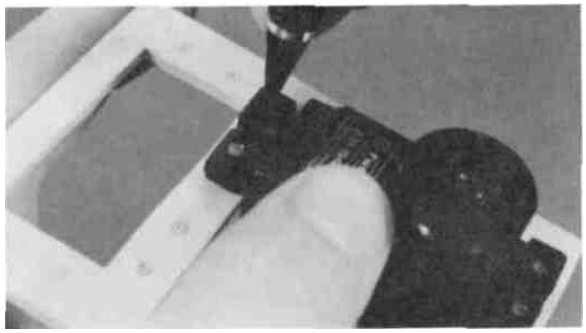
INSTALL SERVOS

NOTE The following instructions and photos describe how to install **Futaba** S-48 **servos** in your PT-Electnc If your radio equipment is different from that shown in the photos, you may have to use a slightly different method to mount your servos properly **Be sure to read the instruction manual for your radio before beginning this section.** If you have difficulty with the radio installation, ask an experienced model builder for assistance

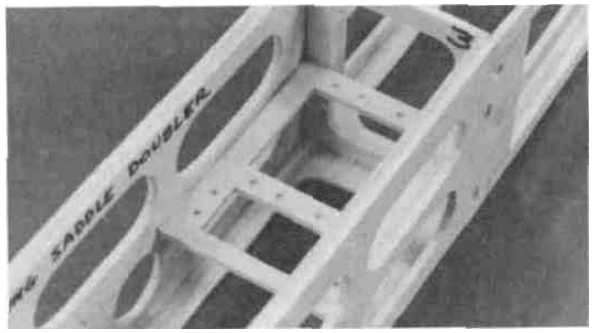
Special Note: Most radio systems sold today have "servo reversing switches" on the transmitter, which enable the modeler to install the servos **without** first checking to determine which direction the servos rotate After the installation has been completed, the modeler merely flips the switches on the transmitter to make the servos rotate in the desired direction Many of the older systems, however, do not have servo reversing instead they include one or two "reverse" or "left-handed" servos which rotate in a direction opposite that of the other servos When installing the servos of a system that does not have servo reversing, you must **plan ahead to** use **the "reverse" servos where they are needed.**

D 1 Prepare the servos by installing the four **rubber grommets** into each servo, then inserting the **brass** eyelets up into the grommets.

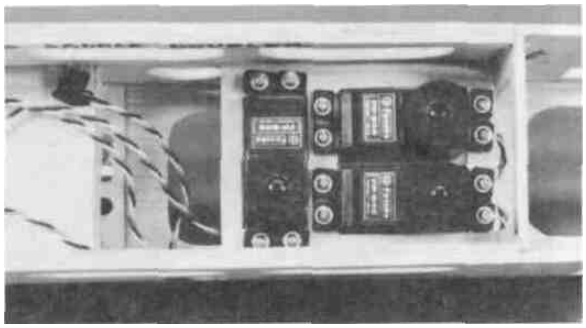
D 2 Place the servos into the die-cut 1/8" plywood **servo tray** provided, and position them so they are not touching the sides of the openings **Note:** If you have only two servos, they will be used for elevator and rudder control only (no servo-activated on-off switching)



D 3. Holding the servos in place, use a pencil to mark down through the brass eyelets onto the plywood. Remove the servos and drill 1/16" holes at each of the marks.



D 4. Study the plan to determine where the servo tray goes. **Glue the servo tray to the fuse sides** and to F-3 with thin CA. Then apply thick CA **on top** and bottom of the tray to lock it in place.



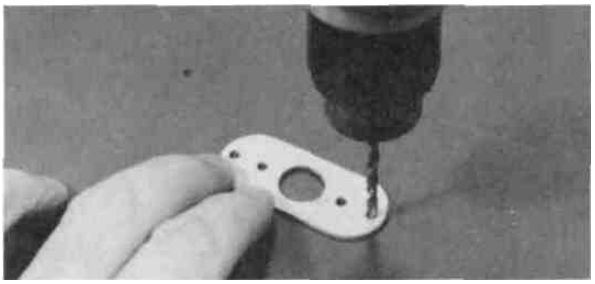
D 5. Now install the servos into the tray using the screws provided with your radio.

INSTALL THE MOTOR AND SWITCH HARNESS

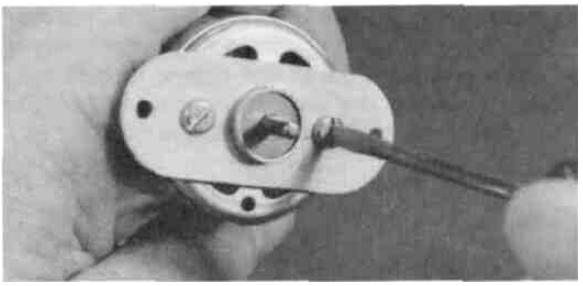
D 1. You'll need the following: **Electric motor** and **switch harness,** die- cut 1/16" ply **F-1B,** two M3 x 6 (metric) screws, and two #4 x 1/2" screws.

M3x6 SCREW

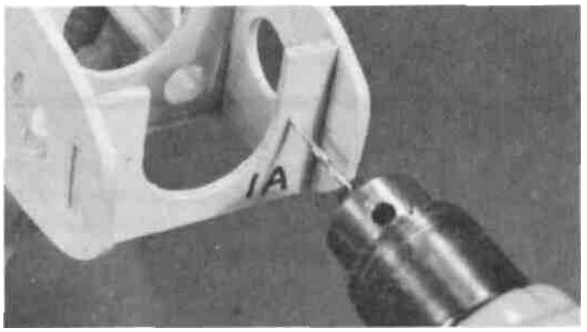
#4x1/2" SCREW



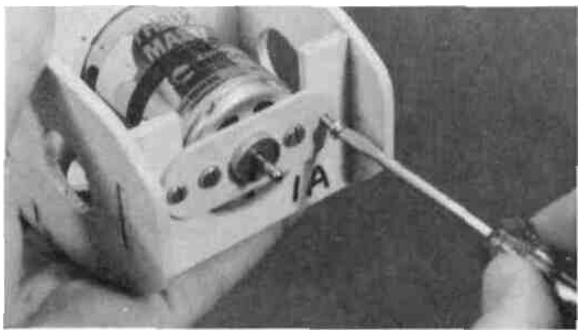
D 2. Note that we have punched the locations of the four screw holes in F-1B Drill 1/8" holes at these four locations. **Be sure to use a wood backing** when drilling to prevent damaging the part you are drilling.



D 3. Mount F-1B onto the front of the motor with the two M3 x 6 metric screws.



D 4. Drill two 5/64" holes in F- 1A at the punched locations. (These are pilot holes for the #4 x 1/2" mounting screws).



D 5. Insert all the switch harness components through the large hole in F-l, then slide the motor into place. Secure F-1B to F-1A with the two #4 x 1/2" screws.

D 6. Remove the nut and the washers from the **toggle switch.** Insert the threaded barrel of the toggle switch through the 1/4" hole in the fuse side, then secure it with a nut on the outside.

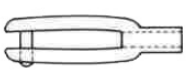
D NOTE: The toggle switch in the photo is shown incorrectly. It should be rotated 180 degrees, as it is shown on the plan, to operate correctly. Correct operation of the toggle switch means that pushing the switch forward is "on", and pushing the switch backward is "off.

INSTALL ON-OFF SWITCH PUSHROD

(Not required for 2-channel operation)

NOTE: If you wish to fly the PT- Electric with a 2-channel radio (rudder and elevator control only), just wrap masking tape around the micro switch to hold it in the "closed" position, and proceed to the next section.

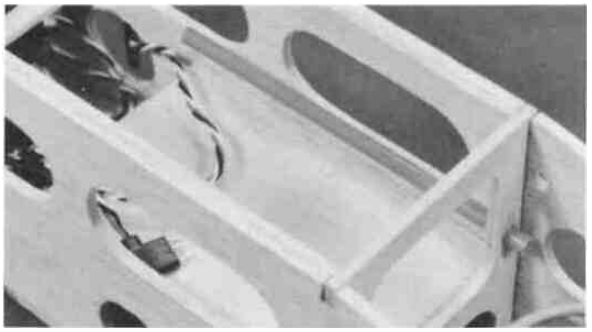
D 1. You'll need the following parts: 4-1/4" long **plastic outer pushrod sleeve, 6-3/8" long inner plastic pushrod, 2-56 threaded rod 1" long, and a nylon clevis.**



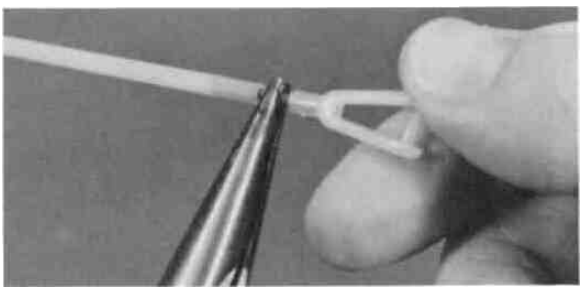
NYLON CLEVIS

2-56 x I" THREADED ROD

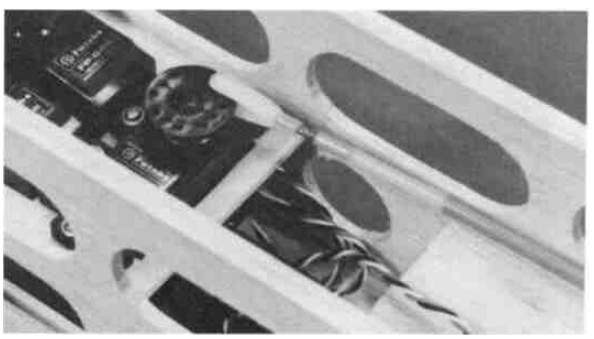
D 2. Roughen the outside surface of the plastic pushrod sleeve with 100 grit sandpaper (so the glue will stick **better).**



D 3. Insert the plastic outer pushrod sleeve through the hole you previously drilled in F-2 and glue it securely to F-2 with thin CA, followed by thick CA. The tube should protrude only about 1/4" in front of F-2.



D 4. Grasp the 1" **threaded rod** in the middle with a pliers, and screw the **nylon clevis** onto one end and the **plastic pushrod** onto the other end.



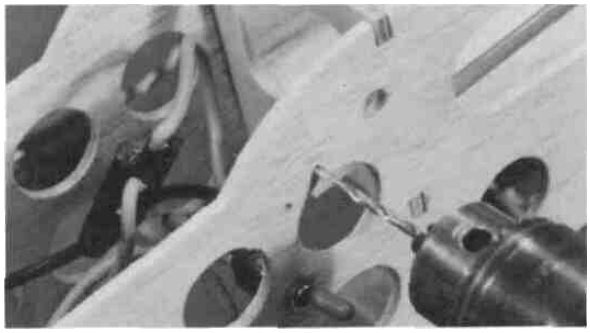
D 5. Insert the plastic inner pushrod into the outer sleeve and attach the nylon clevis to the servo arm. **(You may have to drill the servo arm with a 5/64" drill bit to fit the clevis pin).**

D 6. Temporarily hook up your radio system. **(Be sure to read the radio instruction manual regarding proper hookup and battery charging procedures).**

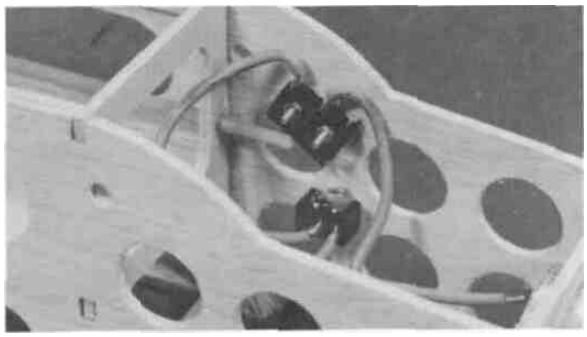
D 7. Study the fuse plan side view and note the position of the **micro switch.** Now hold the micro switch against the fuse side in this approximate position. Operate the throttle servo and observe how the push rod contacts the micro switch. Move the micro switch around until the pushrod "clicks" the micro switch only when the throttle stick is pushed almost fully forward.

D 8 When you have determined the correct position for the micro switch, draw a line around the switch **on** the fuselage side for reference.

D 9 Holding the micro switch in place, push a pin through both holes in the micro switch and out through the fuselage sides



D 10 Now drill two 3/32" holes through the fuselage side at the pin holes Then mount the micro switch with the two 2-56 x 5/8" screws and nuts



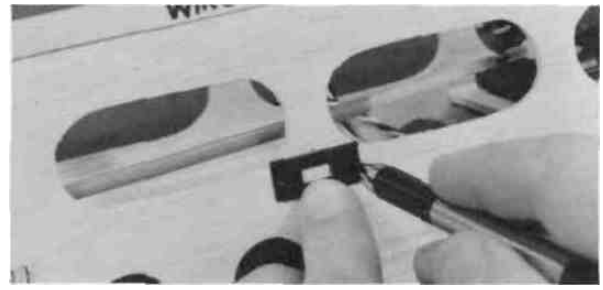
NOTE: Before proceeding, read " Peak Battery Charging " in the appendix at the back of this book.

NOTE: Remove the propeller from the motor before testing your electrical system in the next step!

D 11 When you have the motor and switch harness installed, you may check its operation by hooking up the **motor battery*** and activating the toggle switch The motor should begin running when the transmitter throttle stick is pushed forward to full throttle, and stop when the stick is pulled back With the toggle switch in the "off position, you should not be able to turn the motor on with the throttle stick **In order for this safety feature to be effective, you should always keep the toggle switch in the "off position until just before you are ready to fly.**

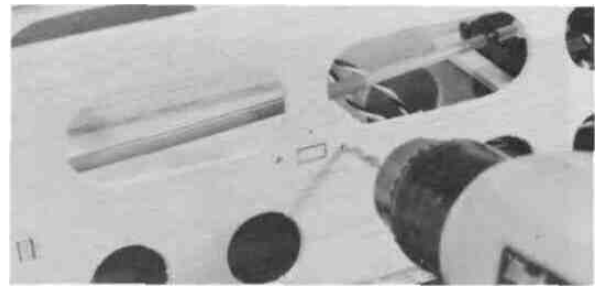
*NOTE The motor battery must have a **Kyosho-type** connector to mate properly with the Thrustmaster switch harness If your battery connector is not compatible, you'll **have to** change connectors

MOUNT THE RECEIVER SWITCH



D 1 Remove the face plate from your receiver switch and hold it against the outside of the fuselage as shown in the photo **Make sure the switch will be located above the battery box, and clear of the on-off switch pushrod!**

D 2 Mark the locations of the **screw holes** and the rectangular **switch hole,** using the faceplate as a guide



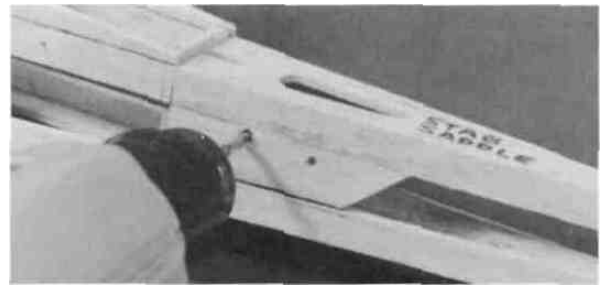
D 3. Drill 3/32" holes for the switch mounting screws.

D 4 Use an Xacto knife to cut out the rectangular switch hole

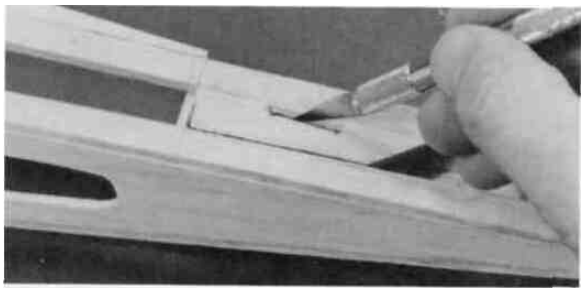
D 5. Mount the switch to the fuse side and check the operation **(Pushing the switch toward the front of the airplane is "on"),**

CUT PUSHROD EXIT SLOTS

D 1 Study the plan and note the location of the elevator and rudder **pushrod exit** slots(they are in the same location on both sides of the fuselage) Using a ruler, transfer the locations of these slots from the plan to the fuselage, marking the front and rear of each slot.



D 2 Drill 1/8" holes in the 3/32" balsa fillers at the front and rear of the pushrod exit locations

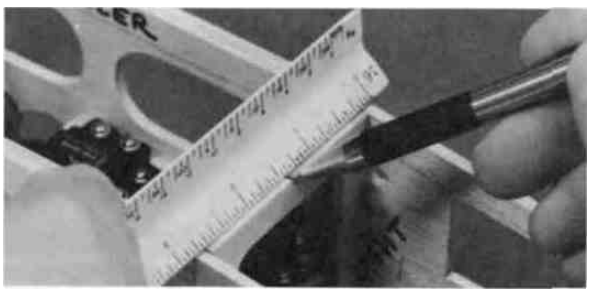


D 3. Use an Xacto knife to cut out the slots, between the holes.

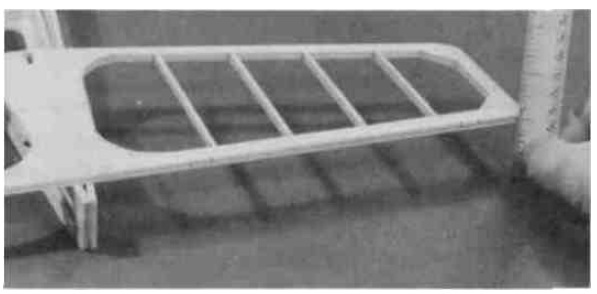
D 4. Sand the fuse sides smooth in the area of the push-rod exit slots.

MOUNT THE STABILIZER

D 1. Sand the **stab saddle** area of the fuselage with your T-bar to remove any excess glue.

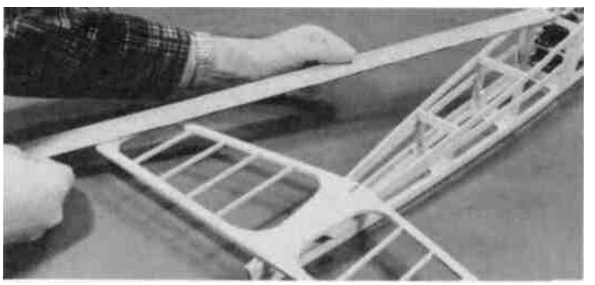


D 2. Accurately measure and mark the **exact center** of the top of former **F-3** as a reference mark. Stick a pin in at this point.



D 3. While holding the stab firmly in place onto the saddle, measure down to the flat work surface from both ends of the stab. If one side is higher than the other, sand the high side of the stab saddle with your T-bar sander and 100 grit sandpaper **(Sand only a little at a time!).** Replace the stab in the saddle and re-check the measurements. Continue this process until the stab is level within 1/16".

D 4. Line up the 3/16" **notch** in the front of the stabilizer with the 3/16" notch in the stab saddle. **Tack glue** the front of the stabilizer to F-6 with only **one drop** of thin CA.



D 5. Measure from your reference mark in the center of F-3 to both rear corners of the stab, and adjust the position of the stab until the measurements are **equal.** Holding the stab in this position, apply thin CA to the stab/fuse joint at the rear of the stab. Also add more CA at the back of F-6 to lock the stab in place.

D 6. Now turn the fuse upside down, and apply thin CA glue all along the stab/fuse joints.

D 7. Temporarily attach the **elevator** to the stab with **the** hinges.

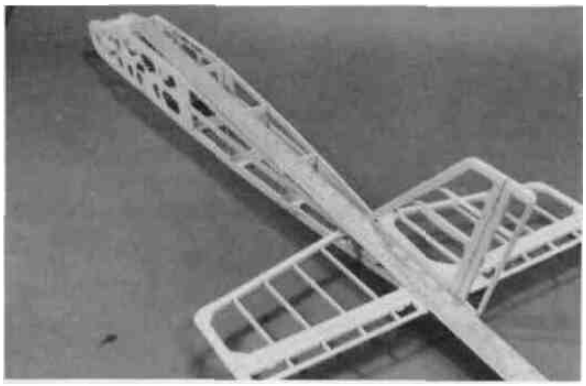
TRIAL FIT THE FIN AND RUDDER

(Do not glue!!)

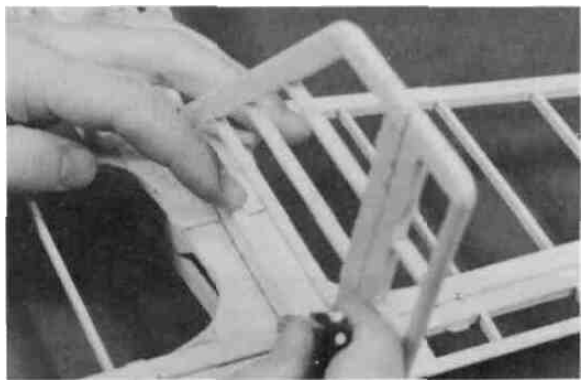
D 1. Temporarily attach the rudder to the fin with the hinges **(do not** glue).

D 2. Set the fin in place on the stab to check the fit and alignment. If the fin TE does not match the fuse tail post, you may sand a little off the lower front corner of the fin LE to permit the fin to slide forward until it contacts the tail post. Also, with the fin resting down on the stab, the bottom of the fin and rudder must not protrude below the bottom of the fuse. If they do, sand them off.

IMPORTANT NOTE: Improper fin alignment is one of the most common causes of poor flying airplanes. **The fin absolutely must line up with the centerline of the airplane!** Therefore, use care in the following steps to mount the fin properly.



D 3. Remember the mark you made in the center of F-3? Now measure 3/32" left and right of that mark and make two more reference marks. Now lay a straightedge along the left side of the fin, with one end of the straightedge on the left mark on F-3. Adjust the position of the fin until it matches the straightedge.

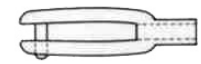


D 4. Holding the fin in this position, draw lines on the stab center on both sides of the fin for future reference. Double check this by laying the straightedge along the right side of the fin and holding it on the **right** mark on F- 3.

DO NOT glue the fin to the stab at this time!

MAKE THE PUSHRODS

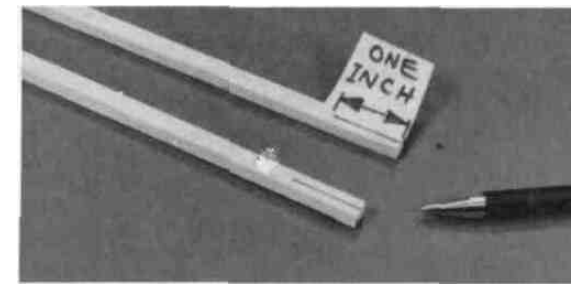
D 1. You'll need the two 1/4" x 1/4" x 12-1/2" balsa sticks, two 12" steel **rods** threaded on one end, two **nylon** clevises and some **strong thread** (not included).



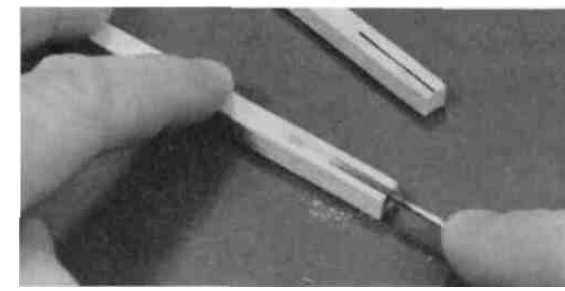
NYLON CLEVIS

STEEL PUSHROD WIRE

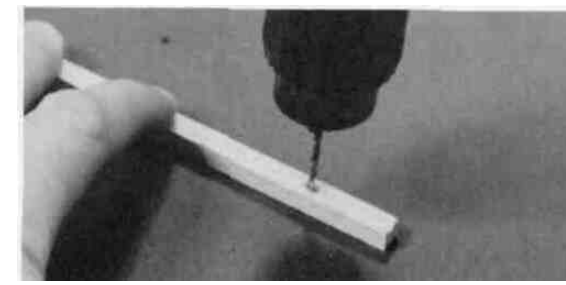
D 2. Clean the oily residue off the pushrod wires using a tissue dampened with alcohol or degreaser.



D 3. Draw a line 1-inch long on **each end** of both 1/4" x 1/4" sticks as shown in the photo.

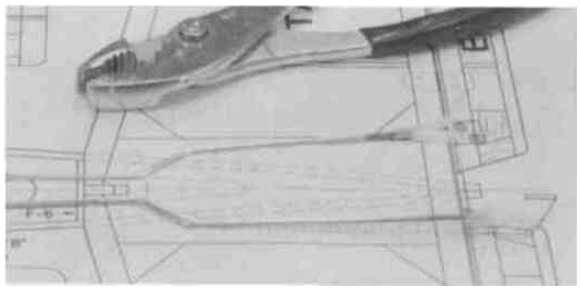


D 4. Use the threaded end of one of the wire pushrods to "file" **grooves** in the balsa sticks where you drew the lines. The depth of the grooves should be about 1/2 the thickness of the wire.

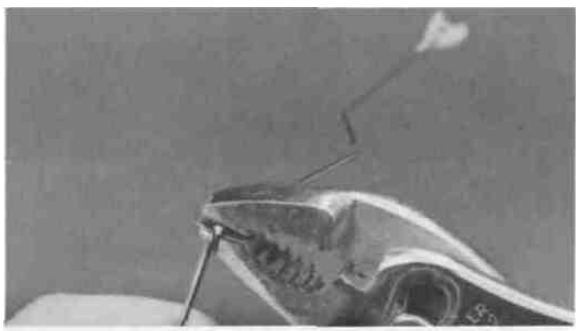


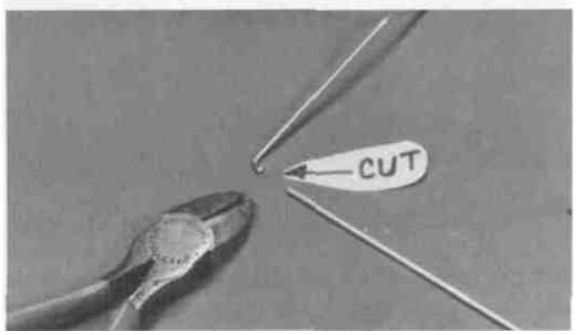
D 5. Drill 5/64" holes through the sticks at the end of the grooves you made in the above step.

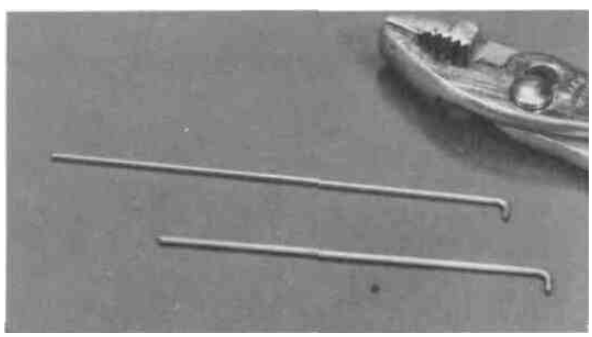
D 6. Screw a **nylon clevis** on the threaded end of both steel pushrod wires. Screw it all the way on, until the wire is visible inside the clevis (about 17 full turns). **Note:** The wire will be easier to hold if you grasp it with a pliers.



D 7. Lay the wires on the fuse plan (top view), **and** use a pliers to bend the wires to match the drawings of the elevator and rudder pushrods. Notice where the wire makes a 90-degree bend and goes into the stick and mark that location on the wire. Make this bend now and cut off the excess wire.

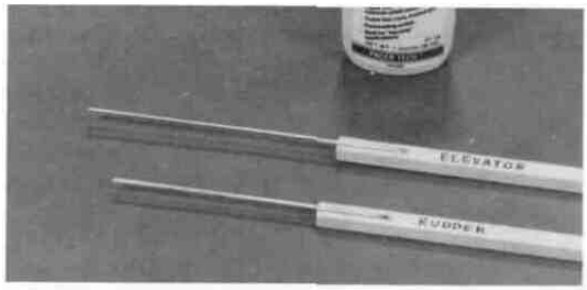


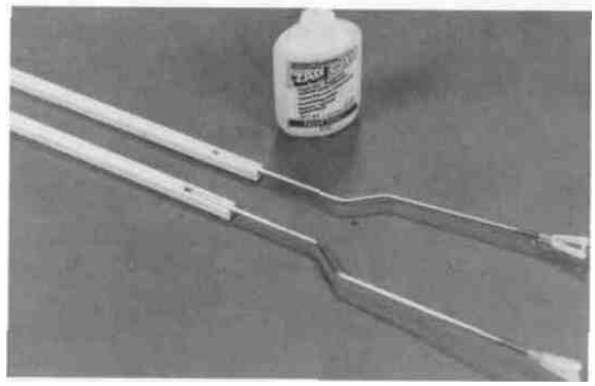




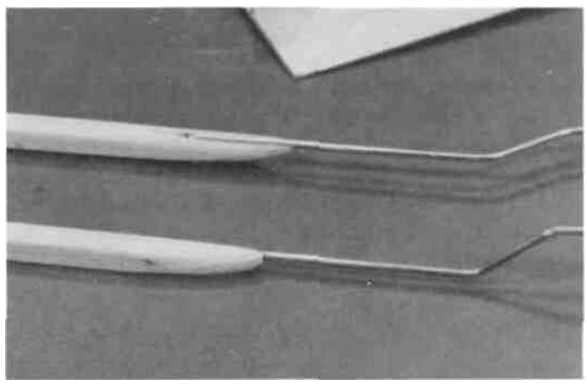
D 8. Take the straight wires that you cut off, and make a short 90-degree bend in one end of each of them.

D 9. Use sandpaper to roughen the four ends of the wires that will be glued into the balsa sticks.

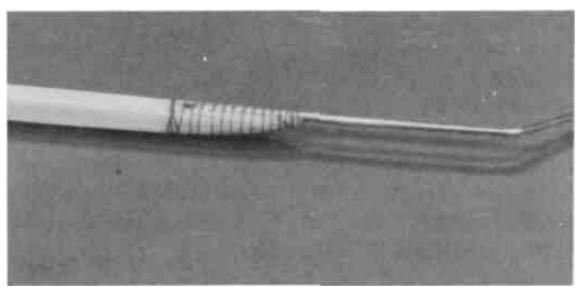




D 10. Insert the wires into the holes and slots in the 1/4" x 1/4" balsa sticks, and glue in place with thin **CA.**



D 11. Use your T-bar to sand the ends of the balsa pushrods to a rounded and somewhat pointed shape, as shown on the plans and in the photos. This will reduce the chance of the pushrod binding against something inside the fuselage.



D 12. Wrap the ends of the pushrods with **strong thread,** as shown on the plan, apply thick CA to the threads and smooth it out with a piece of waxed paper. Allow to harden.

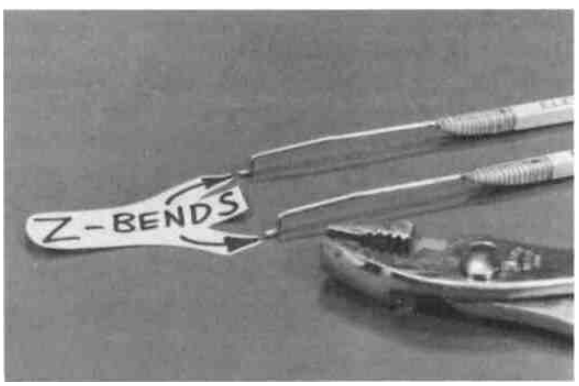
INSTALL PUSHRODS

D 1. Remove the nylon clevises from the pushrods.

D 2. Insert the pushrods, threaded end first, through the openings in F-3, F-4, F-5 and F-6, then out through the pushrod exit slots you previously cut. **Note:** You may have to bend the wire slightly to allow it to pass out through the exit slots. If so, straighten the wire after it is out.

D 3. Screw the nylon clevises back onto the threaded rods, then snap the clevises onto the nylon horns on the rudder and elevator.

D 4. With the elevator, rudder and servos in the neutral position, mark the front of the pushrod wires where they cross the hole in the servo output wheels or arms.



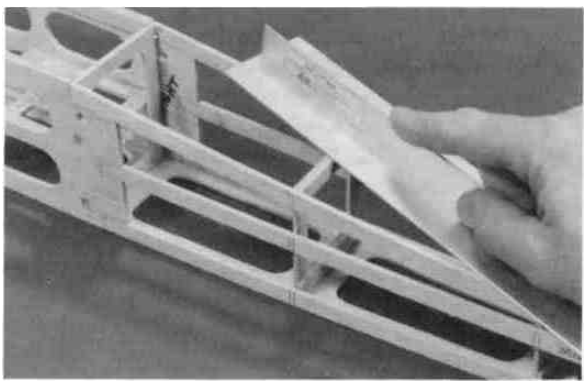
D 5. Remove the clevises and remove the pushrods from the fuselage and make **"Z"-bends*** in the wires at the marks you just made.

*NOTE: You can make a **"Z"-Bend** with a regular pliers (practice on a scrap first), or you may use a special "Z"-bend pliers (available through your hobby shop). There are a couple of alternatives to making Z-bends which you may want to consider: 1. Use a **solder-on clevis** on the servo end of the pushrod or 2. Use a Dubro No. 121 **E-Z Connector** to attach the pushrod to the servo arm.

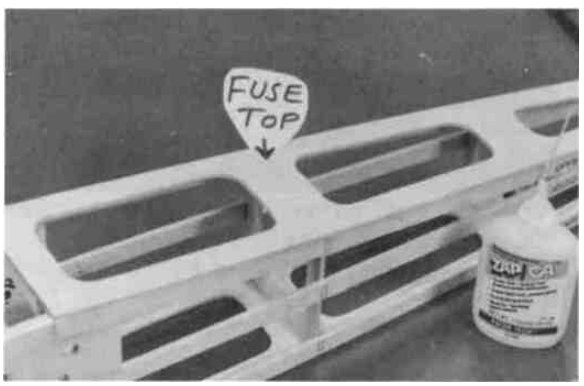
D 6. Cut off the excess wire.

COMPLETING THE FUSELAGE

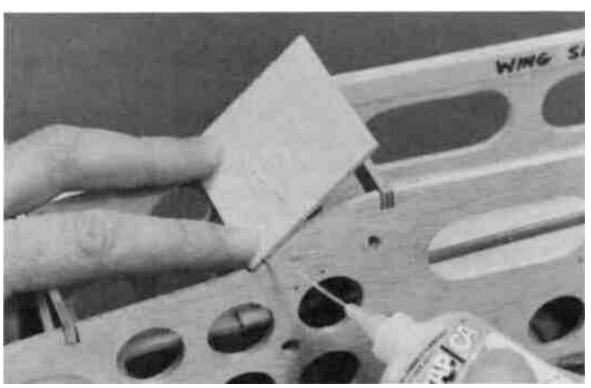
D **1. Remove** the following items from the fuselage: F-1B, Motor, Switch harness, receiver, radio switch, radio battery, servos, pushrods, horns and hinges. **Note:** If it seems strange to you to now remove these items, please be assured that this will make it much easier to perform the next steps, and it will be very easy and fast to re-install these items later.



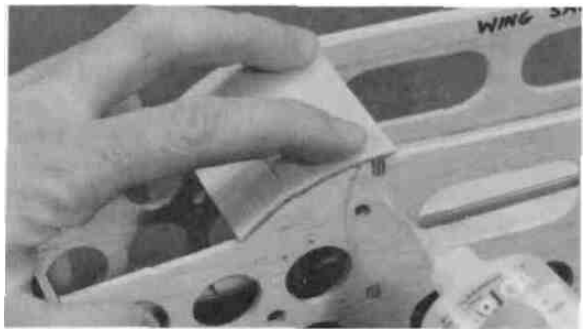
D 2. Carefully sand the top edges of F-3, F-4, F-5 and F-6 until they are even with the top longerons, being careful not to gouge into the upper longerons.



D 3. Trial fit the die-cut 3 32" balsa **fuse top.** It fits against the front of the stab, and extends forward to the front edge of F-3. Glue the fuse top in place.

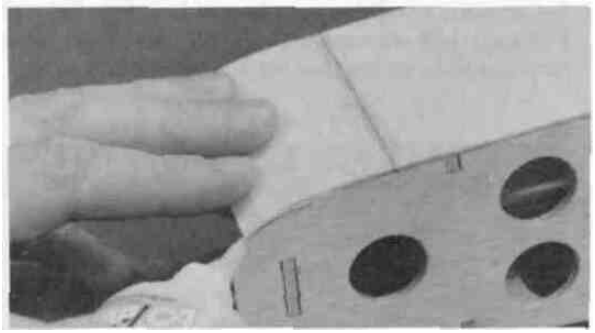


D 4. Find the 3 32" x 2-1/4" x 2-3'4" balsa **windshield** and glue it to the fuse sides at the bottom front corners, using thin CA. Allow to harden.

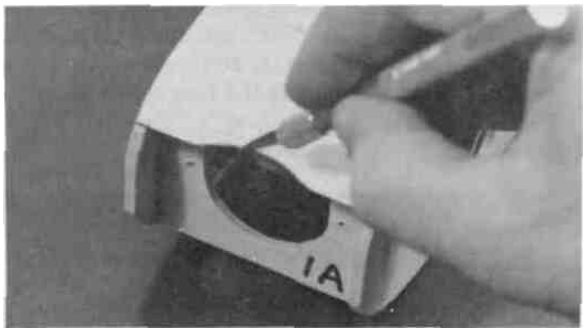


D 5. Bend the windshield around the curve of the fuse sides and over the top of F-2. Glue the windshield in place. Trim the windshield even with the rear edge of F-2. **NOTE:** If the windshield is hard balsa, it will bend easier if you first wet the top surface with water or alcohol.

D 6. Sand the top of F-l to match the top edge of the fuse sides.

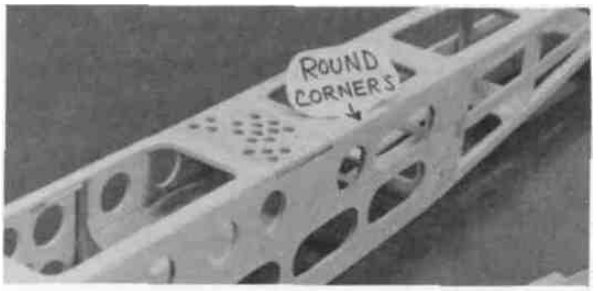


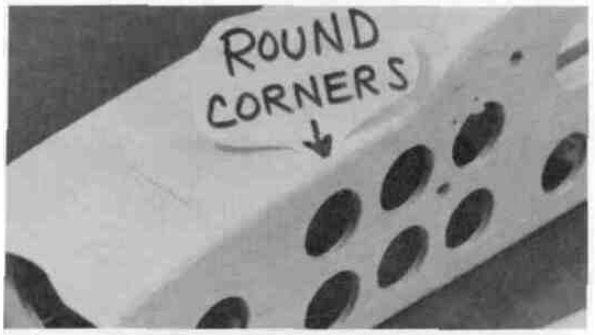
D 7. From the 1/16" x 3" x 6" balsa sheet, cut two pieces of **cross-grain sheeting** and glue them to the top of the fuse in front of the windshield (this is called the "hood top").

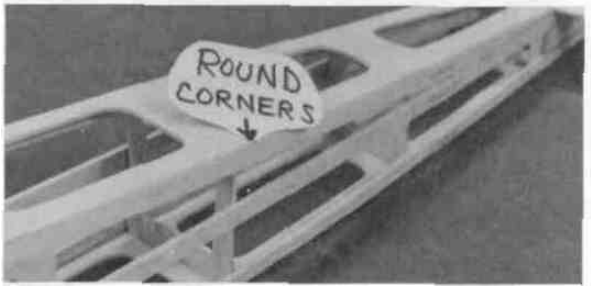


D 8. Carve a rounded area in the front of the sheeting to provide clearance for the motor.

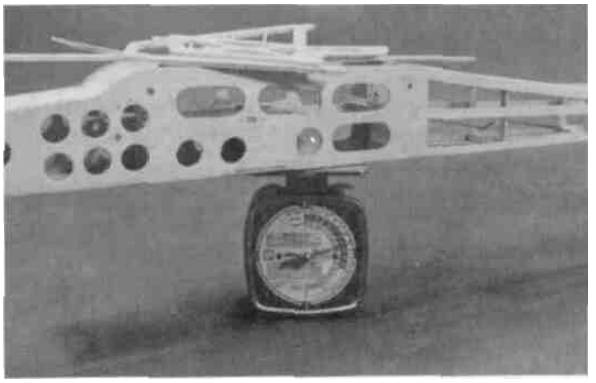
D 9. Apply **lightweight filler** compound to all gaps, gouges and rough areas of the fuselage, and allow to dry.







D 10. **SAND, SAND, SAND!** Using your T-bar sander with 100 grit sandpaper, sand the top and bottom corners of the fuselage to a **rounded** shape as shown in the former detail drawings on the plan (do not round the fuselage corners in the wing saddle area). Sand the fuselage sides, top, and bottom until they are very smooth.

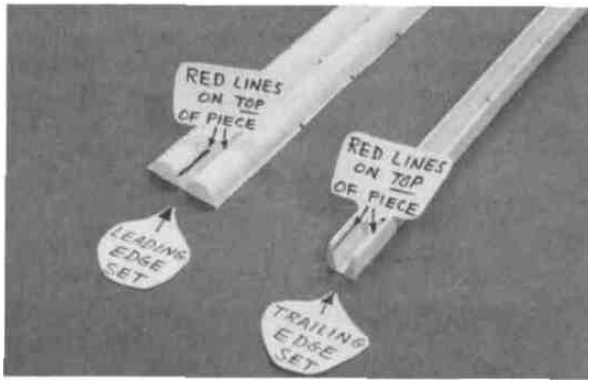


D 11. DO NOT OMIT THIS STEP! Accurately **weigh** the following items on a postage scale: Fuselage, hatch, fin, rudder, stab, elevator and pushrods. These items should have a total weight of no more than 7 **ounces.** If they are heavier than 7 ounces, that means the balsa in your kit is slightly harder and heavier than normal, you have used too much glue, or you have not done enough sanding. If so, you should make every effort to lighten the structure by doing more sanding and by enlarging the lightening holes in the 1/8" balsa fuse sides.

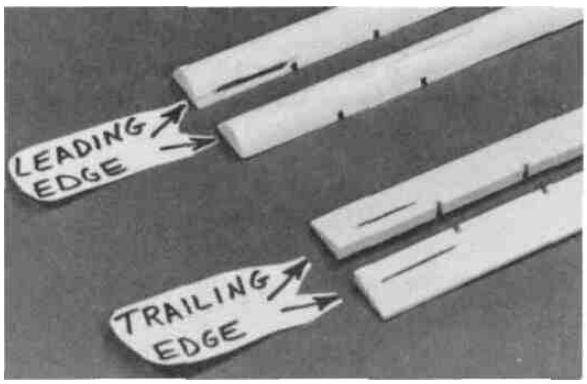
WING

NOTE The PT-Electnc **wing** is made to fit together **without glue,** so you can assemble all of the major parts and check to make sure they are all lined up **before** applying thin CA to the joints

D 1. Turn the plan over to **side 2,** which shows the wing Tape the plan to your flat work surface so the "Right Wing Panel" is facing you Cover the right wing panel drawing with waxed paper (so you won't glue the wing to the plan!).



D 2 The shaped and notched wing **leading edges** (L E) and **trailing edges** (T E) are fastened together by thin layers of balsa Separate them by **folding** until the balsa breaks Sand away the excess balsa that remains along the edges after breaking them apart, using a T-bar with 100-gnt sandpaper. ★ **NOTE: Save several of the thin little balsa scraps which will be used in step 8.**



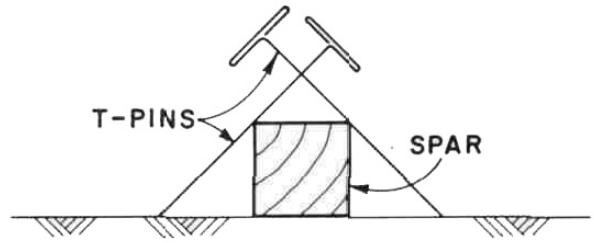
D 3 Before using the L E and T E pieces, you must determine which pieces are to be used for the right wing panel Here's how

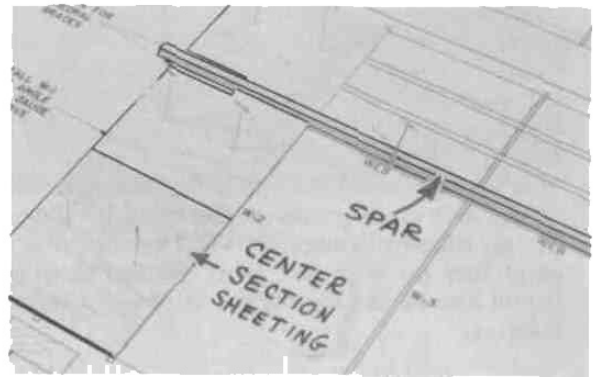
A- We have drawn **red lines** on the **top** of each piece

B- Notice that the pieces are notched on one end, but not on the other **The notched end** goes **toward the wing tip,** and the end without a notch goes toward the center of the wing.

C- Take one of the L E pieces and lay it on the right wing panel plan **with the red line up** If the notched end is on the right side (at the tip) you have the correct L.E.

D- Do the same thing to determine which T E piece to use.





D D 4 Pin one of the 3/16" x 3/16" x 28" hardwood **spars** to the plan, with the right end of the spar lined up with the tip (The excess spar length extends past the wing centerline)

D D 5 Accurately position the three die-cut 1/16" balsa **center section sheets** on the plan and pin them in place Notice the pre-cut openings for the dihedral braces Edge glue the two rear sheets together with thin CA, and glue them to the spar.

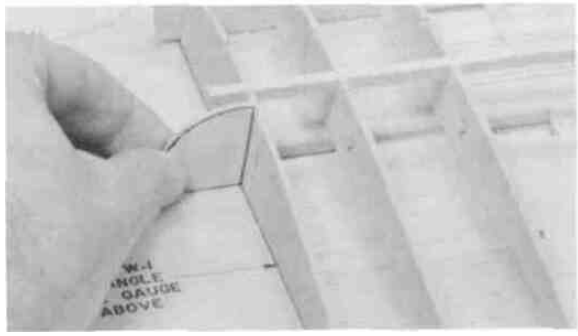
D D 6. Put the two **W-2 ribs** and the eight **W-3 ribs** in place on the spars (do not glue).

D D 7. Lay the **trailing edge** in place with the end lined up with the outside edge of the tip rib on the drawing (the excess length extends beyond the wing centerline), and work the ribs into the notches **(do not glue).**

D D 8 Lay down some of the 1/32" balsa scraps from step 2 between the ribs at the L E (these will raise the L.E. 1/32" off the table).

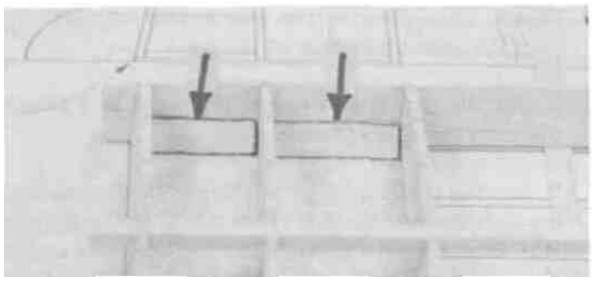
D D 9 Lay the leading edge in place and line up the end with the outside edge of the tip rib on the drawing (the excess length extends beyond the wing centerline) Work the ribs into the notches **REMEMBER:** The L E is 1/32" above the table, supported by the balsa scraps.

D D 10. Set the **W-l rib** in place (do not glue), then lay the **top spar** in place.

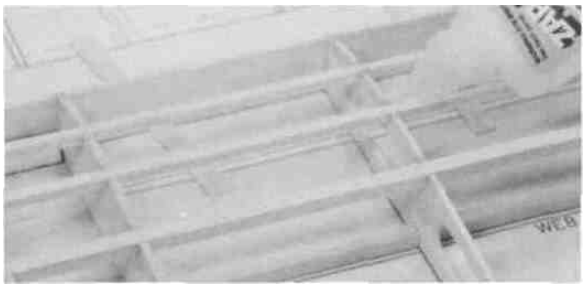


D D 11. Set W-l at the proper **angle,** using the die-cut 1/8" ply **dihedral gauge. NOTE: The edge of W-l must line up with the wing centerline(which** should also **be the edge of the** 1/16" **balsa bottom** sheeting).

D D 12. Make sure that the ribs are all down onto the plan and fully inserted into the notches in the L.E. and T.E. Also make sure that the spars are seated snugly down into the notches in the ribs. Check all parts for correct alignment **(especially rib W-l),** then apply thin CA glue to all joints.

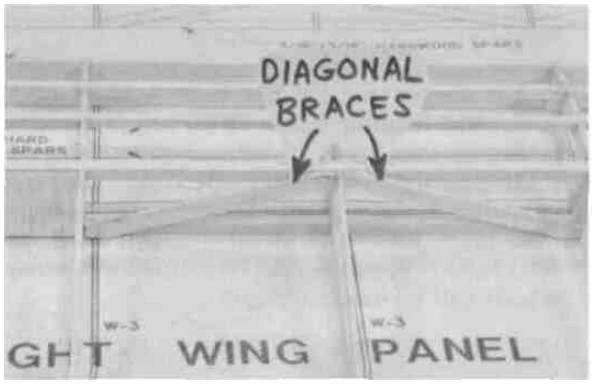


D D 13. From the 5-1/2" length of 1/4" **balsa triangle,** cut pieces to fit between the ribs in the first two rib bays. Glue these pieces to the bottom sheeting and the L.E. as shown on the plan and in the photo.

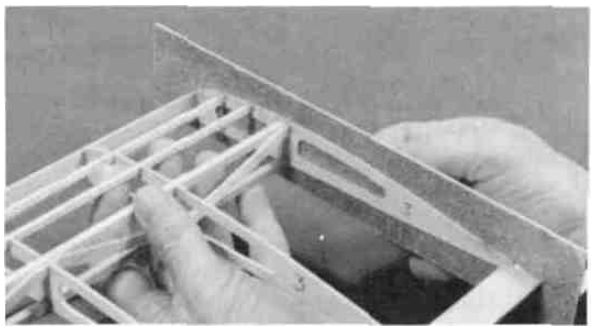


D D 14. Lay two of the 1/8" x 1/8" x 28" balsa sticks in the **front spar notches,** with the ends of the sticks flush with the outside edge of the tip rib. Make sure the spars are fully down into the notches, then apply thin CA to all joints.

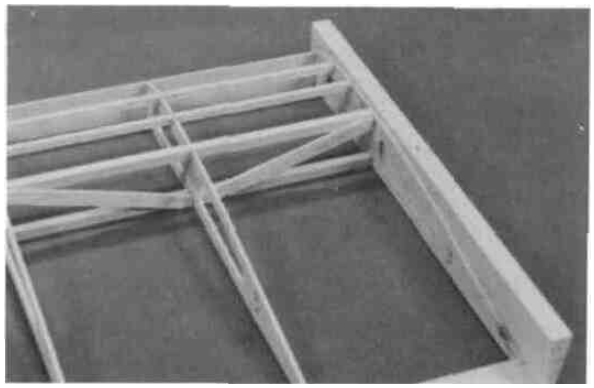
D D 15. Find the stack of 1/16" balsa **shear webs.** Cut one of the webs to fit between the two W-2 ribs and glue it to the back of the spars. Also glue webs to the spars in the next three rib bays. (See the detail drawing showing the webs and braces on the wing plan).



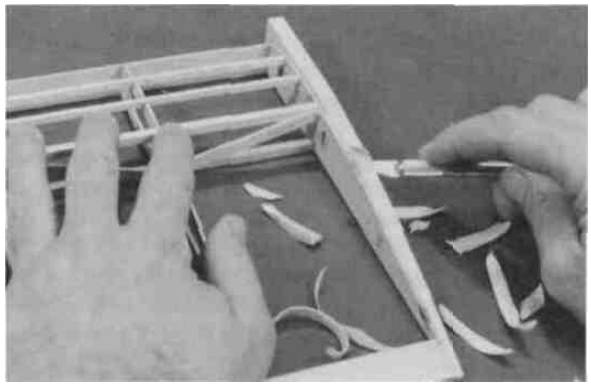
D D 16. From one of the 1/16" x 1/4" x 18" balsa sticks, cut **diagonal braces** and glue these braces to the spars as shown on the detail drawing.



D D 17. Sand the leading edge, spars and trailing edge even with the tip rib, using your T-bar sander.



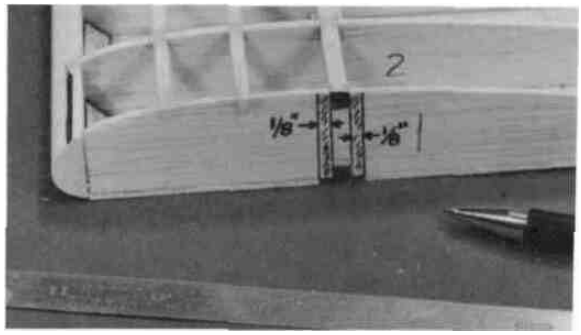
D D 18. Find the two tapered balsa pieces that are 9-1/8" long. These are the **wing tips.** Glue one of these tapered balsa wing tips to the tip rib (the **narrow edge** of the tapered wing tip goes **down).**



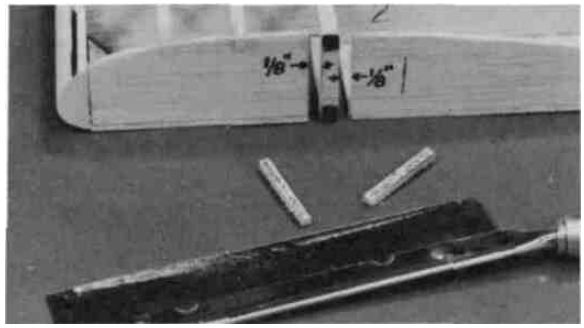
D D 19. **Carve and sand** the wing tip to blend with the tip rib. Sand the front and rear corners to a rounded shape as shown on the plan. Also sand the top **and** bottom edges to a **slightly** rounded shape.

D D 20. Using a razor saw, carefully cut off the leading edge, spars and trailing edge flush with rib W-l. Then sand smooth and flat using a T-bar.

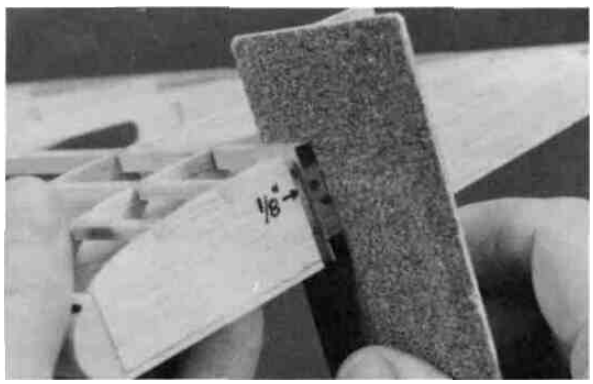
D 21. Turn the plan around so the Left Wing Panel drawing is facing you, and **repeat steps 4 through 20 to build the left wing panel** in the same manner.



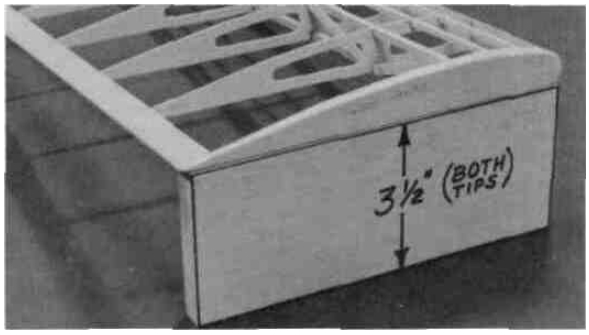
D 22. On rib W-l, draw lines 1/8" in front **and back of** the spars.



D 23. Working **very carefully** and slowly with a razor saw, cut out 1/8" strips in W-l in front and back of the spars. Do this in both wing panels to provide openings for the dihedral braces. **Note:** It is OK if the part of W-l between the spars is broken out.

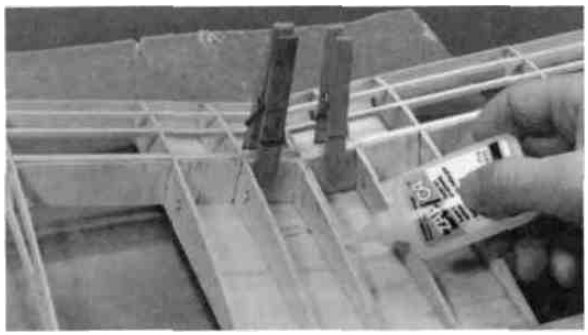


D 24. Check the spars in the area you just cut out. If any wood or glue remains attached to the spars, sand it off with your T- bar.



D 25 Working on a flat table, place the two wing panels together at the center Block up both wing tips 3-1/2" with stacks of books, then trial fit the die-cut 1/8" ply dihedral braces at the center Enlarge the opening in W-l and the bottom sheeting if necessary to allow the dihedral braces to fit without forcing them in.

PRACTICE THE NEXT STEP "DRY" BEFORE ACTUALLY DOING IT!



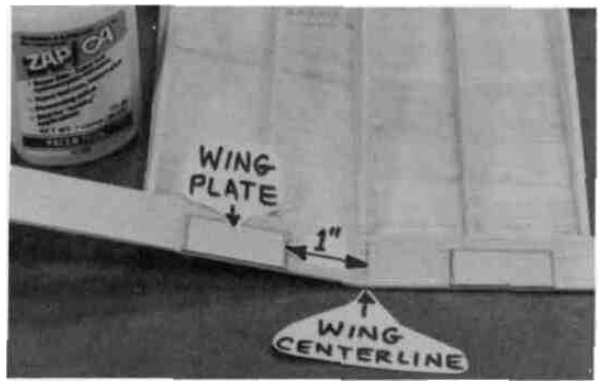
D 26 Place waxed paper under the wing center joint, then mix up a batch of epoxy **(30-minute epoxy** is preferred here to give you more time), and apply it to the dihedral braces and spars Slide the wing panels together, clamp the dihedral braces to the spars with clothespins, and wipe up the excess glue with a tissue While you are waiting for the epoxy to harden, apply thin CA along the joint where the two W-l ribs come together **Make sure the wing panels remain undisturbed until the epoxy has fully hardened.**

D 27. After the epoxy has hardened, examine the center joint and fill any gaps with balsa dust and CA glue.

D 28. Sand the center section and the entire wing smooth with your T- bar sander **NOTE:** When sanding the wing, you must be very careful not to change the shape of the wing by accidentally sanding into the wing ribs.

D 29 Find the two 1/32" x 1-1/4" x 1/2" plywood pieces These are the **wing plates** which protect the trailing edge from damage by the wing hold-down rubber bands.

D 30 Working on the table edge, use a sanding block to "feather" (taper) the edges of the wing plates Feather three edges of each plate, leaving one long edge square.



D 31 Make marks on **the T E 1-inch each way from** the wing centerline

D 32 Put the wing plates in position on the T E The edge of the plate that is **not** feathered goes to the rear along the T E The 1-inch marks you made in step 31 are where the plates begin

D 33 Apply thin CA glue around the edges, **holding** the plates firmly in place until the glue sets.

D 34. **DO NOT OMIT THIS STEP!** Accurately weigh the wing on a postage scale It should have a total weight of no more than **5 ounces.** If it is heavier than 5 ounces, there is not much you can do other than some light sanding of the leading and trailing edges and the wing tips Do not sand the hardwood spars, as this could weaken the wing Proceed to the next section.

PREDICTING THE FINISHED FLYING WEIGHT

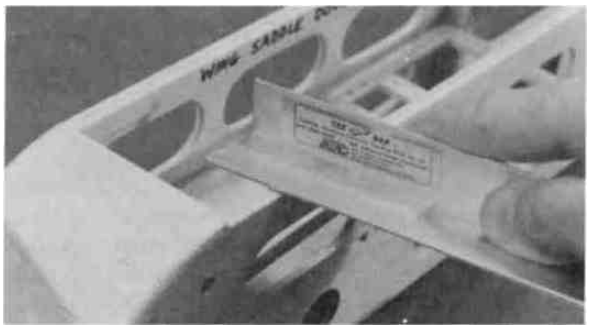
At this time you should try to accurately predict what the final weight of your PT-Electnc will be Remember that you are shooting for a target weight of 48 ounces or less with a 6-cell 1200 mAh motor battery, and 50 ounces or less with a 7- cell 1200 mAh motor battery If it looks like your airplane will be only 1 ounce overweight, don't worry about it, as you will probably be satisfied with the flight performance If, however, you predict a final weight that will be 3 ounces or more overweight, you should take another look at the components you will be installing in your airplane (servos, battery, wheels), to see where you can reduce weight. I'll talk more about this later

Here is a sample weight computation:

Fuselage, etc (see p 26 step 11)	7.0 oz.
Wing	5.0
Wire landing gear and all hardware	2 0
6 #63 rubber bands	0.25
Wheels (lightweight)	1.5
Thrustmaster motor, harness, prop and spinner	9.5
Receiver, switch, 3 standard servos, **225 mAh** receivel bdtteiy	8.75
6-cell 1200 mAh motor battery	11.5
Covering material	3 0
TOTAL	48.5 oz.

COMPLETE THE STRUCTURE

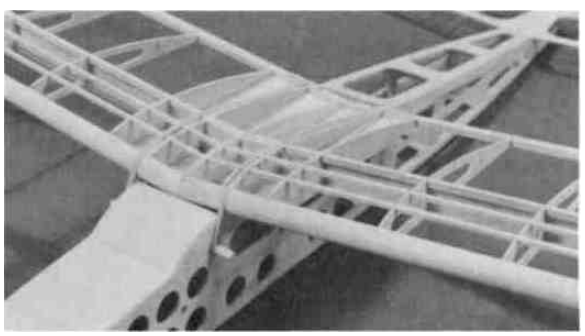
TRIAL FIT THE WING IN THE SADDLE



D 1. Using your T-bar sander, sand the **wing saddle area** to approximately the same angle as the wing.

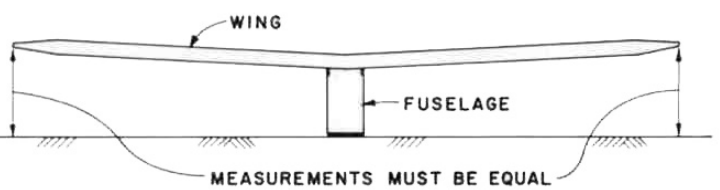
D 2. Use a sanding block to lightly sand the ends of the 1/4" hardwood wing **hold-down dowels** to remove the sharp cut edges.

D 3. Insert these dowels into the holes in the fuselage (do not glue). **NOTE:** If the dowels fit too tightly, enlarge the holes with a 1/4" or 17/64" drill bit.



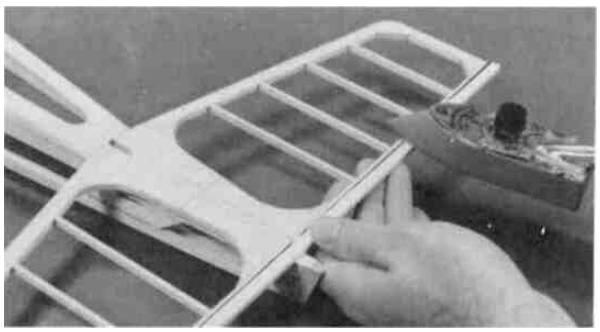
D 4. Lay the wing in the saddle and hold it down with two #63 **rubber bands*** (provided). Check the fit of the wing in the saddle. It should rest snugly and evenly onto the saddle. If not, sand the saddle slightly for a good fit. ***NOTE: When actually flying your PT-Electric, you must use SIX #63 rubber bands for wing hold-down.**

D 5. Measure down from both wing tips to your flat building surface. If the measurements differ by more than 1/8", you must sand the wing saddle slightly until the measurements are the same.

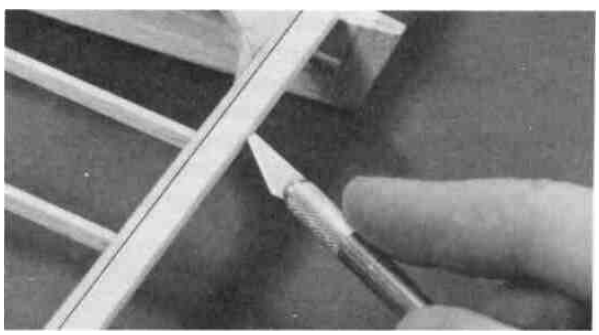


MOUNT THE ELEVATOR

NOTE: This section requires that you begin covering your airplane. Before doing so, please study the instructions that are provided with the covering material.

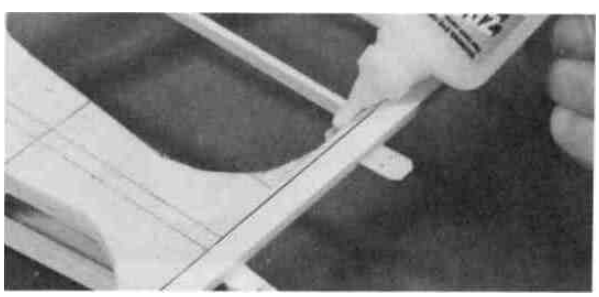


D 1. Cut a 3/4" x 18" strip of covering material (Top Flite "Super Monokote" or similar). Iron this strip to the stabilizer **trailing edge,** overlapping equally onto the top and bottom of the stab.



D 2. Using an Xacto knife, slit the covering in the areas of the hinge slots. **NOTE:** You can find the hinge slots by holding the elevator against the stab T.E.

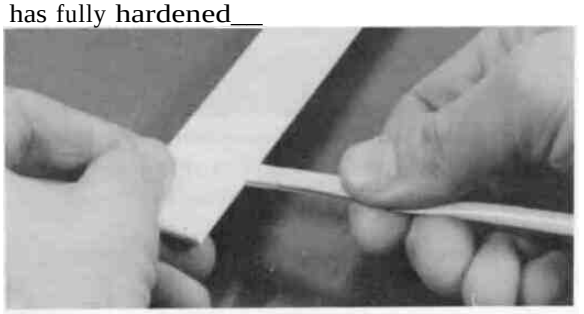
D 3. Now cover the **entire elevator** by covering the bottom first, then the top.

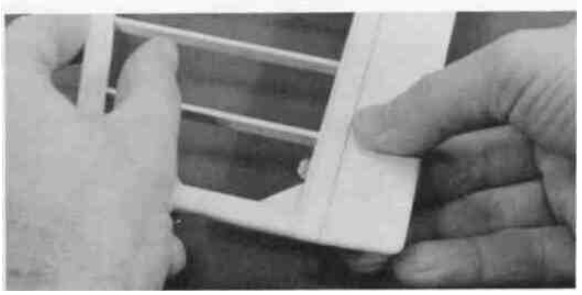


D 4. Insert the hinges into the slits in the stabilizer trailing edge, and glue these hinges to the stab by applying thin CA glue around the hinges. Wait a few minutes, then grasp each hinge and pull to make sure the glue has penetrated and bonded the hinge to the wood.

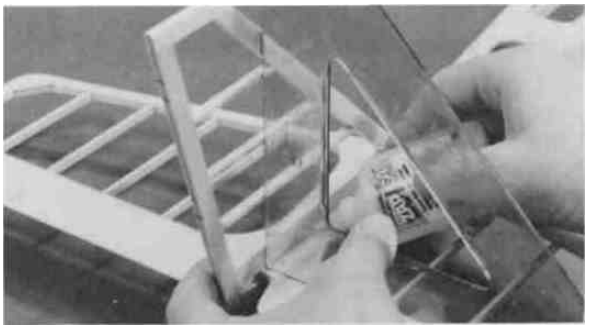
D 5 Slit the covering on the **elevator** in the areas of the hinge slots **NOTE:** You can find the hinge slots by holding the elevator against the stab T E and marking the location of the hinges **NOTE:** For the next step you'll need the following 30-mmute epoxy, a plastic **soda straw,** rubbing alcohol and some tissues

D 6 Mix up a batch of 30-mmute epoxy Force some epoxy up into a soda straw by pushing the straw into the puddle of epoxy several times **Pinch** the end of the soda straw and insert it approximately 1/16' into one of the elevator hinge slots **Squeeze** the straw to force epoxy into the hinge slot Repeat this process to get epoxy into all of the elevator hinge slots, then push the elevator onto the hinges Carefully wipe away all excess epoxy with a tissue dampened with alcohol Do not disturb the elevator until the epoxy has fully hardened__





MOUNT THE FIN



D 1 Hold the fin in place on the stabilizer and line it up with the marks you previously made Check to make sure the fin is perpendicular to the stab, using a draftsman's triangle or a carpenter's square Apply a **couple drops** of thin CA to tack glue the fin in place

D 2 Double check the fin alignment (it **must line up with the fuselage centerline),** then apply thin CA all along the fin/stab joint Also glue the bottom of the fin TE to the fuselage tail post, and glue the front of the fin L E to F-6

TRIAL FIT THE MOTOR BATTERY

D 1 Cut several pieces of 1/4" foam rubber and glue them to the inside of the battery compartment in the locations shown on the plan Don't forget the piece of foam that goes on the hatch, as this is the piece that holds the battery up in the compartment

D 2 Insert your 6 or 7 cell 1200 mAh motor battery through the hatch opening and into the battery compartment to check the fit Add or remove foam rubber as necessary for a good snug fit

COVERING

D 1 **Preparation:** Before covering, make a final thorough check to make sure the entire model has been sanded smooth The covering material probably will not hide imperfections in your structure, so now is the time to fix them Then vacuum the model dust free, using a soft brush attachment on your vacuum cleaner Finally vacuum your entire work area until it is dust-free Remove the hatch, rudder, elevator, hinges, radio, batteries, servos, pushrods, motor, switch harness and landing gear from your model

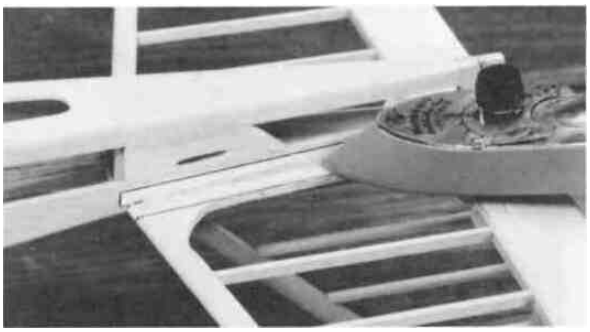
D 2 Using Top Flite **"Super Monokote"** (we used white and metallic blue on our prototypes) or any other good quality covering film and following the manufacturer's instructions, cover your model in the following sequence

COVER THE FUSELAGE

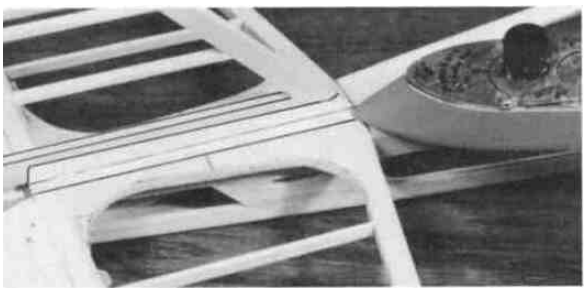
D 1 Stab TE (previously done)

D 2 Elevator bottom (previously done)

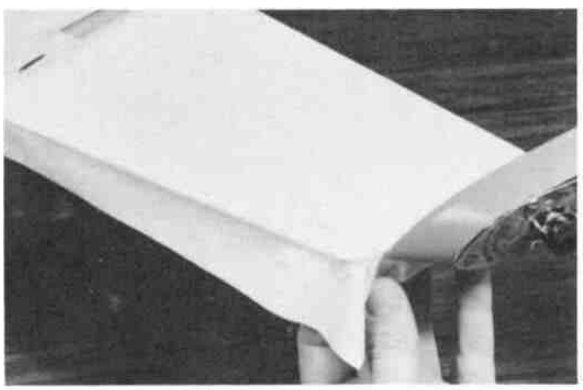
D 3 Elevator top (previously done)

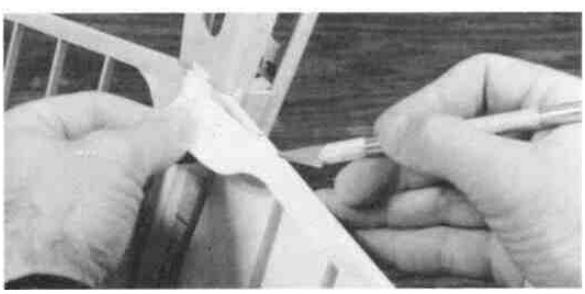


D 4. 1/2" strips of covering at joint between bottom of stab and fuse.

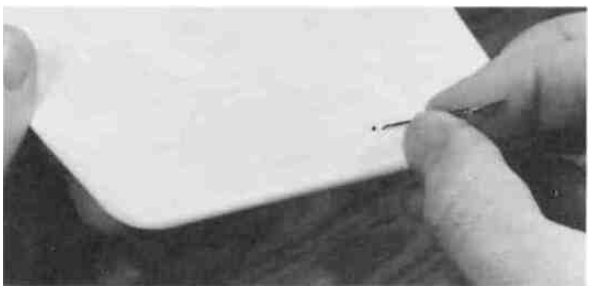


D 5. 1/2" strips at joint between stab and fin.



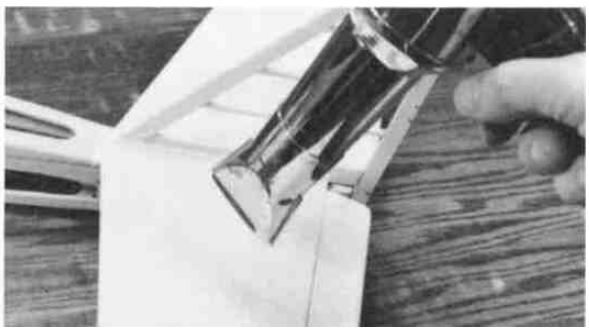


D 6. Stab bottom



D 7. Use a pin to poke "vent holes" in the bottom rear corners of the stab to allow air to escape when covering the top. (Also do this before shrinking the fin, rudder and wing covering).

D 8. Stab top



D 9. Shrink the stab covering, top and bottom

D 10. Fin left side and T.E.

D 11. Fin right side (overlap around T.E.)

D 12. Shrink fin covering, both sides

D 13. Hold rudder against fin and mark hinge locations on fin. Slit covering at slots.

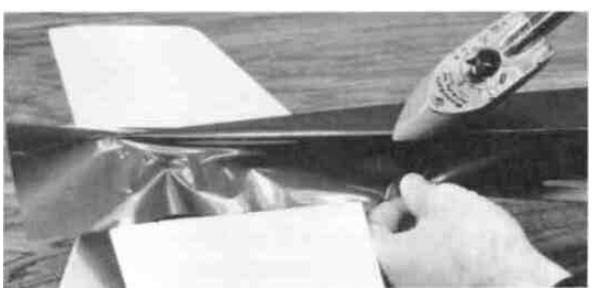
D 14. Rudder left side and L.E.

D 15. Rudder right side (overlap around L.E.)

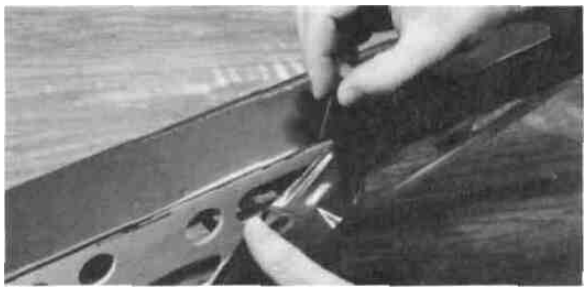
D 16. Shrink rudder covering, both sides

D 17. Slit covering at rudder hinge locations

D 18. Hatch bottom

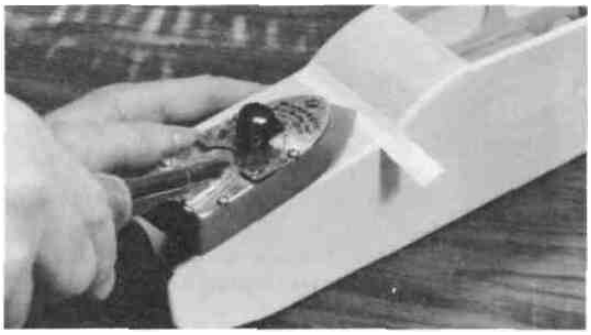


D 19. Fuse bottom



D 20. Fuse sides

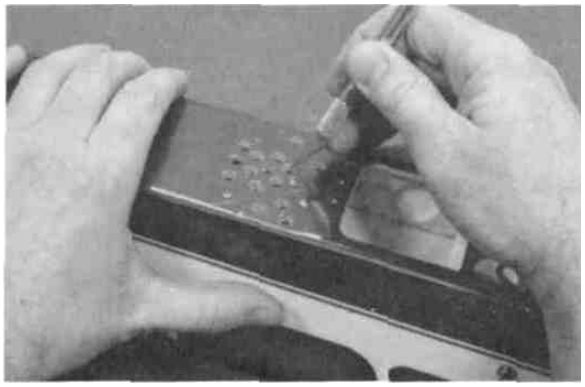
D **21. Fuse top behind wing**



D 22. 1/2" strip at base of windshield

D 23. Windshield

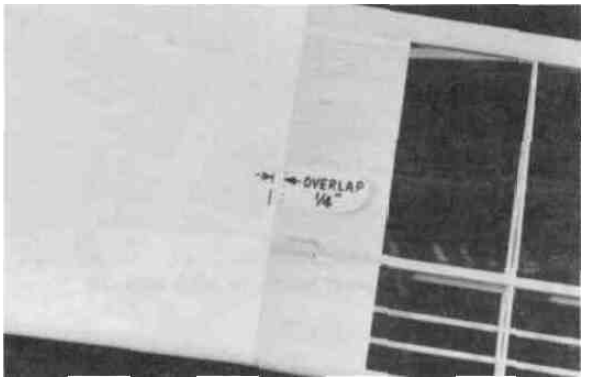
D 24. Fuse top in front of windshield



D 25. Iron the covering down around all openings that are to be cut out, then use a sharp Xacto knife to carefully cut the covering from the following openings: Pushrod exit slots, Wing hold-down dowel holes, Toggle switch hole. Landing gear plate air exit holes, Landing gear mounting screw holes, Micro switch mounting screw holes, Elevator and rudder control horn mounting screw holes, and the Radio switch and switch mounting screw holes.

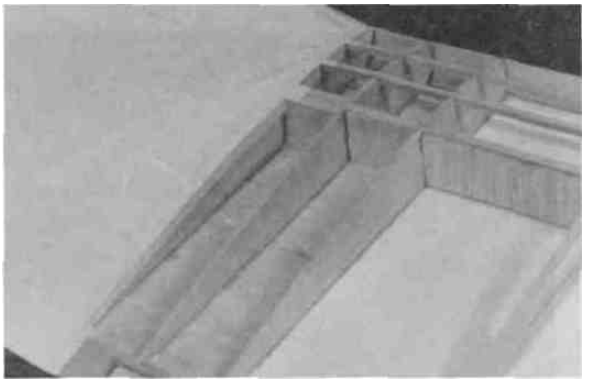
COVER THE WING

D 26. Wing tips



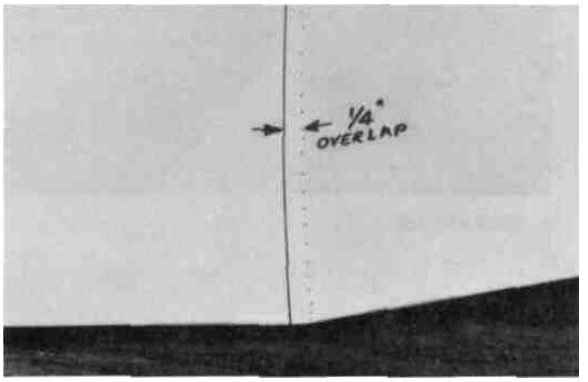
D 27. Wing bottom left (overlap centerline 1/4")

D 28. Wing bottom right (overlap covering 1/2")



D 29. Wing top left (overlap centerline 1/2" and iron covering to the side of rib W-l

D 30. Shrink covering on left wing panel, top and bottom



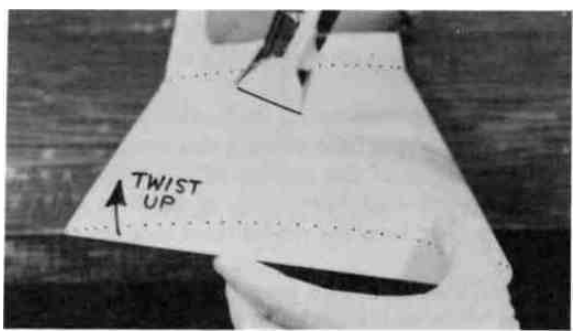
D 31. Wing top right (overlap covering 1/4")

D 32. Shrink covering on right wing panel, top and bottom

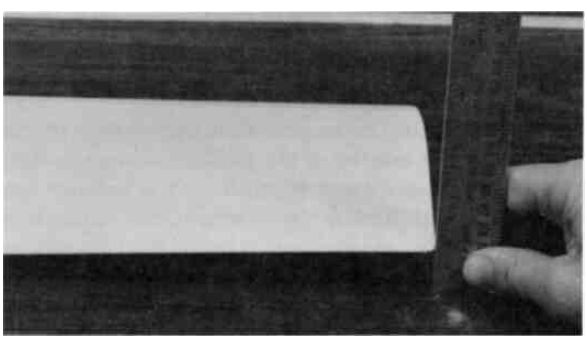
ADD WASHOUT AT THE WING TIPS

SPECIAL NOTE: One important flying characteristic of the PT-Electnc is its ability to recover "hands-off* from a steeply banked turn This is made possible by building the wing with **DIHEDRAL** and **WASHOUT** Washout is intentional and measured wing twist You will add washout to each wingtip by twisting the wing panels so **the trailing edge will be higher than the leading edge** at both wing tips. Here's how to do it...

D 1 Place the wing on your workbench with half of the wing extending off the edge Lay some magazines (or a "shot bag" as shown in the photo) on the wing near the center, to hold it down.



D 2 Now grasp the wing tip and twist it so the trailing edge goes up and the leading edge goes down As you twist you will notice ripples forming in the covering While holding this twist, use a heat gun to "re-shrink" the covering Heat both the top and bottom When you let go of the tip, you will see that the wing will retain some of the twist.

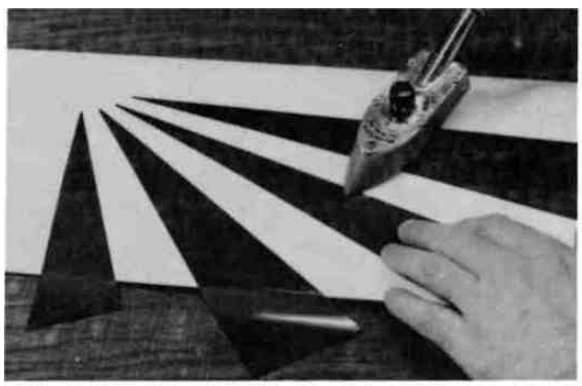


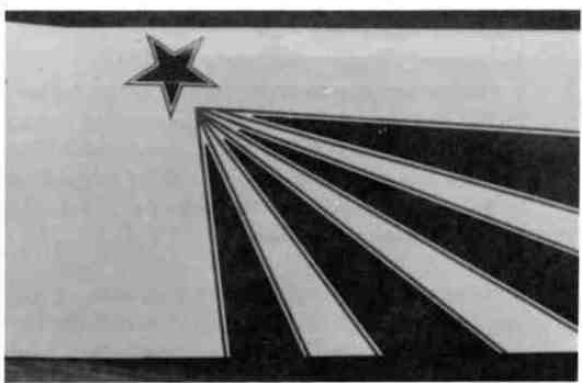
D 3 Place the twisted wing panel back on your flat work surface While holding the center of the wing down on the surface, measure how far the trailing edge is raised at the tip.

D 4 You must continue twisting and re- shrinking until the trailing edge is **1/2-inch** off the surface **at both tips.** As an aid in getting this height correct, you may make a small wood block 1/2" high by gluing together pieces of scrap wood Keep this block handy while twisting and heating, to check your progress

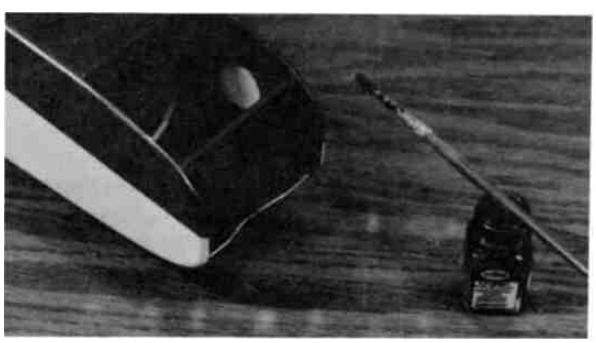
D 5 Depending on what type of covering you have used, you may find that, in time, some of the washout may disappear Check it after an hour and repeat the above process if necessary Also, re-check it periodically before you go Hying, because **THIS IS A VERY IMPORTANT REASON FOR THE STABILITY OF YOUR PT-ELECTRIC.**

ADD TRIM





D 1 Add trim using covering film or self-adhesive trim material or decals **NOTE:** We recommend that you keep your trim scheme as simple as possible for ease of application and to avoid weight build-up.

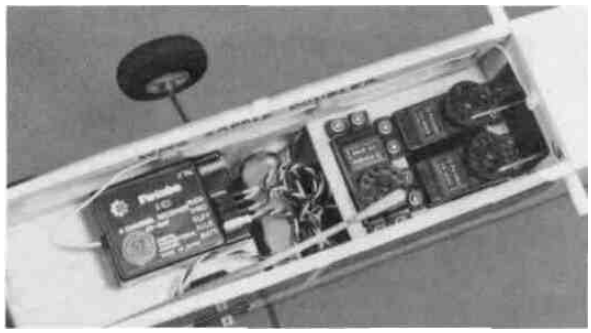


D 2 You may paint F-l, F-1A, F-1B and the motor compartment area with any kind of hobby enamel. (On our prototype we used Testers flat blue enamel)

FINAL ASSEMBLY

D 1 In the same manner as the elevator, install the **rudder hinges** by first inserting them into the fin trailing edge and applying thin CA glue **NOTE:** Remember that you previously cut off part of the bottom rudder hinge, so you must find that hinge and use it in the right place

D 2 Force 30-minute epoxy into the rudder hinge slots with a plastic soda straw, and push the rudder onto the hinges Wipe away all excess epoxy with a tissue dampened with alcohol



D 3 Re-install the servos and the radio switch

D 4 Wrap the 225 mAh receiver battery in foam rubber and insert it into the area between the battery box rear and the servos

D 5 Mount the **receiver** to the top of the battery box in the location shown on the plan using the square of **double-sided foam tape** (provided) Plug the servo wires into the receiver **(The rudder servo must be plugged into the aileron channel for 2 or 3-channel operation).**

D 6 Re-install the control horns, pushrods, main landing gear and nose gear **NOTE:** To attach the elevator and rudder pushrods to the servo wheel, remove the servo wheel from the servo, drill a 5/64" hole in the servo wheel if necessary, woik the Z-bend into the hole in the servo wheel, then replace the servo wheel onto the servo

D 7 Re-install the motor, switch harness and aluminum prop hub (secure the hub by tightening the 6-32 alien setscrew)

D 8 Apply 1/4" wide foam wing seating tape all **around** the wing saddle area to protect the wing

D 9 Lay the wing in place on the wing saddle and carefully center it side-to-side, holding it in place with a couple of rubber bands Now check the alignment of the wing by measuring from the wing tips to the fin TE The measurements should be the same, within 1/16" If not adjust the position of the wing in the saddle When you have the wing positioned properly, secure it with a total of six #63 rubber bands To help in aligning the wing in the future, you may now make marks at the leading and trailing edge at the center of the wing, and make corresponding marks on the top of the windshield and the front of F-3 for future reference

D 10 Route the receiver antenna along the right side of the fuselage and out through a small hole drilled through the fuselage top rear and through F-3 **NOTE:** The antenna hole must enter the radio compartment approximately 5/16" below the top of F-3 so the antenna will not be pinched by the wing T E. (See the antenna drawing on the fuselage plan).

D 11 If your lightweight wheels are the foam type with square edges, you may sand them to a rounded (more streamlined) shape using a sanding block

D 12 Install the **main wheels** and **nose wheel** using 1/8" **wheel collars** (not supplied) on both sides of each wheel A small drop of oil on each axle will help the wheels turn freely

BALANCE YOUR MODEL

NOTE: This section if very important and must not be omitted!

D 1 With the wing attached to the fuselage, all parts of the model installed, **including the 6 or 7-cell motor battery,** gently turn the model upside down

D 2 Carefully measure **3 inches** back from the LE of the wing along both sides of the fuselage and mark the location of the **center of the balance range** (this point is approximately at the rear edge of the spar) Now turn the model right side up

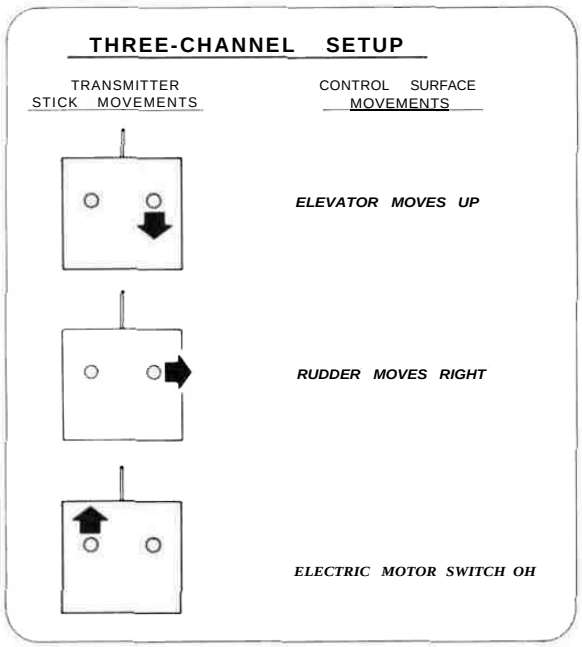
D 3 Lift the model with your index fingers at the marks you made at the center of the balance range (or for more precision you may use the eraser end of two pencils for lifting) If the tail drops when you lift, the model is "tail heavy" and you must add weight to the nose to balance If the nose drops, it is "nose heavy" and you must add weight to the tail to balance

NOTE: The **forward limit** of the balance range is 3/8" **forward** of the center mark The **aft limit** of the balance range is 3/8" **aft** of the center mark

NOTE: You should make your first flights with the model balanced in the **center** of the Balance Range Later you may want to experiment by shifting the balance toward the forward or aft limit of the recommended range Moving the balance forward results in a model that is more resistant to stalls and spins but also may act sluggish and require more speed for takeoff and landing Moving the balance aft makes the model more agile with a lighter and snappier "feel" In any case, **do not balance your model outside the recommended range.**

FINAL HOOKUPS AND CHECKS

D 1. Make sure the control surfaces move in the proper direction as illustrated in the following sketch



D 2. Adjust your pushrod hookups as necessary to provide the following control surface movements'".

Elevator = 3/16" up, 3/16" down

Rudder = 5/16" Lt., 5/16" Rt.

***NOTE:** These control surface "throws" are approximate and provide a good starting point for the first flights with your PT-Electnc You may wish to adjust the throws slightly to provide the smoothness or quickness that you prefer.

D 3 "Break-in" your electric motor by running it **without the propeller** for at least F2 hour This will insure that the motor will provide full power for your first flight, and will extend the overall life of the motor.

D 4. With the prop hub adaptor attached to the motor shaft, slide the propeller onto the shaft of the prop hub adaptor **NOTE:** Do not install the prop backwards' The rounded side of the prop blades must be facing forward Insert the 6-32 **socket head cap screw** through the **aluminum spinner,** and tighten the cap screw securely with the alien wrench.

PRE-FLIGHT

CHARGE THE BATTERIES

Follow the radio 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 Read the battery charging procedure in the **Appendix** at the end of this book to familiarize yourself with the procedure for charging the **motor** battery.

TEST THE MOTOR OPERATION

D 1. Make sure the toggle switch is in the "off" position.

D 2. Make sure no one in the area is operating a radio on your frequency, then turn on the transmitter and receiver (in that order), and pull the throttle stick back Check to make sure that the micro switch is in the "off position Turn off the receiver and transmitter (in that order).

D 3. Open the hatch, insert the charged 6 or 7 cell motor battery, and plug the battery connectors together. Close the hatch and lock it with the hatch tab.

D 4. Position yourself behind the wing, and grasp the airplane firmly.

D 5. Turn on the transmitter and receiver (in that order).

D 6. Make sure that all bystanders are behind the airplane

D 7. Make sure the transmitter throttle stick is pulled back to the "off" position.

D 8. Switch the toggle switch to the "on" position. **The motor should not run at this time.**

D 9 Advance the throttle stick forward to the "on" (or full throttle) position **This should cause the motor to start, spinning the propeller at a high RPM.** The wind generated by the rotating propeller should be blowing toward the rear, and the airplane should **be** pulling forward.

D 10. Continue running the motor and notice how the power continues to be nearly constant for about 4-1/2 to 5-1/2 minutes, after which there is a definite noticeable drop in power The power then drops rapidly until it reaches a point where there is very little thrust pulling the airplane forward. At this point the battery is almost fully discharged.

D 11 Pull the transmitter stick to the "off" position, and turn off the toggle switch.

D 12. Turn off the receiver and the transmitter (in that order).

D 13. **Remove the battery** from the airplane and allow it to cool before recharging Also leave the hatch removed for several minutes to allow the interior of the airplane to cool

NOTE: Follow the above procedure for operation of the system each time you fly!

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 and Join Club fields are set up for R/C flying which usually makes your outing more enjoyable. The AMA can also 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 also have insurance to cover you in case of a flying accident

If a club and its flying site are not available, you need to find a large, area at least 6 miles away from any other R/C airplane operation and also 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 **Read the APPENDIX in the back of this book,** and become familiar with the proper operation of the electric motor and electrical system in your model 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 every time you fly This means with the antenna down, and the receiver and transmitter on, you should be able to walk 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 If this test is successful, then **repeat the test with the electric motor running.** If the control surfaces are not acting correctly, do not fly Correct the problem first **NOTE:** It is possible that the electric motor will cause interference to your radio (some radios are more easily interfered with than others) If this happens, you may try installing a 2nd 01 uF capacitor between the motor leads, then repeat the range check with the motor running

*This is a minimum distance Check the instruction manual for your radio system for the recommended range check distance.

MOTOR SAFETY PRECAUTIONS

Note: Failure to follow these safety precautions will result in severe injury to yourself and others

Get help from an experienced pilot when learning to operate motors

Use safety glasses when starting or running motors

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

Keep your face and body as well as all spectators away from the path of the propeller as you start and run the motor

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

The electric motor and motor battery used in your PT-Electnc is very powerful, and the spinning propeller has a lot of momentum, therefore, if you touch the propeller while it is spinning it may inflict severe bruises, cuts or abrasions Keep this in mind, respect the motor and propeller for the damage it is capable of, and take whatever precautions are necessary to avoid injury Always disconnect and remove the motor battery until you are ready to fly again, and **always make sure the switches are turned off before connecting the battery.**

AMA SAFETY CODE

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

GENERAL

1 I will not fly my model aircraft in competition or in the presence of spectators 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 utilized 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

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 flyer, unless assisted by **an** experienced helper

3 I will perform my initial turn after takeoff away from the pit, spectator and parking areas, and I will not thereafter perform maneuvers, flights of any sort or landing approaches over a pit, spectator or parking area

FLYING

IMPORTANT Regardless who you are or where you live, we strongly urge you to seek the assistance of a competent, experienced R/C pilot to check your model for airworthiness AND to teach you how to fly No matter how stable or "forgiving" your model is, attempting to learn to fly on your own is dangerous and may result in serious or even fatal injury to yourself and others, and total destruction of your model Therefore, find an instructor (even if it means driving a long distance) and fly only under his or her guidance and supervision until you have acquired the skill necessary for safe and fully controlled operation of your model

The instructor will usually tell you about flying rules at the field The number one rule you should always adhere to is **Do not turn on your radio system before you first check out what frequencies people are using at the time.** If you turn on your radio system while someone is flying on the same frequency as your transmitter, you will probably cause their airplane to crash' This is called "shooting someone down" No one wants all their hard work ruined because someone wasn't thinking and turned on their transmitter at the wrong time Always remember this rule.

The instructor will check the model over to make sure all the screws are tight and that the prop is tight. He/she will check hinges to see if they are securely glued. The instructor therefore checks all parts of the model to see if it is airworthy The instructor will recommend changes to be made before the model is ready for flight.

TRIM OUT THE MODEL

Trimming the model means that you have an experienced flier fly the model and make final adjustments to the position of and amount of throw in the control surfaces The distances for the control surface throws we gave you previously are close to where they should be But you won't really know until the plane is in the air Slight changes may need to be made The experienced flier, usually an instructor from a local club, will know what to change as the model is flying The instructor will adjust the trim levers on the radio transmitter to make the model fly straight and level with the control sticks in neutral Then when the plane is on the ground the instructor will adjust the clevises at the rudder and elevator so the trim levers can be moved back to neutral (As you become more experienced, you can trim out your new models yourself The first flight for any new plane should be used to trim it out) Trim changes may be needed anytime so keep checking to see how the control surfaces react to the stick movements

YOUR FIRST FLIGHTS

The ideal way to leam to fly is to use the "buddy box" system The instructor has his (or her) transmitter attached to yours by a trainer cord There is a switch on the instructor's transmitter so he can control who is flying the model If you get into trouble, the instructor can switch the control back to him and get the model flying safely again The instructor will take the plane up to a safe altitude and then let you take over to practice for 2 or 3 minutes Then the instructor can land the model for you As you progress, you then learn to land the plane and take it off by yourself and then to do a complete solo!

THE TAKEOFF (From a Hard-Surface Runway)

(Under the supervision of an experienced R/C pilot)

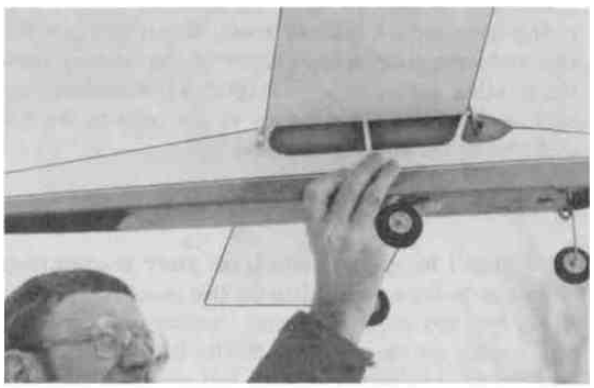
If you have followed all of the above instructions and your instructor has inspected your model and trimmed it out, you should now be ready for takeoff If you are flying from a hard-surfaced runway, you may place the PT-Electnc on the runway **heading into the wind.** Turn on the transmitter and receiver, and switch on the toggle switch Standing behind the airplane, advance the throttle stick all the way to start the motor As the airplane begins to roll it will start to turn left or right Make corrections with the rudder to keep it rolling straight into the wind If it veers way off heading, cut the throttle, bring the plane back and try again

After the airplane has good speed, gently pull the elevator stick back until the airplane breaks ground and begins to fly (Here is where most beginners make their first big mistake') Using the elevator stick, make the plane climb **gradually,** while using the rudder to keep the plane heading into the wind **If you climb too steeply right after takeoff (before the plane has good flying speed), the wing will stall and the plane will drop sharply.** Continue to climb gradually, even through the first turn, until the airplane reaches an altitude of 200 to 300 feet above the ground, which will give you some "maneuvering room" and time to make corrections in the event that you make a mistake.

THE TAKEOFF (Hand-Launch Method)

(Under the supervision of an experienced R/C pilot.

Many people feel that "hand-launching" is the easiest and best way to perform the takeoff with lightweight airplanes such as the PT-Electnc.



The proper hand launch method is as follows If you have followed all of the above instructions and your instructor has inspected your model and trimmed it out, you should now be ready for takeoff The person launching the airplane should grasp the bottom of the fuselage just behind the landing gear and point the nose **into the wind.** Turn on the transmitter and receiver, and switch on the toggle switch Standing behind the airplane, advance the throttle stick all the way forward to start the motor As soon as the motor starts, the hand launcher should raise the airplane above his head and run into the wind (it is not necessary to run far or extremely fast) After several

steps, the hand launcher will thrust the airplane forward, being careful to keep the wings level, and release it to fly Immediately after the launch it will be necessary to make slight corrections with the elevator and rudder to keep the airplane flying level and straight into the wind

Continue flying level until the airplane has good speed, then **gently** pull the elevator stick back until the airplane starts a gradual climb (Here is where most beginners make their first big mistake') Using the elevator stick, make the plane climb **gradually,** while using the rudder to keep the plane heading into the wind **If you climb too steeply right after takeoff (before the plane has good flying speed), the wing will stall and the plane will drop sharply.** Continue to climb gradually, even through the first turn, until the airplane reaches an altitude of 200 to 300 feet above the ground, which will give you some "maneuvering room" and time to make corrections in the event that you make a mistake

FLYING WITH 3 CHANNELS

If you are using three channels of control (rudder, elevator and motor on/off), you may periodically cut off the motor power and glide your airplane In doing so, you will find that it is possible to extend the flight time by several minutes, especially if you fly into a "thermal" (an updraft of air caused by wind currents or by heated air rising from a dark colored area) When flying with three channels, we like to save some of the battery power for the landing, just in case we misjudge the landing approach and need a little extra power to get back to the runway, **or** to make another "go-around".

FLYING WITH 2 CHANNELS

Don't forget to switch on your transmitter and receiver before switching on the motor! If you are only using two channels of control (rudder and elevator), you will switch on the power with the toggle switch, takeoff, and fly the entire flight with full power This method of control works just fine, but we must caution you about the landing Based on the ground testing you have done, you should have a pretty good idea how long the motor will run before it begins to lose power When flying, you should gain plenty of altitude during the 2nd half of the flight When the motor begins to lose power, you will no longer be able to climb, but at that time the airplane will still be flying too fast to make a safe landing But, if you have plenty of altitude, the airplane will fly long enough after it begins to lose power that the battery will be almost completely discharged, allowing you to make a slow and safe landing **Remember:** When flying with 2 channels you must fly the airplane until the battery is almost completely discharged before attempting to land.

Remember, practice and practice You will have a few setbacks, we all do when learning Just don't give up and have fun while you learn Radio Control model airplane flying is one of the most rewarding hobbies around Itjust takes a little work and practice to get there

LANDING

Note: The landing is usually the most difficult aspect of R/C flying For best results you should remain under the training of an experienced R/C pilot until you have developed confidence in your landing skills

Begin your landing approach by flying downwind at an altitude of approximately 100 feet When the airplane is approximately 300 feet past you, make the "final" 180-degree turn and line up the airplane with the runway, heading **into the wind** During the final turn, cut off the motor power to begin the final descent toward the runway **Do not dive the airplane,** as it will pick up too much speed Instead, when you cut the power, the airplane will assume a gradually descending glide You should concentrate mainly on using rudder control to keep the airplane heading into the wind and toward the runway When the airplane reaches an altitude of about 6 feet above the ground, gently apply a little "up elevator" to make the airplane fly level (be careful, as too much up elevator at this point will cause the airplane to stall and drop sharply) As you keep holding a slight amount of up elevator, the airplane will slow down and slowly descend as it loses its flying speed Let the airplane slowly approach the ground, applying a little more up elevator just before touchdown

This may sound difficult and complicated, but rest assured that after only a few flying sessions with an experienced R/C instructor these things will begin to come naturally to you

Good luck, and happy flying!

APPENDIX

PROPER CARE OF YOUR THRUSTMASTER MOTOR

Break- in: To properly break in, run the motor with no load (prop and prop hub removed) for at least 1/2 hour when the motor is new, before using it in your airplane

Power source: A 6-cell, 7 2 volt, 1200 mAh battery pack **(with "Kyosho"-type connector)** is recommended as the ideal power source for good power and long motor life However, for more power, you may use a 7-cell, 8 4 volt, 800 or 1200 mAh battery pack

Oiling: The bronze bearings are self lubricating, but you may extend their life and improve motor performance by applying a very small amount of light machine oil to the points where the center shaft touches the bearings, after each hour of running time Note A "drop" of oil is far too much, so you should apply the oil with a toothpick Never oil the inside of the motor.

Brushes: The Thrustmaster brushes (which transfer electricity to the commutator inside the motor) are maintenance free and will last a long time under normal use You may inspect the brush wear by looking through the vent holes on the sides of the motor When the brushes wear out it is time to replace the motor Note The use of a 7-cell battery pack will shorten the life of the brushes If you notice that your motor has lost power, but the brushes are still good, it may help to spray some motor cleaner (such as "Reedy in a Can") on the brushes

Heat: Using multiple battery packs to run the Thrustmaster in successive flights may cause the motor to become excessively hot Therefore, we recommend a 10-minute "cool-down" period between flights.

WHEN YOU BLOW A FUSE

The Thrustmaster switch harness uses a 20 amp automotive-type fuse Replacements may be purchased through your hobby shop or at most auto supply stores The fuse is designed to open the electrical circuit when an overload or short circuit occurs, to protect the other components

If the propeller is stalled, such as by running into long grass or by "nosing over", the motorJtfill draw a very large electrical current, causing the fuse to "blow" (the internal fuse wire melts *off)*

Any **time** you blow a fuse, turn off the switch, disconnect the battery, check the condition of the wire, switches and other components, and replace if any are damaged Then replace the fuse and check the operation of the system.

WARNINGS: Do not use a fuse rated higher than 20 amps, and never operate the system without a safety fuse, because doing so could easily result in a fire, causing property damage and personal injury!

HOW TO ACHIEVE THE BEST PERFORMANCE FROM YOUR ELECTRIC-POWERED MODEL

Whether you are just starting to build your electric-powered airplane, or have already completed it, you will benefit from the information that follows

Your objective should be to build your airplane in such a way that it will fly as it was designed GREAT' To insure that it does, please read the following comments and suggestions very carefully, and follow as many of them as you can

WEIGHT

NOTE In order to get a handle on this subject of weight, you'll have to be able to **accurately** weigh your airplane at various stages of construction A bathroom scale is definitely not suitable for this' If you do not have access to a suitable scale, we suggest that you take the airplane to your local post office and ask them to weigh it for you.

We know from experience that this airplane, equipped with a stock Thrustmaster motor, will R 0 G (takeofffromahard-surfacedrunway)andflyrealistically with a fully-charged 6-cell battery pack - **IF-** the total weight is under 50 ounces Heavier airplanes do not fly as well At 56 ounces it may not R 0 G , and the climb rate will be disappointing A PT-Electnc that weighs 50 ounces or less will probably fly very well unless other factors are introduced that reduce performance (see " Thrust" and "Other Factors")

Here are several things you can (and should) do to keep your airplane as light as possible Keep in mind that **every ounce you cut from the weight will result in a significant improvement in the way your airplane will fly.**

Lighten the Structure: (If your airplane is overweight)

D 1. Reduce the weight of the wood structure by enlarging the lightening holes in the fuselage sides (A Dremel Moto Tool with a sanding drum works great for this, or use sandpaper wrapped around a dowel).

D 2 Cut out the portion of the stabilizer center section, as shown on the plan

D 3 "Honeycomb" the 3/16" ply landing gear plate by drilling several 1/4" diameter holes, as shown on the **plan.**

D 4. If the fin and stab structure are hard balsa, you may sand at least 1/16" off the inside edges of the Fin, Rudder, Stab, and Elevator Do not remove any material from the fin and stab trailing edge pieces.

D 5 Before covering, be sure to sand the edges of the fin, stab, rudder, elevator, wing tips and fuse corners to a **round** shape Also sand the fuse sides and bottom until they are very smooth, with no traces of the original glue joints.

Use Lighter Equipment:

D 1 It is possible to end up with a 50 ounce airplane while using "standard-size" servos But your task in keeping the airplane light will be made much easier by using "micro" servos For example, you will save **3.6 ounces** by changing from Futaba S28 servos to Futaba S33 servos!

D 2 We strongly urge you to use a 225 mAh radio battery pack in your airplane, rather than the standard 500 or 550 mAh pack This will save a couple more ounces

D 3 You can save a couple of ounces by using the lightweight Dave Brown wheels If you are concerned about the non-aerodynamic shape of the wheels, you can easily sand these foam wheels to whatever shape you desire This will make them even lighter and more aerodynamic

D 4 Cover your model with one of the film-type coverings, such as Black Baron Film, Econokote or Super Monokote, etc Do not use a fabric-type covering

D 5 If you really got carried away with the glue bottle and your airplane is "hopelessly overweight", consider using an 800 mAh motor battery, rather than a 1200 mAh pack Although the flight time will be reduced by a couple of minutes, the weight savings will result in better performance In addition, if you switch from a 6-cell 1200 mAh pack to a **7-cell** 800 mAh pack it will result in a greatly improved climb rate (with a reduction in motor run time).

THRUST

There are several factors that contribute to the way an airplane flies, but the most important things you have control of are WEIGHT and THRUST Here are some ways you can insure **maximum thrust.**

Battery: A 7-cell 1200 mAh battery is 1 or 2 ounces heavier than a 6-cell 1200 mAh battery, but the additional thrust provided by a 7-cell battery more than offsets the increased weight For best results with 6- cells, we recommend using a battery pack that has matched cells, such as the Kyosho 6-cell 1200 mAh racing battery If you are not satisfied with the performance of your airplane with the battery you are using, you may either switch to a 7-cell pack, or you may purchase a "7th cell" that plugs into your switch harness in series with your existing 6-cell pack.

Propellers: The Thrustmaster electric motor was designed especially for powering airplanes by **direct-drive.** It is well suited for this application because it turns a relatively large (8x4 or 9x4) propeller at an RPM that provides sufficient thrust for this airplane Because it has a relatively low no-load RPM (compared with some car motors), you will not benefit by using a smaller diameter prop We have tested many props and have found the Gnsh 8x4 (nylon) to be about the best The Taipan 8x4 (nylon) and the Zinger 8x4 (wood) are about equal to the Gnsh The only prop we found to give **slightly** increased thrust is the Top Flite 9x4 Super-M (wood).

Motor Break-in: Be sure to run your motor with no load (prop removed) for at least 1/2 hour before using it in your airplane Because of the special design of the brushes, your Thrustmaster's performance will continue to improve during the first couple hours of operation

Peak Battery Charging: A fully charged battery pack will provide an initial "surge" of power during the first 15 to 30 seconds of the motor run, then the power curve stays fairly level for the next several minutes If you do not charge your battery **fully** it will not deliver that surge necessary for a good takeoffand climb-out There are three easy ways to "peak-charge" your battery pack:

CAUTION! Regardless of which method you use, you must **never charge the battery unattended.** NiCad batteries have enough power to start a fire' Some modelers have burned down houses or burned family cars by leaving them unattended' If you fully charge a battery, then forget you have done so, then fully charge the battery **again,** this will cause the battery to get extremely hot and may cause a fire or explosion If the timer on your charger sticks, it will charge too long causing the same results If the insulation on your wiring is cracked or missing and the red and black wires touch, shorting the battery, much heat will be produced which could easily start a fire or explosion Always follow the charging instructions included with your battery and charger.

D 1. Use a **"peak-detecting"** battery charger This type charger will automatically charge your battery until it is fully charged Unfortunately, this type charger is not yet available for use with AC current, but it works very well when connected to a 12-volt car battery

D 2 You can monitor the voltage of your charging battery with a voltmeter Your charger may have sockets into which you may plug a voltmeter If not, you may insert the probes from the voltmeter into the rear of the battery plug, making contact with the metal portions As your battery charges, the voltage will gradually increase When the battery is fully charged, the voltmeter will show a slight **drop** in the battery voltage At this point your battery is fully charged.

D 3 The third method of "peaking" your battery is by checking its **temperature** As the battery charges it will remain cool until it is almost fully charged. When it reaches the fully charged state it will rapidly build up heat You can feel this heat with your hand As soon as the pack starts to noticeably warm up, disconnect it from the charger **Do not continue charging until the pack is hot!** Overcharging will damage your battery pack and can result in a fire or explosion

Exercise Your Batteries: A new battery pack should be "cycled" for best results You should peak charge the battery, then discharge it almost completely by actually running your motor with the propeller attached Do this 3 or 4 times on the ground before actually flying Be sure you remove the battery from the airplane between each cycle and allow it to cool before recharging

Switch Harness: The standard **"Kyosho"-type** battery connectors supplied with your switch harness are normally adequate for most installations However, if you are looking for maximum performance, you may want to consider installing high-performance battery connectors, such as "Sermos R/C Snap Connectors" Replacing all the standard switch harness wire with ultra high performance wire, such as Jomar 12 gauge (665 strand) wire will also provide a **slight** increase in performance

OTHER FACTORS

There are several other things that can reduce performance considerably Check for the following conditions **and** correct as necessary.

D 1 Make sure there is plenty of clearance between the front of the fuse sides and the propeller If the prop is very close to the front end of the fuse sides, it may rub slightly during operation (due to vibration),andthiswillreduceperformancesignificantly.

D 2 Examine your propeller for irregularities caused by the injection molding process Carefully remove these imperfections with fine sandpaper.

D 3 Most nylon propellers balance quite well as they come from the factory, but we have found several that require balancing You can improve the performance of your Thrustmaster by balancing the prop, using an inexpensive prop balancer available at your local hobby shop

D 4 To takeoff from a hard-surfaced runway the wheels of your airplane must spin freely, with very little friction Check the wheels for possible binding when

moved from side to side, and put a drop of oil on each axle.

D 5. If you store your airplane resting on the wheels, the wheels will develop "flat spots", which prevent them from rolling smoothly While this may happen with any wheels, it is especially a problem with the lightweight foam wheels To avoid this problem, support the airplane in storage with a Robart "Super Stand" or similar.

SUMMARY

While this may seem like a lot of "extra work" just to make your airplane fly well, most of the things we have listed here are just good common sense modeling procedures If you use the above information as a guide to build (or modify) your airplane, we are certain you will be very well satisfied with the results.

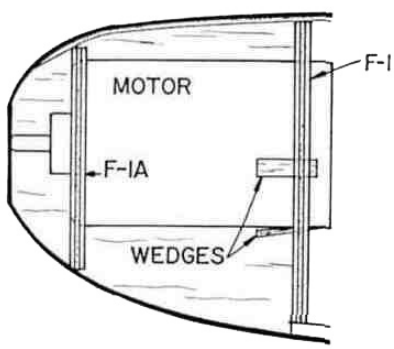
****

SEE THE FULL LINE OF GREAT PLANES AIRPLANES AT YOUR HOBBY DEALER.

WE HOPE YOU WILL SELECT ANOTHER "GREAT PLANE" AS YOUR NEXT PROJECT. THANK YOU!

****

MOTOR VIBRATION



If the propeller is slightly out of balance, it may cause the rear of the motor to vibrate against former F-l, resulting in a noisy airplane. To prevent this, cut a few narrow "wedges" from balsa scrap and push them into the gap between the motor and F-l, as shown in the above drawing.

PT-ELECTRIC PARTS LIST

PART	QTY	DESCRIPTION
LOOSE IN KIT		
PT-EF01	2	DC 1/8" Balsa Fuse Side
PT-EF02	1	DC 3/32" Balsa Fuse Bottom
PT-EF06	1	DC 1/8" Ply Formers 1, 1A, 2 and 3
PT-EF07	1	DC 1/8" Ply Fuse Bottom, etc.
PT-EF11	1	1/16" x 3" x 6" Balsa Hood Sheeting
PT-EP01	*1*	*Fuselage Plans*
PT-EP01W	1	Wing Plans
PT-EP02	1	Instructions
WBNT129	1	1/8" Wire Main Gear
WIRES16	2	12" Wire Pushrod
MOTORA02	**1**	**Motor/Harness**
CAPACIT1	1	Capacitor
HARNESS1	1	Switch Harness
MOTOR001	1	Thrustmaster Motor
ADAPQH01	1	Prop Adapter Hub
ADAPQS01	1	Prop Adapter Spinner
FUSES25	1	25 Amp Fuse
SCRW038	1	6-32 Socket Head Set Screw
SCRW057	1	6-32 x 3/4" Socket Head Cap Screw
WRENCH01	1	1/16" Allen Wrench
WRENCH02	1	7/64" Allen Wrench
PROP001	1	8-4 Nylon Propeller
PT-EA01	**1**	**Small Wood Parts**
DOWEL026	2	1/4" x 4" Wing Dowels
PT-EA06	1	Balsa Shear Webs
PT-EF12	1	3/32" x 2-17/32" x 4-1/16" Balsa Battery Box Top
PT-EF13	1	3/32" x 1-1/4" x 2-17/32" Balsa Battery Box Rear
PT-EF14	1	3/32" x 2-1/4" x 2-3/4" Balsa Windshield
PT-EF15	1	3/16" x 1-27/32" x 2-3/4" Ply Landing Gear Plate
PT-EF16	1	DC 1/16" Ply Motor Mount
PT-EF17	1	1/32" x 1-3/4" x 2-1/2" Ply Screw Back Plate
PT-ER01	1	3/16" x 1/2" x 5-1/2" Balsa Fin Filler
PT-EA03	**1**	**Die-Cut Balsa Parts**
PT-EF03	1	DC 3/32" Balsa Fuse Top
PT-EF04	1	DC 3/32" Balsa Formers 4, 5 and 6
PT-ES06	1	DC 3/16" Balsa Stab Center
PT-EW04	2	DC 3/32" Balsa Ribs 1 & 2
PT-EW05	4	DC 1 1/1 6" Balsa Rib 3
PT-EW06	2	DC 11/16" Balsa Wing Center Sheet

PART #	QTY	DESCRIPTION
PT-EA04	**1**	**Short Sticks**
PT-EF10	2	1/4" sq. x 12-1/2" Balsa Pushrod
PT-ES04	1	3/16" x 5/8" x 7" Balsa Stab Brace
PT-EW07	1	1/4" x 5-1/2" Balsa Triangle
PT-EW08	2	3/8" Tapered Balsa Wing Tip
PT-EA05	**1**	**Wing Parts and Sticks**
PT-EF08	2	3/32" x 3/8" x 17-7/8" Balsa Wing Saddle
PT-EF09	6	1/8" x 3/8" x 23-7/8" Balsa Fuse Longerons
PT-ES01	5	3/16" x 3/8" x 23-7/8" Stab and Fin Stock
PT-ES02	1	3/16" sq. x 23-7/8" Balsa Elevator/Rudder TE
PT-ES03	2	3/32" x 3/16" x 23-7/8" Balsa Tail Rib Stock
PT-EW0I	1	Shaped Balsa LE Set
PT-EW02	4	1/8" sq. x 28" Balsa Front Spar
PT-EW03	4	3/16" sq. x 28" Basswood Spar
PT-EW09	2	1/16" x 1/4" x 18" Balsa Wing Brace
PT-EW12	1	Shaped Balsa TE Set
PT-EM02	**1**	**Hardware**
PLTB003	1	4-1/4" Long Plastic Pushrod Guide Tube
PLTB004	1	6-1/2" Long Plastic Inner Pushrod Tube
FFAP001	1	1" sq. of Double-Sided Foam Tape
NUTS005	2	2-56 Hex Nut
NYLON03	2	Small Nylon Control Hom
NYLON17	3	*Nylon Clevis*
NYLON31	1	4" Long Strip Hinge
NYLON35	2	Nylon Landing Gear Strap
RUBB001	6	#63 Rubber Bands
SCRW001	4	2-56 x 3/8" Screw
SCRW002	2	2-56 x 5/8" Screw
SCRW004	2	#4 x 1/2" Screw
SCRW024	15	#2 x 3/8" Screw
SCRW040	2	3mm x 6mm Motor Screw
WIRES20	1	2-56 x I" Threaded Rod
WBNT124	1	3/32" Wire Elevator Tie
WBNT130	1	1/8" Wire Nose Gear
WSHR001	1	#2 Flat Washer