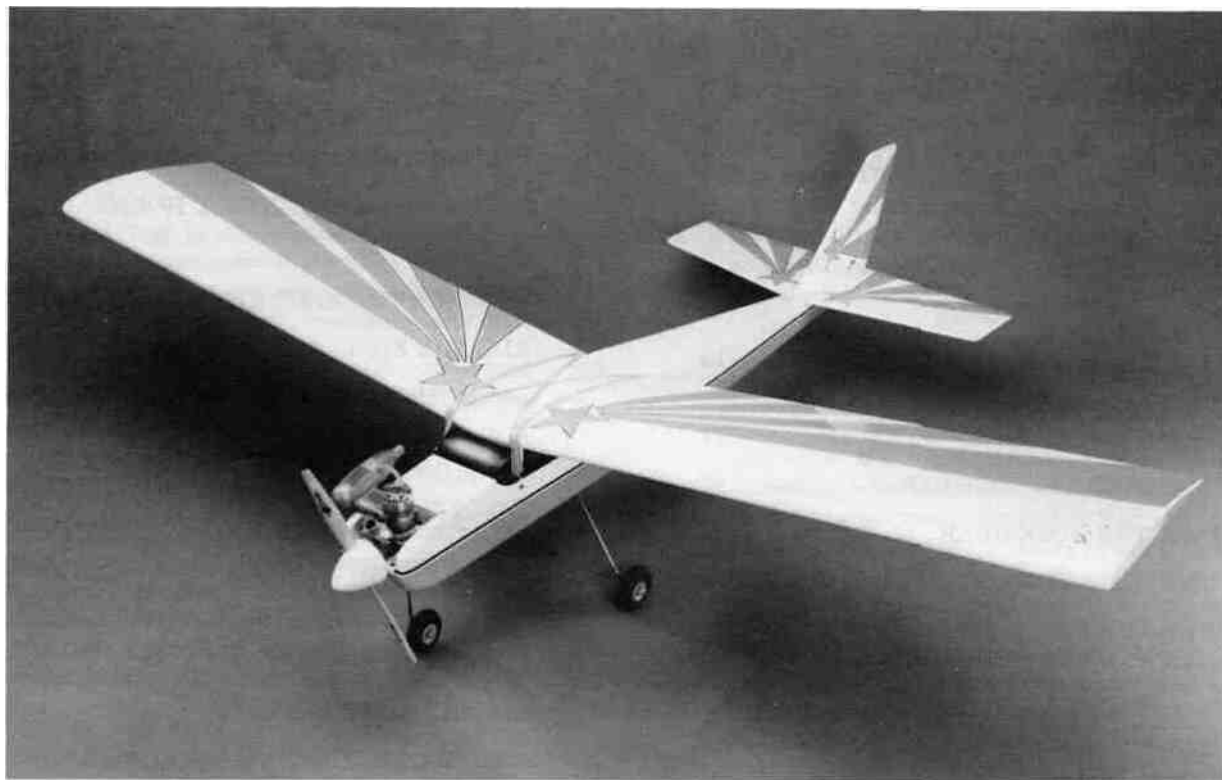


PT40

Instruction Book



Welcome to the World of Radio Control Model Airplanes!

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
5151 East Memorial Drive
Muncie, IN 47302-9252
(800) 435-9262



PO BOX 788 URBANA ILLINOIS 61801

TABLE OF CONTENTS

GENERAL COMMENTS	2	INSTALL TRAILING EDGE, AILERONS AND TORQUE RODS (WING B ONLY)	20
BUILDING PRECAUTIONS	3	INSTALL THE WING TIPS	21
GLUES	3	SAND THE WING SMOOTH	22
BUILDING HINTS	4	INSTALL THE WING PLATES	22
ITEMS NEEDED	4	TRIAL FIT THE WING IN THE SADDLE	22
TOOLS OR SUPPLIES NEEDED	4	MOUNT THE ENGINE	23
SPECIAL NOTE ON ENGINES	4	INSTALL THE SERVOS	24
PARTS IDENTIFICATION DRAWINGS	5	INSTALL NYLON CONTROL HORNS	25
GET READY TO BUILD	6	PUSHRODS	26
BUILD THE FUSELAGE SIDES	7	BALANCE THE AIRPLANE Laterally	29
ASSEMBLE THE FUSELAGE	8	ADD THE FUSELAGE TOP	29
INSTALL THE WINDSHIELD AND HATCH ..	10	SAND THE FUSELAGE	30
MOUNT THE ENGINE BEAMS AND BREAKAWAY PLATES	11	FUELPROOF THE ENGINE AND FUEL TANK COMPARTMENTS	30
INSTALL THE LANDING GEAR	12	PREPARE THE MODEL FOR COVERING	30
PREPARE THE NOSE GEAR	12	COVER THE STABILIZER	30
CUT THE NOSE GEAR PUSHROD OPENING ..	12	COVER THE FIN, RUDDER AND ELEVATOR ..	30
CUT THE PUSHROD EXIT SLOTS FOR THE RUDDER AND ELEVATOR	13	COVER THE FUSELAGE	30
BUILD AND INSTALL THE "TAIL FEATHERS"	13	COVER THE WING	31
MAKE THE HINGES	14	ADD "WASHOUT" AT THE WING TIPS	31
MARK THE HINGE LOCATIONS	14	FINAL ASSEMBLY	32
CUT THE HINGE SLOTS	14	BALANCE YOUR MODEL	34
MOUNT THE STAB ON THE FUSE	14	FLYING	34
MOUNT THE FIN TO THE STAB	15	AMA SAFETY CODE	36
BUILD THE WING PANELS	16	CHANGING FROM 3 TO 4 CHANNEL VERSION	37
JOIN THE WING PANELS	18	FLIGHT PROBLEMS CHART	38
INSTALL THE CENTER RIBS AND BOTTOM SHEETING	19	GLOSSARY	39
INSTALL TAPERED TRAILING EDGE (WING A ONLY)	19	PARTS LIST	40

GENERAL COMMENTS

Congratulations on your purchase of Great Planes' **PT40**, the Perfect Trainer! You now own the easiest building, easiest flying trainer on the market. By following these instructions and by referring to the plans, you will have a model you can be proud of and one that will fly, almost by itself!

Our line of R/C kits is the fastest growing and we believe the finest in the nation. As a result of intensive testing, combined with our years of experience, we know that a well built Great Planes' kit will fly right. But that means:

1. You must **build** the plane according to the plans and instructions
2. You must take time to **build** straight, true **and** strong.
3. You must use a proper R/C **radio** that is in first class condition, the correct sized **engine** and correct **components** (fuel tank, wheels, etc) throughout your building process
4. You must properly **install** all R/C and other components so that the model operates properly on the ground.
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.

BUILDING PRECAUTIONS

Keep in mind that it is impossible for us to guide you specifically as to every possible matter that might come up as you build. The fun and challenge is to tackle the problem, using the plans and instructions for resources as well as the assistance and advice of fellow builders and your local hobby dealer.

The plans are the basic guide to building. **Do not alter or modify** the model as represented by these plans. Follow the step by step procedures given in the building instructions.

Invest in the proper tools for building. Knives, drills and bits, saws, rulers, pliers and screw drivers are but a few of the tools you will need. Check the list of tools needed in this book and seek the advice of your dealer.

For best results, you should have such components as the engine, tank and radio on hand as you build for fitting and installation purposes, it is much more difficult, sometimes impossible, to do a proper building job when components are purchased and fitting attempted after most of the model is completed. Always have an eye on installation of the components you intend to use as you build, take time to think through and prepare for the installation of those components. **Don't hurry!** Take your time to create a well built model that conforms to the plans. Build on a large, **flat** surface. Use waxed paper over

the part of the plans you are working on to prevent glues from sticking to the plans. Remember a careful builder will build a warp-free, straight model that will fly as it was designed to.

Read and obey cautions, warnings and directions on such items as glues, paints and other materials. These are often TOXIC to the human body in terms of breathing and/or touch. Be especially cautious of cyanoacrylate glues that dry almost instantly and bond with great power (also known as CA glues). They require special care since they can be extremely dangerous if they get into the eyes or on human skin. Watch for ventilation warnings and observe them. Keep small children and pets away from all building and finishing materials. Keep your building area safe and clean.

We urge you to read through these instructions, identify all the parts, mark them with their names, letters or numbers and look over the plans so you become familiar with what the model will look like and what the names of the different parts are. Throughout the instructions we will be referring to the various parts of the model as they are called out on the plan. There is a glossary in the back of these instructions if you are unfamiliar with any words or part names. Refer to it for help.

If when you are identifying the parts you find that a part is missing or broken, please let us know about it before you start building and we will correct the problem.

CONSTRUCTION PROCEDURE

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-40...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 **make sure the parts fit well before gluing** because they don't give you a second chance.

If you need time to position glued pieces correctly or need extra strength, use **epoxy** glues. Epoxy is normally used in the firewall and engine mount area and when gluing the two wing panels together. **Five minute epoxy** (it 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.

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. 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.

BUILDING HINTS

Your work area ideally should be large and comfortable enough for you to work without having to put everything away every night. (The kitchen table is not recommended!) The key to a straight fuselage and warp-free wings is a straight, flat building board or work bench. Remember, your model is only as straight as the board you build on. Have all your tools handy and your building will go much easier.

Build over the plans when instructed. Cover the part of the plan you are using with waxed paper so you don't glue the model to the plans! If the parts do not match the plans exactly, it is because the plans have changed size with moisture in the air. Do not be concerned about this. The parts were all cut to fit each other. Use the plans as a guide.

Remember this: In order for your PT40 to perform as it should it is your responsibility to take your time when building and to follow all the instructions given. A careful builder will produce a model that is straight, true and warp-free. A well built model performs best and will fly like it was designed to. So take your time and enjoy!

If at all possible, get an experienced model builder to look at your model during the construction process. It is much easier to make corrections at these times.

The building instructions follow. If you have any questions about building or flying the PT40, please call us at (217) 398-8970 and we'll be glad to help.

It is a good idea to obtain the following items before you start building as you will need to install or test fit some of them before assembly is complete. Most of these items can be purchased from your local hobby dealer.

ITEMS NEEDED:

- 1- 10 x 6 Propeller or Proper Size for Your Engine
- 1- 2-1/4" Spinner or Acorn Type Prop Nut
- 2- 2 1/2" or 2-3/4" Main Wheels
- 1- 2-1/4" or 2-1/2" Nose Wheel

- 6- 5/32" Wheel Collars
- 1- 6 or 8 oz. Fuel Tank
- 1/4 pound- #64 Rubber Bands
- Thin Cyanoacrylate Glue, 2 oz.
- Thick Cyanoacrylate Glue, 1 oz.
- 5 Minute Epoxy, 2.5 oz.
- 15 or 30 minute epoxy, 2.5 oz.
- Wing Seating Tape
- Balancing Weights
- Iron-On Covering Material (Top Flite Super MonoKote Recommended)
- Foam Rubber (For Cushioning Radio Receiver and Battery)
- Radio System (3 or 4 Channel)
- Engine (.25-.40 2-Cycle or .30 to .45 4-Cycle)
- Fuel Line, medium size
- Chicken Stick or Electric Starter
- Glow Plug Clip
- Glow Plug Battery

TOOLS OR SUPPLIES NEEDED:

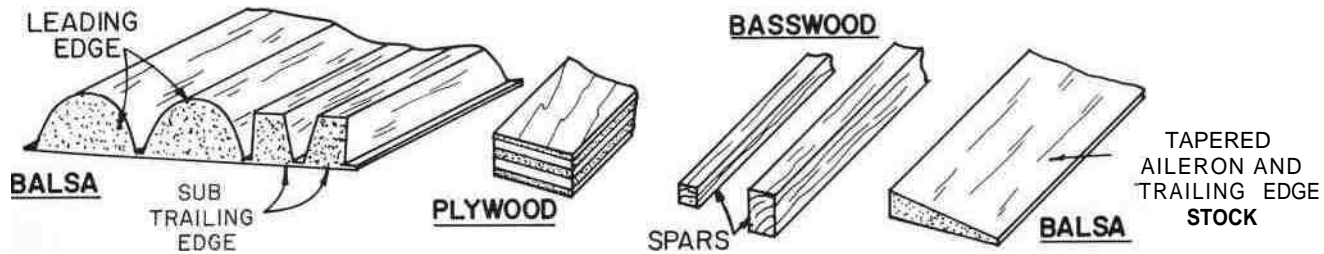
- Hand or Electric Drill
- Drill Bits 3/16", 5/64", 3/32", 1/8", 3/16", 7/32", 5/16")
- Sanding Block or T-Bar
- Sealing Iron
- Heat Gun
- Hobby Saw (X-Acto Razor Saw)
- X-Acto Knife, #11 Blades
- Pliers
- Screw Driver
- 10 ft.-Kite String or Strong Thread
- T-Pins
- Straightedge
- Masking Tape
- Sandpaper, Coarse (100 grit) and fine (220 grit)
- Waxed Paper
- Balsa Filler

Note: As with any other hobby, you may go "all out" if you choose by purchasing all sorts of special hobby tools and accessories (there are hundreds available). However, most of the PT40 parts are accurately pre-cut so you can build it without a lot of special tools. Some of the more advanced R/C kits require the builder to do a lot more cutting and sanding, so you may eventually want to equip your workshop with tools like a Dremel Moto Tool, jig saw, small table saw, disk/belt sander, small drill press, small band saw, etc., but these are not necessary now.

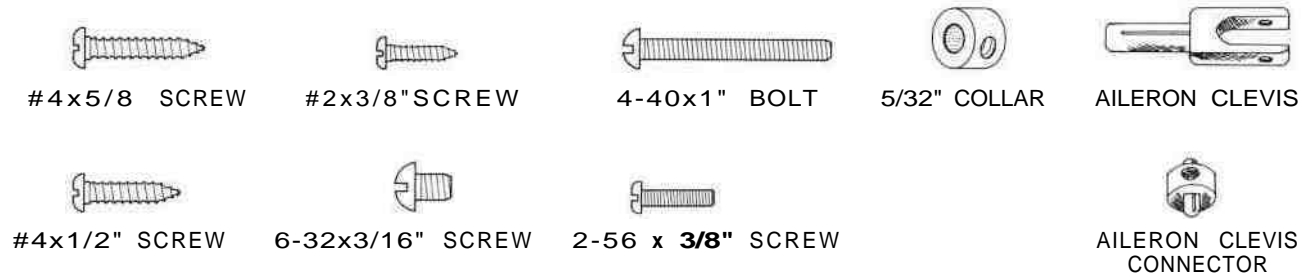
SPECIAL NOTE ON ENGINES

Choose the right sized engine for the PT40 as indicated here. We recommend a .25 to .40 two cycle engine or a .30 to .45 four cycle engine. Too large or too small an engine can result in an unsafe or poor flying model. Remember that a model engine is not a "toy" but a device that can cause serious bodily harm to you or others on the ground or cause harm in the air if abused or misused.

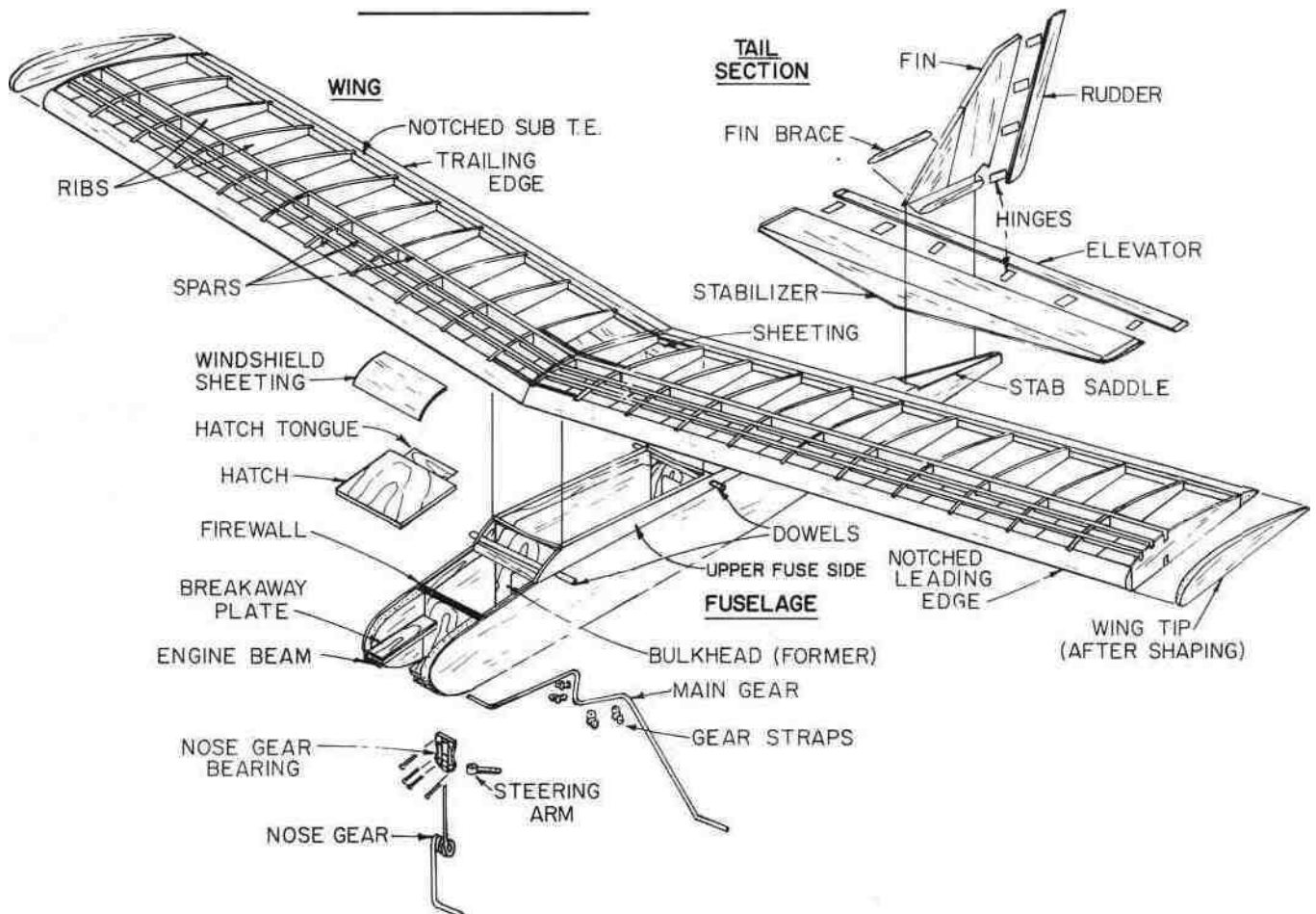
TYPES OF WOOD



HARDWARE

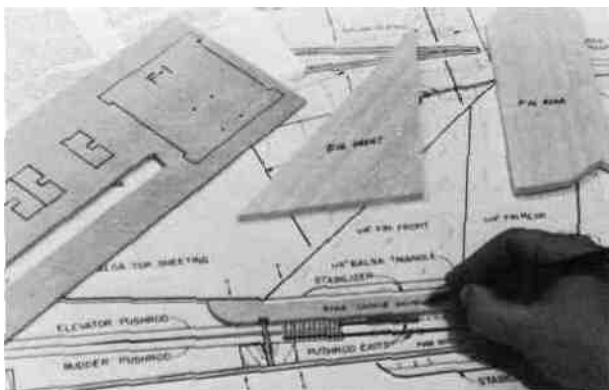


PT40 PARTS



GET READY TO BUILD

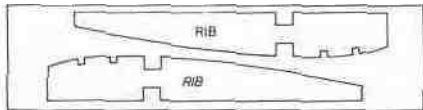
D 1. Unroll the plan sheet. Re-roll it inside out to make it lie flat. Note: The fuselage plan is printed on Side 1 and the wing plan is printed on Side 2.



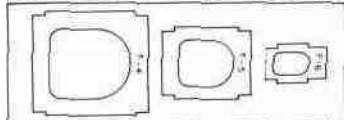
D 2. As you remove all parts from the box, use a felt tip pen to write the name or number on each part. To identify the parts, compare them with the plans **and** with the die-cut parts patterns shown here:

DIE CUT PARTS PATTERNS

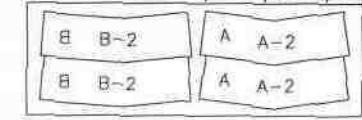
PT40W07 13 PER KIT WING RIBS 3/32x 3x12 Balsa



PT40F05 1 PER KIT 1/8 x 3-1/2 x 9-3/4 PLY



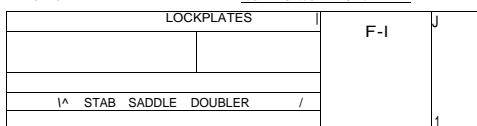
PT40W14 1 PER KIT 1/8 x 3-1/4 x 9-3/4 PLY



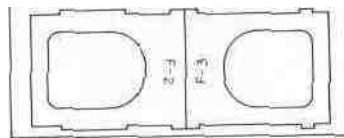
PT40F07 1 PER KIT 1/8 x 3-7/8 x 12 3/4 PLY



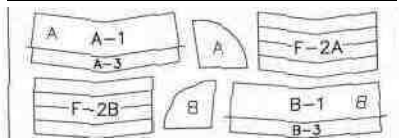
PT40F10 2 PER KIT 1/8 x 3-7/8 x 13-1/2 PLY



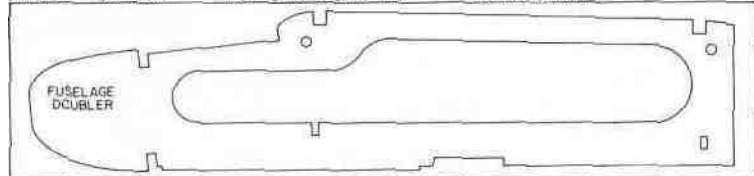
PT40F05 1 PER KIT 1/8 x 3-7/8 x 9-3/4 PLY



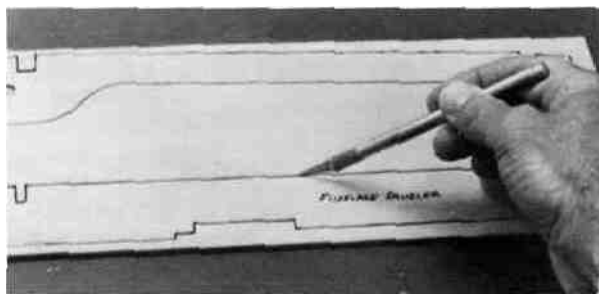
PT40W15 1 PER KIT 1/8 x 4-1/4 x 11-1/2 PLY



PT40F06 2 PER KIT 1/8 x 5-1/8 x 21-1/2 PLY FUSELAGE DOUBLER



D 3. Punch out all the die cut parts excepting the sheets stamped "A" and "B". If a part does not come out easily, cut around it with an X-Acto knife. Mark the die cut parts **before** punching them out. Also save any scrap wood until you are completely finished building. You will use some scrap to build the model. You will find that scrap wood is quite handy to use **for lots of things, like spreading epoxy for instance.**



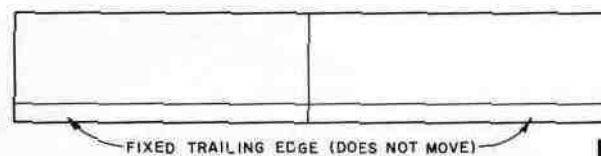
D 4. Separate the parts into four groups: 1- FUSELAGE, 2- WING, 3- FIN & STABILIZER, 4- HARDWARE

IMPORTANT: READ THIS BEFORE STARTING TO BUILD

The PT40 may be built as a "3-Channel" or "4-Channel" trainer.

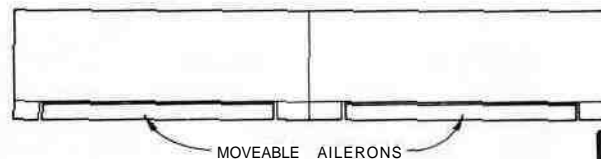
In the 3-channel version, you control the rudder, elevator and throttle, and it uses "**Wing A**" which has a fixed (non-moving) trailing edge and a large amount of dihedral. It requires a radio having 3 or more channels.

WING "A"



In the 4-channel version, you control the rudder, elevator, throttle and ailerons, and it uses "**Wing B**" which has moveable ailerons and less dihedral. It requires a radio having 4 or more channels.

WING "B"

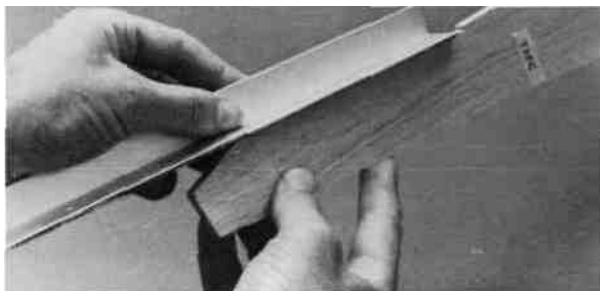


The 3-Channel version is the easiest to build and most stable; therefore, if you are a beginner we strongly recommend that you build your PT40 as a 3-Channel airplane with Wing A.

The 4-Channel version has more ability to perform acrobatic maneuvers, but is more difficult to build and its self-recovery characteristics are not quite as good. If you already have some R/C flying experience and are ready to move up to an airplane that is more maneuverable, you may choose to build your PT40 as a 4-Channel airplane with Wing B.

BUILD THE FUSELAGE SIDES

D 1. Take the two large 1/8" balsa fuselage sides and put them together. Carefully line them up along the bottom edge and the front. Tape them together with a few pieces of masking tape along the bottom edge to prevent them from moving. Now examine the other edges to make sure the two fuselage sides are exactly the same all around. If not, use a T-bar sander with 100 grit sandpaper to lightly sand the edges to match.



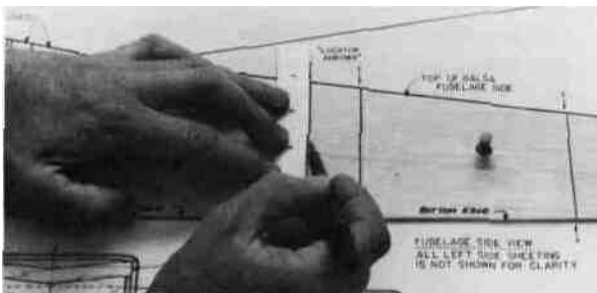
D 2. Now, with the tape still in place along the bottom edge, let the two sides fall open and write "Rt inside" and "Left inside" as shown here.



D 3. Tape the fuselage plan to your building surface.

D 4. Lay the right fuse (fuselage) side on the plan, and carefully position it so the bottom edge and the nose line up with the plan. Insert a few pins or tape to hold it in place.

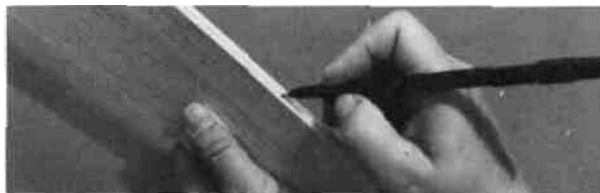
D 5. Using the "locator arrows", a straightedge and a pen, draw six vertical lines on the fuse side as shown. Press lightly to avoid damaging the balsa.



D 6. Remove the fuse side from the plan and make small marks on the top and bottom edges, where the lines end.



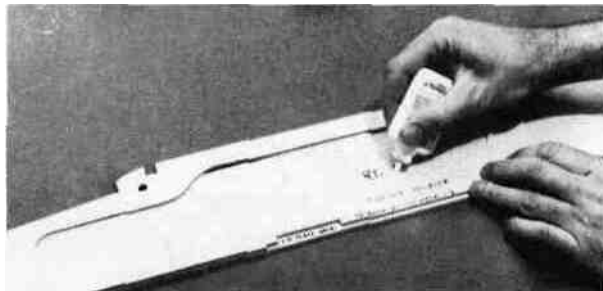
D 7. Put the two fuse sides together (inside to inside), and line them up carefully. While holding them together, transfer the edge marks over to the left fuse side edges as shown here.



D 8. Now draw lines on the left inside fuse side, using the edge marks and a straight edge.

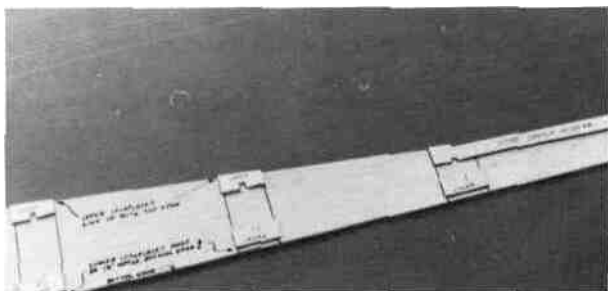


D 9. Lay the large 1/8" ply fuse doubler on the right inside fuse side and position it to line up at the nose and bottom edge. The part of the doubler which is **behind** the L.G. plate area must be exactly 1/8" above the bottom edge of the fuse side. Use a piece of 1/8" balsa (such as the "windshield" piece) to check this spacing. When you are satisfied that the doubler is correctly lined up, apply thin CA glue all around the edges while holding the doubler in place. Use enough glue to make sure it flows under the plywood to make a good bond.

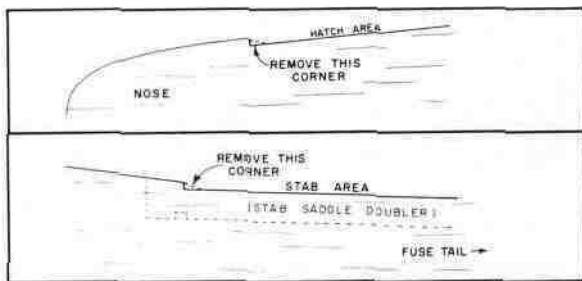


D 10. Position the upper and lower "lock plates" and the stab saddle doublers on the right fuse side, using the vertical guidelines previously drawn. The upper lock plates and stab saddle doubler must be even with the top edge of the fuse side. **The three lower lock plates must be positioned** 1/8" above the bottom edge of the fuse side. Use a piece of 1/8" balsa as a spacer to aid in correct positioning of the bottom lock plates. Glue these parts in place with thin CA.

(See photo on next page.)



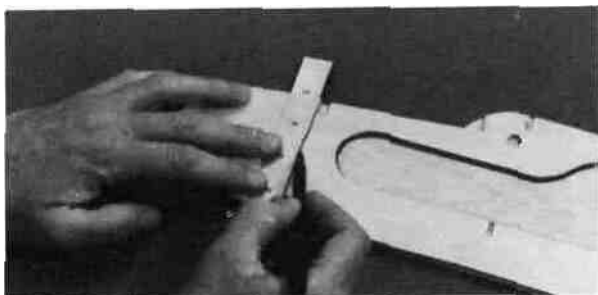
D 11. Notice that the 1/8" balsa fuse side has two slightly rounded corners at the front of the "hatch" area and at the front of the "stab saddle" area. Using an X-Acto knife, cut away these rounded corners to match the doublers.



D 12. Turn the fuse side over and lay the 1/8" balsa **upper fuse side** in place on the doubler, lining up the curved "windshield" edge. Apply glue all around the edges of this upper fuse side.



LI 13. Draw a straight line connecting the front edge of the front slots in the fuse doubler.



D 14. Lay the 1/4" balsa **lower tripler** in place on the fuse doubler, and line it up with the line just drawn and the edge of the doubler. Glue the lower tripler in place with thin CA all around the edges.



D 15. Use one of the 3/8" ply engine beams as a spacer to position the 1/4" balsa **upper tripler**. Move the upper tripler forward or back until it lines up with the line you drew in Step 13.

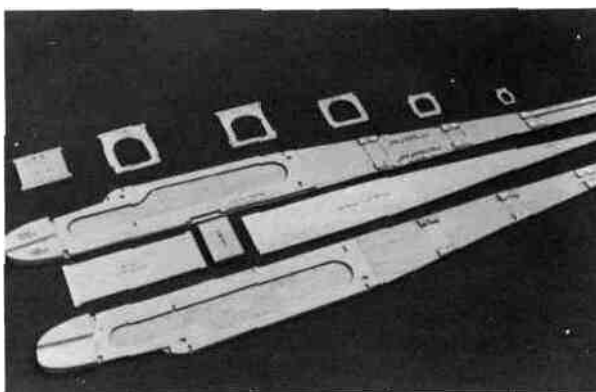


D 16. Remove the 3/8" ply spacer, then glue the upper tripler in place with thin CA all around the edges.

D 17. Glue the fuselage doubler, upper and lower lock-plates, upper fuse side, stab saddle doublers and the 1/4" balsa triplers to the **left** inside fuselage side. Be sure to follow the same procedure as set forth in steps 9-16 when doing so, but **don't make two Rt. fuse sides!**

D 18. Drill or cut out the 5/16" holes in the fuse sides for the wing hold-down dowels. If you use a drill, lay the fuse side on a wood block for a backing to drill into, which will prevent the balsa from tearing.

ASSEMBLE THE FUSELAGE

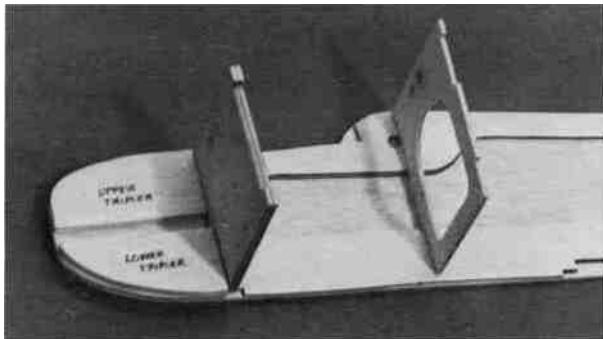


D 1. Before assembling the fuselage, make sure that the following parts are set out within easy reach: both fuse sides with doublers and triplers securely glued on; formers F-1 through F-6; 1/8" ply fuse bottom; 3/8" ply L.G. (landing gear) plate; 1/8" balsa fuse bottom; the tapered balsa "fuse tail wedge" and the six #62 rubber bands provided.

Note: In the next steps you will assemble the fuselage without glue! The interlocking parts enable you to do this so you can get everything together, make sure the parts fit properly, check for straightness and make adjustments if necessary. Then you will glue everything together by applying thin CA.

D 2. Make the "firewall" (Former F-1) by gluing together the two 1/8" plywood parts which are marked "F-1". Use 5 minute epoxy for this job. After the epoxy has hardened, drill four 1/8" holes at the marks for the nose gear bearing mounting holes.

D 3. Lay the right fuse side flat on the work surface. Insert formers F-1 and F-2 into their respective slots in the right fuse side doubler.



D 4. While holding F-1 and F-2 upright, lay the left fuse side in place on these formers. Now put the 1/8" ply fuse bottom in place in the slots provided.



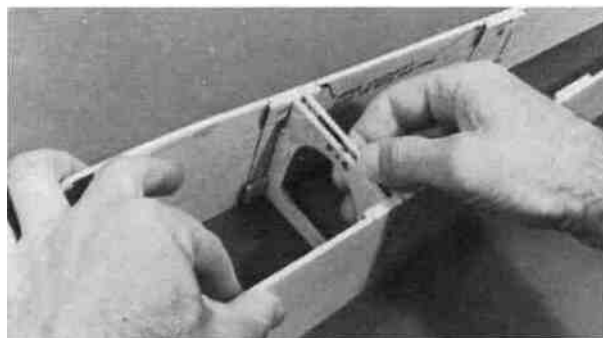
D 5. Holding these five parts together with one hand, slide two #62 rubber bands over the nose, leaving one around F-1 and one around F-2.

Note: Notice that the fuselage has now become somewhat rigid and square. Before proceeding make sure that the tabs in F-1, F-2 and the fuse bottom are properly inserted into the slots in the fuse doublers. Position the fuselage in its normal (upright) position while inserting the other formers in the next steps.

D 6. Put former F-3 in place and secure by sliding a rubber band around the fuselage from the rear.

D 7. Slide another rubber band around the fuse to the F-4 location, pulling the fuse sides together. Now work F-4 into place in the lock-plate notches.

(See photo at top of next column.)



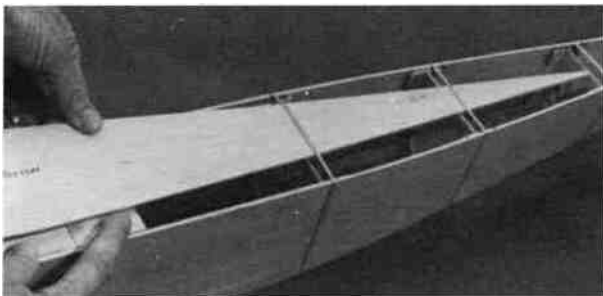
D 8. Put F-5 and F-6 in place in the lock-plate notches and secure with rubber bands.

D 9. Note that the rear end of the stab saddle doublers touch, preventing the rear ends of the fuse sides from coming together. Using your T-bar, sand the rear portions of **both** the stab saddle doublers as shown until the rear ends of the fuse sides nearly touch.

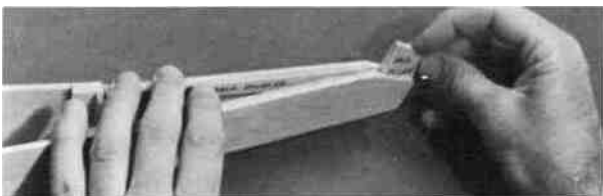


D 10. Turn the fuselage upside down and place the 3/8" ply L.G. plate into the slots provided. Secure with masking tape.

D 11. Now take the 1/8" balsa fuse **bottom** and carefully slide it in place, narrow end first, under the rubber bands, starting at F-3.

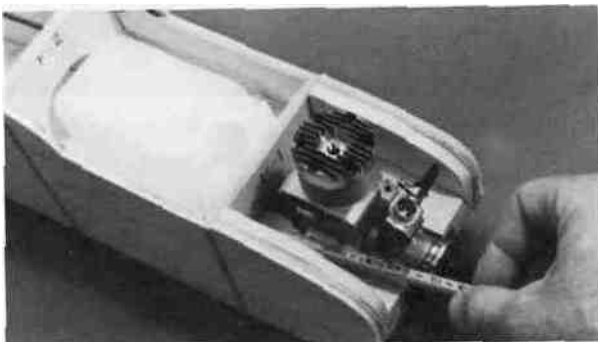


D 12. Finally, insert the tapered balsa fuse tail wedge, and secure with a small rubber band or masking tape.



D 13. **Temporarily** install the 3/8" ply engine beams and the 1/4" ply breakaway plates. Hold in place with masking tape. Now position your engine on the breakaway plates and your fuel tank behind F-1. Don't worry about exact fits at this time. While holding these parts in position, determine where to drill the holes in F-1 for the fuel lines and the throttle pushrod. (See photo and notes on next page.)

NOTE ON ENGINES: The engine mount "breakaway plates" have been cut to an average width which will permit mounting almost any engine you choose. However, you may have to trim these plates slightly to fit your engine. The best way to do this is to sand or file away a little at a time from the inside edges of both breakaway plates until your engine fits between the plates.



NOTE ON FUEL TANK: The PT40 requires any 6 or 8 oz. fuel tank of your choice. Most tanks have three possible openings, one for fuel pick-up, and two for the fill/vent lines. We recommend that you only use **two** lines. Run one line from the "klunk" pick-up to the fuel fitting on the engine carburetor and the other to the "pressure tap" fitting on the muffler.

D 14. Because you have not yet glued the fuse parts together, you may now carefully remove F-1 and drill the holes for the fuel lines and throttle pushrod.

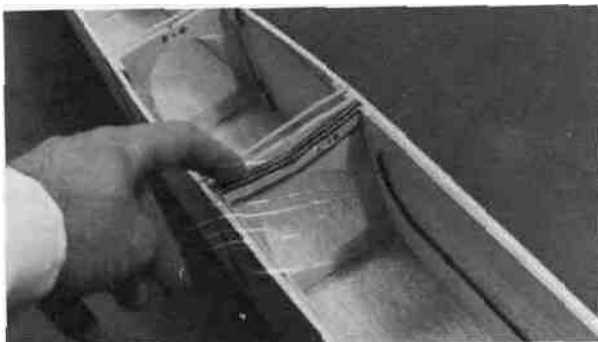
D 15. Insert four 4-40 blind nuts part-way into the 1/8" holes previously drilled. Insert them from the back side of F-1. Apply one drop of thick CA glue under the wide part of each nut, then immediately press them firmly in place with a pliers or a vise.



4-40 BLIND NUT

D 16. Replace F-1 back into the fuse.

D 17. By now you should have decided which wing you are going to build, "**Wing A**" (without ailerons), or "**Wing B**" (with ailerons). If you have chosen "Wing A", find the four F-2A wing saddles and put them into the slots behind F-2 and in front of F-3. If you have chosen "Wing B", use the F-2B saddles.



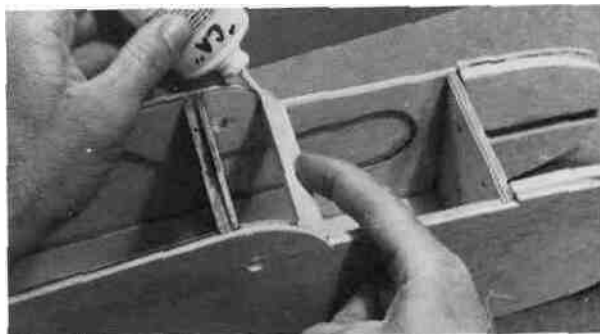
D 18. Check your assembly of the fuselage, making sure that all former tabs are in their respective notches and all parts are in place. Set the fuselage assembly on the plan top view. Your fuse assembly should line up with the plan within 1/16". If not, something is wrong and you should try to straighten it out. If the alignment is far off and you can't find the problem, consult with an experienced model builder to correct the problem before proceeding.

D 19. Lay down a 50" long piece of waxed paper to protect your building surface. Set the fuselage assembly upright (in its normal position) on the waxed paper. With everything in its proper place, apply **thin** CA glue to all the joints, around the formers and along the bottom. Wait a minute for the glue to set, then apply **thick** CA to the joints to make sure a good bond exists, especially in the joints that do not fit perfectly. Note: The use of "Zip Kicker" or other CA glue accelerator will be helpful when using thick CA to fill any large gaps.

D 20. Remove the rubber bands from the fuselage. In the above step you may have glued the rubber bands to the wood in some places. If so, just cut the rubber away from the wood with an X-Acto knife.

INSTALL THE WINDSHIELD AND HATCH

D 1. Put the 1/2" balsa triangle windshield brace in place and apply thin CA glue.



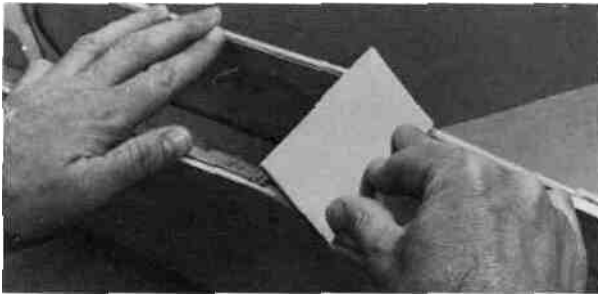
D 2. Sand the 1/2" balsa triangle to match the curve on the fuse sides.



D 3. Sand the bottom edge of the 1/8" balsa windshield at an angle so it will rest flat on the fuse sides.

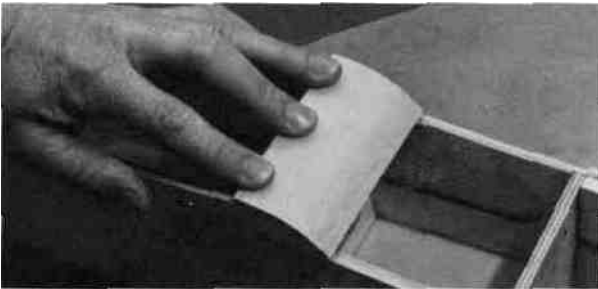
D 4. Apply thick CA to the 1/2" balsa triangle, then immediately place the windshield in position, holding the bottom against the triangle.

(See photo, top of next page.)



D 5. Wet the top surface of the windshield so the wood will bend without breaking.

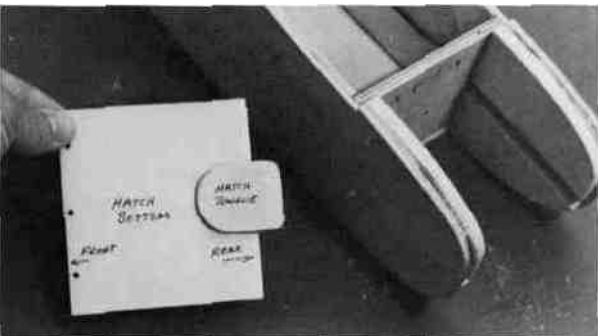
D 6. Apply thick CA to the top of F-2 and the fuse sides where the windshield will contact, then immediately bend the windshield down and hold until the glue sets



D 7. Trim any excess windshield even with the back edge of F-2.

D 8. Taper the rear edge of the 1/8" ply hatch to fit the windshield as shown on the fuse plan side view.

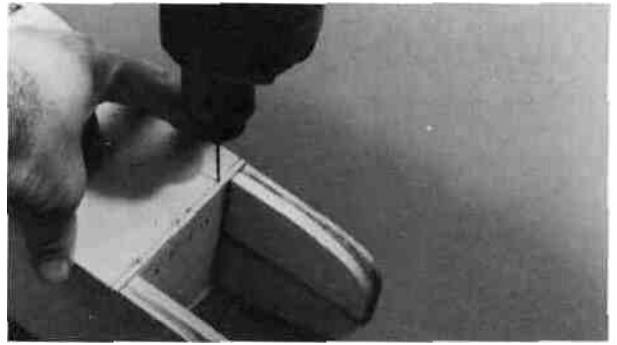
D 9. Find the piece of 1/8" ply that you punched out of F-5. This is used as the hatch tongue. Glue the hatch tongue to the bottom of the 1/8" ply hatch with thick CA. Let the hatch tongue extend about 1/2" beyond the back edge of the hatch.



D 10. Draw a guideline 1/8" back from the front edge of the hatch. This is the centerline of the three hatch hold down screws.

D 11. Holding the hatch firmly in position, drill three 1/16" holes along the guideline •

D 12. Remove the hatch and re-drill the holes **in the hatch only** to 3/32". Then attach the hatch to the fuse with three #2 x 3/8" screws. (See photo, top of next column.)



MOUNT THE ENGINE BEAMS AND BREAKAWAY PLATES

D 1. Glue the 3/8" ply engine beams in place using 5 minute epoxy. With a tissue, wipe off any excess epoxy that squeezes out when sliding the beams into the slots. Allow the epoxy to fully cure before disturbing the beams.



D 2. Holding the 1/4" breakaway plate **under** the 3/8" ply beam, draw a line on the breakaway plate to mark the edge of the beam.

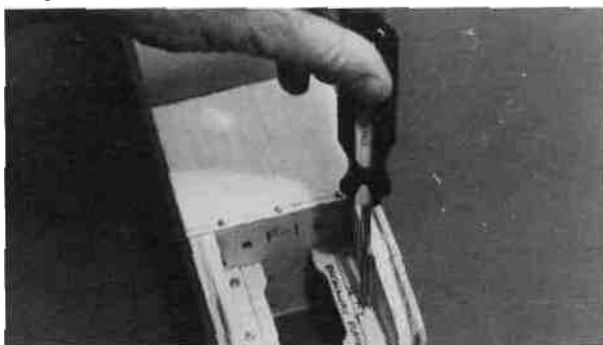


D 3. Now place the breakaway plate on top of the beam and while holding the plate firmly in place, drill three 3/32" holes as shown, drilling down through the breakaway plate and the beam. Do this for both plates and beams.



D 4. Remove the breakaway plates and re-drill the holes **in the breakaway plates only to 1/8"**.

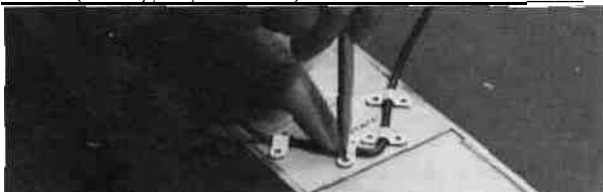
D 5. Fasten the breakaway plates **to the beams** using six #4 x 5/8" screws.



#4x5/8" SCREW

INSTALL THE LANDING GEAR

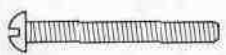
D 1. Turn the fuselage upside down and position the 5/32" wire main L.G. (landing gear) on the ply L.G. plate. Set the four nylon L.G. straps in place and mark the location for the eight screw holes. Drill 3/32" (or slightly smaller) holes at the marks.



D 2. Temporarily mount the main LG using the nylon straps and the #4 x 1/2" screws.



#4x1/2" SCREW



4-40x1" BOLT

D 3. Temporarily mount the nylon nose gear bearing using four 4-40 x 1" bolts screwed into the 4-40 blind nuts previously installed.



D 4. If you are a young person, you should ask an adult to help you with the following step: Using a side cutter, cut off the excess bolt length sticking out behind F-1. **You must wear eye protection when doing this!** Note: An alternate method is to mark the bolts with an indelible marker, remove them from F-1, and cut them off at the marks with a side cutter, hacksaw or a Dremel cut-off wheel.

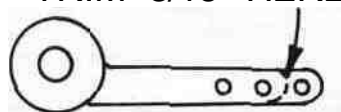
(See photo, top of next column.)



PREPARE THE NOSE GEAR

D 1. Referring to the steering arm drawing here, cut off about 3/16" of the steering arm so it will clear the fuse triplers. Drill out the end hole to 5/64" diameter for pushrod wire clearance.

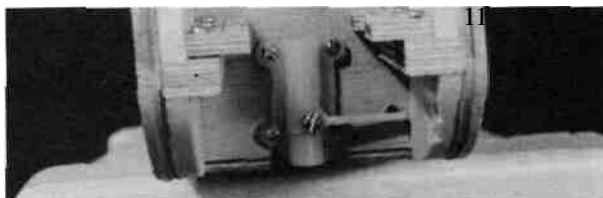
TRIM 3/16" HERE



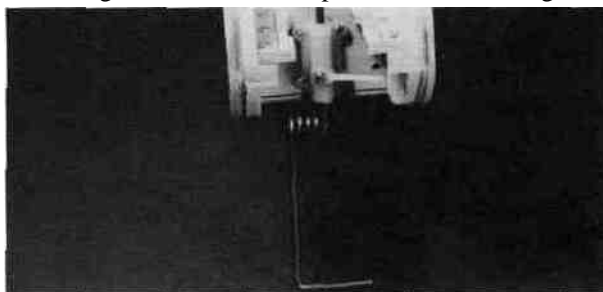
D 2. Assemble the nose gear **steering arm** which consists of a nylon arm, a 5/32" wheel collar and a 6-32 x 3/16" screw.



D 3. Place the steering arm assembly into the nose gear bracket making sure that the wheel collar opening on the steering arm is down and the screw is facing out.



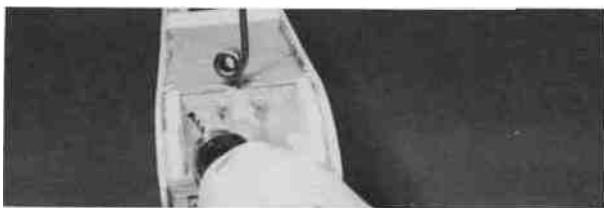
D 4. Referring to the nose gear diagram on the plans, slide the nose gear wire through the holes in the nose gear bearing and wheel collar/steering arm. Tighten the screw, making sure the steering arm is at the angle shown on the top view of the fuselage.



CUT THE NOSEGEAR PUSHROD OPENING

D 1. Mark and drill a 1/8" hole through Former F-1 in the position shown on the F-1 drawing on the plan. This hole is for pushrod clearance.

See photo, top of next page



CUT THE PUSHROD EXIT SLOTS FOR THE RUDDER AND ELEVATOR

D 1. Find the location of the "Pushrod Exits" on the fuselage plan (side view). Measure their locations in relation to the fuse bottom and the back of F-6, and transfer these measurements to your fuselage. Note that the pushrod exit shown in dashed lines is for the rudder pushrod exit on the **left** fuselage side.

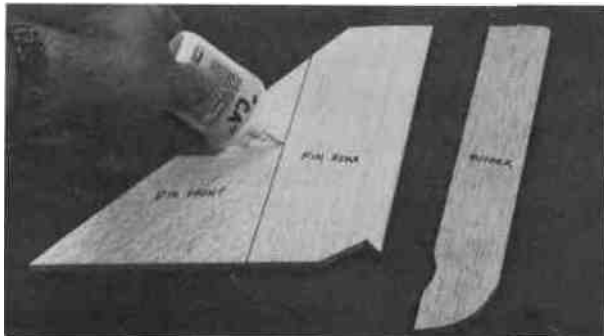


D 2. Cut out the slots with an X-Acto knife.

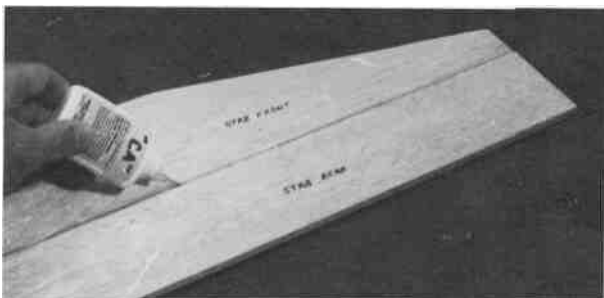
This completes the fuselage construction for now. Note that you have not yet installed the **top** sheet. Set the fuselage assembly aside.

BUILD AND INSTALL THE "TAIL FEATHERS"

Q 1. Working on waxed paper on a flat surface, glue the 1/4" balsa **fin front** to the 1/4" balsa **fin rear** using thin CA. Immediately wipe off any excess glue to make sanding easier. Apply glue to both sides of the joint.



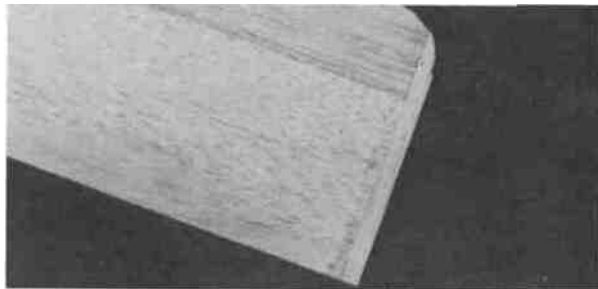
D 2. In the same manner, glue the stab (stabilizer) **front** to the stab **rear**.



D 3. Find the two 1/4" x 1/4" x 5-7/8" balsa pieces. These are used for the ends of the stab and elevator. Cut a 1-3/8" length from each of these pieces and glue them to the ends of the elevator using thin CA glue. Sand the ends even with the elevator using a sanding block.

D 4. Take the two remaining pieces of 1/4" x 1/4" balsa and glue them to the ends of the stab and sand to blend in.

D 5. Round the corners of the fin, rudder, stab and elevator as shown on the plan.



D 6. Sand the fin and stab smooth with a **T-bar** sanding block and 100 grit sandpaper.

D 7. Put the elevator and stab together and sand the tips to the same length.

D 8. Using a sanding block, sand the following to a rounded shape: stab leading edge (excepting the flat center portion), stab tips, elevator trailing edge and tips, fin leading edge, fin tip, rudder trailing edge and rudder tip.

D 9. Using a **fine point felt tip marker**, carefully draw a centerline all along the stab trailing edge, elevator leading edge, fin trailing edge and rudder leading edge.

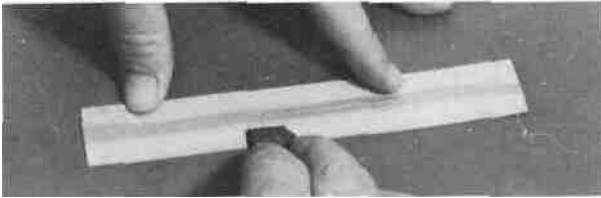


D 10. Using a T-bar sanding block with 100 grit sandpaper, sand the elevator leading edge and rudder leading edge to a "V" shape. Work slowly and carefully so you don't sand away too much balsa. When you have finished, the centerlines you previously drew should remain, and the "V" shape should look like the sketch shown above the fin on the plan.

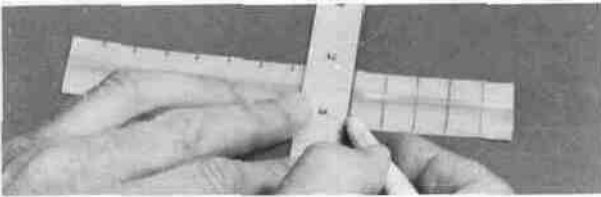


MAKE THE HINGES

D 1. Take the 9" 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 2. Using a ruler and a ball point pen, draw lines dividing the hinge material into eighteen 1/2" -wide segments.

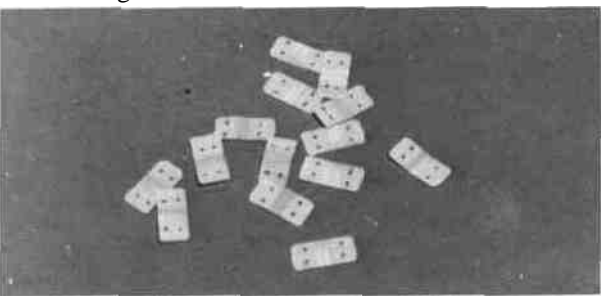


D 3. Drill four 1/16" holes in each of the hinge segments as shown on the plan. Use a wood block as a backing to drill into when drilling these holes.



D 4. Fold the hinge material back and forth a few times on the centerline to "condition" the hinges.

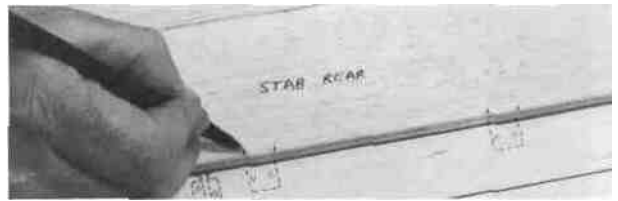
D 5. Cut the hinges apart with a scissors on the lines you previously drew. Also snip off a **small** piece of each hinge corner.



Note: You should end up with 18 hinges, 8 of which you will use for the ailerons if you are building the "B" wing.

MARK THE HINGE LOCATIONS

D 1. Lay the stab on the plan and mark the hinge locations on the stab trailing edge (both sides are the same).



D 2. While holding the elevator in place against the stab trailing edge, transfer the hinge locations to the elevator leading edge.



D 3. Repeat the above process marking the hinge locations on the fin and rudder. **Don't forget to mark the bottom hinge location on the rudder.**

CUT THE HINGE SLOTS

D 1. Move the fin trailing edge close to the table edge. Place a small piece of 1/8" plywood (from die-cutting scraps) next to the hinge slot location.

D 2. Hold your X-Acto knife straight on the scrap wood and cut straight into the fin. The slots should be about 1/2" deep (enough for half of the hinge to fit into).



D 3. Trial fit by pushing the hinges (**no glue**) into the slots to make sure you have cut the slots wide enough and deep enough.

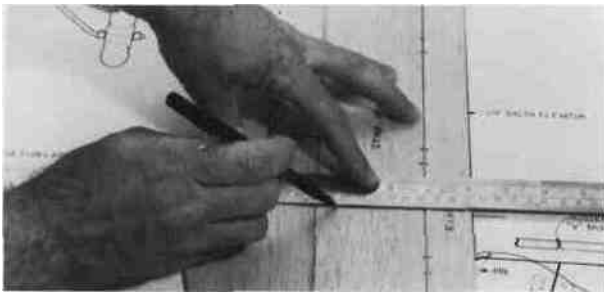
D 4. Repeat this process for the rudder, elevator and stab.

MOUNT THE STAB ON THE FUSE

D 1. Remove the nylon nose gear bearing and the main gear from the fuselage.

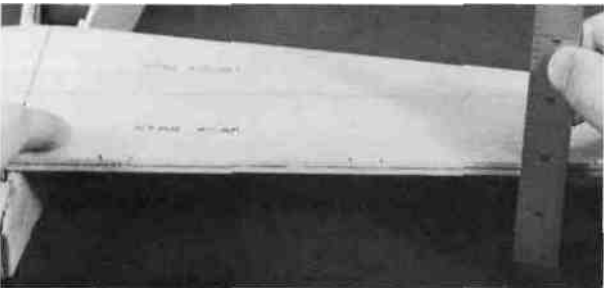
D 2. Lay the stab on the plan and carefully line it up with the outside lines. While holding it in this position, lay a straight edge along the "fuselage centerline" as shown on the plan. Draw the fuselage centerline on the top of the stab with a fine point marker. Work as carefully as you can when doing this!

(See photo, top of next page)



D 3. With the fuse on a flat surface, lay the stab in place on the fuselage in the stab saddle area with the front of the stab touching the rear surface of F-6 and centered side-to-side.

D 4. 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 sanding block and 80 or 100 grit sandpaper. Replace the stab in the saddle and re-check the measurements. Continue this process until the stab is level within 1/16".



NOTE: READ THROUGH AND PRACTICE THE NEXT 6 STEPS (A-F) BEFORE PROCEEDING.

D 5. Now glue the stab securely to the stab saddle with 5 minute epoxy. (You may perform this step with 5 minute epoxy, but a slower curing epoxy will give you more time to make sure the alignment is correct.) It is important that the stab be centered and square on the fuselage; so, follow this procedure exactly:

A- With a ruler, measure to find the exact center of the top of F-3. Stick a pin in at this point.

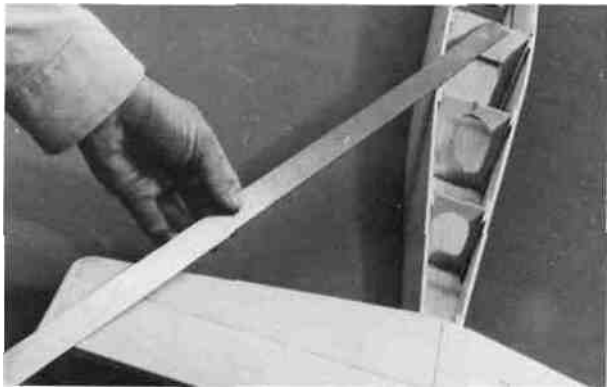


B- Also measure to find the center of the top of F-6 and mark this point with a pencil.

C- Lay the stab in the saddle and line up the "fuse centerline" (which you previously drew on top of the stab) with the mark on F-6 and with the center joint at the rear of the fuse.

D- Check the "squareness" of the stab by measuring from the rear corners of both stab tips to the pin in the center of F-3. Adjust the position of

the stab slightly until both measurements are the same within 1/16" .



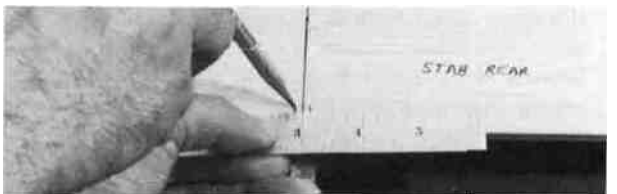
E- When you finally have the stab accurately aligned on the fuse, make four little "alignment marks" on the stab where the leading and trailing edge of the stab intersect with the outside edges of the fuse sides. You will use these marks to quickly and accurately position the stab when gluing it in place. Now remove the stab.

F- Mix up a batch of epoxy and spread it on the stab saddle and the back of F-6. Lay the stab in place using the "alignment marks" for positioning. Before the glue sets, re-check the measurements in step D. Hold or pin the stab in place until the glue sets.

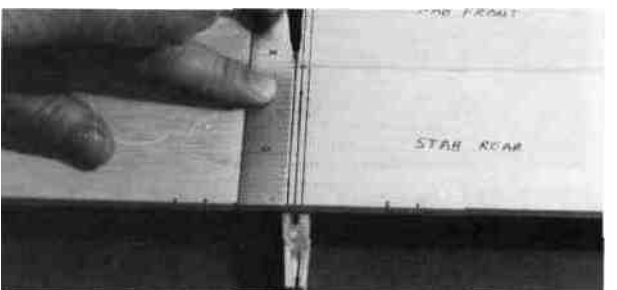
MOUNT THE FIN TO THE STAB

Note: Probably the single most troublesome cause of poor flying models is improper fin alignment. Therefore, you should take the time and care necessary to do your "best when performing this next set of steps. **Read through the next five steps before beginning!**

D 1. At the front and back of the "fuse centerline" which you previously drew on the top of the stab, make accurate marks 1/8" right and left.



D 2. Using a straight edge and a fine point marker, connect these marks, making two parallel lines, **one** on each side of the fuse centerline.

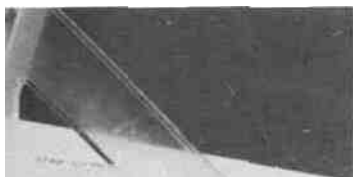


D 3. With the rudder attached to the fin by the top three hinges (not glued in), trial fit the fin onto the fuse. If the rudder is too long and touches the flat work surface preventing the fin from resting on the stab, sand a small amount off the bottom of the rudder.

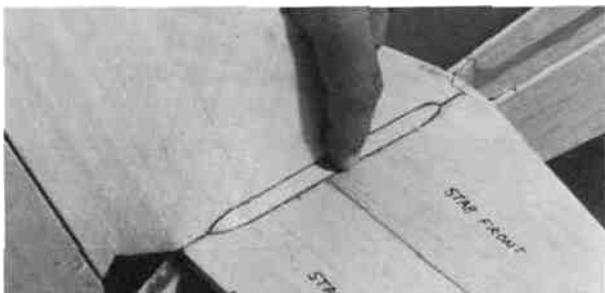


D 4. Apply 5 minute epoxy to the bottom of the fin and position the fin between the guidelines you previously drew. Slide the fin/rudder assembly forward until the bottom of the rudder just touches the back of the fuse. Wipe away any excess epoxy with a tissue.

D 5. Before the epoxy sets, check the squareness of the fin with the stab, using a small carpenter's square or draftsman triangle. Hold position until the epoxy sets firmly.



D 6. Find the two 4-7/8" lengths of 1/4" balsa triangle and sand the ends to a rounded (or pointed) shape as shown on the plan. Trial fit these pieces in place at the fin/stab joint. Later, when you are covering the model (and **before** you cover the fin and stab) cover the outer surface of these triangular pieces, leaving about 1/8" of excess covering all around the edges. Then glue these pieces in place and iron down the excess covering to the fin and stab



D 7. You previously marked the four hinge locations on the rudder. Now transfer the **bottom** hinge location over to the rear of the fuse. Cut the hinge slot in the tapered balsa fuse tail filler.

(See photo, top of next column.)



D 8. Now temporarily assemble the elevator to the stab and the rudder to the fin. Swing the rudder from side to side and the elevator up and down. The rudder and elevator must not touch in any position! If they do, carve or sand the notch in the rudder to insure that they will not bind. In addition, make sure no part of the fin interferes with the free upward movement of the elevator.



Lay the fuselage assembly aside for now.

CHARGE YOUR NICAD BATTERIES

D 1. Read the instruction manual for your radio system to become familiar with how to hook it up.

D 2. Charge your transmitter and receiver batteries now so they will be ready when you need them.

Note: Charge the batteries for the time recommended for the first charge...usually 18-24 hours.

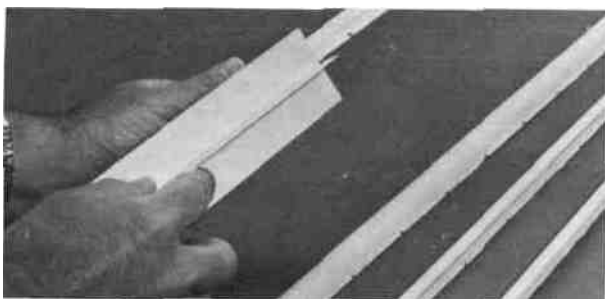
BUILD THE WING PANELS

NOTE: Like the fuselage, the PT40 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. Thick CA will be added after the thin CA has cured.

D 1. Turn the plan over to side 2, which shows the wing. Tape or pin 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 edge (L.E.) and trailing edge (T.E.) are fastened together by a thin layer 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 grit sandpaper.



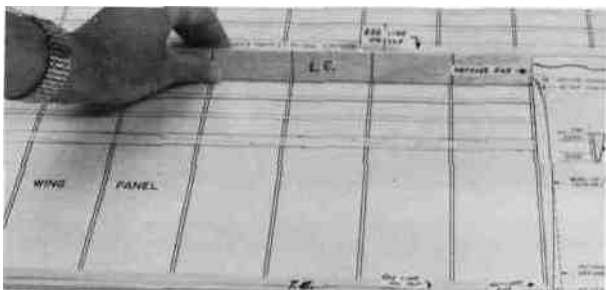


D 3. Before using the L.E. and T.E. pieces, you must determine which pieces are to be used for the right wing panel. Here's how:

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

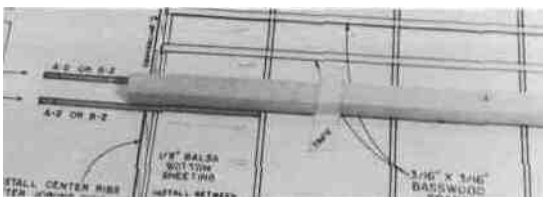
B - Notice that the pieces are notched on one end, but not on the other. The notched end goes toward the wing tip, and the end without a notch goes toward the center of the wing.

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 4 Tape one of the 3/8" x 1/2" basswood spars to the plan, with the right end of the spar lined up with the tip. The excess spar length must extend past the wing centerline. Apply tape in 3 places, between the ribs, near the ends and in the middle.



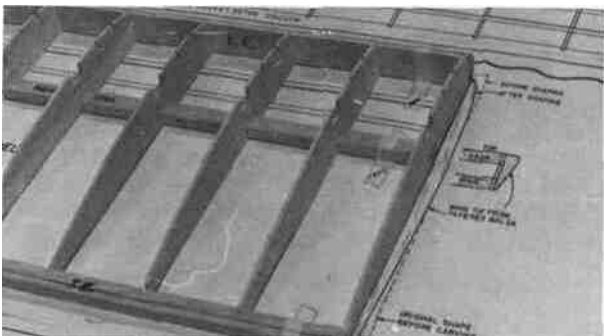
D 5. Remove the 3/32" balsa wing ribs from the die cut sheets and slide 12 ribs into place on the bottom spar, using the plan to get them close to their proper position **DO NOT PUT A RIB AT THE CENTER-LINE.**



D 6. Insert the fronts of the ribs into the notches in the balsa leading edge (L.E.).

D 7. Insert the backs of the ribs into the notches in the balsa trailing edge (T.E.).

D 8. Adjust the position of the leading edge and trailing edge left or right so they match the plan at the right tip. Tape or pin them to the plan so they don't move.



D 9. The tip rib should now match the plan exactly. However, due to shrinkage or expansion of the paper, the other ribs may not line up perfectly. That is OK, because the notches in the L.E. and T.E. are cut in the right places. Before proceeding, make sure none of the ribs are bowed (curved). If they are, straighten them by sliding the center part right or left on the spar.

D 10. Insert the top 3/8" x 1/2" spar into the top notches in the ribs, so the right end is even with the **tip rib**.

D 11. Insert two of the 3/16" x 3/16" basswood spars into the small notches in the top of the ribs, so the right ends are even with the tip rib.



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.

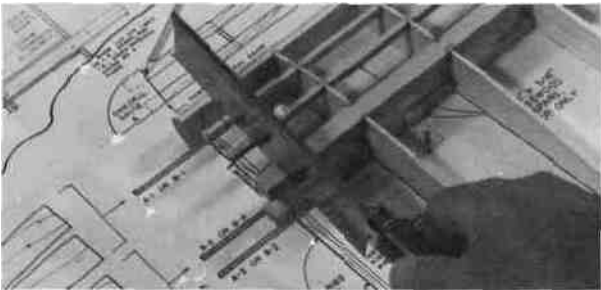
D 13. Apply thin Ca to all joints. After the thin CA has cured, apply some thick CA to each joint.

D 14. Find the die-cut plywood sheets containing the Dihedral Braces, Wing Braces, F-2's and Gauges (PT40W14 & PT40W15). If you are building wing "A" (without ailerons), punch out all the parts that apply to the "A" wing. Compare each part with the drawings on page 6 and mark them with their correct letter and number (A-1, A-2, etc.). If you are building the "B" wing, use only the parts with a "B" on them.

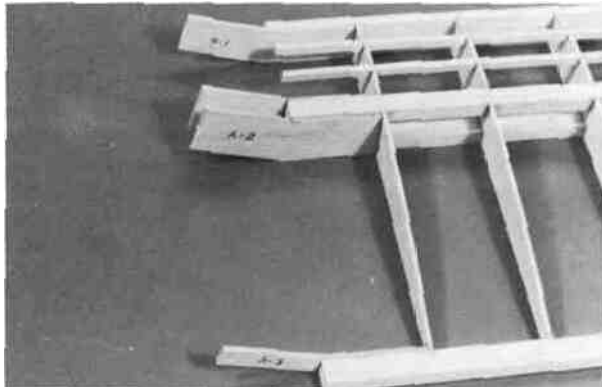
D 15. Using the "dihedral gauge" (A or B, **depending on your wing choice**), draw **cut-off lines** on the back of the L.E. and the front and back of the spars and T.E. (See the sketch on the plan showing how to do this.) **The point of the dihedral gauge must be exactly on the centerline when marking the cut-off lines.**



D 16. Using a razor saw (or any fine-toothed saw), **carefully** cut off the L.E., spars and T.E. on the lines you just drew.



D 17. Using 5 minute epoxy:



Glue A-1 or B-1 to the back of the leading edge.

Glue A-2 or B-2 to the front of the main spars.

Glue A-2 or B-2 to the back of the main spars.

Glue A-3 or B-3 to the front of the trailing edge.

Remove any excess glue with a tissue.

NOTE: Skip to page 39 and add the shear webs as described on that page.

Clamp or hold the parts until the glue hardens.

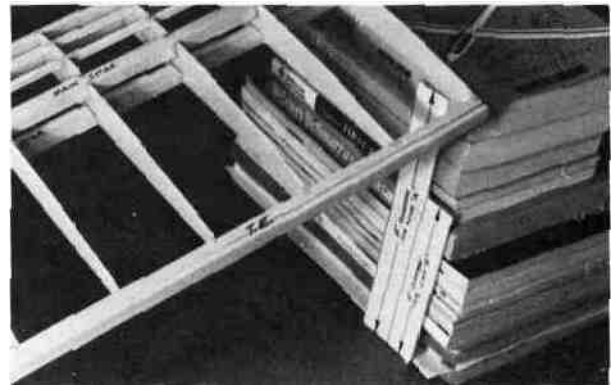
Set the right wing panel aside, and turn the plan around so the left wing panel is facing you.

D 18. Build the **left wing panel** in the same manner as you did the right panel, following steps 1 through 16.

JOIN THE WING PANELS

D 1. Lay the left wing panel flat on the building surface or a large flat table. Place a sheet of waxed paper under the "center" portion of the panel where it will be joined to the right half.

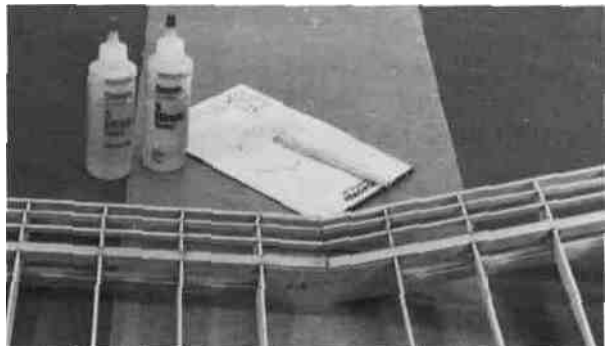
D 2. Slide the right wing panel into position, so the spars touch the spars of the left panel. Block up the right tip with a stack of books. The stack of books must be 8" high for wing A and 5" high for wing B.



D 3. Check to make sure the L.E., spars and T.E. are touching. If not, sand off any long ones slightly until they all touch. Now slide the panels apart.

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

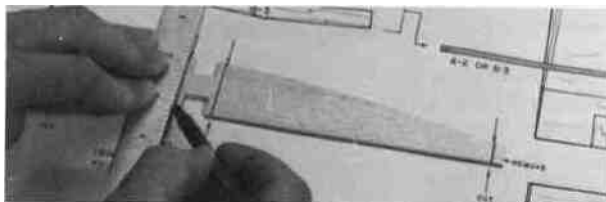
D 4. Mix up a batch of epoxy (30 minute epoxy is preferred here to give you more time, or 5 minute epoxy may be used if you work quickly), and apply it to the dihedral braces, L.E., spars and T.E. Slide the panels together and wipe up the excess glue with a tissue.



Make sure the wing panels remain in position until the epoxy has fully hardened.

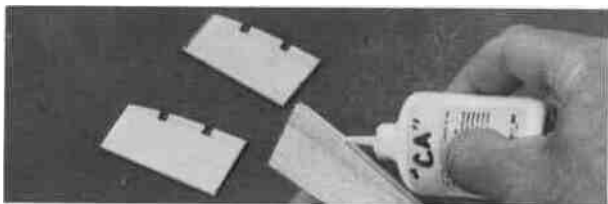
INSTALL THE CENTER RIBS AND BOTTOM SHEETING

LI 1. After building the wing, you have two ribs remaining. Lay these ribs, one at a time, on the drawing in the lower left corner of the wing plan. With a straight edge and a pen, mark the four cut-off lines, using the arrows as a guide.

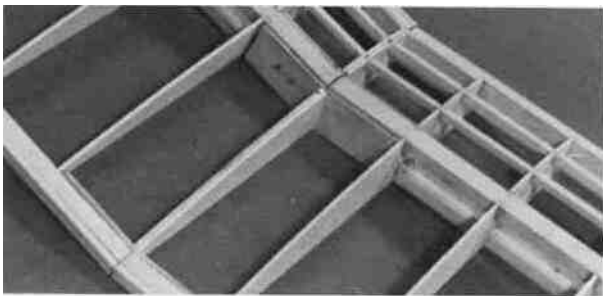


D 2. Cut the ribs at the cut-off lines using a razor saw.

D 3. Place the two "front parts" together and the two "aft parts" together, and apply thin CA glue around the edges.



D 4. Position these center rib parts in place in the center of the wing and glue them to the L.E. spars and T.E. You may use thin CA if the ribs fit perfectly; otherwise use thick CA or epoxy.



D 5. From the sheet of 1/8" x 3" x 13" balsa, cut rectangles to fit **between** the center rib and the 2nd rib in both wing panels. The easiest way to do this is to lay the wing right on the 1/8" balsa sheet and trace around the inside edge of the ribs and spars as shown here.



Note: The grain of this bottom sheeting must run in the same direction as the spars.

D 6. Working on waxed paper, glue the bottom sheeting to the inside edges of the ribs and dihedral **braces**.

D 7. Turn the wing upside down and inspect the bottom of the center section. If there are any major gaps between parts, fill them with balsa dust (from sanding) and apply thin CA.

D 8. Sand the bottom of the center section smooth with a sanding block and 100 grit sandpaper.

At this point the bottom center section should look like this:

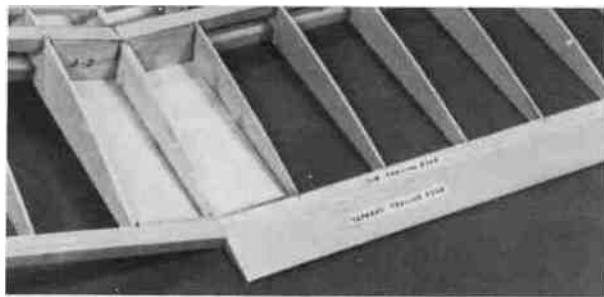


INSTALL TAPERED TRAILING EDGE (WING A ONLY)

Note: The following 7 steps apply only to wing A (without ailerons). If you are building Wing B, skip to the next section now.

D 1. Find the two tapered balsa T.E. pieces. They are 1-3/16" wide and 30" long.

D 2. Place one of the trailing edge pieces against the rear edge of the right wing panel on a flat surface. If there is a 3/32" gap along the top edge, that means the T.E. is upside down. If so, turn it over.



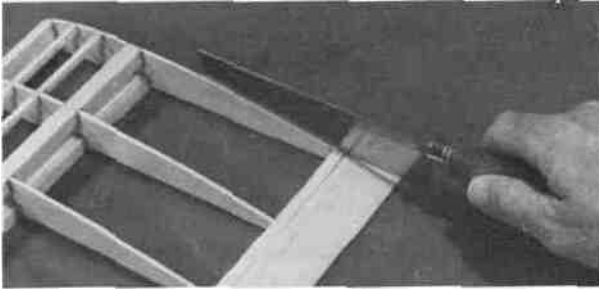
D 3. Working on a flat surface covered with waxed paper, hold the tapered T.E. firmly against the rear edge of the Rt. wing panel with the left edge at the wing centerline, and apply thin CA along the joint. Make sure the wing and the T.E. **are down** flat on the work surface when doing so.

D 4. Take the other tapered T.E. and determine which side goes up, as in step 2.

D 5. Trial fit this piece in place against the rear edge of the Left wing panel. You will probably notice that there is a gap on the bottom, where the two T.E. pieces come together. If so, sand the end of the T.E. so it fits snugly against the end of the right T.E.

D 6. Glue the left tapered T.E. in place, as in step 3.

D 7. With a razor saw, cut off the ends of the tapered trailing edges even with the tip ribs.



INSTALL TRAILING EDGE, AILERONS AND TORQUE RODS (WING B ONLY)

Note: The following 27 steps apply to wing B (with ailerons). If you are building wing A, skip to the next section now.

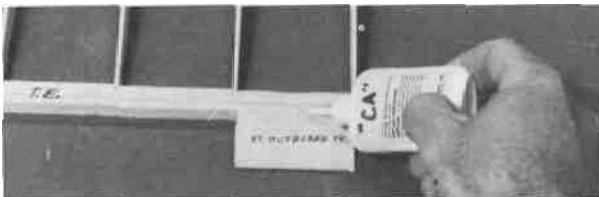
D 1. Find the two tapered balsa T.E. (trailing edge) pieces. They are 1-3/16" wide and 30" long.

D 2. Place one of the T.E. pieces against the rear edge of the right wing panel on a flat surface. If there is a 3/32" gap along the top edge, that means the T.E. is upside down. If so, turn it over.

D 3. Just below the right wing drawing (on the plan), there is a separate drawing showing the aileron details. Using this drawing as a guide, cut the tapered T.E. into three parts. Label these parts: "**Rt. inboard T.E.**", "**Rt. Aileron**" and "**Rt. outboard T.E.**" ("Rt." is an abbreviation for "right".)

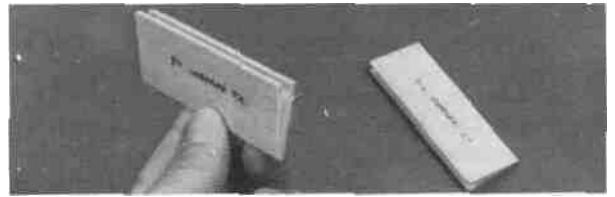


D 4. Glue the Rt. outboard T.E. piece to the rear edge of the right wing panel. The outer edge of the T.E. should be even with the tip as shown on the plan.



D 5. Repeat steps 1-4 for the **left side**, making the "**Lt. inboard T.E.**", "**Lt. Aileron**" and "**Lt. outboard T.E.**" ("Lt." is an abbreviation for "left".)

D 6. Find the "**aileron torque rods**". You will notice that there is a black nylon tube on each of the bent rods. This nylon tube is called the "**torque rod bearing**". You must now make a groove in the front edge of each inboard T.E., so the torque rod bearing may fit into the groove.



There are several ways to accomplish this, so you may choose one of these:

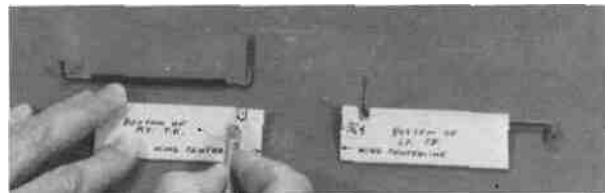
A- File the groove with an 1/8" or 5/32" diameter round file, available at hardware stores (this type of file is normally used to sharpen small chain saw teeth).

B- Cut the groove with a 5/32" outside diameter brass tube. You can sharpen the tube by cutting around the inside of one end with an X-Acto knife.

C- Cut the groove by running the T.E. piece over a small table saw, with the blade set at the height needed to cut a groove 5/32" deep.

D- Rout the groove out with a Dremel Moto Tool and a 1/8" bit.

D 7. Turn the two inboard T.E. pieces upside down as shown in the following photo, and measure 7/16" out from the "wing centerline". At the 7/16" point, cut a notch in both pieces with an X-Acto knife, providing free movement for the threaded portion of the aileron torque rods.



D 8. Roughen the surface of the nylon torque rod bearings using a piece of 100 grit sandpaper.

D 9. Slide the nylon torque rod bearings as far as they will go toward the threaded portion of the torque rods.

D 10. With a toothpick, apply a small amount of petroleum jelly (Vaseline, etc.) around the torque rod where it enters the nylon bearing. This will help prevent any excess glue from getting in and possibly "locking up" the torque rod.

D 11. Place the torque rods into the grooved T.E. pieces.

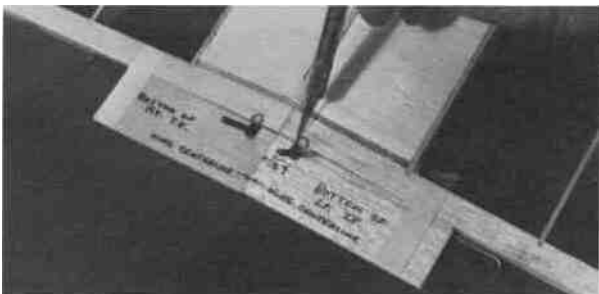
STOP! AT THIS POINT YOU MUST CAREFULLY STUDY THE PLANS AND PHOTOS TO MAKE SURE YOU HAVE THE RIGHT TORQUE ROD IN THE RT. INBOARD T.E., AND THE LEFT TORQUE ROD IN THE LT. INBOARD T.E. THE THREADED PORTION MUST COME OUT THE BOTTOM, AND THE SHORT BENT END MUST POINT TOWARD THE REAR.

D 12. If the nylon bearing fits snugly into the groove, you may use a few drops of thin CA to glue it in place. If you have a loose fit, use thick CA or epoxy. **DO NOT GET GLUE INTO THE ENDS OF THE NYLON BEARING TUBE!**

D 13. Turn the wing upside down, with the trailing edge facing you, and temporarily position the inboard T.E. pieces against the back edge of the wing. You will notice the gap between the pieces, caused by the dihedral angle. Sand the ends of the inboard T.E. pieces so they come together without a gap.



D 14. With the T.E. pieces taped in their proper position mark the location of the slots (where the threaded portion comes out) on the back edge of the wing as shown. Then remove the T.E. pieces and cut slots in the back edge of the wing.



D 15. Glue the inboard T.E. pieces to the back of the wing by carefully holding or taping the pieces in place and applying thin CA in small drops along the joints. Use care to avoid getting glue inside the nylon bearings.

D 16. Mark a centerline all the way down the leading edge of each aileron.

D 17. Hold the ailerons in place against the back edge of the wing and mark the location where the torque rods will enter the ailerons.



D 18. Drill a 3/32" hole in each aileron to accept the torque rods.



D 19. Sand the leading edge of the ailerons to a "V" shape as shown on the plan.

D 20. Groove the leading edge of each aileron to accept the torque rods.

D 21. Trial fit the ailerons onto the torque rods.

D 22. Cut or sand a small amount off both ends of the ailerons to provide about 1/16" to 3/32" of clearance at each end. (Remember....the ailerons will be covered with Super Monokote or other covering material; therefore you must make some space at the aileron ends so they don't tighten up after covering.)



D 23. Remove the ailerons and draw a centerline down the back edge of the wing, in the aileron opening.

D 24. Place the ailerons on the wing plan and mark the locations of the hinges on the leading edge of the ailerons. Now put the ailerons back in place on the wing and transfer the hinge location marks to the back edge of the wing.

D 25. Cut the hinge slots for the ailerons in the same way that you did for the elevator and rudder.



D 26. Using 100 grit sandpaper, roughen the ends of the torque rods that will go into the ailerons.

D 27. Trial fit the ailerons on the wing with the hinges in place. **DO NOT GLUE THE HINGES IN UNTIL AFTER COVERING.**

THE FOLLOWING INSTRUCTION PHOTOS SHOW THE "B" WING (WITH AILERONS), BUT THE PRINCIPLES APPLY TO BOTH "A" AND "B" WINGS.

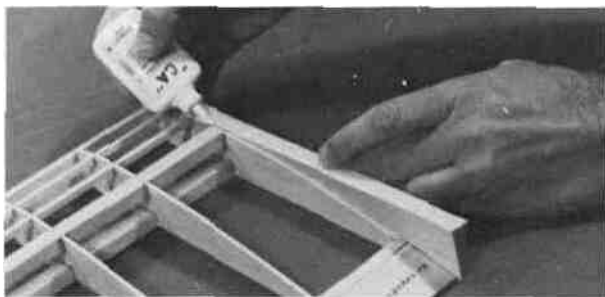
INSTALL THE WING TIPS

D 1. Sand the wing tips smooth and flat with your T-bar and 100 grit sandpaper.

D 2. Find the two tapered balsa pieces **that are** 11-3/8" long. These are the wing tips.

D 3. Holding the wing and wing tip on a flat surface covered with waxed paper (the narrow edge of the tapered piece goes down), apply thin CA glue to the joint.

(See photo, top of next page.)



D 4. Carve and sand the wing tip to blend in with the tip rib, L.E. and T.E.



D 5. 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.

SAND THE WING SMOOTH

D 1. Lightly sand the entire wing with your T-bar and 100 grit sandpaper. Pay special attention to blending the ribs in with the leading and trailing edges and spars and removing any excess glue residue that would cause bumps when the covering is applied later.

D 2. Now lightly sand the wing again with a T-bar and 220 grit sandpaper. After this step, the wing should be very smooth and ready for covering.

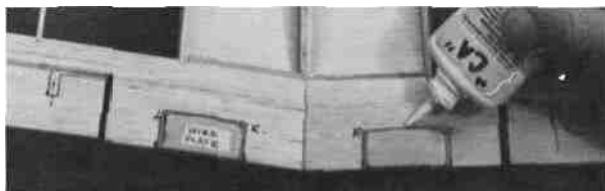
INSTALL THE WING PLATES

D 1. Find the two pieces of 1/32" x 3/4" x 1-1/2" plywood. These are the "Wing Plates" which protect the trailing edge at the points where the wing hold down rubber bands are fastened.

D 2. 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 3. Make marks on the T.E., 1" each way from the wing centerline.

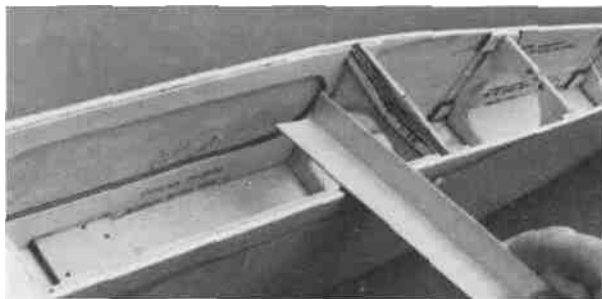
D 4. Put the wing plates in position on the T.E. The edge of the plate that is **not** feathered goes to the rear along the trailing edge. The 1" marks you made in step 3 are where the plates begin.



D 5. Apply thin CA glue around the edges, holding the plates firmly in place until the glue sets.

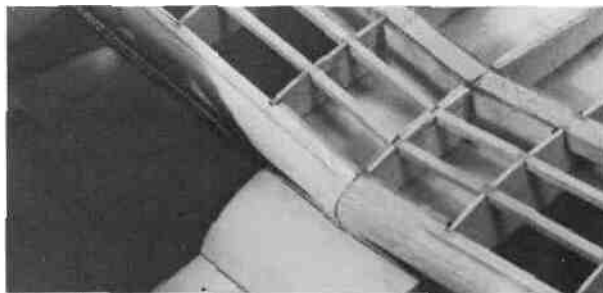
TRIAL FIT THE WING IN THE SADDLE

D 1. Using your T-bar sander, sand the inside edge of the plywood fuse side doublers at the same angle as the F-2A or F-2B formers.

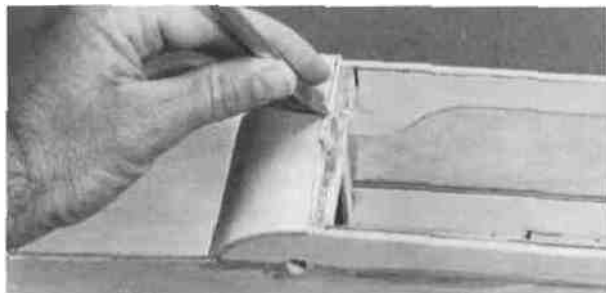


D 2. Lay the wing in place on the fuselage with the T.E. resting against the front of F-3.

D 3. Notice that the center of the wing L.E. rests on the top rear portion of the windshield, preventing the wing from resting down onto the fuse sides. Mark the area of the windshield that needs to be cut away.



D 4. Using an X-Acto knife and a sanding block, carefully remove part of the windshield, a little at a time, until the wing rests down flat on the fuse sides. You may have to cut into F-2 slightly.

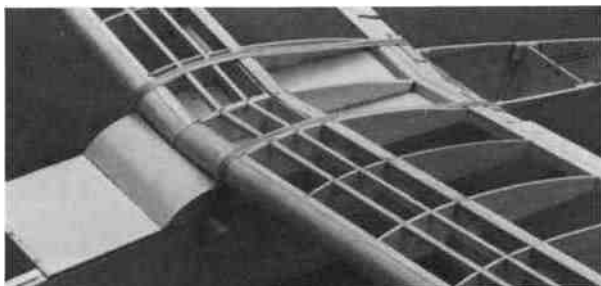


D 5. Find the two 5/16" diameter hardwood wing hold down dowels that are 5-3/16" long. Round the ends of these dowels slightly with sandpaper.

D 6. Insert the dowels into the holes in the fuse sides. Enlarge the holes with a round file or drill, if necessary.

DO NOT GLUE THE DOWELS IN PLACE UNTIL AFTER THE FUSELAGE HAS BEEN COVERED.

D 7. Attach the wing to the fuselage with eight #64 rubber bands. The bands should all be passing over the plywood wing plates on the trailing edge, and the wing should be resting firmly down on the fuselage sides.



D 8. With the wing attached to the fuse, and the fuse bottom resting on a flat surface, measure from both wing tips down to the flat surface. If the measurements differ by more than 1/8", sand the wing saddle area (a little at a time!) until the two measurements are nearly the same.

MOUNT THE ENGINE

Note: There are many different engines that will be OK for mounting in the PT40 and the engine mounting system that is used makes it possible for you to install any engine you choose as long as it is within the following range: .25-.40 2-cycle, or .35-.45 4-cycle. The following photos show installation of the O.S. Max .40 FP engine. The plans also have drawings of the K&B .40 (2-cycle) and the O.S. Max .40 FS (4-cycle). Depending on your engine, you may have to use a slightly different method to end up with a good solid mount. If you have any trouble, be sure to ask an experienced model builder for assistance.

D 1. You should already have the breakaway plates screwed (but not glued) to the engine beams. The breakaway plates have also been cut out so your engine can fit down between them. If not, do so now.

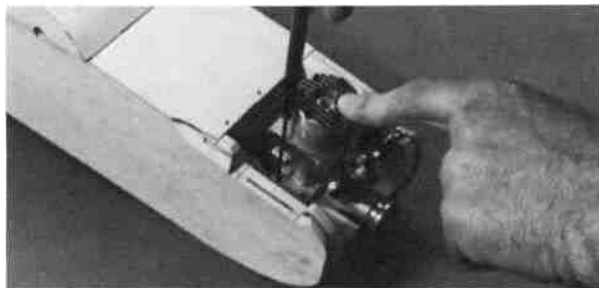
D 2. Put the engine in place on the breakaway plates. Mark the area of the fuse side that must be cut away to clear the needle valve. Cut this area away now, using a round file, Dremel Moto Tool or a small saw.



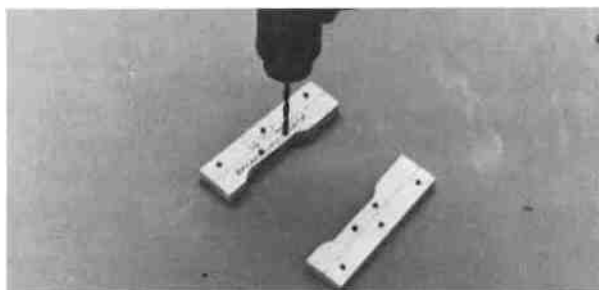
D 3. Now install the muffler onto the engine, put the engine in place on the breakaway plates, mark and cut away enough of the fuse side to provide clearance for the muffler.

D 4. Remove the muffler and again put the engine in place on the breakaway plates. This time, however, you must carefully position the engine so it is pointing straight ahead. Also, the engine must be far enough forward to allow the propeller to turn freely without touching the front of the fuse sides.

D 5. Holding the engine in this position, use a pencil to mark the location of the engine mounting holes on the breakaway plates. Note: For this step, it is helpful to have a "mechanical pencil" with the lead extended, which enables you to mark **straight down** through the engine mounting holes.



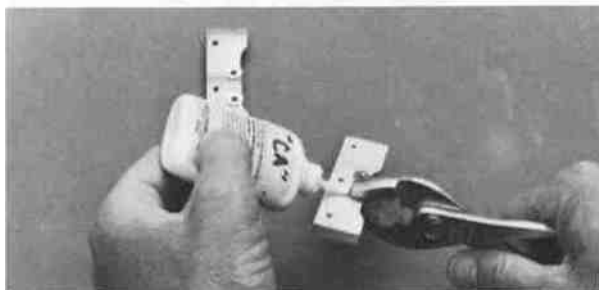
D 6. Drill 1/8" holes through the breakaway plates at the marked locations.



D 7. Install 4-40 blind nuts in the bottom of the holes you just drilled, as follows:



4-40 BLIND NUT



A- Push the blind nut in part way with your finger.

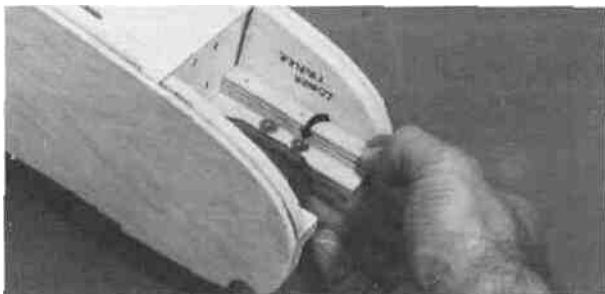
B- Apply a drop of thick CA around the base of the nut.

C- Immediately squeeze the nut in, using a pliers or a vise.

D 8. Screw the breakaway plates down tightly to the engine beams, and notice two things...

A-Looking at the bottom, do the blind nuts extend into and between the breakaway plate and the engine beam?

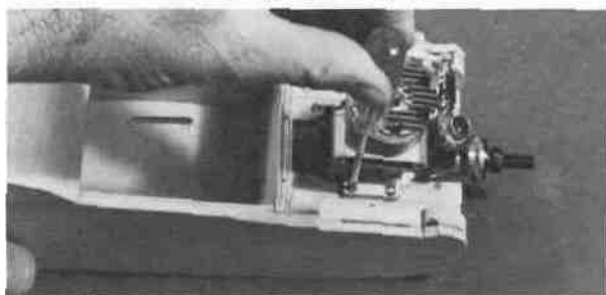
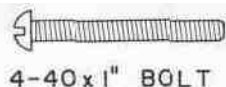
B-Do the blind nuts stick out into the area where the engine goes, preventing the engine from being lowered into place?



D 9. If your answer to A is yes, remove the breakaway plates and carefully cut away the top layer of plywood on the engine beam, in the area where the **blind** nut was hitting.

D 10. If your answer to B is yes, use a flat file to file away the portion of the blind nut that is sticking out into the engine area.

D 11. Now re-install the breakaway plates. Then mount the engine to the breakaway plates with the four 4-40 bolts provided. **Note:** Later when you install the engine the final time (before flying), make sure you slip the small **lockwashers** on the 4-40 bolts before mounting the engine.



INSTALL THE SERVOS

Note: The following instructions and photos describe how to install Futaba S-28 servos in your PT40. 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 ser-

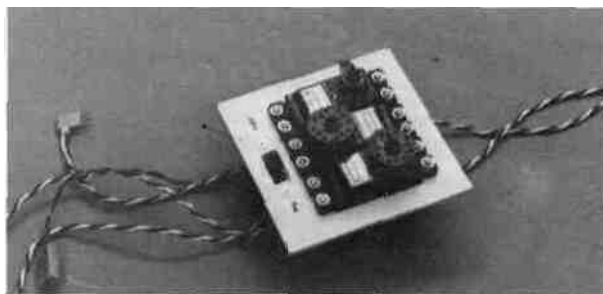
vos **without** first checking to determine which direction the servos rotate. After the installation has been completed, the modeler merely flips the switches on the transmitter to make the servos rotate in the desired direction. Many of the older systems, however, do not have servo reversing...instead 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 from 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 (3 are required if you built Wing A, 4 if you built Wing B) by installing the four rubber grommets into each servo, then inserting the brass eyelets up into the grommets.

D 2. Place the servos in the 1/8" plywood servo tray provided, and space them out so they are not touching each other or the sides of the opening.

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. Insert the switch into the slot provided in the servo tray and mark the locations of the screw holes. Drill 3/32" holes for the switch mounting screws. Re-install the switch. Note: Install the switch such that sliding the switch toward the right fuselage side turns the radio off.

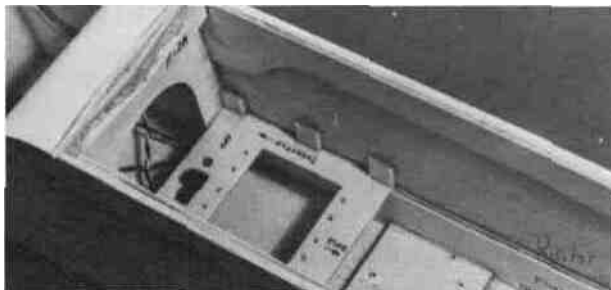


D 5. Place the plywood servo tray into the fuselage to rest on top of the lower portion of the plywood fuse side doublers in the position shown on the plan. Check to determine how it fits. Note that the switch slot should be in the front. Sand the sides of the servo tray if necessary for a good fit between the balsa fuse sides.

SPECIAL NOTE : If your battery pack is the **flat** type (as shown on the fuse plan side view), it will fit nicely under an 8 oz. fuel tank in the front compartment. If your battery pack is the **square** type you will either have to use a 6 oz. fuel tank or place the battery behind F-2. **If this is the case, allow room for the battery behind F-2 by mounting the servo tray 1-3/4" behind F-2.**

D 6. Remove the tray. Apply 5- minute epoxy to the top of the lower portion of the plywood fuse side doublers where the tray will rest, then lay the servo tray in place and allow the epoxy to harden.

D 7. "Lock" the servo tray in place by gluing a few scraps of 1/8" ply (from the die-cutting scrap) to the fuse side and the top of the servo tray using thick CA as shown here.



D 8. Put the servos into the tray and screw them down with the screws provided with your radio. Tighten the screws "finger tight", not "wrench tight".

D 9. Make a single servo mount as described below, for the aileron servo. **This is only required for Wing B. If you built Wing A, skip to the next section.**

From 1/8" plywood die-cutting scraps, cut one piece 1-1/8" wide x 2-7/16" long. Also cut two pieces 3/8" wide x 1-3/16" long, with the wood grain running the long way. From the 3/8" x 5/8" x 2-1/2" balsa provided, cut two triangular **servo rail braces**. Use the pattern shown here:



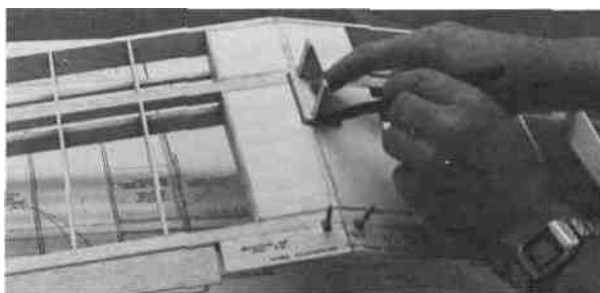
Glue the above five parts together to make the single servo mount. Study the plan to see how they go together.



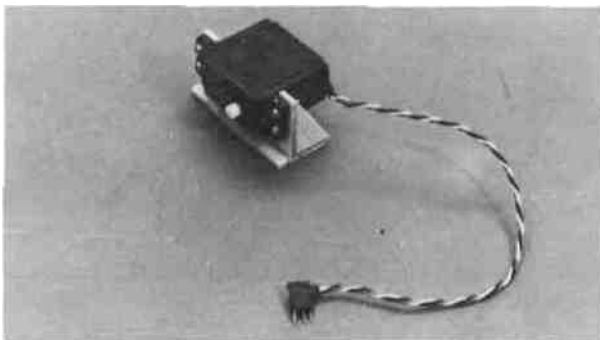
D 10. While holding the servo in place on the rails, mark the location of the four mounting holes through the brass eyelets onto the plywood. Drill 1/16" holes at these marks.

D 11. Attach a large servo wheel to your 4th servo.

D 12. Determine from the plan (See the "Bottom of Wing" detail) exactly where this aileron servo mount should be located. Lay the mount in place on the bottom of the wing and using a felt-tip marker, draw a dark line around the base of the servo mount. **DO NOT GLUE THE SERVO MOUNT TO THE WING UNTIL AFTER COVERING.**



D 13. Screw the aileron servo to the mount using the screws provided with your radio.

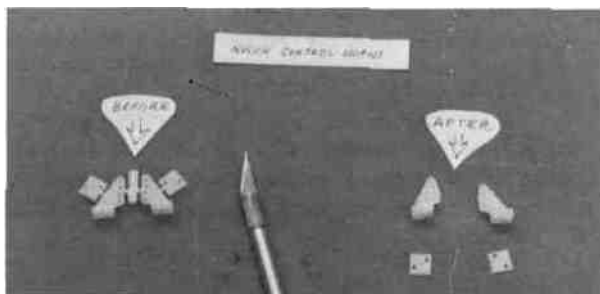


INSTALL NYLON CONTROL HORNS

D 1. Find the set of two nylon control horns and cut them apart with an X-acto knife. Also find the four 2-56 screws that are 5/8" long.



2-56 x 5/8" SCREW



D 2. Remove the rudder and elevator from the fin and stab. Remove the hinges.

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 the holes in the horn.

D 4. Drill 3/32" holes through the rudder at the marks you just drew.

D 5. Repeat steps 3 and 4, locating and drilling holes in the **elevator**. **Note: When marking the locations for drilling, you must hold the nylon horn on the BOTTOM of the elevator!**

D 6. Temporarily mount the control horns on the rudder and elevator. (Note that the elevator horn is mounted on the bottom, and the rudder horn is mounted on the left side.) To do this, insert two 2-56 screws through the holes in the horn and through the holes you drilled. Then screw them into the nylon "nutplate" which originally came attached to the horn.

D 7. Re-install the rudder and elevator onto the fin and stab, but do not glue in the hinges.

PUSHRODS

D 1. Get the following parts together before starting:

2- 1/4" diameter hardwood dowels, 25" long

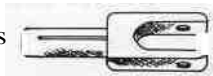
6- 12" long wire, threaded one end

2- small nylon aileron clevis connector

2- nylon aileron clevis

4- standard nylon clevis

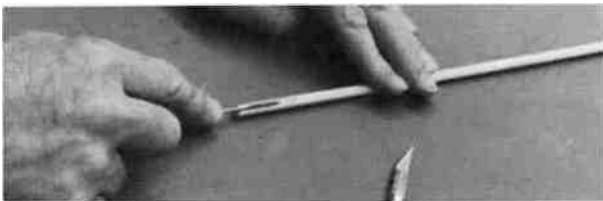
10 feet of kite string or strong thread (not supplied)



D 2. Write "elevator pushrod" on one of the 1/4" x 25" dowels, and "rudder pushrod" on the other.

D 3. Lay the elevator pushrod dowel on the fuselage top view. Note that the **front** pushrod wire attaches to the **top** of this dowel, and the **rear** wire attaches to the **right** side. To avoid confusion later, draw lines 1-3/8" long on the dowel where the wires will be attached.

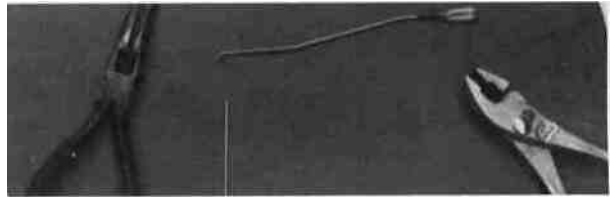
D 4. Use the threaded end of one of the wire pushrods to "file" grooves in the dowel where you drew the lines. The grooves need not be deeper than 1/2 the thickness of the wire.



D 5. Drill 5/64" holes through the dowel, 1-3/8" in from each end, at the end of the grooves you made in step 4.



D 6. Take one of the 12" threaded wires, attach a clevis and bend the wire to match the drawing of the elevator rear pushrod wire (top view). At the front end of this wire drawing, note that the wire makes a 90 degree bend and goes into the dowel. Make this bend now, and cut the wire off.

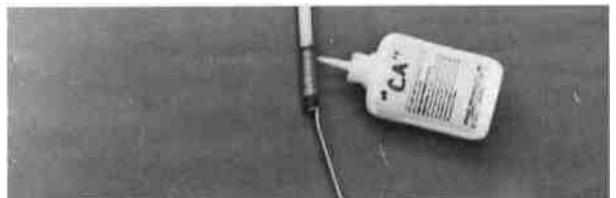


D 7. Round both ends of the dowel slightly to help prevent the possibility of it "hanging up" on something.

D 8. With 100 grit sandpaper, roughen the end of the wire that will be glued to the dowel.

D 9. Insert the wire into the hole and the groove in the dowel. Apply a couple drops of thin CA to hold in place.

D 10. Wrap kite string or strong thread around the wire and dowel as shown on the plan, then apply thick CA onto the string.



D 11. After cutting the pushrod wire to length in step 6, you should have a straight piece of wire remaining that has a length of about 6-1/2 inches. Make a short 90 degree bend in one end of this rod.

D 12. Roughen the end of the rod near the bent end using sandpaper.

D 13. Insert this rod into the hole and groove in the front end of the elevator pushrod dowel, wrap with thread and apply thick CA.

D 14. Following a similar method as given in steps 3-13, make the "Rudder Pushrod". Note that the groove in the front of the rudder pushrod is on the top of the dowel while the groove in the rear is on the **left**.



D 15. Remove the nylon clevises from the rear ends of the elevator and rudder pushrods.

D 16. Insert the pushrods into the fuselage through the openings in Formers 3-6 and out through the slots in the fuse sides that you previously cut.

D 17. Screw the nylon clevises back on the rear ends of the pushrods. Pry the clevises open with a screwdriver and hook them up to the outer holes in the nylon elevator and rudder horns. Twist the pushrods slightly, so the rods come out of the fuse side slots without binding.



D 18. Temporarily hook up the receiver, battery pack, switch and servos. **Read the instruction manual for your radio to learn how to do this.**

D 19. Center the "trim tabs" on your radio transmitter for the elevator, aileron and rudder controls. The trim tab for the throttle should be pushed all the way forward.

D 20. Turn on the transmitter and receiver so the servos rotate to their normal "centered" positions. Now turn off the receiver and transmitter (in that order).

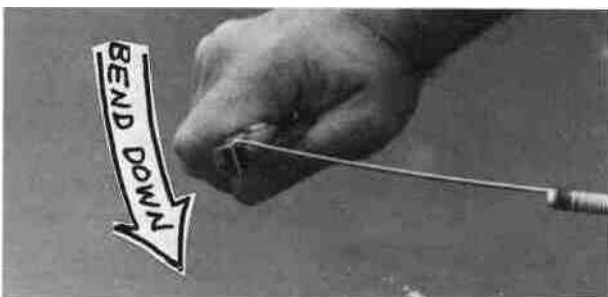
D 21. **With the rudder centered** (straight with the fin) lay the front part of the rudder pushrod across the hole in the servo wheel where it will attach. Using an indelible marker, make a small mark on the pushrod at the hole location.



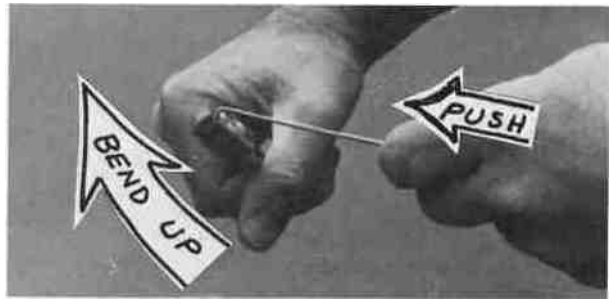
D 22. Center the elevator and mark the pushrod where it goes across the hole in the elevator servo wheel.

L_] 23. Remove the elevator and rudder pushrods from the fuselage and make "Z"-bends in the pushrods at the marks you just made. Here's how...

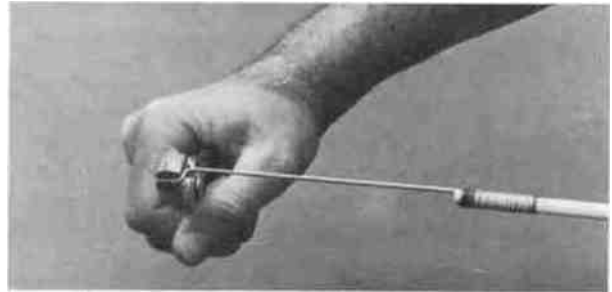
A-Bend down with pliers.



B-Bend up with pliers.



C-Finish Z-bend.



D 24. Now you may re-install the pushrods and insert the Z-bends into the servo wheels. Note: To do this you must remove the servo wheel from the servo, drill out the hole in the servo wheel to 5/64" diameter, work the Z-bend into the hole, and replace the servo wheel on the servo.

D 25. Turn the radio on, and check the movement of the elevator and rudder. To re-center the elevator and rudder, turn the clevis on the rear end of the pushrod.

D 26. From die-cutting scrap, cut two pieces of 1/8" plywood 1/4" wide and 2-3/4" long. Glue these "pushrod braces" to the front of F-4, above and below the pushrod dowels, as shown in the drawing of F-4 on the bottom of the fuse plan.

D 27. To provide adequate movement to move the throttle from full power to idle, you will probably have to use a longer servo arm than the small wheel which is standard on the servo. Take one of the 4-arm servo arms and cut off three of the arms.

D 28. With the long arm attached to the throttle servo, as shown on the fuse plan top view, lay a pencil across the top of the arm and make a mark on the back of F-2. Also make a mark for the nose gear pushrod hole. Note: Also see the drawing of F-2 near the bottom of the plan.



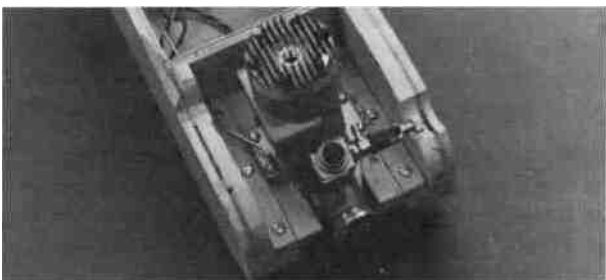
D 29. Use a drill with a 1/8" bit to drill holes through F-2 for the throttle and nose gear pushrods.



D 30. Bend one of the pushrod wires that has a clevis attached so it runs freely from the throttle arm on your engine to the throttle servo.

D 31. Turn on your transmitter and receiver, and push the throttle stick and the throttle trim tab (left side of the transmitter) fully forward. Now turn off the receiver and transmitter (in that order). The servo arm should now be angled forward about halfway.

D 32. Insert the throttle pushrod through the holes in F-1 and F-2 and attach the nylon clevis to the throttle **arm on your engine**.



D 33. With the pushrod in place and the carburetor wide open, mark the location of the servo arm **hole** on the pushrod using an indelible marker.

D 34. Remove the throttle pushrod and make a Z-bend at the mark you just drew and cut off the excess wire. Note: To re-insert the throttle pushrod, you will have to remove the clevis and slide the pushrod in from the rear. Do so now.

D 35. Turn on the radio and check the operation of the throttle. With the throttle stick and trim fully forward the carburetor should be fully open. With the throttle stick fully back and the trim fully forward the carburetor should be open just a very small amount. With the throttle stick and the trim fully back the carburetor should be fully closed. The servo must not bind or "buzz" at the full- forward or full-back positions.

Note: Adjustments made in this set-up are made by:

A-Moving the clevis to a different hole in the throttle arm (outer hole gives **less** movement than inner hole)

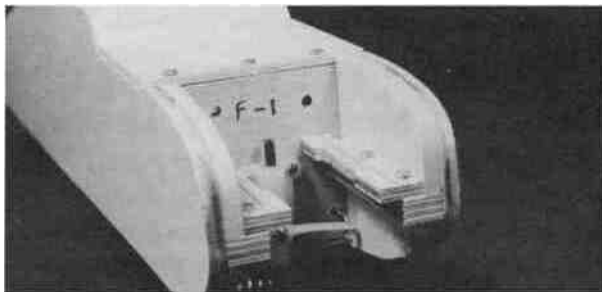
B-Moving the Z-bend to a different hole in the servo arm (outer hole gives **more** movement than the inner hole).

C- Turning the nylon clevis on the pushrod.

D 36. Re-mount the nose gear bearing, steering arm and the nose gear.

D 37. Take the final pushrod wire, attach a clevis and bend the wire to match the nose gear pushrod drawing on the fuse plan side view, but do not make the Z-bend yet and do not cut off the excess wire.

D 38. Insert the pushrod through the holes in F-2 and F-1 with the clevis at the servo end. Attach the clevis to the servo wheel.



D 39. With the nose gear centered (not turning right or left), mark the location of the hole in the steering arm on the pushrod using an indelible marker.

Note: The nose gear pushrod attaches to the servo wheel on the opposite side of the rudder pushrod attachment.

D 40. Remove the nosegear pushrod and make a Z-bend at the mark you just made. Cut off the excess wire.

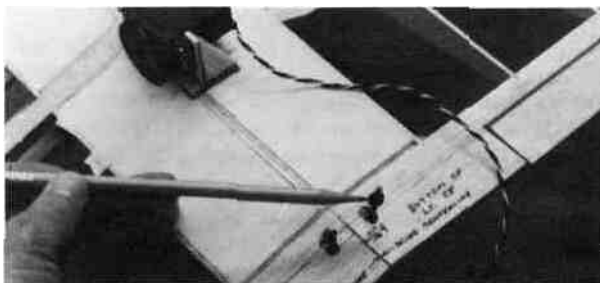
D 41. Remove the clevis and re-insert the nose gear pushrod through F-1 and F-2. Re-install the clevis, hook it up and check for proper operation.

Note: To attach the Z-Bend to the steering arm, you must remove the arm from the nose gear first. Attach the Z-Bend and then put the steering arm back in place. Adjustments to re-center the nose wheel are made by turning the clevis at the servo end of the pushrod.



If you built Wing A, skip to the next section.

D 42. Temporarily tape the aileron servo mount in place on the bottom of the wing.



D 43. Find the two small white nylon aileron clevis connectors and screw them about halfway onto the threaded aileron torque rods.

D 44. Screw the two white nylon clevises onto the threaded pushrod wires that do not have clevises attached. Screw them on 12 **turns**, which is halfway.

D 45. Bend the aileron pushrods to match the patterns shown in the "BOTTOM OF WING" detail on the wing plan.

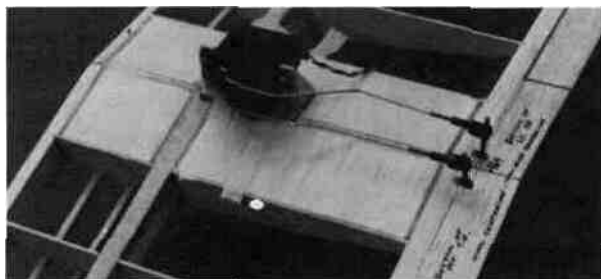
D 46. Attach the nylon clevises to the clevis connectors.

SPECIAL NOTE: To insure adequate roll (aileron) control at low speeds, it is necessary to set up the aileron pushrod linkage so the ailerons move upward a lot more than downward. This is called "differential throw". If you study the "BOTTOM OF WING" details you will see how this is accomplished. You must use a large servo wheel, and attach the pushrods off-center, as shown in the drawing.

D 47. Drill two 5/64" holes in your large servo wheel, about 45 degrees off-center. The Futaba large servo wheel has lines that radiate out from the center every 45 degrees.

D 48. With the servo wheel and the ailerons centered, hold the aileron pushrods in place over the holes in the servo wheel, and mark the hole locations on the pushrods using an indelible marker.

D 49. Remove the pushrods and make Z-bends at the marks you just made.



D 50. Re-install the aileron pushrods, work the Z-bends into the servo wheel, hook up the aileron servo to the receiver using the aileron extension cord provided with your radio system, and check the operation of the ailerons.

BALANCE THE AIRPLANE Laterally

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

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

D 1. Temporarily insert the wing hold down dowels into the fuselage, and attach the wing with about four #64 rubber bands.

D 2. Start with the fuselage resting on a level table with the nose gear off one edge of the table.

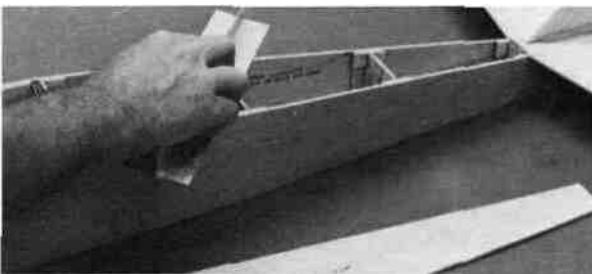
D 3. Grasp the propeller shaft of the engine and lift, so the airplane is being supported only by the propeller shaft and the bottom of the rudder. Do this several times.

D 4. If one wing tip always drops when you lift, it means that side is heavy. Balance the airplane by adding weight to the inside edge of the other wing tip rib. A good way to add weight to the tip is by sticking several small nails (brads) or tacks into the tip rib, from the inside. Add only a few nails or tacks at a time, securing each one with a drop of thin CA then re-checking the balance.

Note: In preparation for the next part, remove all pushrods, all radio equipment (excepting the switch), nose gear bearing, nylon aileron clevis connectors, nylon rudder and elevator horns, engine, rudder, elevator, ailerons and all hinges. Before removing, you may wish to pre-mark any parts that may cause confusion when re-assembling them later.

ADD THE FUSELAGE TOP

D 1. With your T-bar and 100 grit sandpaper, sand the top of the fuse sides, upper lockplates and the formers smooth and flat.

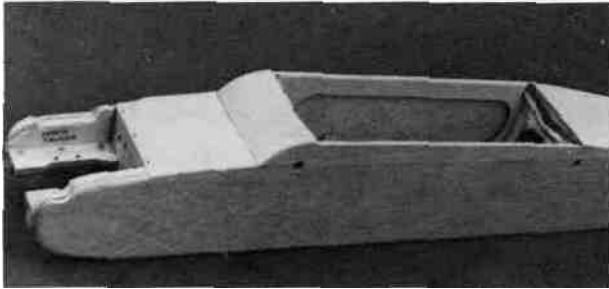


D 2. Lay the pre-shaped 1/8" balsa fuse **top** in place against the front of the stab. The front edge of the fuse top must be even with the front edge of F-3. If not, cut or sand a small amount off the **rear** edge of the fuse top. Continue cutting and checking until the fuse top is the correct length.

D 3. Mix up some 5 minute epoxy and apply it to the tops of F-4 and F-5 **only**. Immediately lay the fuse top in place and apply thin CA glue all around the edges.

SAND THE FUSELAGE

D 1. Use your T-bar with 100 grit sandpaper to sand the entire fuselage smooth. Pay special attention to the glue joints, as they will show right through the covering if left bumpy or uneven. Round all edges slightly, **excepting the wing saddle area and the hatch saddle area**, to make it pleasing to the eye.



D 2. Now change to a T-bar with 220 grit sandpaper and go over the entire fuselage **again**, final sanding it very smooth.

FUELPROOF THE ENGINE AND FUEL TANK COMPARTMENTS

Note: Most of the model's surfaces will be sealed and protected by the covering material you use; however, the engine and tank compartments would be difficult and impractical to cover, so you must protect these areas by brushing on one or more coats of "fuel proof paint which is available from your local hobby dealer. Or, instead of paint, you may mix up some 30 minute epoxy, thin it to a brushing consistency by adding a little rubbing alcohol and brush it on.

D 1. Fuelproof the inside surfaces of the engine compartment, including the engine beams, balsa triplers, and the front of F-1.

D 2. Fuelproof the breakaway plates.

D 3. Fuelproof the inside of the fuel tank compartment, including the bottom of the hatch.

PREPARE THE MODEL FOR COVERING

D 1. Check the fuselage and the wing for any dents you might have put in the wood. A small amount of water placed on the dings will repair them. The water causes the balsa to swell, removing the dings automatically. Use balsa filler on larger dings. Sand the balsa filler to a smooth finish using fine grade sandpaper. You should have already final sanded your PT40 but give it another sanding with fine paper. The better the finish at this stage the better the covering will look.

D 2. Wipe all the dust from the model with a tack rag or vacuum with a hand held attachment. Tack rags are sold at hardware stores and are chemically treated so they will clean surfaces prior to painting.

D 3. Make sure all hardware, engine etc. is out of the model so you can do a good job of covering.

NOTE ON COVERING TOOLS:

Since we recommend that you use a plastic covering such as Super Monokote to finish your PT40, you'll need to be aware of the tools you'll need to borrow or buy to apply the covering to the model. The covering itself has an adhesive on the side that goes toward the wood. The covering is heated so it will stick to the wood. A sealing iron and a heat gun were made expressly for applying this type of covering. You'll also need an X-Acto knife with a new blade or scissors to cut the covering.

NOTE ON COVERING SEQUENCE:

We recommend that you start with the stab bottom and then do the stab top, fin, elevator, rudder, ailerons (if you built Wing B), the fuselage and then the wing.

GENERAL COMMENTS

Pieces of covering are cut about an inch over-size. The covering is laid into position on the bottom of the part, such as the stab, after the backing is removed. The covering is tacked (touched with the sealing iron) in a few places along the edges, then is sealed along the edges with the sealing iron, leaving a small opening at one edge for a vent. Then the sealing iron is placed over the rest of the covering in from the edges, heating it. Quickly seal the area with a small rag by lightly rubbing the area. Then seal the vent you left open. If you get any bubbles, pick them with a pin and reseal. Now seal the covering around any edges and trim with your knife without cutting into the wood. The top of the part is then covered, overlapping the edges and trimmed underneath so you won't see the seam when the plane is on the ground. Using this covering and these tools is not really difficult but takes some practice to get really nice results. So practice and you'll be pleased how nice your models will look.

COVER THE STABILIZER

D 4. Start at the corner of the fuselage. Fold 1/4 inch of the covering up against the fuse side and **anchor** it in place with your sealing iron. Then tack and fasten the rest of the covering. You want to have a good seal at the stab/fuselage joint so oil from the engine exhaust won't soak into the wood.

COVER THE FIN, RUDDER AND ELEVATOR

D 5. Use the techniques mentioned above and cover these parts. The seal at the fin/fuselage joint is important, so seal it well.

COVER THE FUSELAGE

D 6. Start at the bottom. The bottom covering should overlap the sides by 1/4 inch. Lay the covering in position, tack and seal the edges. Leave the tail and nose open slightly for trapped air to escape. Now use the heat gun and rag and fasten the rest of the covering.

D 7. Do the sides next. Tack and seal the edges, vent at the nose and tail and finish the job. Trim the covering flush with the bottom and flush at the top also.

D 8. Cover the top of the fuselage. Do this in two parts, the rear and the front of the fuselage on either side of the wing saddle area. Tack and seal the edges. Finish the top area with the heat gun and rag. Bring the top covering down 1/4 inch over the sides. Trim and seal it.

D 9. Carefully cut away the covering from the fuse sides where the wing hold down dowels will be inserted. Smear 5-minute epoxy on the dowels and insert them so they stick out the same on both sides. Wipe off the excess epoxy with a tissue. After the epoxy sets you may either cover or paint the exposed ends of the dowels.

COVER THE WING

D 10. Cover the tips first with 3" x 12" pieces of covering material. Iron the covering down to the flat ends of the tips, then pull and stretch the covering around the comers while heating with the iron. Trim off the excess.

D 11. Now cover the bottom of one wing panel, overlapping the center of the wing by at least 1/4". First iron the covering down to the center of the wing and at the tip. Next, seal the covering to the trailing edge and the leading edge (the covering should wrap at least halfway around the leading edge). Once sealed all the way around, you may shrink the covering tight with a heat gun. Hold the heat gun a few inches away from the covering, and keeping it moving, so you don't melt through. Finally, use the iron to seal the covering to the spars.

D 12. Cover the bottom of the other wing panel in the same manner as above.

SPECIAL NOTE: When covering the top of the wing, make sure the top covering overlaps the bottom covering by at least 1/4" at the leading edge.

D 13. Next, cover the top of one of the wing panels. At the center of the wing, allow the covering to overlap the center ribs by about 1/2". Slit the covering at the spars, then iron it down to the side of the center rib, as shown in the following photograph.



D 14. Cover the top of the other wing panel making sure you overlap the covering at least 1/2" at the center.

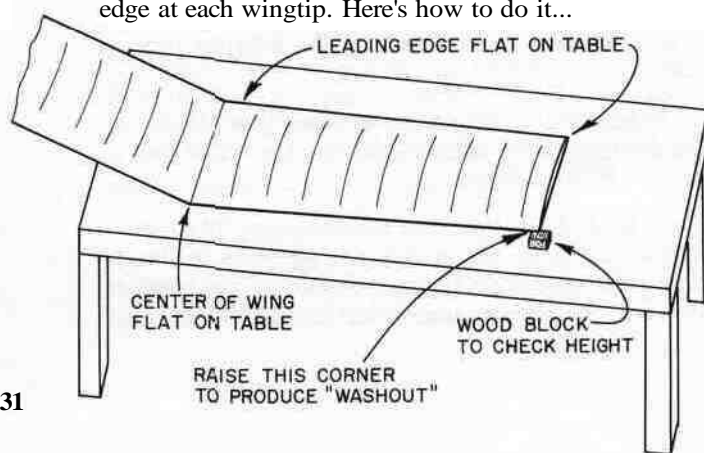


SPECIAL NOTE: The above instructions for covering told you how to cover with one color. You can get a little fancier and use a second color for trim like we did on ours on the box lid. If you use two colors, cover with the lightest color first, like the white on ours. The white was put on the fuselage side about halfway down. Then the red was cut with a straight edge, tacked and sealed at the red/white seam and then tacked and sealed at the bottom. A heat gun was then used to finish. The rest of the plane was covered totally in white and then pieces of Super MonoKote red were cut to shape and adhered with a heat gun and rag to the white. Just the top of the wings have the red trim. You usually want the top of the wings to look different than the bottom so you can tell what the airplane is doing in the air.

After the red trim was added, we put some of our 1/16" black striping tape along the red for more trim. We used gray Super MonoKote for the windows, masked them off and spray painted black around the edges to give the windows some depth. You can follow our trim scheme or create your own! Use your imagination and have fun creating your very own PT40.

ADD "WASHOUT" AT THE WING TIPS

SPECIAL NOTE: One important flying characteristic of the PT40 is its ability to recover "hands-off" from a steeply banked turn. This is made possible by building the wing with **DIHEDRAL** and **WASHOUT**. You will add washout to each wingtip by intentionally warping the wing panels, so that the trailing edge will be higher than the leading edge at each wingtip. Here's how to do it...



D 1 Have someone hold the center of the wing firmly down to the flat building surface. Now grasp the tip of the wing and twist it so that the trailing edge raises off the surface. While holding in this twist, use a heat gun to "re-shrink" the covering. Heat both the top and the bottom. When you let go of the tip, you will see that the wing will retain some of the twist.

D 2. You must continue twisting and re-shrinking until the trailing edge is $7/8$ " off the surface. **AT BOTH TIPS** As an aid in getting this height correct, you may make a small wood block $7/8$ " high by gluing together pieces of scrap wood. Keep this block handy while twisting and heating, to check your progress.

D 3. 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 flying, because **THIS IS A VERY IMPORTANT REASON FOR THE STABILITY OF YOUR PT40**

D FINAL ASSEMBLY

D 1 Lay the rudder and elevator (and ailerons if you built Wing B) on the plans and mark the hinge locations on the leading edge of each part. Now use your X-Acto knife (blade must be sharp) to cut slits in the covering at the hinge locations. Trial fit the hinges to make sure you have "found" the slots which you previously cut.

L] 2. Glue the hinges into the rudder and elevator (and ailerons). **NOTE** Do not just smear glue on the hinge and push it into the slot, as most of the glue will be wiped off as it is being pushed in. You must also work some glue into the slot. A good way of doing this is to scoop up some epoxy with a plastic soda straw, then pinch the end of the straw, insert it into the hinge slot, and squeeze the straw to force glue into the slot. Then insert the hinge halfway into the slot. After pushing in the hinge, wipe away all excess glue with a tissue.

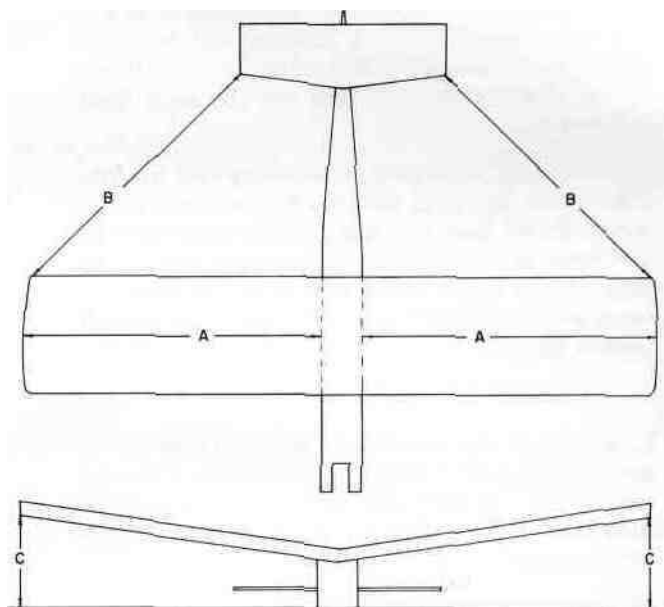
D 3. After the epoxy has hardened, put glue (15 or 30 minute epoxy is recommended) into the hinge slots in the stab, and push the elevator hinges into the slots. Wipe away all excess epoxy with a tissue. Repeat this process for the rudder.

D 4 Wing B only Glue the aileron hinges in place in the same manner, but also apply epoxy into the torque rod holes before pushing the ailerons into place.

D 5. Install $1/4$ " wide **wing seating tape** (sticky side down) onto the wing saddle and the top of the F-2A (or F-2B) saddles.

D 6 Note- Each time you put the wing into the wing saddle to fly the model, it needs to be in the same position. Follow the steps below so the wing will be in the correct relationship to the fuselage.

A Place the fuselage on the work surface right side up. Place the wing into the wing saddle. Make the following measurements. If the distances you measure are not the same, move the wing in the wing saddle until the measurements are the same.



B Measure the wing from side to side in the saddle. The distance from the fuselage side to the wing tip on each side should be the same. $A = A$

C Measure from each wing tip to each stab tip. These distances should be the same. $B = B$

D Wing tip to work surface distance is the same on both sides $C = C$

E When the wing is all lined up to the fuselage after the above measurements are made, mark a small line on the wing and a small line on the fuselage drawn with a pen on the covering, so you can put the wing in the same position each time before you rubber band it.

D 7. Re-install the nose gear assembly, main landing gear, engine and muffler.

D 8 Re- install the nylon horns on the elevator and rudder. For the rudder, you will have to re-drill the two holes for the 2-56 screws because the lower hinge now blocks the holes.

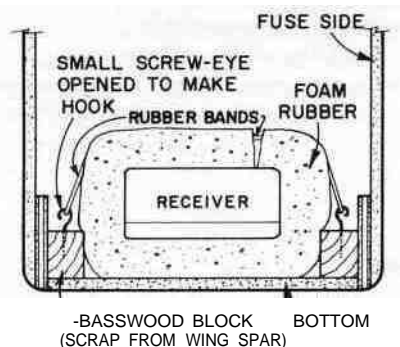
D 9 WING B ONLY- Using a sharp X-Acto knife or single edge razor blade, carefully cut away the covering from the bottom of the wing where the aileron servo mount will be attached. You should be able to faintly see the dark outline that you previously drew under the covering. Now glue the aileron servo mount to the bottom of the wing.

D 10. Using an X-Acto knife, cut away the covering from the rudder, elevator and nose gear pushrod slots; then re-install the pushrods for the rudder, elevator, throttle, nose gear and (ailerons).

D 11. Cut a hole in the center of the fuse top, about 2" behind the wing saddle, and glue in a 2-1/2" length of fuel tubing to serve as an antenna exit (see the fuse plan).

D 12. Wrap foam rubber around the receiver and hold the foam in place with a couple of rubber bands. Now you must attach the receiver to the fuselage in such a way that it does not move around, but at the same time it must be cushioned from vibration. A good method for accomplishing this is to secure two hooks down in the bottom corners of the fuselage, and rubber band the receiver down.

RECEIVER (AND BATTERY) MOUNTING



D 13. Wrap the battery pack in foam rubber, place it in a plastic bag, and close it with a couple of small rubber bands. Now secure the battery pack in the bottom of the fuel tank compartment in the same manner as you did the receiver. Also place a piece of foam rubber between F-1 and the battery pack.

D 14. From scraps of plastic, make the "antenna strain relief" and the "antenna clip" (unless your radio system includes these). Pass the receiver antenna wire through the holes in the plastic strain relief piece, then through the antenna exit tube. Adjust the position of the strain relief such that the portion of the antenna inside the fuselage remains loose, even when you pull on the end of the antenna. Now attach the end of the antenna to the top of the fin using your antenna clip, a small rubber band and a pin. Note: The receiver antenna is "tuned" for the frequency on which the radio will operate, so do not cut off any of its length. Just allow the excess to trail **behind**.

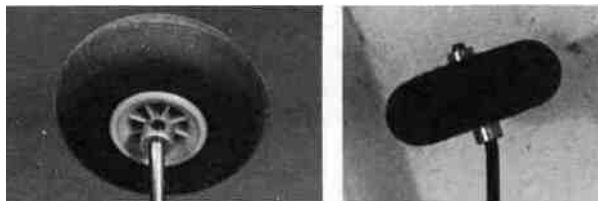
D 15. Plug the servo wires into the receiver and hook up the battery and switch (refer to your radio instruction manual for guidance).

D 16. The fuse top view shows a piece of 1/16" wire passing through the switch and out the side of the fuse. This enables you to switch the receiver on and off without removing the wing. Install a remote on/off switch pushrod similar to the one shown.

D 17. Lay the fuel tank in place on top of the battery pack. Run a piece of fuel line tubing from the fuel **pick-up** ("klunk") through the hole in F-1 to the fit-

ting on the carburetor. Run a second piece of tubing from the tank "vent" through the hole in F-1 to the pressure tap fitting on the muffler. To prevent fuel **foaming** the tank must be isolated from direct contact with the fuselage, so add foam rubber in front and on top of the tank before replacing the hatch.

D 18. Install the wheels on the main landing gear and nose gear using 5/32" wheel collars on both sides of each wheel



SPECIAL NOTE: If you plan to *fly* from a concrete, blacktop or smooth grass field, use 2-1/2" diameter main wheels and a 2-1/4" diameter nose wheel. However, if the field you will be flying from is rough or has fairly long grass, we recommend using 2-3/4" main wheels and a 2-1/2" nose wheel. In either case, you should bend the main landing gear if necessary so the model sits level or slightly nose down when at rest.

D 19. Install the proper size propeller for your engine (see your engine instruction manual), and a 2-1/4" diameter spinner. Note: If you choose not to use a spinner, you should (for safety reasons) use a rounded "acorn"-type prop nut to hold the propeller on.

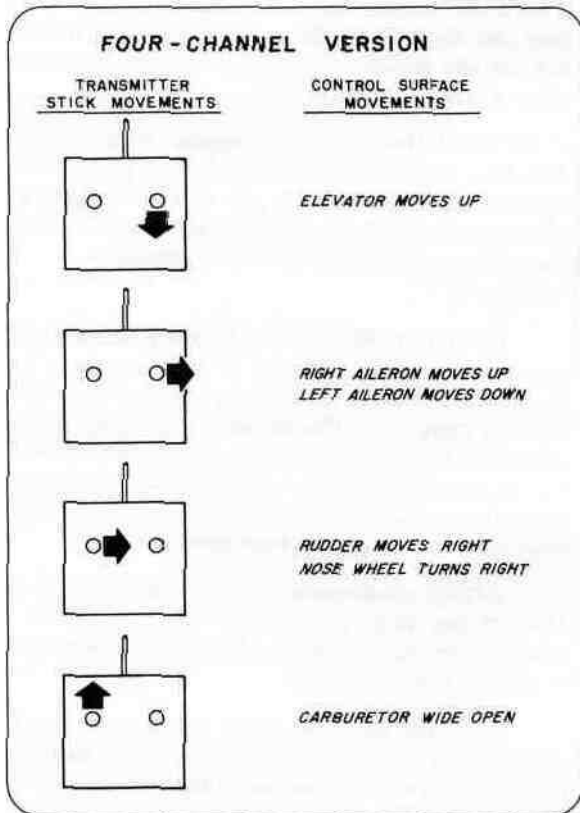
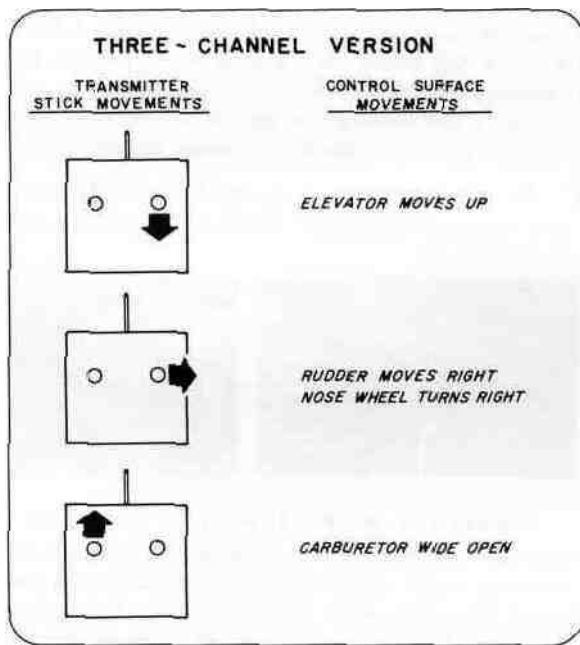
SPECIAL NOTES ON PROPELLERS: Vibration is the main enemy of the electronic and mechanical parts in an R/C airplane, and an out-of-balance propeller is the primary source of the hard vibrations that cause problems. For only a few dollars you may purchase a prop balancer. We highly recommend that you do so, and carefully balance each propeller before bolting it on your airplane.

Always use propellers that are in perfect shape. Discard any prop with nicks, scratches, splits or cracks or any sign of wear and damage. **Never** repair or alter a prop (propeller).

Paint the prop tips white so you can see the ends when the prop is spinning (this is especially important if you are using one of the black fiberglass-filled nylon props).

Install the prop with the curved side facing forward. Securely tighten the prop nut. Inspect the prop and re-tighten the nut after every few flights. If you install a spinner, make sure the edges of the spinner do not touch the prop blades.

D 20. While standing behind the model, adjust the servo reversing switches on your transmitter so the elevator, rudder, throttle (and ailerons) move in the correct directions as follows:



D 21 By turning the clevises on the threaded ends of the pushrods, adjust the elevator and rudder to the neutral (not up or down) positions. Also (for Wing B) adjust the aileron pushrod clevises so the bottom of the ailerons are even with the flat bottom of the wing.

Note The throttle pushrod should already be properly adjusted according to "PUSHRODS", Step 35.

D 22 Adjust the pushrod hookups so the elevator, rudder (and ailerons) move the correct amounts, as

given below, with full movement of the transmitter sticks.

ELEVATOR = 3/16" up and 3/16" down

RUDDER = 3/16" right and 3/16" left

AILERONS = 7/16" up and 1/8" to 1/4" down

D 23 Write your name and address plainly on a piece of paper and glue the paper inside the fuselage onto one of the fuse sides. If you lose your model the finder will know who to contact.

D 24. Temporarily attach the wing with **10 or 12** good #64 rubber bands.

REMEMBER Proper installation of all R/C components and accessories is crucial to the safe and proper operation of your model, and that improper or faulty installation of *even one* component or accessory may result in damage or destruction of the entire model, as well as cause serious personal injury or property damage. Therefore, if you are confused or uncertain about any of the above final assembly steps, please ask an experienced model builder for assistance.

BALANCE YOUR MODEL

NOTE: THIS STEP IS VERY IMPORTANT, AND MUST NOT BE OMITTED!

D 1 With the wing rubber banded to the fuselage, all parts of the model installed, and an **empty** fuel tank, gently turn the model upside down.

D 2 By feel, determine the location of the center of the main wing spar in the vicinity of the 2nd wing rib (where the bottom center section balsa sheeting ends).

D 3 From the center of the main wing spar, measure exactly 5/8" back (toward the tail) and make a mark. Do this on both sides of the wing bottom. **Note** For ease of checking the balance, you may stick a thumbtack into the bottom wing sheeting at these balance point marks.

D 4 Turn the fuselage right side up, place your index fingers under the wing and lift the airplane at the balance point. If the tail drops when you lift, the model is "tail heavy" and you must glue weights into the nose of the model, either in the engine area or fuel tank compartment until it balances right on the balance point. On the other hand, if the nose of the model drops when lifting, the model is "nose heavy" and you must glue a small amount of weight to the tail (under the stab, near the fuse) until it balances right on the balance point.

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.

CHARGE THE BATTERIES

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

1. FLY IN A SAFE PLACE

1. The best place to fly your R/C model is an AMA 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, grassy area at least 6 miles away from any other forms of radio operation like boats and cars and also is away from houses, buildings and streets. A schoolyard may look inviting but it is too close to people, power lines and possible radio interference.

2. 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 the control surfaces are not acting correctly, do not fly. Correct the problem first.

3. GROUND CHECK THE MODEL

The instructor will check to see that you have the radio installed correctly and that all the control surfaces do what they are supposed to. He/she will check the engine operation and help you "break in" the engine on the ground. This means that you will run the engine and use up at least two tanks of fuel to let the engine get broken in. Adjustments are made to the carburetor so the engine runs at its best. The instructions that come with the engine will tell you how to break in the engine.

ENGINE SAFETY PRECAUTIONS

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

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

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

Use safety glasses when starting or running engines.

Do not run the engine in an area of loose gravel or sand, 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 engine.

Keep away from the prop. loose clothing, shirt sleeves, ties, scarfs, or loose objects (pencils, screw drivers) that may fall out of shirt or jacket pockets **into prop.**

Use a "chicken stick" device or electric starter, follow instructions supplied with the starter or stick. Make certain glow plug clip or connector is secure so that it will not pop off or otherwise get into running propeller.

Make all engine adjustments from behind rotating propeller.

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

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

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 your frequency, you could crash their airplane. 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 try to 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.

4. TRIM OUT THE MODEL

Trimming the model means that you have an experienced flier fly the model and make final adjustments to the 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 need to be made. The experienced flier, usually an instructor from a local club, will know what to change as he or she flies the model. 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 he or she will adjust the clevises at the rudder, elevator and ailerons 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 out the model.) Trim changes may be needed anytime so keep checking to see how the control surfaces react to the stick movements.

5. LEARNING TO HANDLE THE MODEL ON THE GROUND

After your instructor makes sure the model is airworthy, it's your turn! The first thing you do is to practice taxiing the model on the runway. Choose a time when there is very little wind to blow the model over on the ground. Work the controls with a gentle hand. Don't push the sticks way over as far as they go. Give small amounts of right or left rudder to keep the model heading straight down the runway. As the model heads away from you, pushing the rudder stick to the right makes the model turn to the right and pushing the stick to the left makes the model turn to the left. Now turn the model around, slowly! Too fast and you could tip it over. Now as the model comes toward you, pushing the rudder stick to the right makes the model turn left! The model is actually still turning right but it looks backwards to you because the model is coming at you now. This is normal. You may want to turn your back on the model and look over your shoulder as you are learning to taxi.

Keep practicing the taxi on the runway, keeping the model in control at all times. After awhile, look straight at the model as it comes toward you without turning your back on it. Push the stick in the direction that the model is turning to make it turn the other way. Practice until you feel comfortable making the model turn right and left and making it turn around and come back to you. Set up some empty pop cans or something similar and practice going around the cans without knocking them over.

6. YOUR FIRST FLIGHT

The ideal way to learn to fly is to use the buddy

box system. The instructor has his or her transmitter attached to yours by a cord. There is a switch on the instructor's transmitter so he/she can control who is flying the model. If you get into trouble, the instructor can switch the control back to him/her 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!

If it is **absolutely necessary** for you to learn by yourself, go to your hobby shop and buy some books on flying models. Learn all you can before you actually take the plane up. Take your time and don't try to do everything at once. You'll have to take the plane off, do some turns and then land it again without crashing it. Have a flight plan in mind before you take off. Following is a sample flight plan you might want to follow for those first critical flights. Study this flight plan and run through it on the ground. Practice moving the controls on your transmitter and imagine what the plane is doing. The more you practice on the ground, the easier it will be in the air.

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.

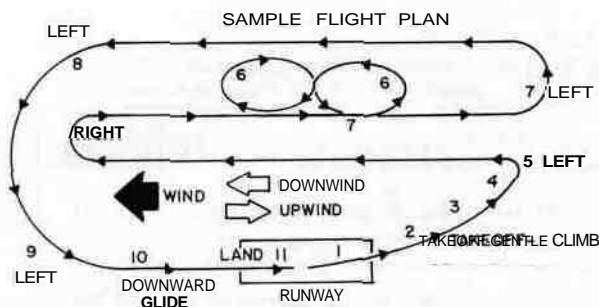
3 Where established, I will abide by the safety rules for the flying site I use, and I will not willfully and deliberately fly my models in a careless, reckless and/or dangerous manner.

RADIOCONTROL

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.



- 1 Head the model into the wind. Release the model and slowly advance the engine to full throttle.
- 2 Make gentle right or left stick movements to correct the take off run and make the model run straight down the runway.
- 3 As the speed builds up, give a slight amount of "up elevator", pulling back on the elevator stick, and the plane will fly itself off the ground. Don't give too much up elevator. You don't want the nose to rise so the model climbs too steeply.
- 4 Reduce the throttle slightly to give a nice gentle rate of climb. Keep the wings level with right and left rudder with Wing A or right and left ailerons with Wing B. Fly the plane to about 100 to 150 feet. Don't fly it so far away that you can't see it.
- 5 Make a wide, gentle turn to the left by giving left rudder or left aileron stick. Keep turning until the model is heading downwind, which is back toward you. Level the wings by centering the stick. You may have to give a little opposite stick to level it out.
- 6 After the model passes you, start a very gentle left turn. Level it out and now do 2 or 3 figure eights, which are a series of right and left turns.
- 7 After the last figure eight left turn, keep the plane flying upwind for a ways and then prepare for your landing. Make a gentle left turn and fly downwind past where you are as far as you flew upwind.
- 8 Make a gentle left turn and fly upwind and start to judge where you want to land.
- 9 Line the plane up with the runway. Don't worry too much if you don't land on the runway the first time. Just getting the plane down in one piece is your primary goal.
- 10 When you are sure you can reach the runway, cut the throttle slowly to give the plane a gentle downward glide, not too steep. Keep the wings level. Don't bring the nose up too much as the plane may stall (the wings will lose their lift and the plane will tend to drop and go out of control).
- 11 If you are going to land short of the runway, give a little power to bring it in. If you are overshooting the runway and the plane is low enough and you have room in the grass, land it. If you are too high, give it throttle, a little up elevator, get back into the pattern and come around again for another try.

After the model is on the ground after that first flight, you can stand back and say "I did it!" even though the pattern you flew may not have been perfect and the plane didn't do what you wanted it to do. Hopefully, you got the model down in one piece. Turn off the transmitter and then the receiver. Check out the model. Is the prop still ok. All the screws **tight**. Any dings in the covering. Always check the plane after each flight. Fix any problems on the ground. They sure won't get fixed in the air.

Make the model airworthy again, fuel it up and take her up again. Try flying the pattern again and again until you feel comfortable. Then try flying a pattern you make **up**.

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. It just takes a little work and practice to get there.

CHANGING FROM 3 TO 4 CHANNEL VERSION

If you have constructed Wing A and set up your PT40 for 3-channel operation, it will serve you well during the initial training phase of learning to fly R/C. After you have become proficient at soloing your 3 channel PT40 (which may require 50 to several hundred flights), you will then be ready to fly a more maneuverable airplane with 4 channels of control (including ailerons).

Assuming your PT40 is still in good condition, you may wish to convert it to a 4-channel version. The **best** way to do so is to purchase a new PT40 wing kit and build it up following the wing B instructions.

Or: You may carefully cut the tapered trailing edge off your wing and use it along with the aileron torque rod hardware to make ailerons for your wing, following the wing B instructions. Note that this will produce a wing that has ailerons and the full dihedral of Wing A. We think you will find the results to be satisfactory.

Or: You may cut the wing in half down the center joint, cut away the covering in the center rib bays, re-join the wing halves at the Wing B dihedral angle, **gluing in the plywood dihedral braces found in the die-cut "B" sheet**, cut off the tapered trailing edge and use it along with the aileron torque rod hardware to make ailerons for your wing following the Wing B instructions. Then re-cover the center of the wing. Although this method produces a true "Wing B", it is the most difficult, so we urge you to seek the help of an experienced modeler.

KEEP MODEL AVIATION A SAFE SPORT!

GOOD LUCK AND GREAT FLYING!

FLIGHT PROBLEMS TROUBLE SHOOTING GUIDE

<u>FLIGHT PROBLEM</u>	<u>PROBABLE CAUSE</u>	<u>RECOMMENDED SOLUTIONS</u>
Does not automatically pull out of a dive after elevator stick is released.	<ol style="list-style-type: none"> 1. If dive continues straight ahead, the cause may be incorrect elevator trim (a) or improper balance (b). 2. If dive results in a right or left turning spiral, the cause may be incorrect elevator and/or rudder trim. 	<ol style="list-style-type: none"> 1 (a) Re-trim the elevator for level flight at 1/2 throttle. 1 (b). Carefully balance the airplane, front to back at the balance point shown on the plan, 5/8" behind the center of the main spar. 2. Re-trim the rudder and elevator for straight and level flight at 1/2 throttle. If this does not correct the problem, see below.
Does not automatically return to straight flight after a right or a left bank after rudder stick is released.	<ol style="list-style-type: none"> 1. Incorrect rudder trim. 2. If rudder trim varies as speed is changed, the cause may be incorrectly aligned or warped vertical fin. 3. The airplane may not be laterally (side-to-side) balanced. 4. The wing may be crooked in the saddle. 5. Unequal or insufficient washout (twist) in the wing panels. 	<ol style="list-style-type: none"> 1. Re-trim the rudder for straight flight at all speeds. 2. Check alignment of vertical fin. If warped, twist while heating. If not aligned with fuselage centerline, cut off and re-install. 3. Check lateral balance by lifting the airplane at the propeller shaft and at the aft end of the fuselage. If one side drops, add weight to the opposite wing tip to balance. 4. Check wing alignment by measuring from both wing tips to the top of the rudder hinge line. These measurements must be the same, within 1/16". If not, re-position the wing in the saddle. 5. With the wing on a flat surface, check the amount of washout at each tip. The washout must be the same at both tips (7/8").
Operating elevator and rudder control stick results in jerky and erratic flight.	<ol style="list-style-type: none"> 1. Improper control surface throws. 2. Insufficient or weak wing hold down rubber bands may allow the wing to lift when making a tight turn or when pulling out of a dive. 3. If the model is balanced more than 1/4" behind the recommended location, it will be too pitch sensitive and "squirrelly". 	<ol style="list-style-type: none"> 1. Set up the elevator and rudder to move the recommended amounts with full deflection of the transmitter stick. 2. Attach wing to fuselage with at least 10 or 12 good #64 rubber bands. 3. Carefully balance the airplane, front-to-back, at the balance point shown on the plan, 5/8" behind the center of the main spar.

GLOSSARY

AILERON: The hinged, movable surfaces on the trailing edge of the wing that causes the aircraft to roll (bank) left or right.

BREAKAWAY PLATE: A part, usually hardwood, to which the engine is fastened by screws. The plate will "breakaway" in the event of a crash, thereby saving the engine from damage.

BULKHEAD: A part that gives shape to the fuselage and also divides it into different compartments. Same as a former. Usually designated "F1", "F-2", etc.

CA (CYANOACRYLATE): A glue that cures almost instantly to give a strong bond. Thin CA seeps into a joint to bond it and thick CA will fill gaps at a joint.

CLEARANCE HOLE: A hole drilled or cut in a part to leave room for another part (screw, etc.) to fit through it.

CONTROL SURFACE: The movable parts of the aircraft that control its operation: The rudder, the elevator, and the ailerons (some planes even have flaps and/or spoilers).

DIHEDRAL: The angle between the right and left wing panels.

DIHEDRAL BRACE: An angled part that helps to hold the wing panels at the correct angle, and provide strength in the center of the wing.

ELEVATOR: The hinged, movable part at the rear of the stabilizer that causes the aircraft to climb or dive.

ENGINE BEAM: A part, usually hardwood or plywood, rigidly mounted to the fuselage that supports the engine.

EPOXY: A two part glue consisting of a "resin" and a "hardener" that when mixed together gives a very strong glue joint. Epoxy comes in different bonding times: 5 minute, 15 minute, 30 minute, etc.

FINAL SAND: To use a fine grade of sandpaper to sand the airplane, after everything is built, to get it ready to be covered or painted.

FIN: The vertical stabilizer or fixed part of the tail section that helps keep the aircraft going straight ahead.

FIREWALL: A part, usually plywood, that separates the engine compartment from the tank compartment. The engine mount or beams are attached to the firewall.

FORMER: A part that gives shape to the fuselage and also divides it into different compartments. Same as a bulkhead. Usually designated "F1", "F-2", etc.

FUSELAGE (FUSE): The body of the model.

GLUE JOINTS: The area where two or more parts are joined together by glue.

LEADING EDGE (L.E.): The front or forward edge of a part such as the leading edge of the wing or the leading edge of the rudder.

PILOT HOLE: A small hole that is drilled to guide a screw into the wood. The hole is smaller than the screw diameter.

RUDDER: The hinged, moveable part at the rear of the fin that causes the aircraft to turn left or right

SADDLE: The areas on the fuselage where the wing and the stabilizer rests.

SPAR: A part that runs the length of the wing and acts to strengthen it.

STABILIZER (STAB): The fixed horizontal part of the tail section that helps to keep the aircraft from pitching (climbing or diving).

TACK GLUE: To glue parts together temporarily so they will stay in place during another procedure. A very small amount of glue is used so the parts can be broken apart later.

TACK RAG: A chemically treated rag that is used to clean dust and dirt from the model after it has been final sanded.

TRAILING EDGE (T.E.): The rear or back edge of a part such as the trailing edge of the wing or the trailing edge of the rudder.

TRAIL PIT: The attempt to fit parts together before you glue them to make sure they fit correctly..

WING PLATE: A piece of thin plywood that is glued to the top of the wing to protect it from rubber bands or wing bolts.

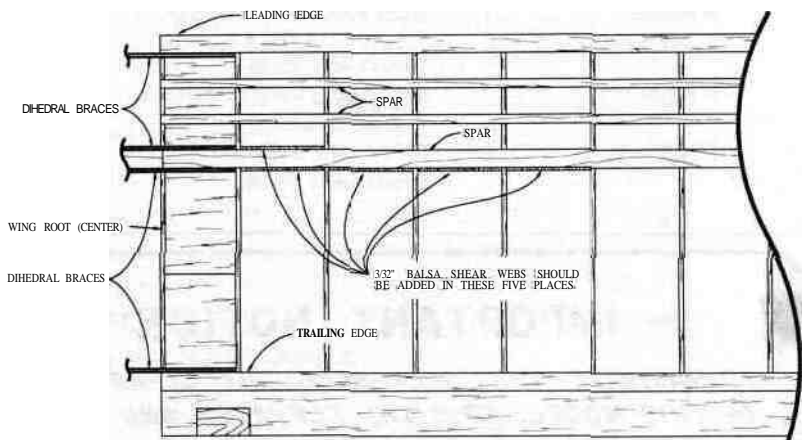
WING: The part of the model that creates lift. The wing can be mounted on top of the fuselage, on the bottom of the fuselage or somewhere in between.

NOTICE:

Add shear webs to the wing as described below (after step 17 on page 18)

We have included in this kit, ten 3/32" **Balsa Shear Webs** which are wrapped in clear plastic. We recommend that you add them as described below as they will add strength to the wing which will help it survive violent maneuvers and crashes.

Glue a 3/32" balsa shear web to the back side of the main 3/8" x 1/2" basswood spars in each of the four rib bays shown in the sketch. Also glue one shear web onto the front side of the spars in the rib bay next to the dihedral brace. These shear webs should be securely glued to the spars for maximum strength and sanded flush with the top and the bottom of the wing.



PT40 PARTS LIST

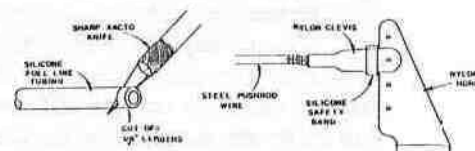
PART NUMBER	QTY	DESCRIPTION	PART NUMBER	QTY	DESCRIPTION
PT40F01	2	Balsa shaped 1/8 Fuselage Side	PT40F14	1	7-Ply 3/8x2x3-15/32 Landing Gear Plate
PT40F02	1	Balsa Shaped 1/8 Fuselage Top	PT40W10	2	3-Ply 1/32 x 1-1/2x3/4 Wing Plate
PT40F03	1	Balsa Shaped 1/8 Fuselage Bottom	PT40A05	1	SUB PACK - BALSA PARTS
PT40F05	1	3-Ply 1/8 Die Cut F2, F3	PT40F04	2	Balsa Shaped 1/4 Upper Nose Tripler
PT40F06	2	3-Ply 1/8 Die Cut Fuselage Doubler	PT40F09	2	Balsa Shaped 1/4 Lower Nose Tripler
PT40F07	1	3-Ply 1/8 Die Cut Fuselage Bottom, Servo Tray	PT40F11	1	Balsa Tapered 9/64 x 1-1/2 Tail Wedge
PT40F10	2	3-Ply 1/8 Die Cut F1, Stab Saddle, Lockplates	PT40F12	1	Balsa 1/8x2x3-3/4 Windshield
PT40F15	1	3-Ply 1/8 Die Cut F4, F5, F6	PT40F18	1	Balsa 1/2 Tri 3-15/32 Windshield Brace
PT40F16	2	Dowels -1/4 Diameter x 25" Pushrods	PT40R04	2	Balsa 1/4 Tri 4-7/8 Fin/ Stab Fillet
PT40F17	1	3-Ply 1/8x3-23/32x3-1/2 Hatch	PT40S04	2	Balsa 1/4x1/4x5-1/2 Stab Tips
PT40F22	2	Balsa Shaped 1/8 Upper Fuselage Side	PT40W11	1	Servo Rail Brace
PT40P01	1	Plan, Fuselage and Wing	PT40M02	1	HARDWARE BAG
PT40P02	1	Instruction Book	NYLON26	1	Nylon Strip Hinge, 9"
PT40R01	1	Balsa Shaped 1/4 Rudder	RUBB001	6	#63 Rubber Bands
PT40R02	1	Balsa Shaped 1/4 Fin Rear	WBNT111	1	Wire 5/32 Nose Gear
PT40R03	1	Balsa Shaped 1/4 Fin Front	WIRES16	6	Threaded Pushrod Wires
PT40S01	1	Balsa Shaped 1/4 Stab Front	PT40M01	1	PARTS BAG - NYLON AND METAL
PT40S02	1	Balsa 1/4x2-3/4x20-7/8 Stab Rear	NUTS001	8	4-4- Blind Nuts
PT40S03	1	Balsa 1/4x1-1/4x20-7/8 Elevator	NYLON02	2	Nylon Control Horns
PT40W05	1	Balsa 1/8x3x13 Center Sheeting	NYLON16	1	Steering Arm
PT40W08	4	Basswood 3/16x3/16x30 Front Spar	NYLON17	4	Nylon Standard Clevis
PT40W09	2	Balsa Shaped 3/8 Wing Tip	NYLON20	2	Nylon Swivel
PT40W14	1	3-Ply Die Cut 1/8 Dihedral Braces	NYLON21	2	Nylon Aileron Clevis
PT40W15	1	3-Ply Die Cut 1/8 A & B Wing Braces, F-2A, F-2B, Gauges, A-3, B-3	NYLON30	4	Nylon Landing Gear Straps
WBNT112	1	Wire 5/32 Main Gear	NYLON33	1	Nylon Nosegear Bearing
PT40A02	1	SUB PACK - RIBS	SCRW002	4	2-56 x 5/8 Screws
PT40W07	13	Balsa 3/32 Die Cut Rib, 2 Per sheet	SCRW003	8	4-40 x 1 Screws
PT40A04	1	SUB PACK - HARDWOOD	SCRW004	8	#4 x 1/2 Screws
DOWEL021	2	Dowel 5/16 Dia x 5-3/16 Wing Hold Down	SCRW010	6	#4 x 5/8 Screws
PT40F08	2	3-Ply 3/8x21/32x3-1/4 Engine Beam	SCRW020	1	6-32 x 3/16 Screw
PT40F13	2	3-Ply 1/4x3/4x3-1/4 Breakaway Plate	SCRW024	3	#2 x 3/8 Screws
			WBNT110	1	Aileron Torque Rods, 1 Set
			WHCL005	1	5/32 Wheel Collar
			WSHR002	4	#4 Washer
			PT40W01	1	WING PACK
			PT40W02	1	Balsa Leading Edge, Trailing Edge, Set
			PT40WU4	4	Basswood 3/8 x 1/2 x 30 Main Spar
			PT40W06	2	Balsa Tapered 11/32 x 1-3/16 x 30 Trailing Edge

- IMPORTANT NOTICE -

TO MAXIMIZE THE "SELF-RECOVERY" CAPABILITIES OF THIS MODEL, TRIM THE ELEVATOR AND RUDDER FOR STRAIGHT AND LEVEL FLIGHT AT 1/2 THROTTLE.

Beginners: Please show this notice to your instructor.

IMPORTANT TIP



Slide the silicone bands **over** the nylon clevises to insure that **they** do not pop open during flight.