

FUN-ONE

INSTRUCTION BOOK



WARRANTY

Great Planes Model Manufacturing Co., Inc. guarantees this kit to be free of defects in both material and workmanship at the date of purchase. This warranty does not cover any component parts damaged by use or modification. In no case shall Great Planes' liability exceed the original cost of the purchased kit. Further, Great Planes reserves the right to change or modify this warranty without notice.

In that Great Planes has no control over the final assembly or material used for final assembly, no liability shall be assumed nor accepted for any damage resulting from the use by the user of the final user-assembled product.

By the act of using the user-assembled product the user accepts all resulting liability.

If the buyer is not prepared to accept the liability associated with the use of this product, he is advised to immediately return this kit in new and unused condition to the place of purchase.

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



TABLE OF CONTENTS

INTRODUCTION	3	Shaping and Sanding	31
Precautions	3	INSTALL PUSHRODS AND	
Decisions You Must		RADIO COMPONENTS	31
Make Now	4	One Aileron Servo	31
Other Items Required	4	Two Aileron Servos	31
Supplies and Tools Needed	4	Rudder, Elevator and	
Die Patterns	5	Throttle Servos	32
Abbreviations	6	Control Surface Throws	33
Types of Wood	6	Install Receiver, Switch	
Get Ready to Build	6	and Battery	33
TAIL FEATHERS	6	FINISHING	34
Build the Stabilizer and		Balance the Airplane Laterally ...	34
Elevators	6	Final Sanding	34
Build the Fin and Rudder	8	Covering	34
Temporarily Install the Hinges ...	9	Attach the Wing Tips	34
FUSELAGE ASSEMBLY	10	Glue the Hinges	35
Prepare Fuse Sides	10	Glue Canopy in Place	35
Prepare Firewall	11	Wing Seating	36
Assemble the Fuselage	11	Balance Your Model	36
WING ASSEMBLY	16	Final Hookups and Checks	36
Build the Wing Panels	16	PRE-FLIGHT	37
Join the Wing Panels	18	Charge the Batteries	37
Sheet the Leading Edges	22	Find a Safe Place to Fly	37
Add the Center Sheeting	24	Ground Check the Model	37
Install Aileron Torque Rods	25	Range Check Your Radio	37
Install Ailerons	26	Engine Safety Precautions	37
FINAL ASSEMBLY	27	AMA SAFETY CODE	38
Install Landing Gear	27	FLYING	38
Install Engine	27	Takeoff	38
Fit Fuel Tank and		Flying	38
Fuelproof Tank Compartment ..	28	Caution	39
Mount Stabilizer and Fin	29	Landing	39
Install Canopy	30	2-VIEW	39
Build the Wing Fairing	30	PARTS LIST	40

WARNING! THIS IS NOT A TOY! THIS IS NOT A BEGINNER'S AIRPLANE!

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, using common sense and in accordance with all safety standards 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
1810 Samuel Morse Dr.
Reston, VA 22090 (703)435-0750**

INTRODUCTION

Congratulations! Thank you for purchasing the Great Planes FUN-ONE!

The Great Planes FUN-ONE defines a new type of sport airplane. Its sleek looks are not characteristic of the type of planes that are as maneuverable as the FUN-ONE. This state-of-the-art kit will provide you with many hours of enjoyment from this point on - even the construction is FUN! So lets begin.

NOTE: This is not a beginner's airplane! While the FUN-ONE is easy to build and flies great, we must discourage you from selecting this kit as your first R/C airplane. It is highly maneuverable, and lacks the self-recovery characteristics of a good **basic trainer** such as the Great Planes **PT Series** airplanes. On the other hand, if you have already learned the basics of R/C Flying and you are able to safely handle an "aileron trainer" airplane such as the Great Planes **Trainer Series** or **Big Stick Series** airplanes, the FUN-ONE is an excellent choice.

Please inspect all parts carefully before starting to build! If any parts are missing, broken or defective, or if you have any questions about building or flying this airplane, please call us at (217)367-2069 and we'll be glad to help. If you are calling for replacement parts, please look up the part numbers and the kit identification number (stamped on the end of the carton) and have them ready when calling.

PRECAUTIONS

1. You must build the plane **according to the plans and instructions**. Do not alter or modify the model, as doing

so may result in an unsafe or unflyable model. In a few cases the plans and instructions may differ slightly from the photos. In those instances you should assume the plans and written instructions are correct.

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

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

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

5. You must **test** the operation of the model before 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. Be sure to check the nylon clevises often, and replace if they show signs of wear.

6. You must **fly** the model **only with the competent help** of 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 fly-ability of your finished model depends on how **you** build it; therefore, we cannot in any way guarantee the performance of your completed model, and no representations are expressed or implied as to the performance or safety of your completed model.

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

DECISIONS YOU MUST MAKE NOW

ENGINE AND MOUNT SELECTION

The recommended engine *size* range is as follows:

.25 - .40 cubic inch displacement **2-cycle**

.40 - .50 cubic inch displacement **4-cycle**

NOTE: There are several "High Power" .25 to .34 size engines available which have as much power as some .40 size engines yet weigh about the same as most .25 size engines. We highly recommend either **the OS Max .32** or the **Super Tigrc G34**. The FUN-ONE can structurally handle hot .40 size engines but be careful about using heavy engines. The short tail moment and swept wing makes it easy to end up with a nose heavy model!

This kit includes a Great Planes **MM19** engine mount that fits most .20 - .34 (2-cycle) engines. If you prefer, you may purchase a custom engine mount made specifically for your engine (check with your hobby dealer), or you may choose to install shock-absorbing rubber-cushioned mounts.

SELECTION OF WHEELS

To save weight, we recommend using lightweight **foam** rubber wheels.

2-3/4" diameter main wheels are recommended.

The larger the diameter the more they will absorb hard landings and the better they will roll on grass fields). If you build it with tricycle landing gear, the nose wheel should be 1/4" smaller than the main wheels.

A 1-1/4" diameter tailwheel is recommended.

OTHER ITEMS REQUIRED

- 0 **Four-channel radio with 4 servos** (A **radio with** at least five channels, 5 servos and mixing capabilities is required if flaperons will be used).
- 0 Propellers (see engine instructions for recommended sizes).
- 0 Spinner (2" diameter)
- 0 Fuel Tank (6 ounce)
- 0 5/32" Wheel Collars (2 - for tricycle)
- 0 3/32" Wheel Collars (2 - for taildragger)
- 0 2 Rolls Monokote covering (or similar)
- 0 Silicone Fuel Tubing (std. size)
- 0 Wing Seating Tape (or silicone sealer ... see instructions)
- 0 Latex Foam Rubber Padding (1/4" thick)
- 0 Dubro "E-Z Connector" (or equivalent)
- 0 Flex-Cable Pushrod for Throttle (& Nosegear)

SUPPLIES AND TOOLS NEEDED

- 0 2 oz. Thin CA Adhesive
- 0 2 oz. Medium or Thick CA Adhesive

RADIO INSTALLATION

The FUN-ONE is capable of using computer radios and other radios with mixing functions to provide flapcrn type control. This type of mixing uses a separate servo for each aileron and allows both ailerons to move in relation to the elevator. The flapcrns will drop when up elevator is applied, and vice-versa, which enables the plane to perform very tight maneuvers and also enhances its slow flight capabilities. This setup also provides the most precise flight characteristics since the ailerons are hooked directly to the servo with the control horn in the middle of the aileron (very little slop).

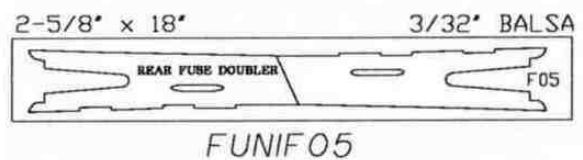
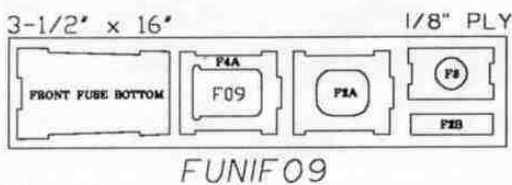
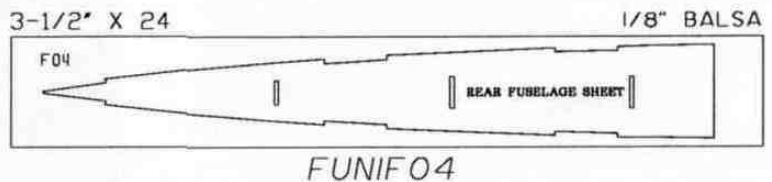
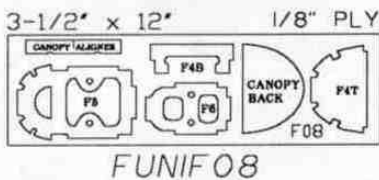
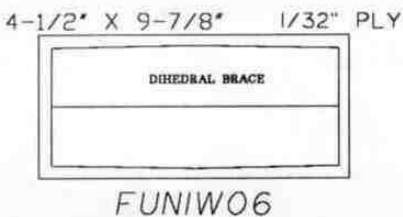
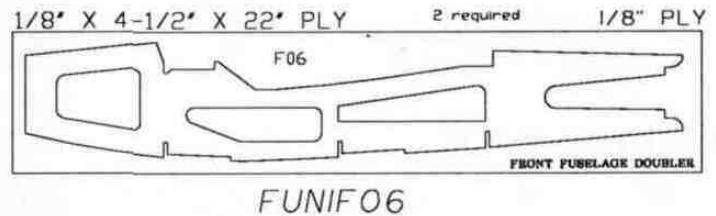
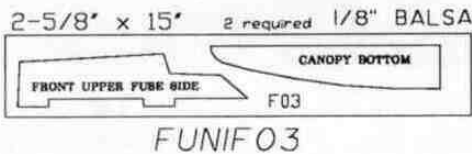
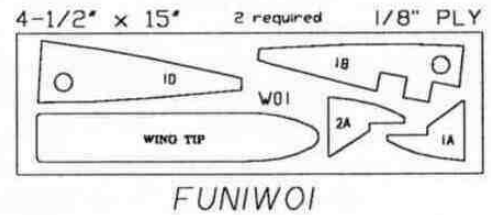
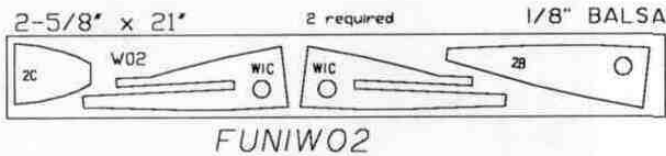
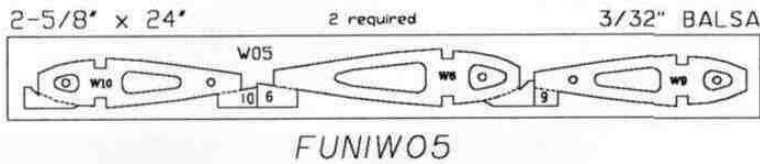
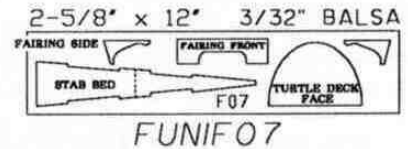
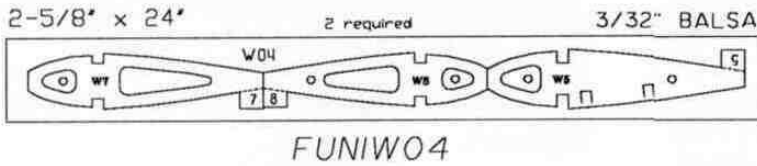
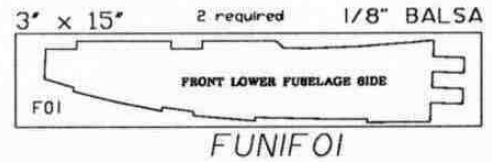
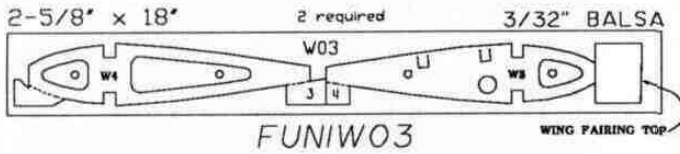
If you have a radio without mixing capabilities you will normally install only one servo in the center of the wing. NOTE: If you are going to use a high power .40 size engine you should consider using two aileron servos connected by a Y-harness to achieve the precise control offered by this set-up. There is also much less chance of aileron flutter with two servos.

There are several places in the instructions which alert you to perform different steps depending on the setup you choose. You might also consider installing the servo rails and tubes for two servos even though you may not plan on using two servos right now. They do not add much weight and they will be there if you ever need them.

- 0 2.5 oz. 5-Minute Epoxy
- 0 Hand or Electric Drill
- 0 **Drill Bits:** 1/16", 5/64", 3/32", 7/64", 9/64", 13/64", 7/32", and 1/4"
- 0 Sealing Iron
- 0 Heat Gun
- 0 Hobby Saw (Xacto Razor Saw)
- 0 Xacto Knife, #11 Blades
- 0 Pliers
- 0 Screw Drivers
- 0 T-Pins
- 0 Straightedge
- 0 Masking Tape (Required for construction)
- 0 Sandpaper (coarse, medium, fine grit)*
- 0 T-Bar Sanding Block (or similar)
- 0 Waxed Paper
- 0 Lightweight Balsa Filler
- 0 1/4-20 Tap, Tap Wrench
- 0 Vaseline Petroleum Jelly
- 0 Dremel Moto Tool or similar (optional)

*NOTE: On our workbench, we have four 11" T-Bar sanders, equipped with #50, #80, #100 and #150-grit sandpaper. This setup is all that is required for almost any sanding task. We also keep some #320-grit wet-or-dry sandpaper handy for finish sanding before covering.

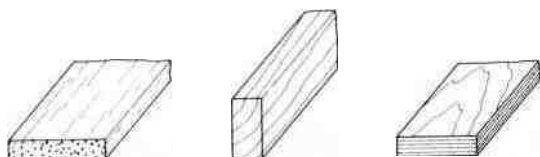
DIE PATTERNS



COMMON ABBREVIATIONS USED IN THIS BOOK AND ON THE PLANS:

Elev = Elevator
Fuse= Fuselage
LE = Leading Edge (front)
•LG = Landing Gear
Lt=Left
Ply = Plywood
RI = Right
Stab= Slabilizer
TE = Trailing Edge (rear)
" =Inches
Tri = Triangle Stock

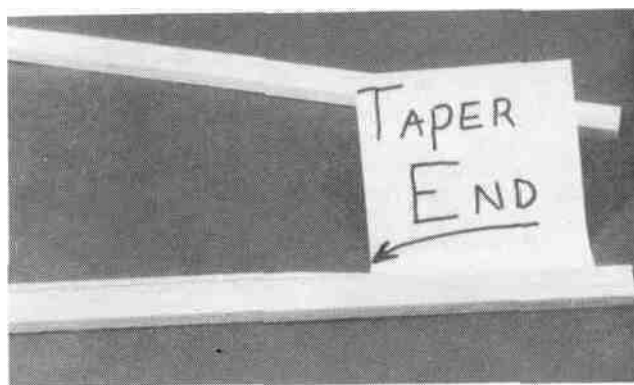
TYPES OF WOOD



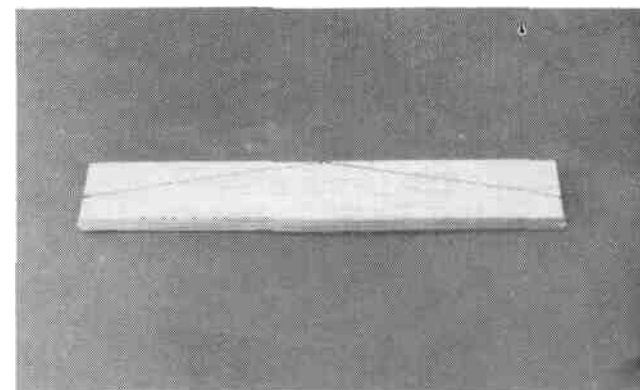
TAIL FEATHERS

BUILD THE STABILIZER AND ELEVATORS

- D 1. Tape the **fuselage plan** down to your flat work surface. Tape a piece of waxed paper over the stab and elevator portion of the plan.
- D 2. Cut the stab leading and trailing edges from the 1/4" x 1/2" x 30" stick (FUN1S01). They can be cut slightly oversize since we will sand them to the correct length later.



- D 3. Taper both ends of the 1/8" x 1/4" x 14-7/8" **Basswood Stab Brace** (FUN1S03) as shown on the plans and glue it to the front edge of the slab trailing edge with CA. Use the plans as a reference to center the brace on the TE.



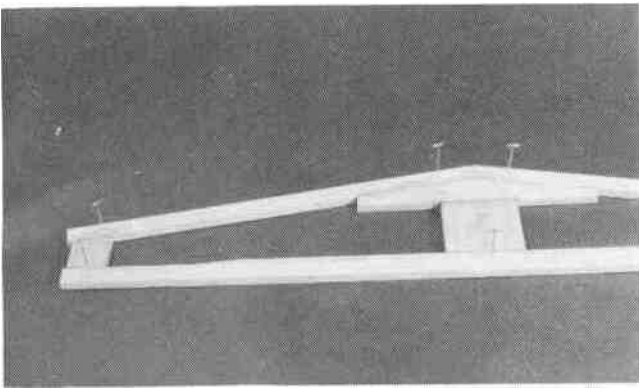
- U 4. Cut the **stab center pieces** from the 1/4" x 1" x 30" stick (FUN1S04) and pin them in place on the plan. Make the front "brace" by first cutting it to length, then set it on the plan and draw lines where the cuts will be.

GET READY TO BUILD

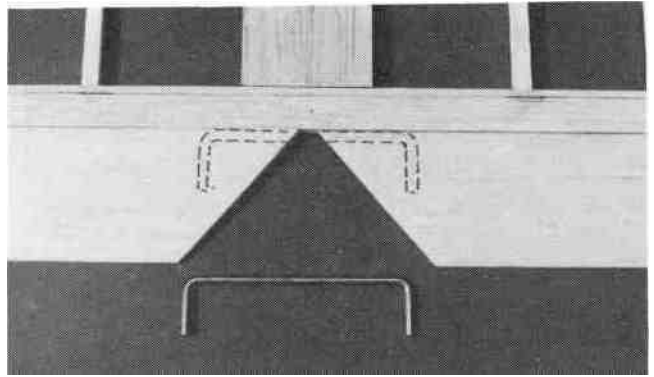
D 1. Unroll the plan sheets. Re-roll the plans inside out to make them lie flat.

D 2. Remove all parts from the box. As you do, figure out the name of each part by comparing it with the plans and the parts list at the back of this book. Using a felt tip pen, write the part **name** or **size** on each piece to avoid confusion later. Use the die-cut patterns shown on page 5 to identify the die-cut parts and mark them **before** punching out. Save all scraps. If any of the die-cut parts are difficult to punch out, do not force them! Instead, first cut around the parts with an Xacto knife. After punching out the die-cut parts, use your T-Bar or sanding block to **lightly** sand the edges to remove any die-cutting irregularities.

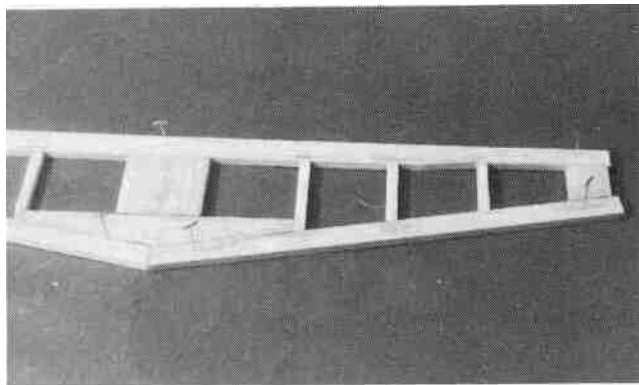
D 3. As you identify and mark the parts, separate them into groups, such as **fuse** (fuselage), **wing, fin** and **stab** (slabilizer), and **hardware**.



D 5. Pin the leading and trailing edges **in place and** glue everything together with thin CA

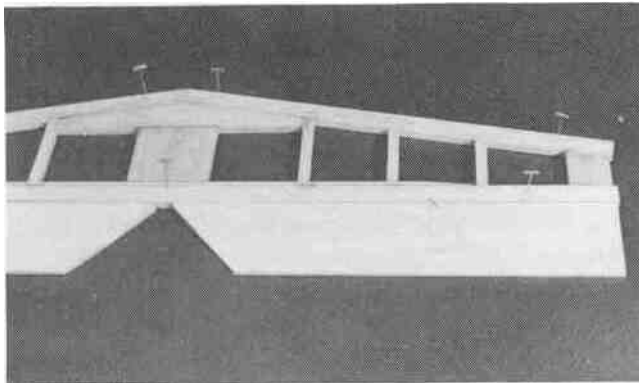


D 8. Lay the 1/8" **wire** elevator joiner (WBNT145) in place on the elevators and mark its outline using a fine point felt-tip pen. Be sure to position the joiner wire directly over where it is shown on the plans which gives you about 1/32" clearance between the front of the wire and the trailing edge of the stab.

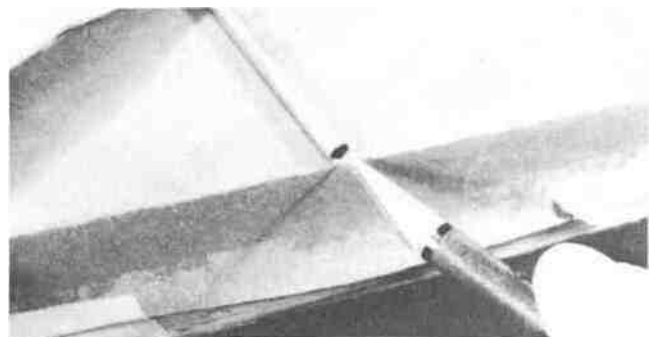


D 6. Cut the "**ribs**" from the 1/4" square x 30" stick (FUN1S02) and glue them in place. Remove the stab from the work surface and apply med/thick CA to all of the joints. Sand both sides of the stab smooth and replace the stab on the plan.

D 9. Remove the elevators from the plan and draw a centerline along the leading edge of each. Accurately drill holes in the elevators for the 1/8" wire joiner. Begin by drilling a 1/16" or 5/64" pilot hole, then drill the final hole to a depth of 7/8" with a 9/64" drill bit. (The hole is drilled slightly oversize to allow for positioning, and to create a hard epoxy "sleeve" around the wire).

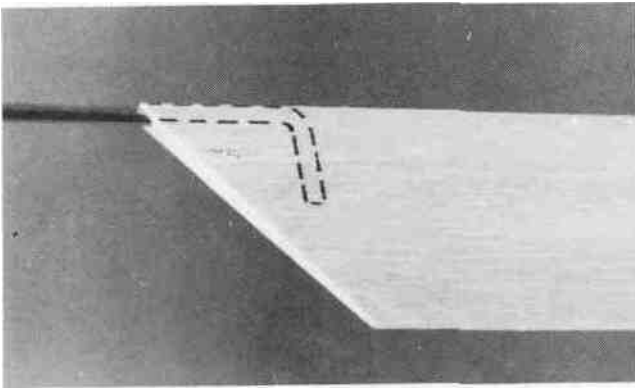


D 7. Cut the two elevators from the Tapered Elevator Strip (FUN1S05) and pin or tape them in place behind the stab.



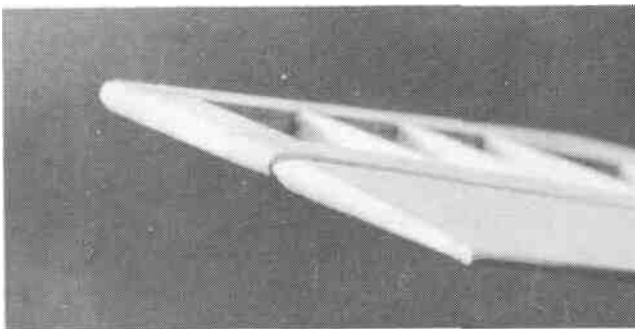
D 10. Using an Xacto knife, sharpen the inside of one end of a 1/8" diameter brass tube and use it to cut grooves in the leading edge of the elevators to accept the joiner wire.

D 11. Roughen the joiner wire with coarse sandpaper, then clean the wire thoroughly with alcohol to remove any oily residue.



D 12. **Trial fit** the joiner wire into the elevators, then glue it in using 5-minute epoxy. Work plenty of epoxy into the holes with a toothpick, then pin the elevators in place over the plan to insure perfect alignment. Keep the joiner pushed into the elevators all the way to keep a 1/32" gap between the front of the joiner and the slab trailing edge. Keep this assembly pinned down until the glue has completely cured.

D 13. Remove the stab from the work surface and sand the tips of the leading and trailing edge flush with the stab ends. Draw a centerline around the stab and sand the leading edge and the tips of the slab to a nice rounded cross section.

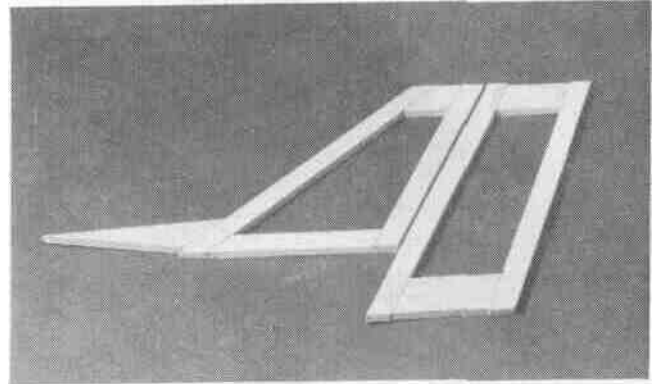


D 14. Remove the elevators from the plan and sand the leading edge to a **V-shape** as shown on the plans. Tape the elevators in place against the slab and sand the elevator ends to match the stab.

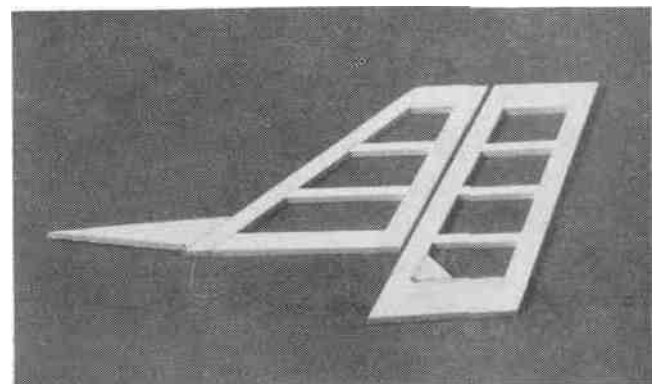
BUILD THE FIN AND RUDDER

D 1. Tape the **fuselage plan** down to your flat work surface. Tape a piece of waxed paper over the fin and rudder portion of the plan.

U 2. Cut the **fin and rudder frame** from the 1/4" x 1/2" and the 1/4" x 1" slicks and pin them in place over the plan. Put a drop of thin CA on each joint but be careful not to glue the fin to the rudder.

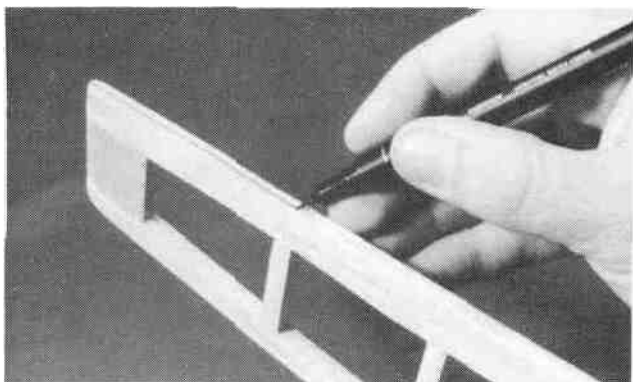


D 3. Cut the dorsal fin from the 1/4" x 1" slick and tack glue it to the fin using the plan to correctly position it. The dorsal fin may have to be removed later. Cut the rudder gusset from the same stick and glue it in place.



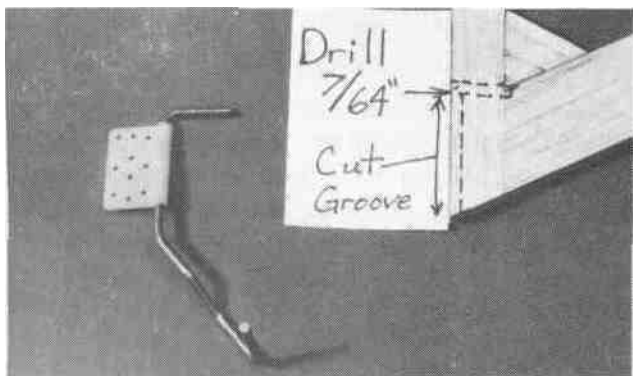
D 4. Cut the "ribs" from the 1/4" square stick and glue them in place with CA.

D 5. Remove the fin and rudder from the work surface and apply med/thick CA to all joints. Use a T-bar or sanding block to sand both sides smooth.



I—I 6. Carefully draw a **centerline** all around the edges of the fin and rudder (this will help to maintain symmetry when sanding).

I—I 7. Using a sanding block and coarse (50 or 80-grit) sandpaper, sand both sides of the rudder to a **taper** as shown on the plans. The trailing edge should end up approximately 3/32" wide and have a rounded shape. (Do not sand to a sharp edge). Sand the bottom edge to a rounded shape. Sand the leading edge to a "V-shape" as shown on the plan. Sand the top and front edges of the fin and dorsal fin to a rounded shape but leave the trailing edge square.



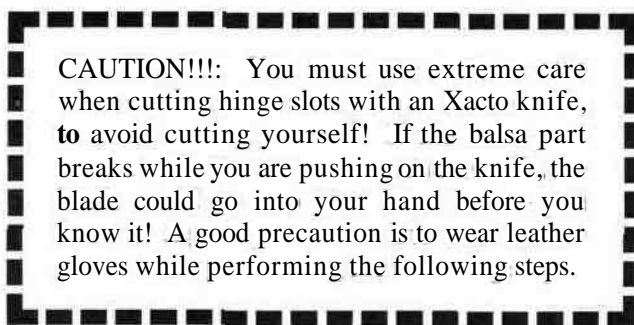
I—I 8. If you are building a taildragger- check the plans and mark the location of the **tailgear** (WBNT128) on the rudder. Drill a 7/64" hole in the rudder (the hole is drilled slightly oversize to allow for positioning, and to create a hard epoxy "sleeve" around the wire). Then **groove** the rudder leading edge to accept the **tail-gear wire** using the sharpened 1/8" brass tube from earlier. (See the photo at step 10 on page 7).

TEMPORARILY INSTALL HINGES

(Do not glue)

NOTE: On an experimental basis, we have included "laminated hinges" in this kit, and the following instructions are written for this type of hinge. Our R&D department has thoroughly tested these hinges and found them to be easy to install and sufficiently strong and durable for this type of airplane. However, as the kit builder you are reminded that you are ultimately responsible for the structural integrity of your aircraft. If you are not confident using this type of hinge, please feel free to substitute your favorite hinge.

I_I 1. Lay the rudder and elevators on the plan and mark the **hinge locations**. Place the rudder against the fin TE and transfer the marks over to the fin. Place the elevators against the slab TE and transfer the marks over to the slab.



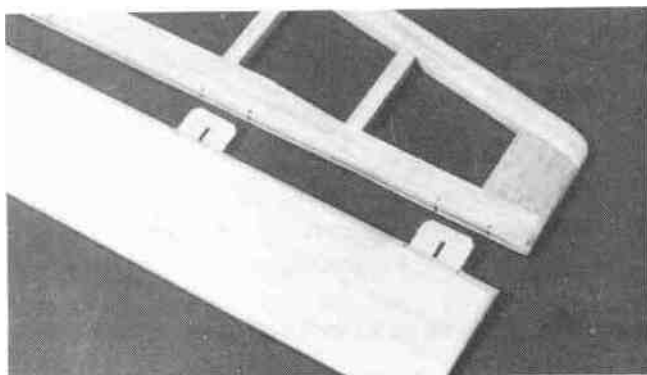
D 2. Cut the hinge slots **on the accurate centerlines which you previously drew**, using an Xacto knife. The recommended procedure for cutting hinge slots with an Xacto knife is given below.

A. Begin by carefully cutting a **very shallow slit** in the trailing edge at the hinge location. This first cut is to establish your cut in the right place, so concentrate on staying on the centerline and **don't cut too deep!**

B. Make three or four more cuts in the same line, **going slightly deeper each time**. As you make these additional cuts, work on going straight into the wood. Continue this process while "**wiggling**" the knife handle back and forth until the blade has reached the proper depth for the hinge.



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

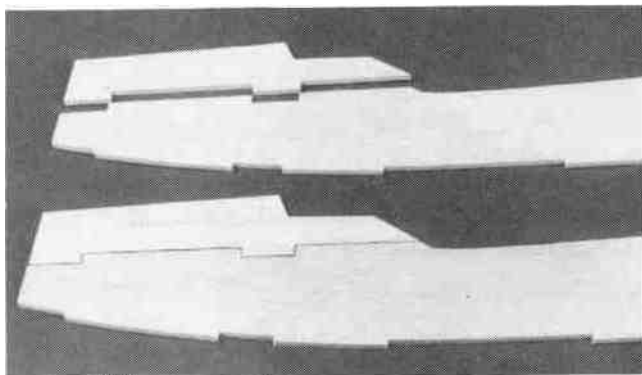


D 3. Insert the hinges into the slots and trial fit the rudder and elevators in place on the fin and stab. Do not glue the hinges until you are instructed to do so later in this book. Hinge gluing instructions are included later.

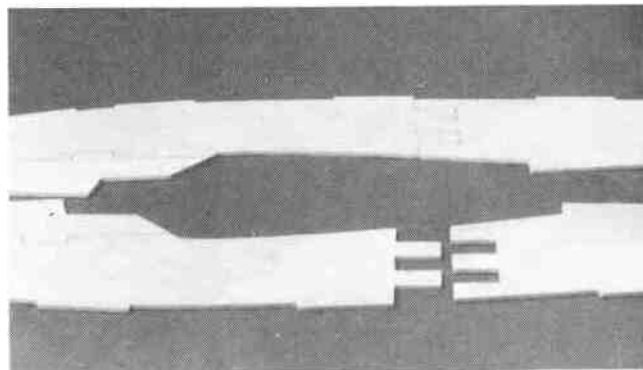
FUSELAGE CONSTRUCTION

PREPARE FUSE SIDE

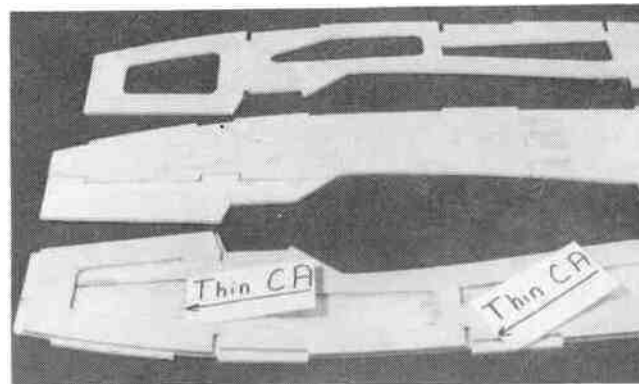
NOTE: The photos show both fuse sides being assembled at the same time to help you identify the parts. You should assemble one side first as the instructions explain.



D 1. Position one of the 1/8" **die-cut balsa upper front fuse sides** (FUN1F03) above one of the 1/8" **die-cut lower front fuse sides** (FUN1F01). Slide the two parts together pressing them flat against the work surface and apply thin CA along the joint.

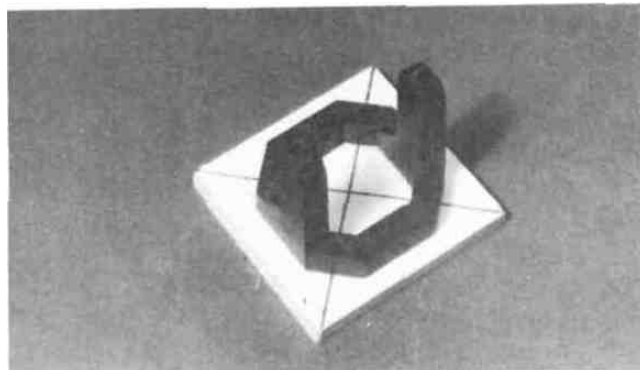
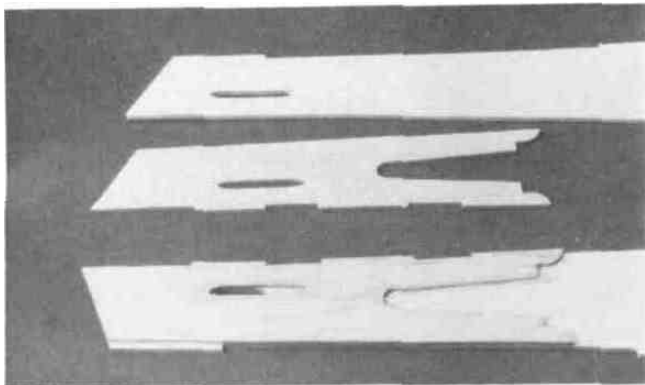


D 2. Position one of the 1/8" **die-cut balsa rear fuse sides** (FUN1F02) behind the front fuse side you just assembled. Slide the two parts together pressing them hard against the work surface. Line the two parts up over the plan and apply thin CA along the joint. Sand both sides of the balsa fuse side smooth.



D 3. Lay one of the 1/8" **die-cut plywood front fuse doublers** (FUN1F06) on top of the balsa fuse side. The doubler should line up with the fuse side at the front 1/2" of the doubler, the rear 3-1/2" of the doubler and around the wing saddle area. Study the plan and photo carefully to make sure you correctly position the doubler. When you have it in position apply thin CA around all edges of the doubler, including the inside lightening holes.

D 4. Glue one of the 3/32" balsa die-cut rear fuse doublers (FUN1F05) to the fuse side lining it up with the back edge of the fuselage and the top and bottom of the fuse side. Use thin CA to glue it in place. (The photo for this step is at the top of the next page).



holes. This will automatically center it. Hold it in place and use a nail to make a mark in the center of each hole.

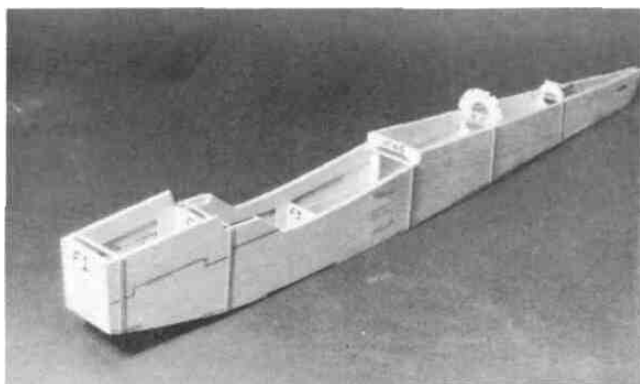
D 2. Remove the engine mount and drill 9/64" holes at the bolt locations, then install the **4-40 blind nuts** (NUTS001) on the **BACK** of F1. Press the blind nuts in with pliers, or tap them in with a hammer.

D 3. Temporarily attach the engine mount to the firewall with the 4-40 x 5/8" bolts (SCRW052). Use the bolts to help pull the blind nuts into place. If you are using a different mount and more than 1/8" of the bolt protrudes through the firewall, you should cut off the excess bolt length.



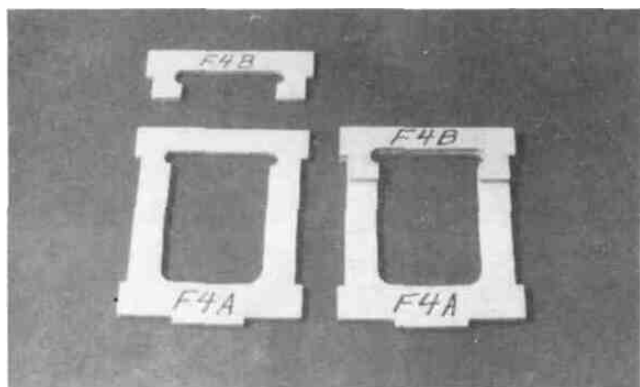
ASSEMBLE THE FUSELAGE

D 1 Lay the two fuselage sides down flat on the work surface with the **doublers facing up**. Trial fit formers **F1, F2A, F3, F4A/B, F5** and **F6** (from FUN1F08 AND FUN1F09) in place on both fuse sides.



D 2. Using #64 rubberbands to hold everything together, assemble the fuse sides along with the formers and the 1/8" **die-cut balsa rear fuse** bottom (FUNF04) and the 1/8" **die-cut plywood front fuse** bottom (FUN1F09).

D 5. Go back to step 1 and assemble the other fuselage side. **BE CAREFUL TO ASSEMBLE A RIGHT AND A LEFT FUSE SIDE. DO NOT MAKE TWO EXACTLY ALIKE!!!**



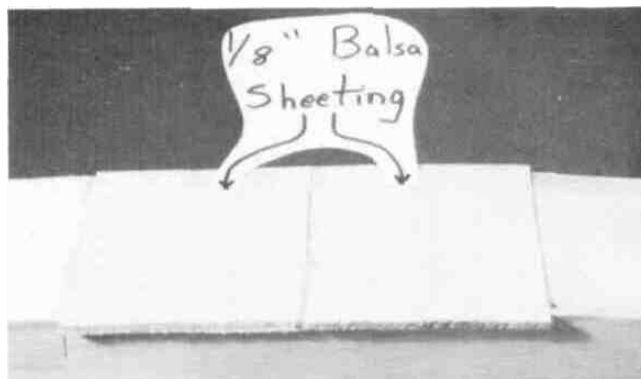
D 6. Glue former **F4B** (FUN1F09) on former **F4A** (FUN1F08) lining up the edges as shown in the photo.

PREPARE THE FIREWALL (F1)

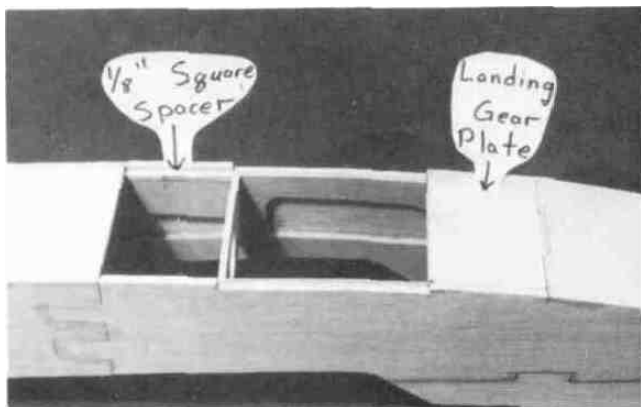
D 1. Use a straight edge to draw two crossing lines from corner to corner on the **FRONT** face of former **F1** (FUN1F20). Refer to the fuse side view on the plans to determine the front of the firewall. Position the **engine mount** (MM19D90) against former F1 so that the crossing lines are visible through each of the four engine mount

Make sure everything is seated properly and apply thin CA to all of the joints starting at former F1 and working your way to the rear. At the rear of the fuse glue the two sides together. Do one former/section at a time and hold everything lightly together while the glue cures. This structure is self-aligning and can be done right in your lap, it does not need to be done on a flat surface. Apply med/thick CA to all the joints.

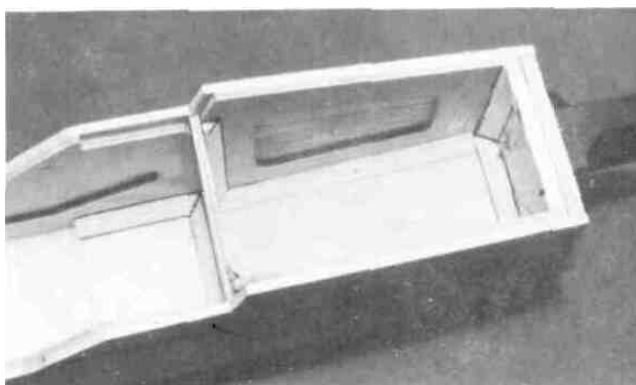
D 3. Glue the 1/4" x 2" x 2-5/8" plywood landing gear plate (FLJN1F13) in place with med/thick CA or epoxy. It goes in the forward position behind former F2 for taildragggers and in the rear position behind former F3 for tricycle gear. OPTIONAL: If you want you can cut an extra landing gear plate and glue one in each position and so you can switch from one style of landing gear to the other.



D 6. Cut the 1/8" x 3" x 6-1/2" middle bottom sheet (FUN1F22) of balsa exactly in half to make two 3-1/4" pieces and glue them in place on the bottom of the fuse. Note: The grain should run **ACROSS** the fuselage. Sand the edges of the sheeting flush with the fuse sides.



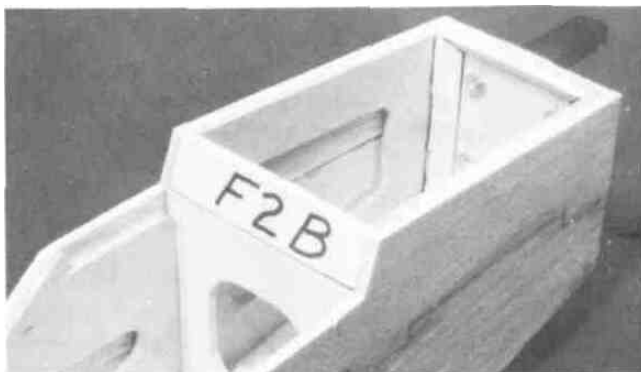
D 4. Cut the 1/8" x 1/8" x 4" balsa spacer (FUN 1F21) exactly in half to get two 2" pieces. Glue these pieces into the other landing gear cutout.



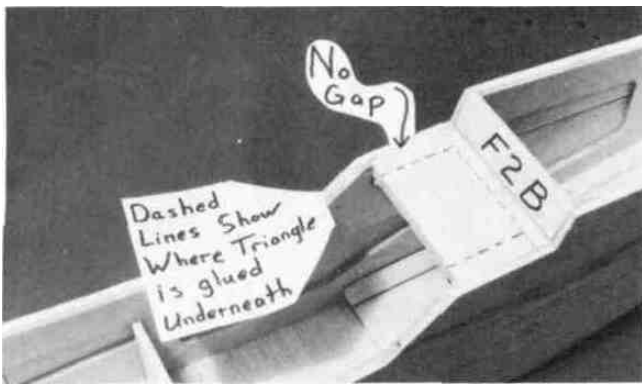
D 7. Cut pieces of the 1/4" x 30" balsa triangle (BAL143) to the correct length and glue them in place around the firewall, along the front fuse bottom, along the front of F2A and above the landing gear plate. The plans and the photos help show where the triangle goes.



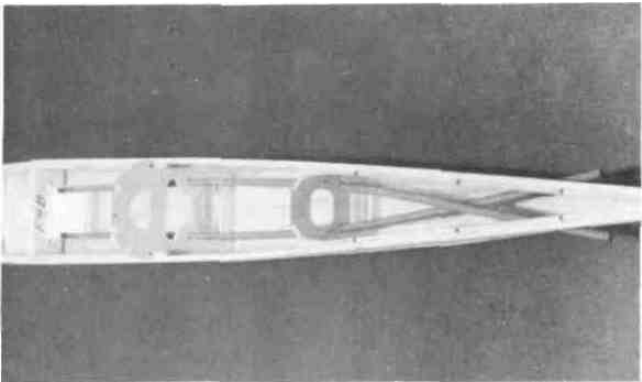
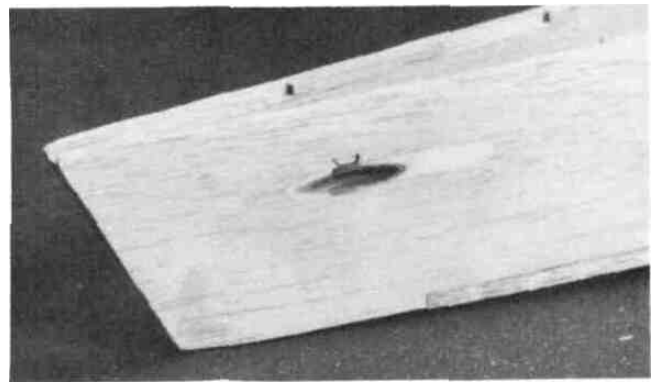
D 5. Trim the fuselage sides flush with the spacers you just glued in.



D 8. Glue former F2B (FUN1F09) in place on top of former F2A. Sand the lop of the former flush with the top edge of the fuselage.

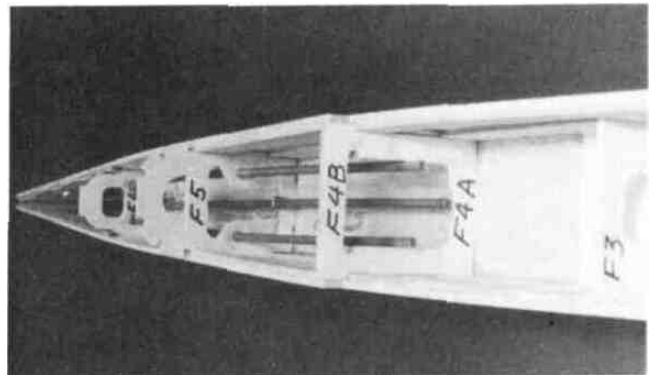


D 9. Using epoxy securely glue the 1/4" **plywood wing bolt block** (FUN1F18) in place. Notice that the block is cut square and there is a slight gap towards the rear. Simply press the fuselage sides up tight against the wing bolt block until the glue cures. Add three pieces of 1/4" triangle underneath the block as shown in the photo.

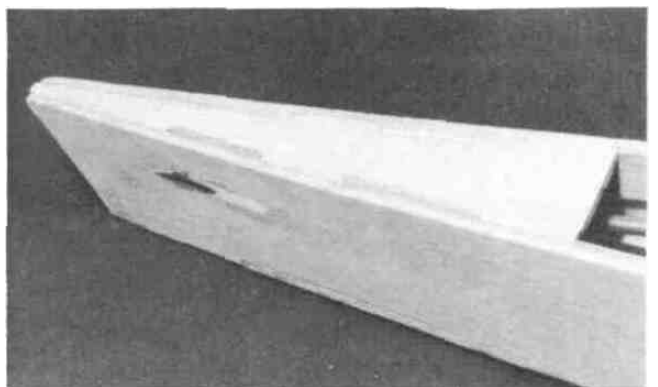


D 10. Install the outer pushrod tubes (PLTB011) by threading them through formers F5 and F6 and then through the OPPOSITE fuse side. Make sure the one that goes through (the highest hole in F6 is above the other where they cross. Allow them to extend about 1" past F4B and 1" past the die-cut fuselage exit. Mark where the tubes contact the formers and remove the tubes. Scuff up the tube surface with 100 grit sandpaper in those locations and replace in the fuselage. Glue the tubes in place with med/thick CA.

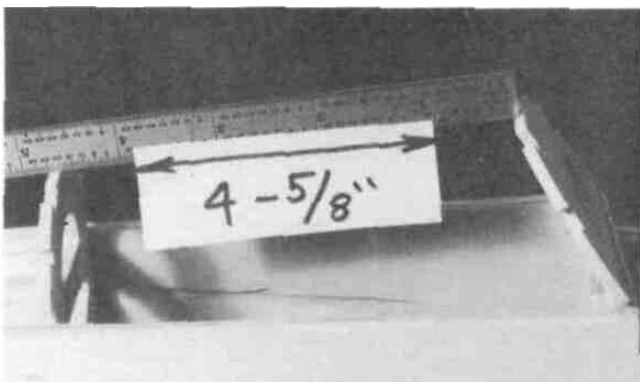
D 11. Cut the tubes off flush with the fuselage side and apply some balsa filler around the tube. After the filler dries sand everything flush with the fuselage side. (See photo for this step in next column)



D 12. If you want to install an antenna tube in the fuselage, now is the time to do that. We normally use a piece of pushrod tubing and secure it along the fuselage bottom, exiting near (the rear of the fuselage). Be sure to anchor the tube securely as (the maneuvers this plane is capable of could knock it loose).

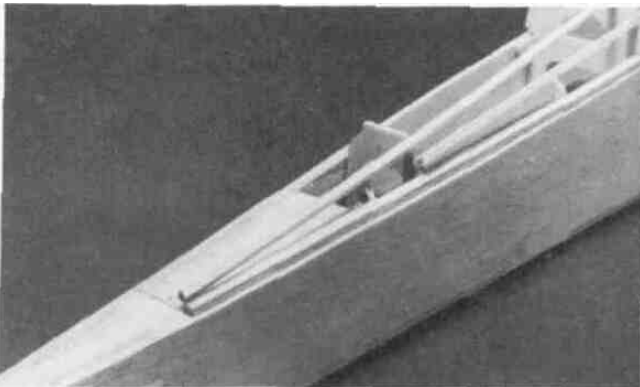


D 13. Securely glue the 3/32" **die-cut stab bed** (FUN1F07) in place with CA. The embossed line on the stab bed should be facing up. Make sure it is sealed properly so the slab will sit level without modification.



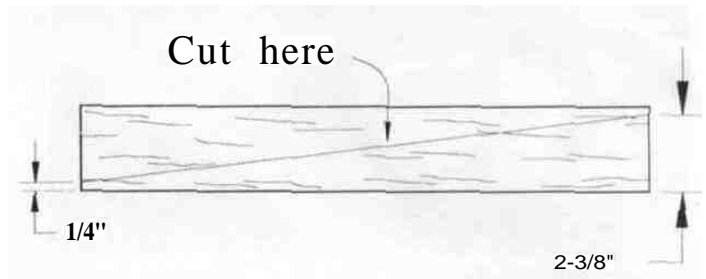
D 14. Center former **F4T** (FUN 1F08) on top of former F4A/B. The back of F4T should be lined up with the back of F4B and it should be tilted back until the top of F4T is 4-5/8" from F5. When positioned correctly glue it in place with med/thick CA.

D 15. Notice an embossed line across the slab bed 3-7/8" from the rear. This is where the front of the stab will be. If it is hard to see draw a line there.

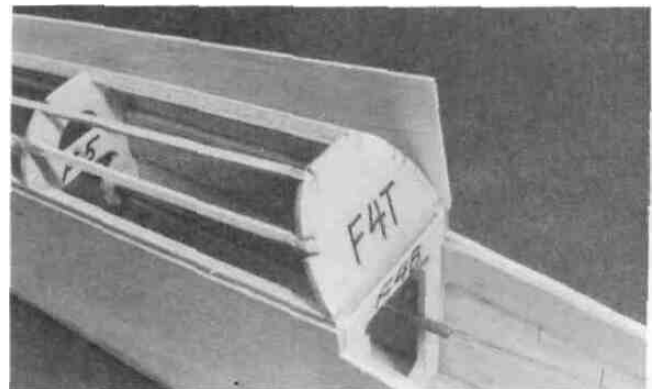


D 16. Glue three 1/8" x 3/16" x 18" balsa stringers (FUN1 F14) in place as shown in the photo. The bottom stringer should start at the line you just drew on the stab bed and remain 1/16" away from the edge of the fuselage side to allow for the turtle deck sheeting which will be applied later. The top stringer should be attached to the bottom stringer near the stab bed but not be touching the stab bed as shown in the photo. The middle stringer should start at former F6. Cut the excess stringers off flush with former F4T. Do the same for the other side of the turtle deck.

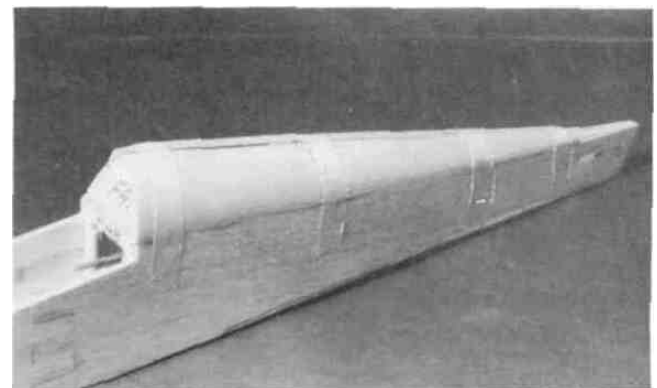
D 17. Locate the 1/16" x 2-5/8" x 16" turtle deck sheeting (FUN1F16) and cut it in two as shown in the sketch below.



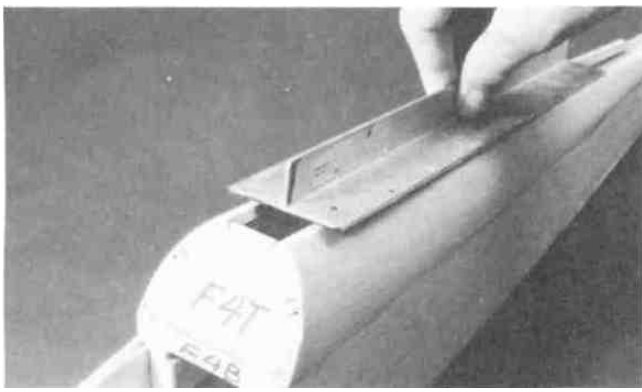
Turtle Deck Sheeting



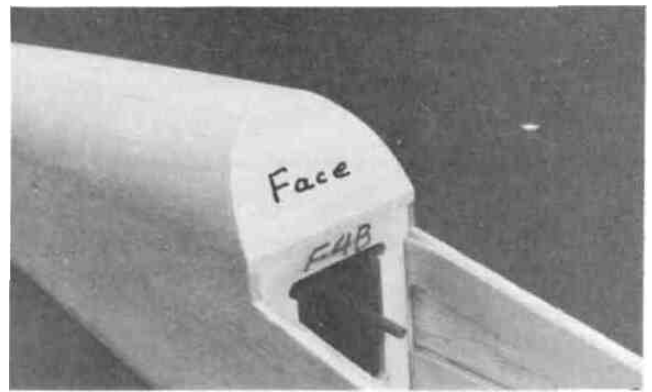
D 18. Glue the sheeting onto the little ledge formed by the fuselage side and the bottom stringer.



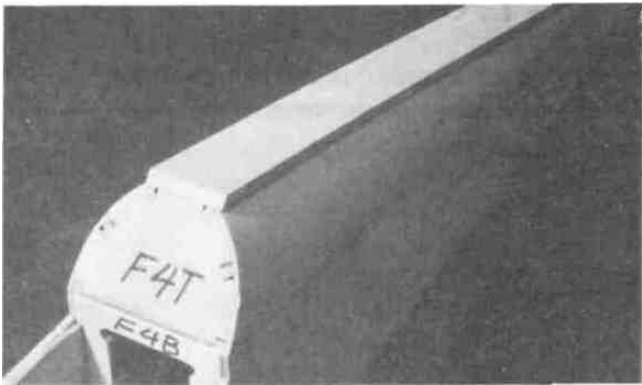
D 19. Use a damp rag to wet the outside of the turtle deck sheeting to make it bend easier. Apply some med/thick CA to formers F4T, F5 and F6 and bend the sheeting into place. Use at least four strips of masking tape to hold the sheeting. Apply thin CA along the stringers and allow the glue to cure. Glue the other piece of sheeting in place.



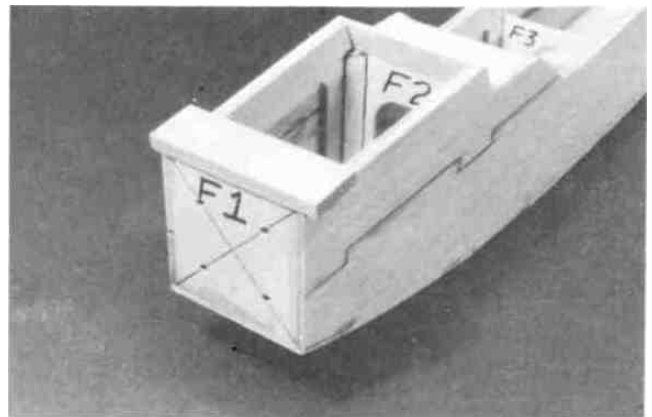
D 20. Cut the sheeting off flush with former F4T and the end of the stringers and use a sanding block to sand the top of the sheeting flush with the top of the formers and stringers. **Be careful not sand any dips or valleys into it or the top will not fit nicely.**



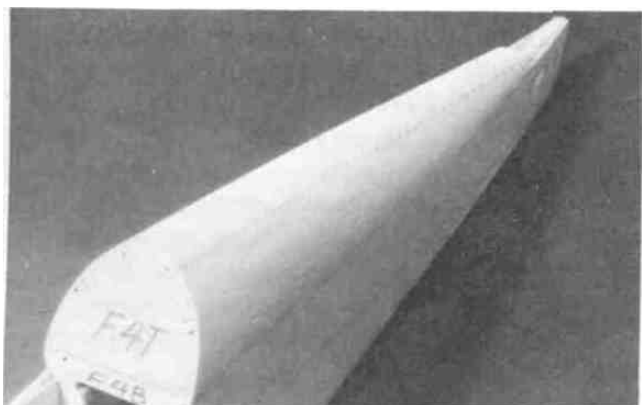
D 23. Glue the 3/32" die-cut turtle deck face (FUN 1 F07) in place on the front of F4T and sand it flush using a sanding block pressed flat against the turtle deck. Do not round off the corners of the face because the canopy will bull up against this piece. Also sand it flush with the face of F4B.



D 21. Glue the 3/16" x 1-3/8" x 14-7/8" balsa turtle deck top (FUN 1 F15) in place making sure it is centered. Cut off the ends and sand them flush with former F4T and the end of the stringers.



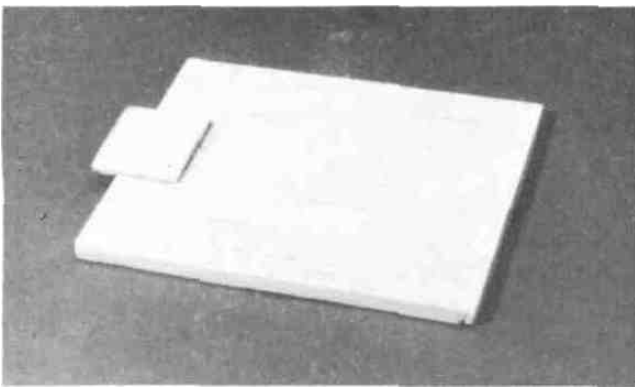
D 24. Glue the 3/16" x 15/16" x 3" balsa hatch front (FUN1F11) in place. Allow it to overlap former F1 slightly (1/32" or less). Sand it flush with the fuse sides and the front of F1.



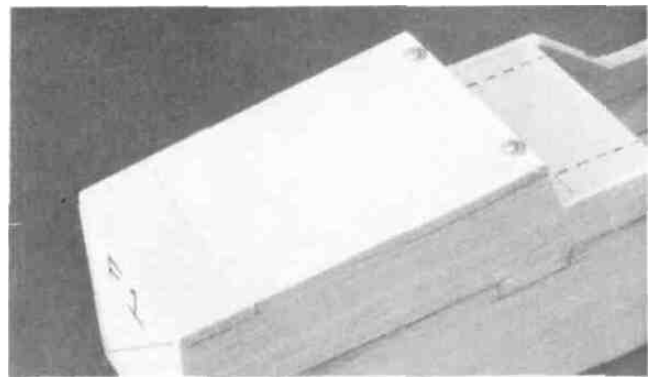
D 22. Use a razor plane to carefully "rough" carve the turtle deck top and then sand it with a sanding block to blend in with the sheeting.



D 25. Glue the 1/4" square x 2-5/8" basswood hatch hold down block (FUN 1 F17) to the front of former F2B. Notice that the top of the hold down is slanted and not flush with the top of the fuse sides.



D 26. Glue the **1/16" x 1" x 1" plywood hatch tongue** (FUN1F12) to the front of the **hatch** (FUN1F10) so that half of the tongue extends past the edge of the hatch.

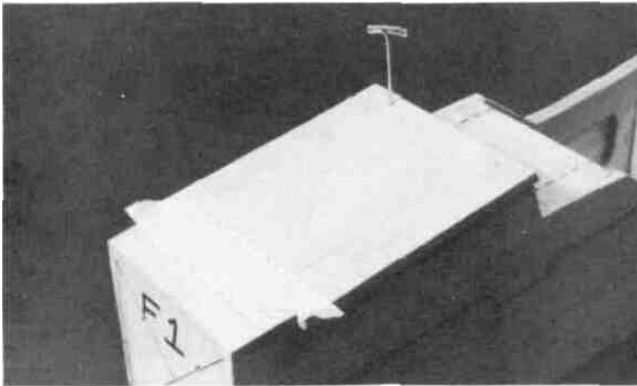


to round off the back edge of the hatch because the wing fairing will bull up against this surface.



WING ASSEMBLY

NOTE: The following instructions explain how to build the wing on a flat surface using the built in "Jig Tabs", directly on the plans.



D 27. Position the hatch on the fuselage and use a piece of masking tape to hold it against the hatch front and act like a hinge. Push a T-pin through the hatch approximately 3/8" from the edge of the fuselage and 1/16" in front of F2B. Pick the hatch up slightly and look see where the pin stuck into the basswood hold down. It should enter the basswood as close to the former as possible (within 1/32"). If it does not, adjust the position of the pin and try it again. Do this on both sides of the hatch and then drill a 1/16" hole where each pin is.

D 28. Remove the hatch and enlarge the holes in the **hatch only** 3/32".

D 29. Use two #2 x 3/8" **sheet metal** screws (SCRW024) and two #4 **washers** (WSHR005) to screw the hatch into place. Sand the sides and back of the hatch flush with the fuselage sides and the face of former F2B. Be careful not

BUILD THE WING PANELS

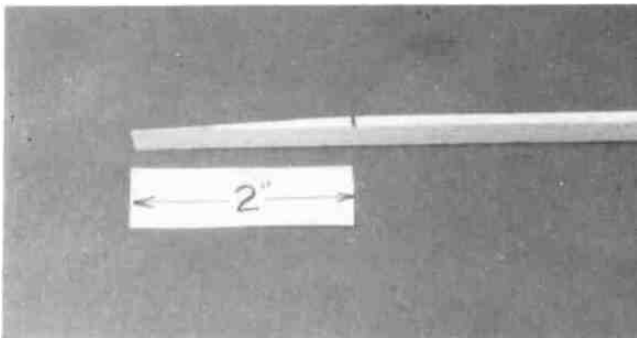
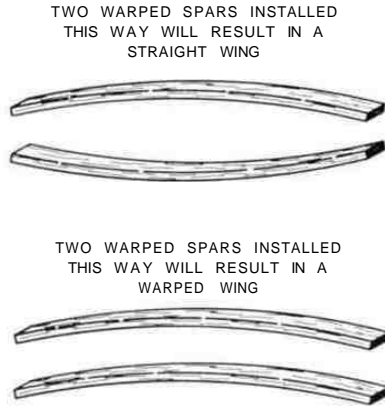
NOTE: It will be helpful to build the wing on a piece of "Celotex" or other semi-soft (and flat) surface, into which you may easily slick pins firmly hold down the wing parts while building, avoid warps. *Available from lumber companies and home centers.

D 1. Tape the plan to your flat work surface, and cover the wing drawing with waxed paper (so you won't glue the wing the plan!). **NOTE:** If your work space is limited, you may cut the left and right wing half drawings apart.

D 2. The shaped wing leading edges (LE) (FUN 1W07) and trailing edges (TE) (FUN1W08) are fastened together by thin strips of balsa. Separate them by cutting between the two pieces. Sand away the excess balsa that remains along the edges after cutting them apart, using a T-bar with 100-grit sandpaper.

D 3. Before using the 1/4" x 3/8" x 28" **hard balsa spars** (FUN1W09), examine them carefully for possible imperfections. Look for knots, soft spots, diagonal grain

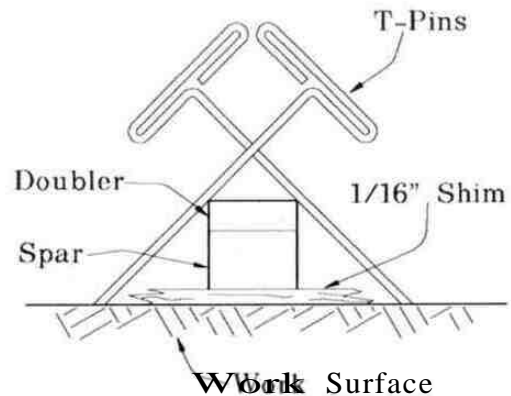
and any other imperfections. If possible, position each spar so the imperfections (if any) are on the outer half of the wing panel (toward the tip), where they will be least affected by high stress. If the spars arc warped slightly, try to "balance them out" by installing the warped spars in opposite directions (see sketch). **NOTICE:** If you feel that any of the wing parts are unusable due to severe warps or other defects, give us a call and we'll replace the parts.



D 4. Find the four 1/8" x 3/8" x 14" balsa **spar** doublers (FUN 1 W 17). Sand the last 2" one end of each spar doubler to a taper as shown in the photo. Glue the spar doublers to the spars with the square end of the spar doubler lined up with the spar end. Sand the doubler to match the spar and to remove any excess glue.

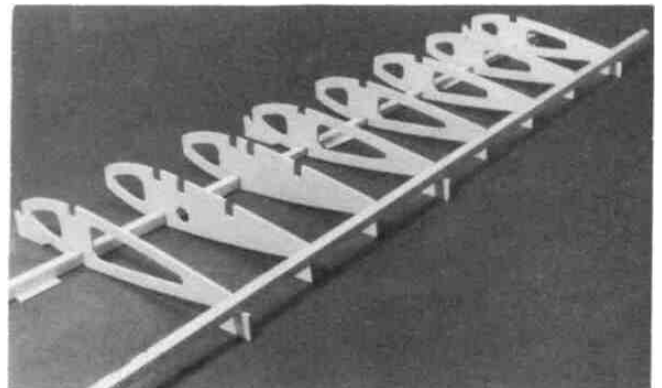
D 5. Carefully punch out all the die-cut 3/32" balsa wing ribs. Sand the edges slightly to remove any die-cutting irregularities. If you are going to build the wing on a wing jig do not punch out the lightning holes yet as some of them contain the jig holes. You may even have to tack glue these in place until the wing is removed from the jig. If you are going to install individual servos for each aileron, cut out the servo rail notches in ribs W4 and W5. **NOTE:** If you are going to use only one servo now but think you may want to have individual servos later, go ahead and build the servo rails into the wing and cover over them. Then they will be there if you decide you want them.

NOTE: Follow steps 6 through 13 to build the LEFT wing panel, then repeat these steps to build the RIGHT wing panel.



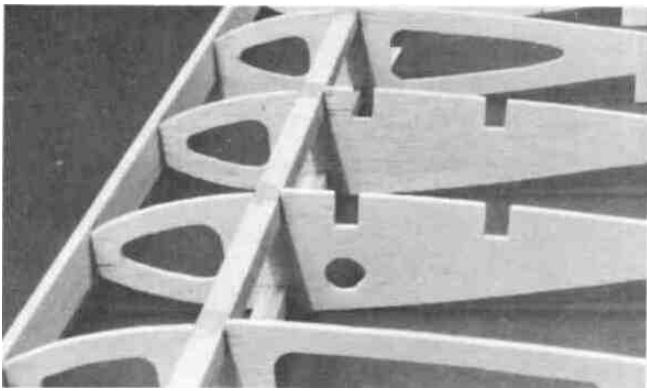
DD 6. Use some scrap pieces of 1/16" balsa to shim the spar up off the work surface 1/16". Place a "shim" in every other rib bay and pin a spar to the plan **with the spar doubler up and toward the root**. **NOTE:** The spars are cut slightly too long. Position the spar on the plan so approximately 1/8" extends past the center of the wing plan.

DD 7. Place the ribs on the spar with the jig tabs down, in their approximate position, but do not glue. **NOTE: The wing is built upside down.**



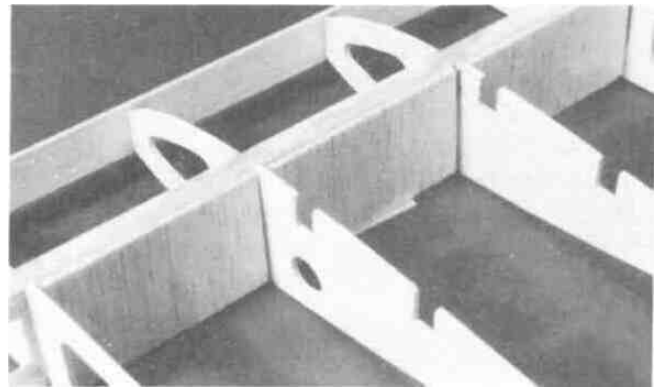
DD 8. Examine the shaped, notched balsa trailing edges. Notice that the notches at one end of each TE are closer together. This is the "root" end of the TE. Insert all ribs into the TE notches. The TE should rest on the ledges on ribs W3, W6 and W10 but make sure that it is also flush with the tops of all ribs. Check to make sure that each rib is perpendicular to the work surface and apply a drop of thin CA to each joint on the TE and the spar.

NOTE: Thin CA glue may be used in tight-fitting joints, but to insure strong joints we recommend that you follow up by also applying medium or med/thick CA to all joints.



D D 9. (Glue the top spar in place with the spar doubler facing down. Glue the LE in place making sure it is resting properly in the jig labs and it is centered "UP and DOWN" on the ribs. It may be necessary to remove a small amount of material from the jig labs for the LE to fit properly.

IMPORTANT: In the following steps you'll find it necessary to remove some of the pins holding the wing down to your building board. As you do, take other steps as necessary to continue holding the wing down, such as by applying weight to the top of the wing, or by relocating the pins.

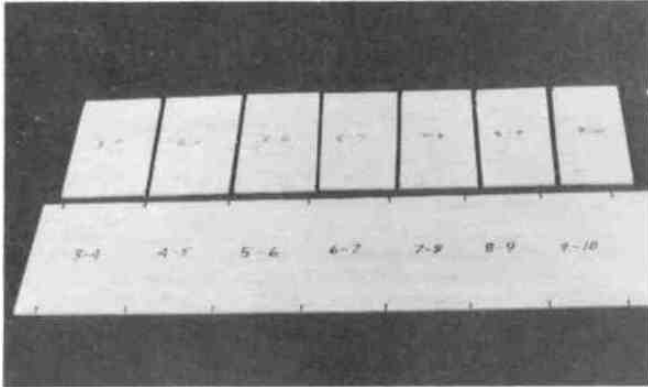


NOTE: There will be a small gap between the ribs and the webs but this is normal.

D D 12. With the wing accurately lined up over the plan, cut the leading edge, trailing edge and the spars off at the root end. Use a drafting triangle or square to accurately transfer the cutoff lines from the plan to the structure.

D D 13. Cut the LE, TE and Spars off flush with rib W10. If you built the wing on a wing jig, now is the time to remove the panel from the jig.

D 14. Go back to step 6 and assemble the other wing panel.

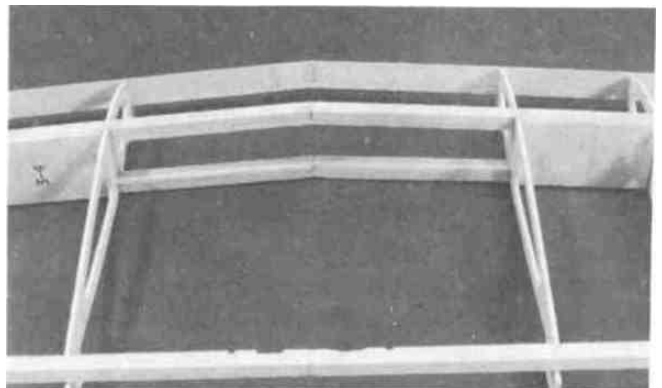


D D 10. Position the 3/32" x 3" x 14-7/8" balsa shear web sheet (FUN1W14) over the shear web template on the plan. Make sure the sheet is correctly aligned with the template and transfer the marks from the plan to the sheet. Move the sheet over to the side and write each web designation onto the sheet so you will know where each one goes. Use a straight edge and an Xacto knife to cut between the lines making the shear webs.

D D 11. Securely glue the webs to the back side of the spars. Center the webs between the spars and the ribs.

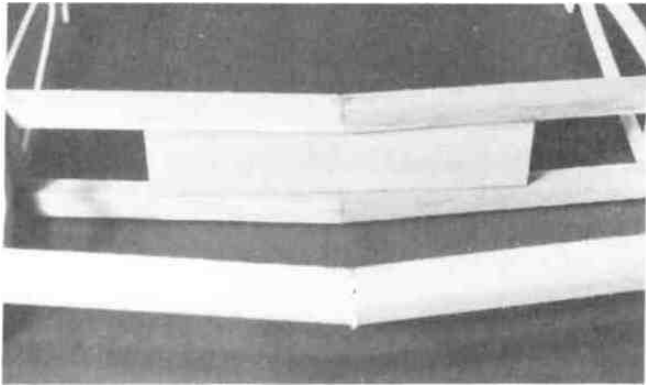
JOIN THE WING PANELS

D 1. On a flat surface trial fit the two wing halves together. The leading edges, trailing edges and the spars should bull up nicely against each other. Sight down the trailing edges to make sure they are straight with each other (No sweep in the wing). Sand where needed to achieve a good straight fit between the wings. **NOTE:** The dihedral is automatically built into the wing by building it flat upside down on the building board. This makes the top spars level with each other and the bottom spars will rise slightly with the taper of the wing.

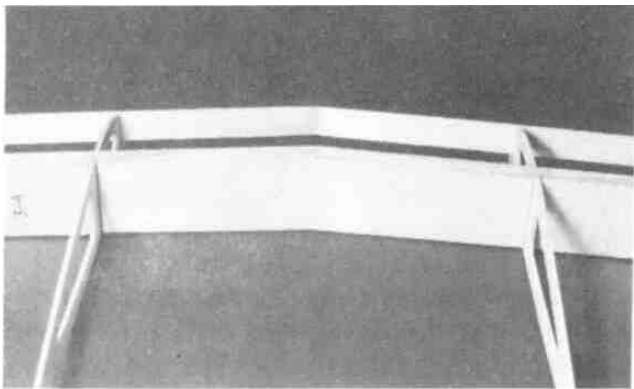


D 2. Use med/thick CA to "tack glue the two panels together and pin or hold everything in place while the glue

cures. Make sure the spars are precisely lined up with each other.

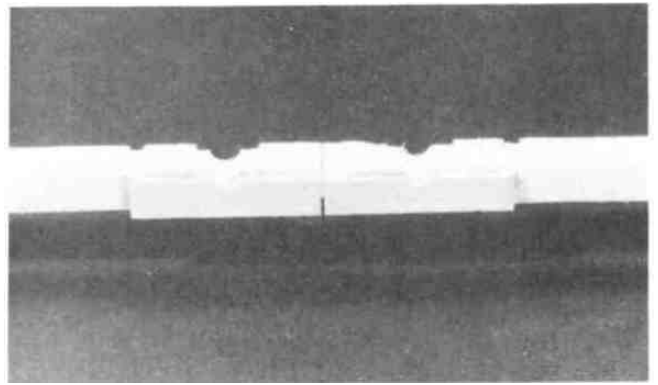


D 3. Trial fit the 1/8" **plywood wing joiner** (FUN 1 WI 3) in place between the spars. It should fit between the spars without protruding past the edges of the spars. Sand it if needed to achieve a good fit without pushing the spars apart. Securely glue it in place with epoxy but be careful not to get any glue on the front or back of the spars.

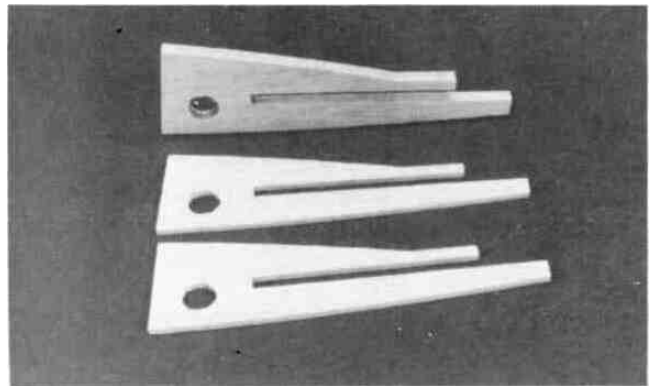


D 4. Trial fit the 1/32" **plywood dihedral braces** (FUN1W06) in place. They easily should fit between the ribs and should not extend past the outer edges of the spars. Hold or clamp them tightly against the spar while gluing them in place with epoxy.

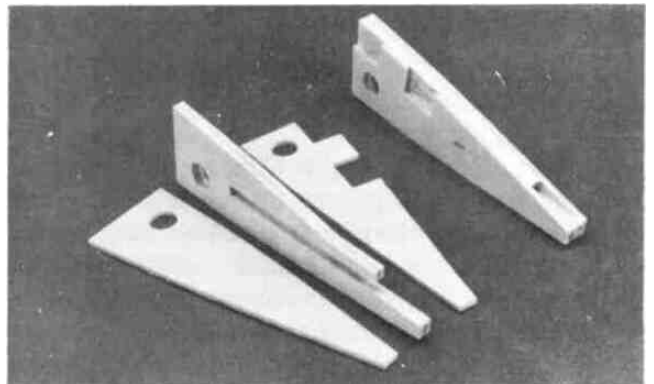
D 5. Glue the 1/8" plywood die-cut dowel aligner (FUN1FOS) to the back of the trailing edge (If you are going to use one aileron servo just tack glue the aligner **in** place as it will be removed later). Position it so the embossed line is centered with the joint between the two



trailing edges. The top of the dowel aligner should be flush with the top of the trailing edges. Sand or file a round notch in each trailing edge where the dowel aligner notches are as shown in the photo.

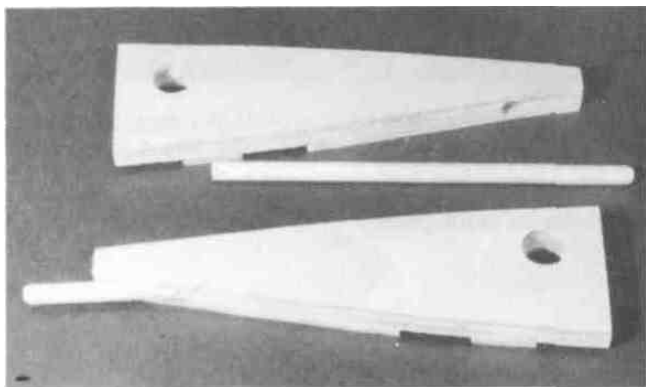


D 6. Glue two 1/8" **die-cut balsa W1C ribs** (FLIN1W02) together making sure they are lined up with each other.

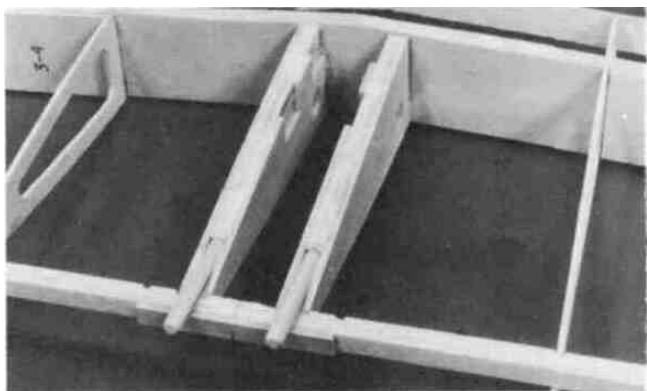


D 7. Glue a 1/8" ply die-cut W 1 B rib (FUN1 WO 1) to one side of the W 1 C ribs and glue a 1/8" **ply die-cut W1D rib** (FUN 1 W01) to the other side of the W 1 C ribs. Line these ribs up so that all of their trailing edges are even and sand off the extra balsa around the dowel hole flush with

the plywood ribs. NOTE: when making this rib assembly for the other wing, be sure to glue the plywood ribs to the opposite sides of the W1C ribs so you will have a "right" and a "left" as the photo above shows.

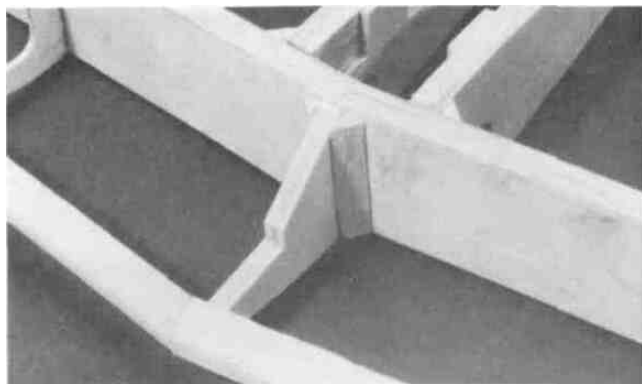


D 8. Round *off* both ends of each 1/4" x 5-3/4" **dowel** (DOWEL037) and trial fit them into the W1 rib assemblies. Glue the dowels in place with plenty of med/thick CA or epoxy.



D 9. Position the wing back over the plan and trial fit both W1 rib assemblies. Enlarge the notches in the TE if needed to get the dowels to be positioned **exactly** over the notches in the dowel aligner. Tack glue the rib assemblies at the trailing edge so they are centered up and down on the trailing edge. Don't worry if the dowels are not seated in the aligner notches but do make sure they are both directly above the aligner notches. Securely glue the front of the rib assemblies to the dihedral brace. Add some med/thick CA to the trailing edge joint but don't allow excess glue to accumulate on the trailing edge or the 1/16" sheeting will not fit well.

D 10. Add a piece of 1/4" triangle (BAL143) to each outside spar/W1 rib joint and a small piece at the trailing edge of each rib assembly (See photo at step 11).

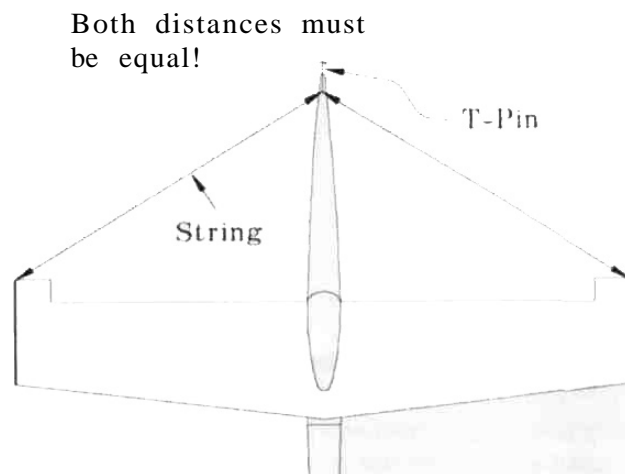


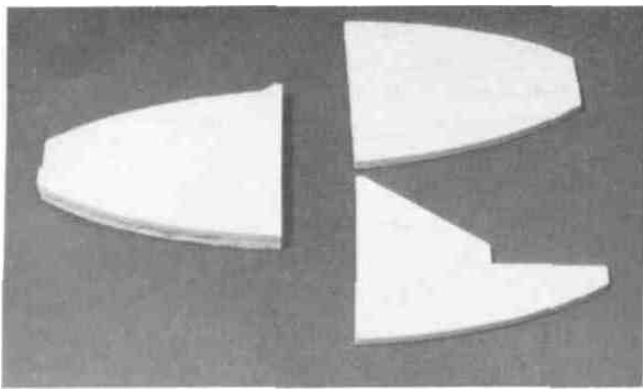
D 11. Glue the two 1/8" ply **W1A** ribs (FUN1W01) together and glue them in place in the center of the wing as shown in the photo. Glue a piece of 1/4" triangle on both sides of the ribs near the spars.

D 12. Glue the 1/8" **balsa W2B** ribs (FUN1W02) in place in the remaining notches. Be sure the 1/2" diameter hole is down.

D 13. Remove the wing from the work surface and test fit it to the fuselage. Sand a "Flat" on the **front** of the leading edge to allow it to seal properly. The bottom of the leading edge will still keep the wing from seating all the way in the saddle but we can make sure the wing is aligned.

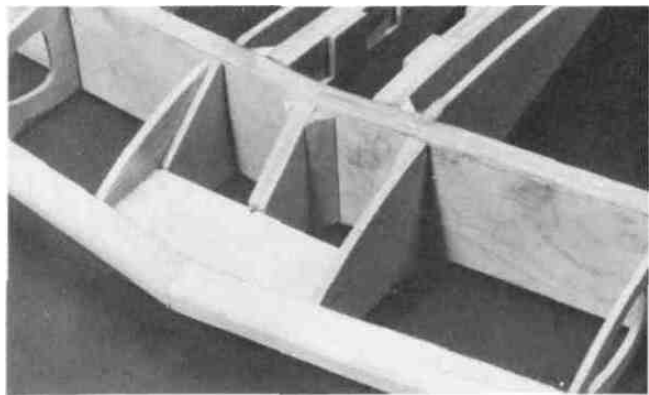
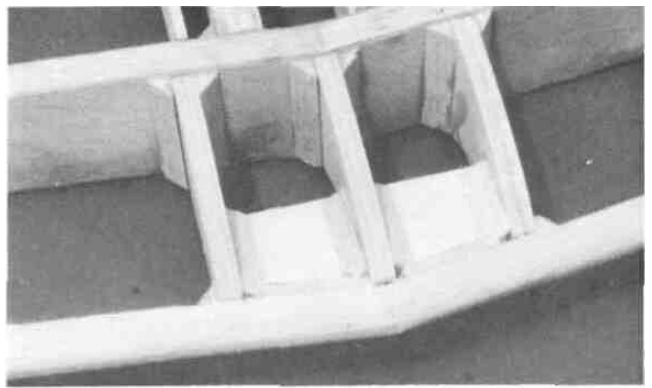
D 14. Tie a 3' piece of string to a T-pin and stick the T-pin into the middle of the slab base at the very back. Pull the string out to one wing tip and mark it or grip it with your fingers where it touches the tip. Swing the string over to the other tip to see if the two distances are equal. If they are, make a mark on the leading edge and former F2B so you will know when the wing is on correctly. If the distance is not equal, adjust the wing until it is, then make the mark.





D 15. Glue the **1/8" plywood W2A's** (FLJN1W01) to the **1/8" balsa W2C ribs** (FUN1W02). Make a RIGHT and a LEFT!

D 16. Measure to find the middle of the **1/4" plywood wing bolt plate** (FUN1 W1 5) and make a mark at the front edge. **Tack** glue it in place on the two W1 A ribs with the mark in the middle of the two ribs and pushed up against the leading edge and **level**.

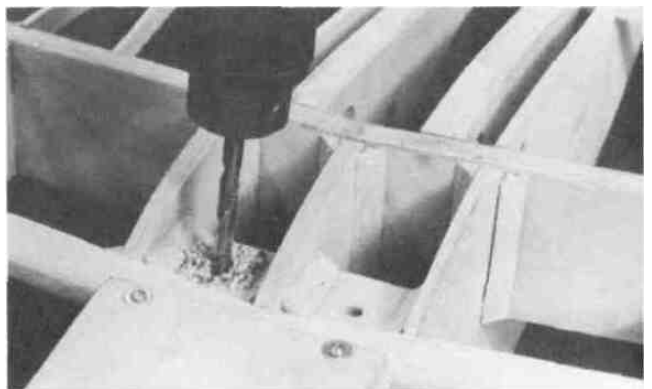


D 17. **Tack** glue the W2 front rib assemblies in place making sure they are centered up and down on the leading edge and spars and pressed against the ends of the wing bolt plate.

D 18. On the side of the wing with the dowels sticking out (the bottom of the wing) the leading edge should be cut away flush with the wing bolt plate between the W2 front ribs (See bottom photo at step 20).

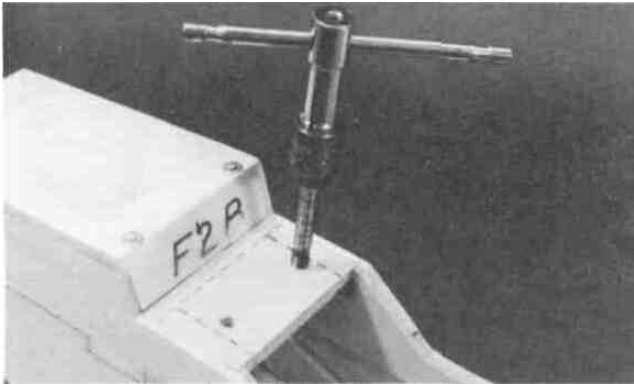
D 19. Replace the wing on the fuselage and recheck its alignment. Also set the fuselage flat on the work surface and make sure the wing is parallel to the surface. If it is not, adjust the wing bolt plate or the dowel notches in former F4 until they are.

D 20. When satisfied with the wing alignment the front pieces **must** be securely glued in place. Add med/thick CA to all joints that have only been tack-glued. Add pieces of 1/4" tri around the wing bolt plate and the W2 rib assemblies.



D 21. Replace the wing on the fuselage with the alignment marks lined up and hold the wing **tightly** to the fuselage. Drill two 13/64" holes through the wing bolt plate and down through the wing bolt block as shown above. The holes should be approximately centered in the open part of the plate. **Keep the drill perpendicular to the wing bolt plate while doing this and do not allow the wing to move while drilling.**

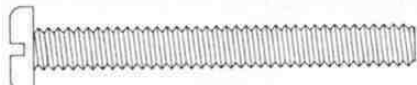
D 22. Remove the wing and re-drill the holes **in the wing only** to 1/4".



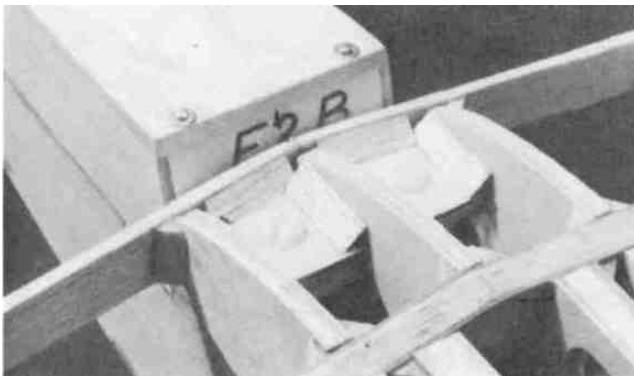
D 23. Use a **1/4-20 tap** and a **tap wrench** to cut threads in the ply wing bolt block in the fuselage.

D 24. Harden the threads in the wing bolt block by applying thin CA to the threads. After the glue has **completely** cured, re-tap the threads.

D 25. Cut the **1/4-20 x 2" nylon wing bolts** (NYLON 13) so the threaded portion is approximately 3/4" long. A easy way to cleanly cut them without messing up the threads is to press an Xacto knife into the bolt where you want to cut it and then bend the bolt with your hands. It will break where the cut is, just clean up the threads with the knife.



1/4-20 x 2" Nylon Bolt



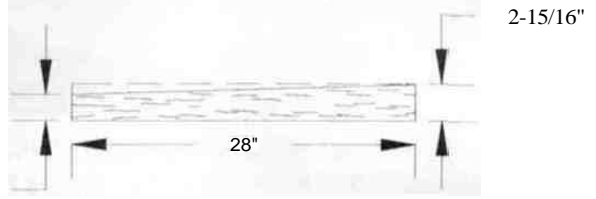
D 26. Test fit the wing to the fuse using the 1/4-20 **nylon bolts** and then remove the wing.

D 27. Later you will apply foam **wing seating tape** or **silicone sealer** to the wing saddle. To allow space for this wing cushion material, you may sand the saddles **slightly** in the areas where the wing touches the saddle, to provide a small gap.

SHEET THE WINGS

NOTE: In the next steps, maintain straightness by keeping the wing down on the flat surface.

D 1. Before applying the leading edge sheeting in the next step, use your T-bar to lightly sand off any protruding edges on the shear webs and smoothly blend the ribs to the the spars.

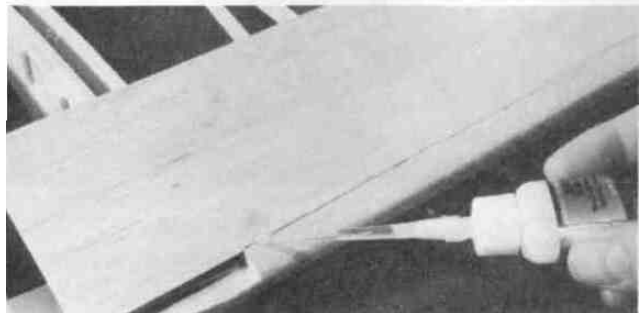
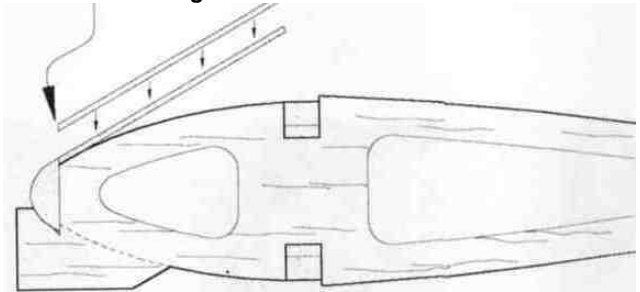


Leading Edge Sheeting

D 2. Cut the **1/16" balsa leading edge sheeting** (FUN 1 W 11) as shown in the sketch above (Make 4).

D 3. Prepare the balsa leading edge sheeting by sanding the front edge to a slight bevel so it will fit snugly against the back of the leading edge

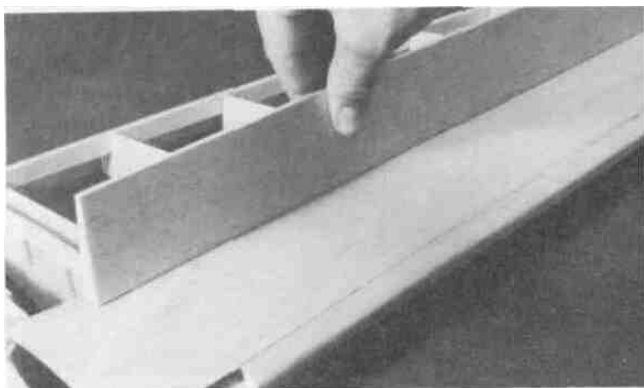
Bevel this edge



D 4. Position the leading edge sheeting in place and glue it to the leading edge with thin CA. Do not attempt to glue it to the ribs yet, just let it rest on the ribs while you glue it to the LE. **NOTE:** The root end of the sheet should start at the wing centerline.

D 5. Check the leading edge sheeting. If it does not bend around the ribs easily, wet the top surface of the sheeting and wait a few minutes so it will bend easier.

D 6. Apply med/thick CA glue to the top edge of the ribs and to the top of the spar. Bend the sheeting down onto the ribs and spar. Place one of the ailerons on top of the sheeting with the **thick edge** near the spar and apply hand



pressure to hold the sheeting down until the glue has set.

D 10. Install the top 1/16" wing sheeting using the same procedure.

D 11. Cut a hole in the top sheeting above each wing bolt hole big enough to get the wing bolts in and out.

INSTALL AILERON SERVOS

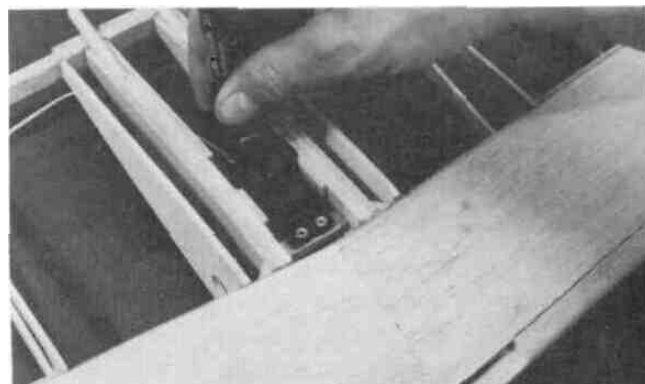
IF YOU ARE GOING TO INSTALL TWO AILERON SERVOS SKIP AHEAD TO STEP 3.

D 1. Cut two 1/4" x 3/8" x 3-1/4" **basswood aileron servo rails** (FUN1W16) to fit between the W1 rib assemblies (approx. 1-1/4" long). Use a servo to determine the positioning of the rails and tack glue them in place in the bottom of the notches with med/thick CA. Try to keep the servo as low in the wing as possible. Be sure to allow enough space between the rails to get the servo in and out. Add more glue to securely hold the rails in place.



D 7. Trim the root end of the sheeting even with the center of the wing over the spar, and flush with rib W3 in front of the spar. Trim and sand the sheeting at the tip of the wing flush with rib W10.

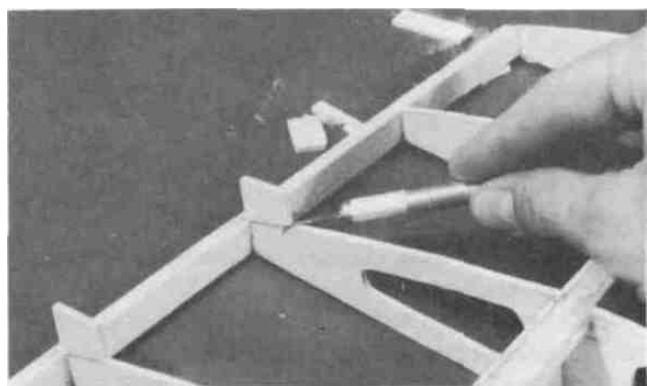
D 8. Install the other panel wing sheeting.



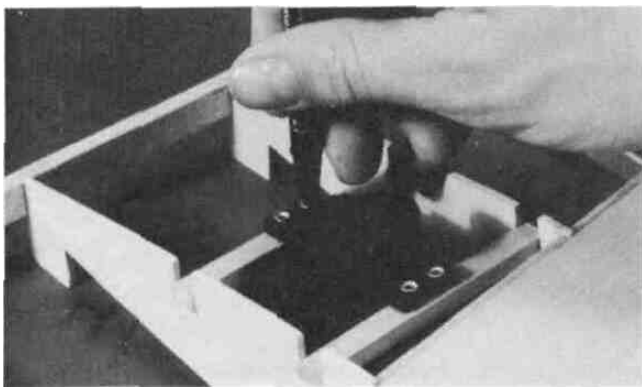
D 2. Position the servo in place on the rails and mark through the mounting holes where to drill. Remove the servo and use a 1/16" drill bit to drill holes where you made the marks.

IF YOU ARE ONLY INSTALLING ONE AILERON SERVO SKIP AHEAD TO ADD THE CENTER SHEET.

D 3. If you are installing two aileron (flaperon) servos test fit the two 1/4" x 3/8" x 3-1/4" **basswood aileron servo rails** (FUN1W16) in place in the bottom of the notches in ribs W4 and W5. Check the fit of the aileron servo between these rails and adjust if necessary. **Securely** glue the rails in place with med/thick CA.

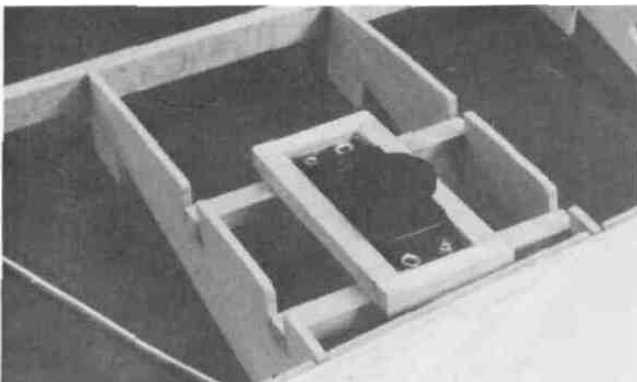


D 9. Cut the jig tabs off of each rib using the embossed line as a guide and sand the ribs smooth.



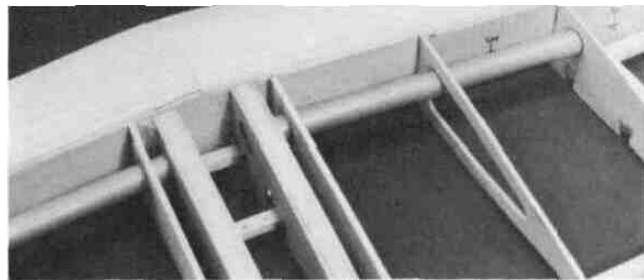
D 4. Position the servo in the center of the rib bay and mark on the rails, through the mounting holes, where to drill. Remove the servo and use a 1/16" drill bit to drill holes where you made the marks.

D 5. Install the servos using the mounting screws provided with your radio.



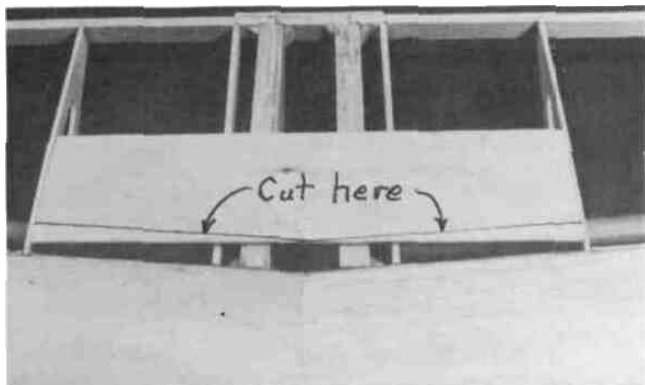
D 6. Cut four pieces of 1/4" square balsa (FUN 1S02) approximately 1/8" longer than the servo and glue one on each side of each servo. Cut four more pieces of 1/4" square balsa to fit across the ends of the "servo bays" and glue them to the 1/4" balsa already in place. Sand these "frames" so they are flush with the surface of the ribs but **do not change the shape of the ribs while sanding.** **NOTE:** Put a strip of masking tape on each rib to keep from sanding the ribs during this step.

D 7. Enlarge (elongate) the hole in rib W4 towards the TE so that you can install the **paper tube** (PTUBE001) for carrying the servo cable. The paper tube can be held diagonally through rib W3, inserted into rib W4, and then slid through the remaining ribs and into position with its



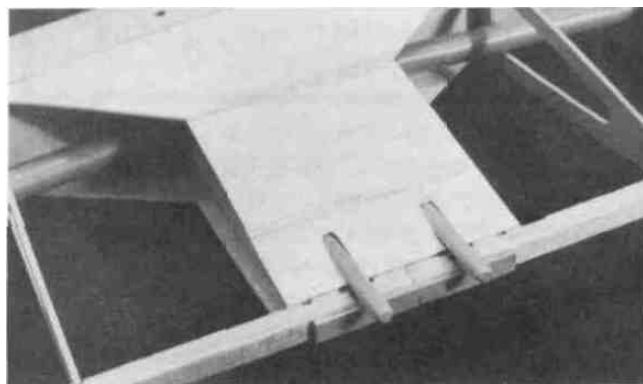
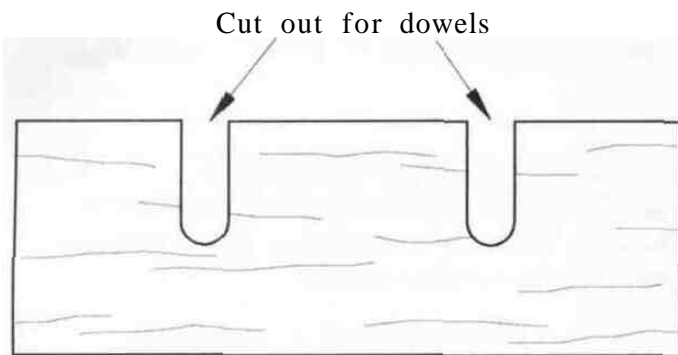
end flush with rib W1 B. Any extra tube protruding more than 1/4" past Rib W4 can be cut off. Glue the tube into place with med/thick CA.

ADD THE CENTER SHEETING



D 1. Cut two of the **1/16" x 2-5/8" x 9-7/8" balsa wing center sheets** (FUN1 W12) to fit **between** the W3 ribs. Position one of the sheets between the ribs and mark where the center of the leading edge sheet is. Now slide the sheet forward until it touches the rear of the leading edge sheeting joint and mark where the sheets cross at the W3 ribs. Remove the center sheet and cut from the center dot to each end dot. Test fit the sheeting back into place. Sand it if needed and glue it in place. Repeat this for the other side of the wing.

D 2. Cut four pieces of sheeting 3-1/2" long from the remaining 1/16" x 2-5/8" x 9-7/8" center sheets. Glue one of these sheets behind the one you just installed with it centered over the W1 and W2 ribs. Cut another one to fit between the last one and the trailing edge and glue it in place. Do the same for the other side of the wing. On the bottom of the wing the last sheet will have to be cut similar to the sketch on the following page to clear the dowels.

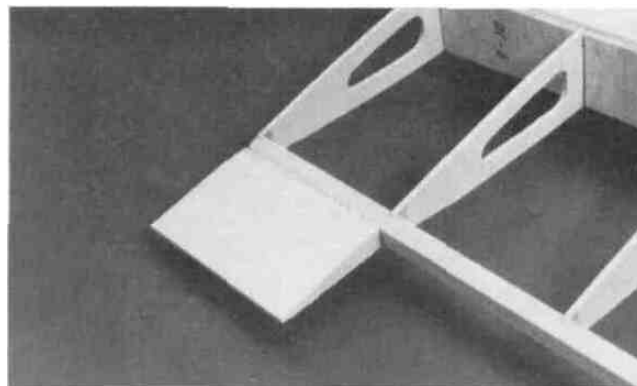


D 3. Cut the front center sheet at an angle to match up with the rear pieces as shown in the photo. Also cut away the sheeting on the bottom of the wing for either the servo cables or the aileron servo whichever the case may be.

D 4. Sand the leading edge so it will blend in smoothly with the leading edge sheeting.

IMPORTANT: The shape of the leading edge will affect the way this airplane performs snap rolls and spins. A blunt, rounded leading edge will "soften" the stall, making the plane very docile when flying slowly, enabling it to flare nose-high for very slow landings; however, this may cause the plane to be a little sluggish when trying to enter a snap roll or spin. A sharper leading edge will help the plane enter snap roll and spin maneuvers more crisply, while sacrificing only a little of the low speed stability. The leading edge has been approximately pre-shaped, and will work great for most sport flying. If you would like crisper snap rolls and spins you should sand the inner 1/3 of each wing panel to gradually form a slightly sharper LE radius. **To avoid tip stalls, make sure the leading edges of both wing panels have the same shape.**

D 5. Cut 3" off each **aileron** (FUN 110) and glue the short pieces to the tip end of each trailing edge. **Make sure**



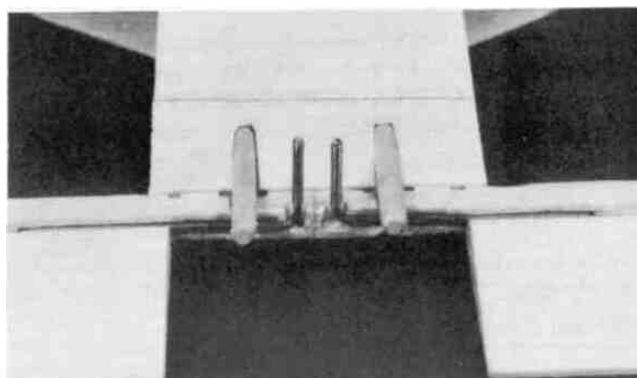
that they follow the natural contour of the wing and are not tilted up or down. Sand them to fair smoothly with the TE and sand the ends flush with rib W10.

D6. Tack glue the 1/8" plywood Wing Tips (FUN1W01) in place with two drops of med. CA. They should line up with the front portion of the airfoil and be centered with the 3" aileron portion at the TE. Sand the wing and wing tip to get a smooth transition between the two. Remove the wing tip and sand both sides smooth and **lightly** sand the edges to remove any "fuzz". They will be glued back on after the plane is covered.

INSTALL AILERON TORQUE RODS

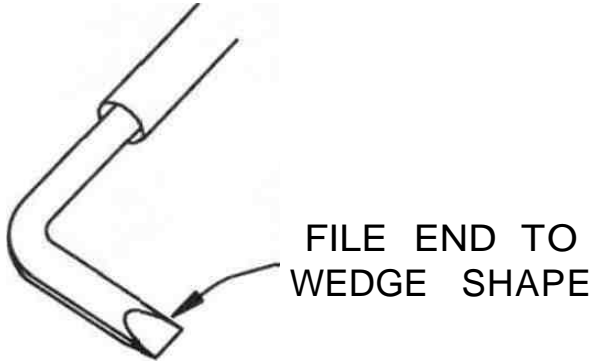
(One aileron servo only)

D 1. Remove the dowel aligner which was tack glued into place.



D 2. Cut a groove to fit the torque rods in the TE. A clearance groove also has to be cut in the top of the TE to allow the torque rods to move. Also cut small clearance notches in the dowel aligner. Note: The torque rod horns must exit the **BOTTOM** of the wing! Test fit the torque rods in the groove, they should be totally in the TE so the dowel aligner will fit back into place.

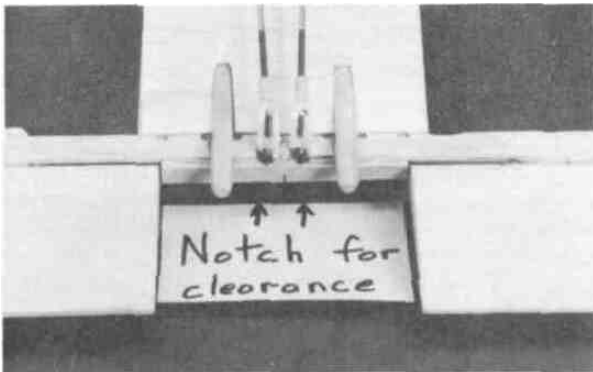
D 3. Roughen the unthreaded end of the **aileron torque rods** (WBNT153) with 100-grt sandpaper, and file the same end to a wedge shape.



D 4. Roughen the surface of the plastic bearing tubes with 100-grt sandpaper.

D 5. Clean the torque rods and bearing tubes with alcohol.

D 6. Slide the plastic bearings toward the threaded end of the torque rods, then use a toothpick to apply a **small** amount of petroleum jelly to the ends of the plastic tubes (to help prevent glue from getting inside and locking up the torque rods).



D 7. Use 5-minute epoxy or med/thick CA **sparingly** to glue the plastic bearing tubes into the grooves in the TE and the dowel aligner back into place. Wipe off any excess glue and allow it to harden.

INSTALL AILERONS

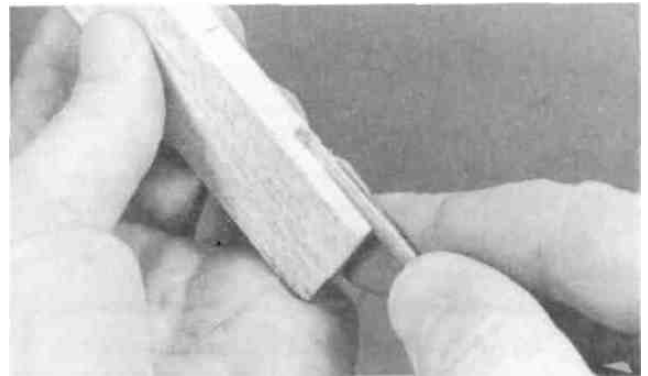
NOTE: Do not glue the aileron hinges until after your model has been covered.

D 1. Draw an accurate **centerline** along the LE of the tapered balsa **ailerons** and the wing TE.

D 2. Make a mark 1/8" outboard of the dowel aligner and cut the ailerons to fit between this mark and the tip of the wing. You should provide approximately 1/16" gap at the **outboard** end of the ailerons.

**IF YOU ARE INSTALLING 2 SERVOS
SKIPTO STEP 5!**

D 3. Lay the ailerons in place, with the torque rods resting on top of the ailerons. **Mark the torque rod locations on the top of the ailerons** (Similar to the procedure used in step 5 on page 9).



D 4. Drill a 7/64" hole in the ailerons at the torque rod locations, starting at the leading edge centerline and drilling **straight** in to the proper depth (approx. 1"). (The hole is drilled slightly oversize to allow for positioning, and to create a hard epoxy "sleeve" around the wire). Use a 1/8" dia. sharpened brass tube to cut a groove in the leading edge of the aileron (Similar to step 10 on page 7).

D 5. Lay the ailerons on the plan and mark the **hinge locations** on the ailerons. Place the ailerons against the wing TE and transfer the marks over to the wing.

D 6. Cut the hinge slots in the ailerons and wing TE using an Xacto knife.

D 7. Sand the leading edge of the ailerons to the same **"V-shape"** as shown on the wing rib detail drawing.

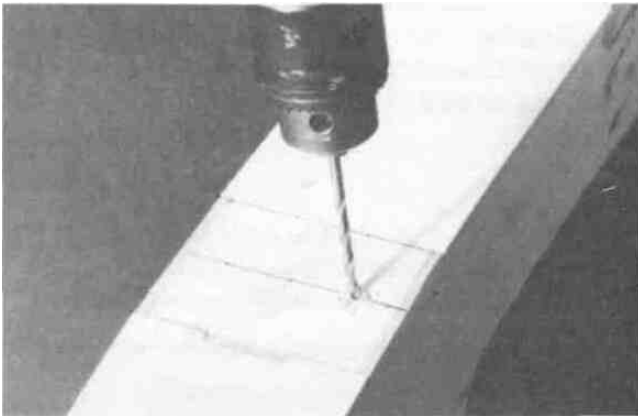
D 8. Insert the hinges into the slots and trial fit the ailerons in place on the wing. **Do not glue the hinges until after you have covered the wing.**

There should be no hinge gap!

FINAL ASSEMBLY

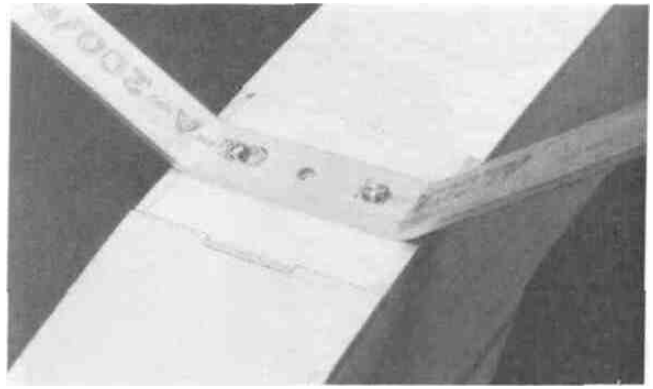
INSTALL LANDING GEAR

NOTE: The landing gear included in this kit is designed to help absorb the impacts of hard landings. It will bend easier than traditional landing gear but it will help keep the plane in one piece and it can easily be removed and straightened out many times. A different landing gear may be used if you desire but we have found this feature a bonus at fun flys when other pilots are knocking the gear off or breaking the plane slamming it on the runway trying to do quick touch-and-go's.

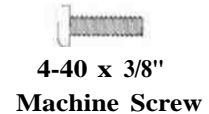


D 1. Flip the fuselage upside down and draw a line across the middle of the landing gear plate. Now make a dot at the midpoint of that line. Position the **landing gear** (L-6U) so that it is centered on this line and mark where the two outside holes should be drilled. Drill a 9/64" hole at each outside dot. The holes should be perpendicular to the landing gear plate.

D 2. Insert a **4-40 blind nut** (NUTS001) on the inside of the fuselage in each hole. Temporarily mount the



landing gear to the fuselage with **4-40 x 3/8" machine screws** (SCRW031) and **#4 flat washers**. Use the bolts to pull the blind nuts into place.

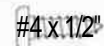


INSTALL ENGINE

D 1. Place the engine pointing straight ahead on the mount and mark the mounting hole locations on the mount. At the marked locations, accurately drill 3/32" (or #43) holes. **NOTE:** If you have access to a drill press, use it for drilling these holes to insure that they are drilled vertically.

D 2. Now you may use one of the following methods to attach your engine to the mount:

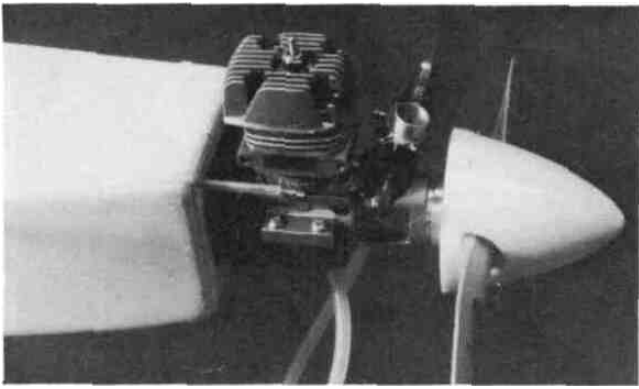
Method 1: Screw the **#4 x 1/2" sheet metal screws** (SCRW004) (provided in the kit) through the engine mounting flange and into the mount. When first installing these screws, put a drop of oil into each screw hole.



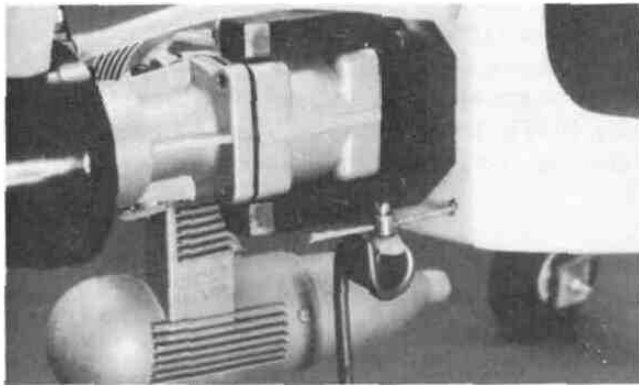
Sheet Metal Screw

Method 2: Cut threads into the holes you just drilled using a 4-40 tap and tap wrench. If you use this method you'll have to supply your own bolts (4-40 x 1" socket head cap screws) for attaching the engine to the mount. **NOTE:** 6-32 hardware is recommended if you are installing a 4-cycle engine.

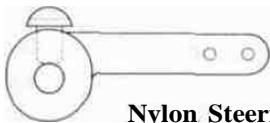
D 3. Temporarily install the **engine mount** onto the fuselage.



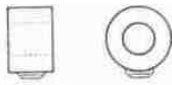
D 4. With the engine on the mount, plan the throttle **pushrod** routing. A flexible cable type pushrod is recommended for this application since it has to bend under the fuel tank. The pushrod should be located as close as possible to the fuse sides (to allow room for the fuel tank), and the guide tube should not have any tight bends. Drill a 1/8" hole in F1 for the throttle pushrod guide tube, but stay at least 1/8" in from the outside edge of the fuse sides.



D 5. If you are building it with tricycle landing gear, install the nosegear (WBNT075), and the nylon steering arm as shown in the sketch and on the plan. Determine where the pushrod should exit the fuselage and drill a 1/8" hole for the flexible cable pushrod. Also drill a hole in former F1 for the pushrod. **NOTE:** Try to plan the pushrod installation so the rudder pushrod and the nose-wheel pushrod are on the same side of the fuselage, as shown on the plan.



Nylon Steering Arm

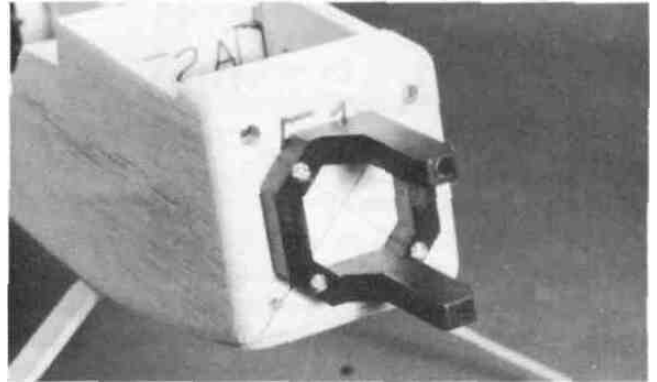


5/32- Wheel Collar

FIT FUEL TANK and FUELPROOF TANK COMPARTMENT

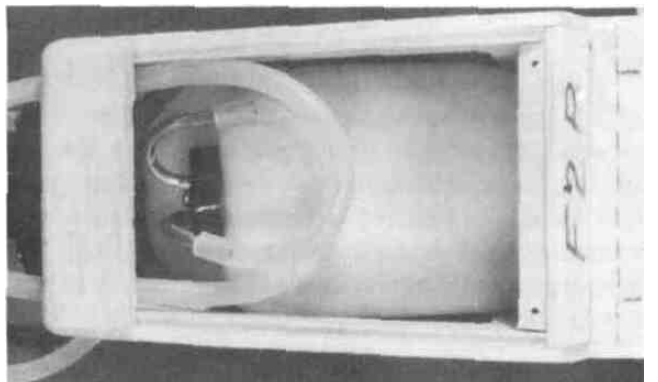
D 1. Assemble your **6 oz. fuel tank**. We recommend bending the brass tubes as shown in the photo to prevent them from cutting through the silicone fuel lines if pressed

against the firewall. Try not to "kink" the tubes when bending (See photo at step 4).



D 2. Drill two holes (7/32" or size to fit your fuel tubing) for your **fuel tubing** vent and fill lines. The location of these holes will depend somewhat upon the type of engine you are using, but will normally be in the upper two corners.

D 3. Now remove the engine mount and fuelproof the inside of the fuel tank compartment and the front of F-1 by brushing on a coat of polyester resin or 30-minute epoxy thinned with alcohol.



D 4. You may permanently install the **fuel tank** at this time, or you may wait until the plane is nearly completed. When you install the tank, be sure to **cushion** it from vibration and prevent it from moving by surrounding the tank on all sides (and front) with **latex foam rubber**. Leave several inches of extra fuel tubing in front of F-1 (you can cut off the excess later). The photo shows how to route the fuel tubing to prevent kinking.

MOUNT STABILIZER AND FIN

D 1. Lightly sand the **stab saddle area** smooth with a T-bar or sanding block. Be careful not to sand an angle onto the stab bed.

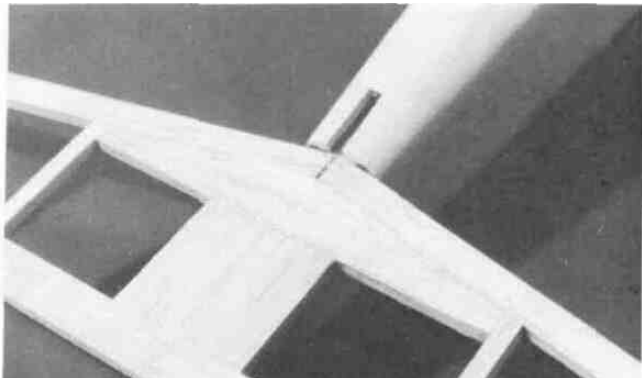
D 2. Accurately measure the trailing edge of the stabilizer and mark the center point.

D 3. Temporarily mount the wing on the fuse (for reference).

D 4. Lay the stab in position on the slab saddle with the stab centerline lined up with the fuse centerline. The TE of the stab should be even with the back of the fuselage with the center mark on the TE positioned over the joint between the two fuse sides.

D 5. Use a string and a T-pin like you did on the wing but stick the pin at the front middle of the turtle deck to help align the slab. With the slab in alignment, make a mark on the front of the stab and a corresponding mark on the back of the turtle deck top, which will be used for rapid alignment when gluing.

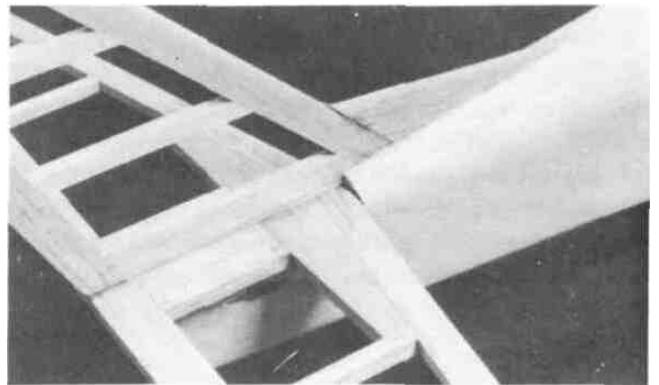
D 6. Mix up a batch of 5-minute or 30-minute epoxy and apply it to the stab saddle. Press the stab into position and **pin in proper alignment until the glue has firmly set**. Wipe off any excess epoxy before it sets up.



D 7. Draw a line on the turtle deck approximately 1" long starting at the rear **center** of the turtle deck top. Position the fin in place on the stab and mark where you

will need to cut away the turtle deck top to allow the fin to sit flat on the stab. Now cut through the turtle deck top 1/8" on both sides of this line and trial fit the **fin** on the stab. **The fin trailing edge must line up with the aft end of the fuselage.** If the dorsal fin keeps the fin from silting flat on the stab, cut it off and glue it back on later.

D 8. Carefully align the fin on the stab. **The fin must be positioned perpendicular to the stab and must line up with the fuselage centerline EXACTLY!** Securely glue the fin in place with epoxy.

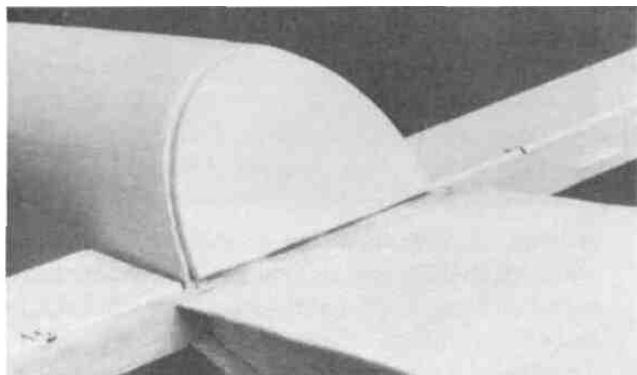


D 9. Re-glue (if necessary) the 1/4" balsa **dorsal fin** in place on the aft deck. The dorsal fin, like the fin, must also line up with the fuselage centerline. Blend it to the fin with balsa filler.

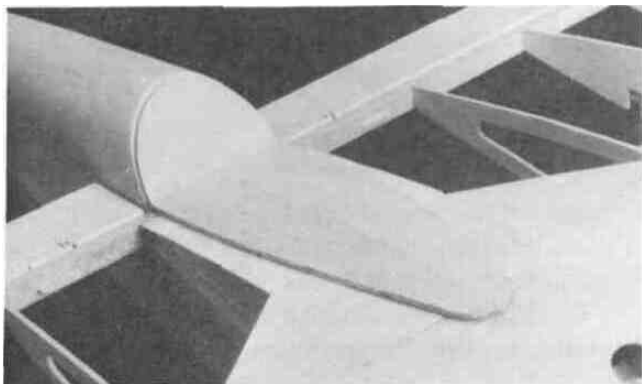


D 10. Cut two pieces of 1/4" triangle and sand them as shown on the plan and in the photo to make the **Fin fillets**. Securely glue the fillets in place on both sides of the fin. Use a lightweight balsa filler to blend these in with the turtle deck and sand them smooth.

INSTALL CANOPY



D 1. Mount the wing to the fuselage and test fit the 1/8" **plywood canopy back** (FUN1F08) in place against the front of the turtle deck. Notice that the gap between the top of the canopy back and the top of the turtle deck seems too large when viewed from above, but it should be equal all around when viewed from the front of the plane. Tack glue it to the wing with a drop or two of med/thick CA, but be very careful not to glue it to the fuselage.

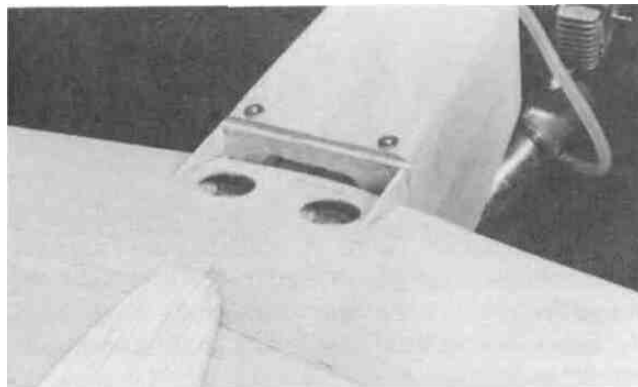


D 2. Glue the two 1/8" **balsa canopy bottom halves** (FUN1F03) together and sand them smooth. Glue the canopy bottom in place in front of the canopy back. Align the center of the bottom with the center of the canopy back and the joint between the right and left leading edge sheeting.

D 3. Using scissors, carefully cut the **canopy** (CANPY047) along the trim line. Sand the edges smooth and test fit the canopy in place. Trim or sand it if needed so the canopy will fit nicely. Do not glue the canopy in place until after the plane is covered.

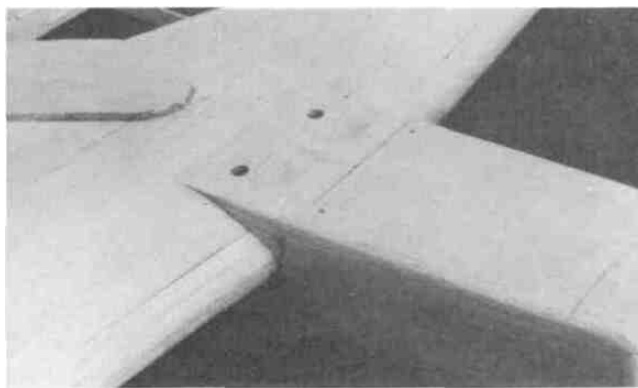
BUILD THE WING FAIRING

D 1. Sand the 3/32" **die-cut balsa wing fairing front** (FUN1F07) to fit down against former F2B. The top edge of the fairing front should be 1/16" lower than the top of the hatch. Use two pieces of paper as a shim between former F2B and the fairing front to allow for the thickness of the covering material.



D 2. Sand off the "die-cut bumps" on the 3/32" **die-cut balsa fairing sides** (FUN1F07) and then sand them to fit between the fairing front and the wing. The tops of these pieces should be 1/16" below the top of the hatch. Glue the sides and the front pieces in place but **be careful not to glue them to the fuselage**.

D 3. Remove the wing from the fuselage and remove the wing bolts from the wing. Add med/thick CA to all of the fairing joints and canopy back. Test fit the two 3/32" **balsa fairing tops** (FUN1F07) in place and sand them to achieve a good fit. Glue these in place and sand the tops flush with the front.



D 4. Drill a 1/4" hole through the fairing tops by inserting the drill through the wing bolt plate holes from the bottom of the wing. Enlarge these holes so the wing

bolts will fit back in, then reinstall the wing. Sand the fairing to blend in with the fuselage and the wing. Add filler where necessary to make a nice smooth fairing. Note: If you want to only have small holes to insert a screwdriver through and keep the bolts captive, make marks on the wing and hatch showing the center of each bolt. Then, after gluing the tops into place, drill a hole from the top of the wing just large enough to get your screwdriver through. When doing this the threaded portion on the bolts can be no longer than 5/8". If you ever break a wing bolt (which is not probable) it will be necessary to enlarge these holes to replace the bolt, but it looks nicer with small holes.

SHAPING AND SANDING

D 1. Using a sanding block and 80-grit sandpaper, sand the fuselage comers to a rounded shape. Refer to the cross-sections on the fuse plan, and try to sand the corners to the same shape as shown on the plan.

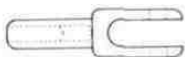
D 2. Vacuum the entire structure thoroughly, then inspect for any poorly glued joints and gaps. Apply additional glue and/or balsa filler as necessary, then sand the entire fuselage and wing smooth.

INSTALL PUSHRODS AND RADIO COMPONENTS

(ONE AILERON SERVO):

D 1. Mount the servo in the wing using the screws provided with the radio.

D 2. Screw the nylon **aileron clevises** (NYLON21) approximately 2/3 of the way onto the threaded end of the two **12" steel wire pushrods** (WIRES 16).



Nylon Aileron Clevis

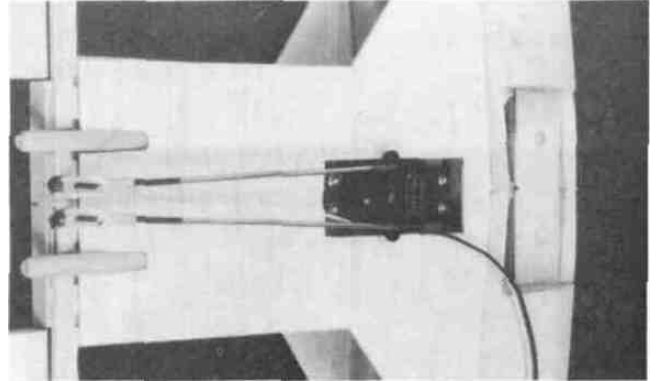
D 3. Screw the nylon **aileron clevis connectors** onto the aileron torque rods.



Nylon Clevis Connector

D 4. Cut two arms off of a 4-arm servo horn and install the horn on the servo. The horn should be parallel to the wing TE.

D 5. Attach the clevises to the clevis connectors, then, with the ailerons in the neutral position, mark the pushrod wires where they cross the holes in the servo arm. Remove the pushrods and make a **"Z-bend"** in the rods at that point, using a "Z-bend pliers" or a standard pliers.



D 6. Remove the servo wheel from the servo and work the Z-bends into the wheel (**NOTE:** You may have to enlarge the servo wheel holes with a 5/64" diameter drill bit). Replace the servo wheel and check the operation of the ailerons. (See page 33 for the recommended amount of aileron movement).

(TWO AILERON SERVOS):

D 1. Mount the servos in the wing using the screws provided with the radio.

D 2. Cut three arms off of a 4-arm servo horn and install a horn on each servo. The horns should be parallel to the wing TE and pointing towards the tips of the wing.

D 3. Screw a nylon clevis (NYLON 17) onto each 12" threaded steel pushrod (WIRES 16). **NOTE: Screw them on all the way until the threads are protruding inside the clevis.**

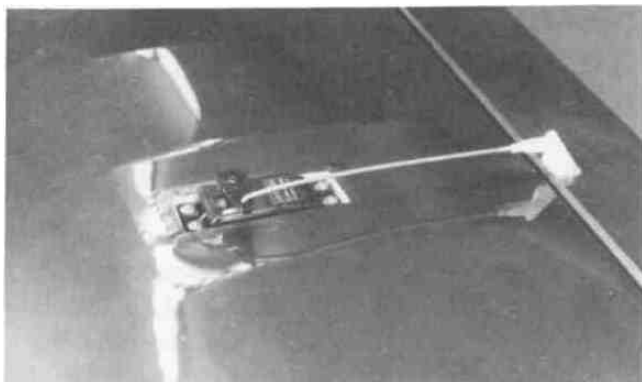


Nylon Clevis

D 4. Tack glue a **nylon control horn** (NYLON03) onto each aileron, directly behind the outer side of each servo. The front of the control horn should be just behind the bevel on the aileron. Mark where the mounting holes should be and drill a 3/32" hole for each screw.

D 5. Snap the nylon clevis onto the control horn (the second hole from the outside) and lay the pushrod across the servo horn.

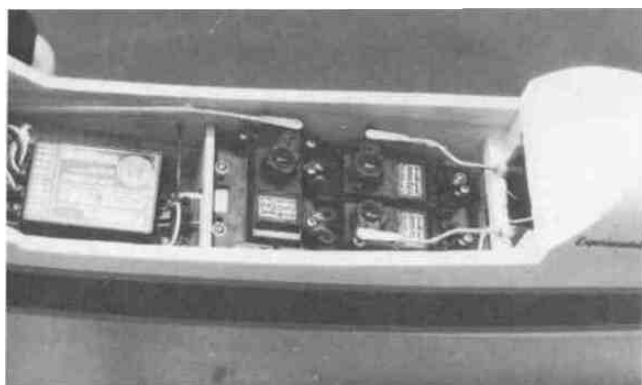
D 6. Mark where the pushrod wires cross the holes in the servo horn. Remove the pushrods and make a Z-bend in the rods at that point.



D 7. Work the Z-bends into the servo horns (use a hole approximately 1/2" from the center of the horn) and snap the clevis back onto the control horn. Check the operation of the ailerons. (See page 33 for the recommended amount of aileron movement and page 36 for the correct direction of movement).

ELEVATOR, RUDDER AND THROTTLE SERVOS

REMEMBER: Plan your servo installation carefully, as your setup may differ from the plans and photos, depending on which engine you use.



D 8. Mount the elevator, rudder and throttle servos in the fuselage using the 1/4" x 3/8" x 2-3/4" basswood

servo rails (FUN1F19). If you have a servo tray for 3 servos that will fit you can use it on top of the servo rails. **NOTE:** when mounting these servos make sure they are as close to the fuselage bottom as possible. The servo rails are cut to fit on the ledge formed by the fuselage doubler but they can be cut to fit between the doublers so the servos can be installed lower in the fuselage.

D 9. Tack glue the nylon control horns (NYLON03) on the elevator and rudder in the positions shown on the plan and mark the mounting hole locations. Drill 3/32" holes at these locations. Remove the horns.

IMPORTANT!

D 10. Harden the balsa in the area of the control horns (on both sides of all control surfaces) by poking several holes with a pin, then applying thin CA glue. Sand smooth.

D 11. Mount the horns with 2-56 screws (SCRW002) and the nylon nutplates which were attached to the horns.



2-56 x 5/8"

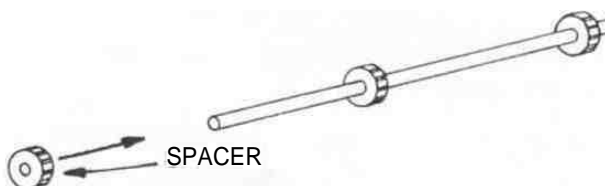
Machine Screw



Nylon Nut Plate

D 12. Screw a **nylon clevis** (NYLON 17) onto the threaded end of each long steel wire pushrod (WIRES 17). **NOTE: Screw them on all the way until the threads are protruding inside the clevis.**

D 13. Cut the short length of **1/8" diameter plastic tube** (PLTB014) into several pieces, approximately 1/4" long. Slide at least six of these pieces onto each of the long pushrod wires and space them approximately 2-1/2" apart (do not glue yet). **NOTE:** If these tubes do not slide on easily, cut them to a shorter length.



NOTE: While installing the pushrods, position the above plastic tube spacers so they always stay inside the pushrod

guide tubes. If the tubes are not a tight friction fit on the pushrod wires, apply a drop of thin CA to secure them.

D 14. Insert (he **pushrod wires** into the pushrod guide tubes (previously installed) and attach the clevises to the elevator and rudder horns.

D 15. While holding the rudder and elevators in the **neutral** position, mark where the pushrod wires cross the holes in the servo wheels where each pushrod will be attached.

D 16. Remove the elevator and rudder pushrods and make "**Z-bends**" at the marks you just made. Cut off the excess pushrod wire.

D 17. Unscrew the nylon clevises, re-insert the pushrods, and replace the clevises. Remove the servo wheels and work the Z-bends into the holes (drill out the holes in the servo wheels to 5/64" if necessary). Finally, place the servo wheels back onto the servos and check the operation of the elevator and rudder.

**We recommend the following
CONTROL SURFACE THROWS:**

NOTE: Throws are measured at the **widest part** of the elevator and rudder.

ELEVATOR: (High Rate)... .1/2" up 1/2" down
(Low Rate)3/8" up 3/8" down

RUDDER: (High Rate)... .As much as possible
(Low Rate)1" right 1" left

AILERONS: (High Rate)... .3/4" up 3/4" down
(Low Rate)1/2" up 1/2" down

FLAPERONS (for dual aileron servos only): This is something you will have to play with to suit your flying style and balancing position. A good place to start with is 30% of the elevator throw on computer radios. This is about 3/8" of aileron (flap) travel at full elevator travel (1/2"). Be careful when setting (his up so that full aileron/elevator/flap throw does not bind the servo or over extend the ailerons.

NOTE: Too much elevator throw will cause the plane to roll or snap out of tight loops and high angle of attack maneuvers.

NOTE: If your radio does not have "dual rates", then set up the control surfaces to move at the **low rate** throws for sport flying, and **high rate** throws for "HOT DOGGING".

D 18. Securely anchor the pushrod guide tubes to F-4 using cross-braces cut from scrap 1/8" balsa.

D 19. Attach the throttle pushrod to the throttle. **NOTE:** We recommend using a DuBro "E-Z connector" (or similar) for this hookup, for ease of installation and adjustment. **HINT:** Solder the flex cable pushrod where it will pass through the E-Z connector, then sand the cable until it fits through the hole in the connector.

D 20. Hook up your radio system and test the operation of all controls.

INSTALL RECEIVER, SWITCH AND BATTERY

D 1. Wrap your receiver and battery in plastic bags, then wrap with foam rubber.

D 2. Secure the **battery** to the fuselage between F-2 and F-3. The battery must be secure, but must be surrounded by foam rubber to protect it from hard vibrations. **NOTE:** If you later find the airplane to be nose-heavy, it may be necessary to move the battery behind former F4. If you do put the battery there it is very important to properly secure it so it doesn't move around.

D 3. The receiver should also be positioned in the area between F-2 and F-3.

D 4. Route the receiver **antenna** in one of the following ways:

- a. Route the antenna along the inside of the fuse (in the radio compartment) and out of the fuse side just behind the servos. Anchor the antenna to the top of the fin with a rubber band.
- b. From the receiver, run the antenna directly through the left fuse side, then back to the stab.
- c. Install another "pushrod guide tube" (not supplied) along the inside of the fuse, along the bottom, exiting just forward of the tailcar. Insert the antenna through the tube, and leave the excess length trail behind.

D 5. Mount the on-off switch to the front of F-3 using double-sided "servo tape," or in the servo tray, and run a 1/16" pushrod wire out the left side of the fuse, so you can operate the switch without removing the wing.

FINISHING

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.

D 1. 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 2. Temporarily attach the wing and engine (with muffler) to the fuselage.

D 3. With the wing level, lift the model by the engine propeller shaft and the bottom of the rudder (this may require two people). Do this several times.

D 4. If one wing always drops when you lift, it means that side is heavy. Balance the airplane by gluing weight to the other wing tip. **NOTE: An airplane that has been laterally balanced will track better in loops and other maneuvers.**

FINAL SANDING

D 1. Nearly every imperfection in your wood structure will show through the covering material; therefore, before covering, you should make a final check of the entire structure. Fix any "dings," then sand the entire structure smooth using progressively finer grades of sandpaper.

COVERING

D 1. Because it is assumed that you have had some previous model building experience, we won't go into detail in regard to the covering procedure. **Follow the instructions included with your covering material.**

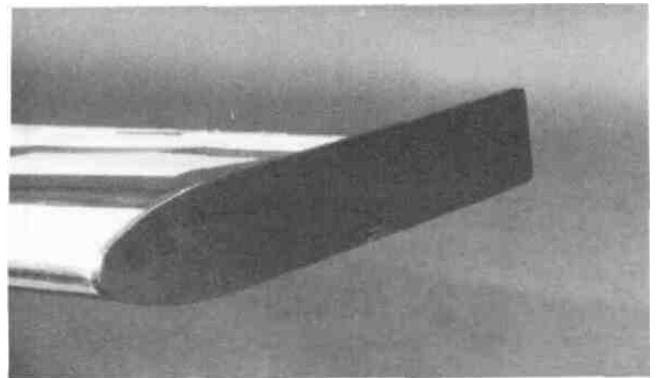
NOTE: When covering the fin and stab, begin by apply-

ing 1/2" wide strips of covering in the corners between the fin and slab, and (on the bottom of the stab) between the slab and the fuse sides. Next, cover the stab and fin with pre-cut pieces that have a straight edge to overlap (1/8"+overlap) the strips you previously applied. **DO NOT, under any circumstances, attempt to cut the covering material after it has been applied to the fin and stab, except around the leading and trailing edges and the tip.** Modelers who do this often cut through the covering and part-way into the balsa stab. This can weaken the stab to the point where it may fail in flight!

Recommended Covering Sequence:

1. 1/2" Strips as described in above note
2. Rudder left side
3. Rudder right side
4. Bottom of elevators
5. Top of elevators
6. Stab bottom
7. Stab top
8. Fuse bottom
9. Fuse sides
10. Turtle deck
11. Hatch
12. Fin left side
13. Fin right side
14. Bottom of ailerons
15. Top of ailerons
16. Bottom of left wing panel
17. Bottom of right wing panel
18. Top of left wing panel (overlap covering 1/4" at wing LE)
19. Top of right wing panel (overlap covering 1/2" at the center and 1/4" at the LE)
20. Wing tips (both sides)

ATTACH THE WING TIPS



D 1. Hold the wing tips against the tip ribs. Make sure they are lined up properly and use a felt tip marker to mark, on the tip, around the airfoil. Cut the covering away from

the inside of the airfoil shape you just drew. Try to stay approximately 1/8" inside the line. Glue the wing tips in place with med CA.

GLUE THE HINGES

D 1. Lay the rudder, elevators and ailerons on the plans and mark on the leading edge of each part the locations of the hinges, torque rods and tailgear. Now use a sharp Xacto knife 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. In the same manner, slit the covering at the hinge locations in the wing, stab and fin TE. Also cut the covering away from the torque rod and tailgear slots.

D 2. The proper method for installing the "**Laminated Hinges**" is as follows (elevator is used as an example):

1. Slide all hinges halfway into the elevator hinge slots, then insert the hinges into the hinge slots in the stabilizer.
2. Adjust the position of the elevators so they match the stab at the tips. Pull the elevators away from the stab a tiny bit (approximately 1/64", or the thickness of 4 sheets of paper).
3. Verify that the elevators will move up and down without binding.
4. With a pointed applicator tip, apply several drops of thin CA glue to the top and bottom of each hinge.
5. Using a folded tissue, immediately absorb any excess CA glue that may have gotten onto the covering material.
6. After the glue hardens, the elevators will seem quite stiff. Working the elevators fully up and down several times will loosen them up.

D 3. Using coarse sandpaper, roughen the part of the aileron torque rods that will be glued into the ailerons, then clean off the sanded portion of the rods with alcohol or a degreasing solvent. Roughen and clean the tailgear wire in the same manner. Using a toothpick, apply a small amount of Vaseline where the torque rods and tailgear wire enters the nylon bearing tubes (to prevent glue from getting inside and locking them up).

D 4. Using a small stick, work a generous amount of epoxy into the tailgear hole in the rudder and the tailgear bearing slot in the aft end of the fuselage, push the rudder and rudder hinges into place and **wipe off all** excess

epoxy. Now carefully position the rudder with respect to the fin, and glue the hinges with thin CA, in the same manner as the elevator hinges.

D 5. Using a small stick, work a generous amount of **epoxy** into the aileron torque rod holes. Push the ailerons and aileron hinges into place and **wipe off all** excess **epoxy**. Now carefully position the ailerons with respect to the wing, and glue the hinges with thin CA, in the same manner as the elevator hinges.

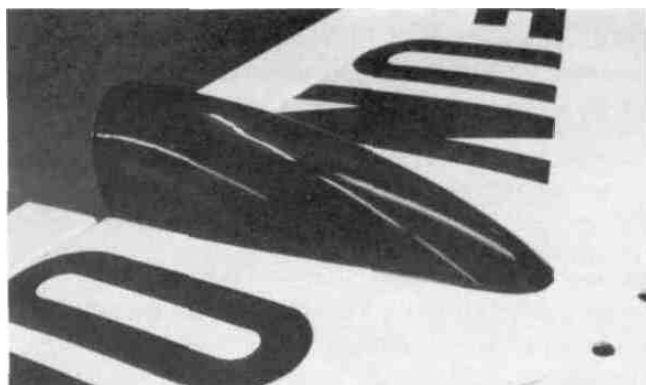
GLUE CANOPY IN PLACE

NOTICE: The canopy in this kit may have a thin protective coating on both sides. **Peel off this film before attempting to tint or glue the canopy.**

D 1. Some modelers prefer to tint their canopies. You may tint your canopy by immersing it in a concentrated mixture of Rit powdered dye and hot tap water. Remove the canopy every 5 minutes and rinse it off to check the amount of tint. The hotter the water and the longer you leave it in the dye solution the darker it will tint. **CAUTION:** Do not heat the dye water above tap water temperature, as this could deform the canopy.

D 2. Paint or trim the cockpit area as desired. 400 grit wet-or-dry sandpaper glued to the canopy base and back makes a simple but nice looking cockpit floor.

D 3. Lightly sand the inside of the canopy around the edge (sand a strip approximately 1/8" wide). **NOTE:** To avoid sanding more than you want, it is helpful to first apply strips of masking tape on the inside of the canopy, 1/8" in from the edges.



D 4. Hold the canopy in place on the fuselage and very carefully apply medium viscosity CA glue around the edges. To control the amount of CA, it is very helpful to use the small diameter teflon applicator tubing which is supplied with most CA glues, or use a "Z-End" applicator tip.

D 4. The unsightly glue that is visible now can be hidden by applying striping tape around the base and back of the canopy.

WING SEATING

D 1. Apply 1/4" wide foam **wing seating tape** to the wing saddle area to seal the wing/fuse joints.*

D 2. Also apply a couple pieces of the roam tape to the 1/4" ply wing hold-down plate, which helps to distribute the load when the nylon bolts are tightened.

***NOTE:** An alternate method of sealing the wing/ruse joint is to use "**silicone bathtub sealer**". This is an excellent method, used by many experts because it results in a permanent and nearly perfect wing saddle joint. Briefly, the technique is as follows: 1. Cover the top of the wing center section with waxed paper or plastic kitchen wrap. Pull out all wrinkles and tape it to the wing. 2. Squeeze out a bead of silicone sealer onto the wing saddle area of the fuselage. 3. Lay the wing in into saddle and push down gently. The excess silicone sealer will squeeze out. 4. Allow to dry without disturbing for **at least 24 hours**. 5. Remove the tape, then remove the wing from the saddle (leaving the waxed paper or plastic wrap in place). 6. Gcnily pull the waxed paper or plastic wrap away from the sealer. 7. Using a new single-edge razor blade, trim the sealer flush with the fuse sides.

BALANCE YOUR MODEL

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

D 1. Accurately mark the balance point on the bottom of the wing on both sides of the fuselage. The balance point is shown on the plan (CG), and is located approximately 35% back from the leading edge at the midpoint of each wing panel (7-3/8 inches forward of the trailing edge of the ailerons). This is the balance point at which your model should balance for your first flights. Later, you may wish to experiment by shifting the balance up to 1/4" forward or back to change the flying characteristics. Moving the balance forward may improve the smoothness and arrow-like tracking, but it may then require more speed lor takeoff and make it more difficult to slow down

for landing. Moving the balance **aft** makes the model more agile with a ligliler and snappier "feel" and often improves knife-edge capabilities. In any case, do not balance your model outside the recommended range.

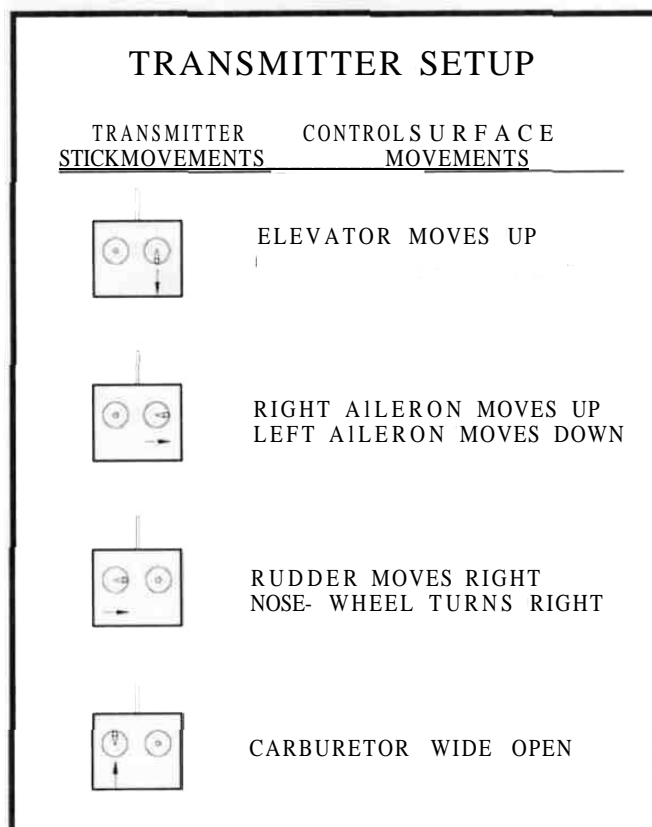
D 2. With the wing attached to the fuselage, all parts of the model installed - wheels, spinner, etc. (ready to fly), and an **empty** fuel tank, hold the model with the stabilizer level.

D 3. Lift the model at the CG marks. If the tail drops when you lift, the model is "tail heavy" and you must add weight* to the nose to balance. If the nose drops, it is "nose heavy" and you must add weight* to the tail to balance. **NOTE:** Nose weight may be easily installed by using a Prather "Spinner Weight" (available in assorted weights, up to 2 ounces), or by gluing strips of lead into the tank compartment. Tail weight may be added by using Prather "stick-on" lead weights, and, later, if the balance proves to be OK you can open the fuse bottom and glue these in permanently.

*If possible, first attempt to balance the model by changing the position of the receiver and battery. If you arc unable to obtain good balance by doing so, **then** it will be necessary to add weight to the nose or tail to achieve the proper balance point.

FINAL HOOKUPS AND CHECKS

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



D 2. Adjust your pushrod hookups as necessary to provide the proper control surface movements as listed on Page 33.

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

D 3. Check for wing twist as follows:

NOTE: Even if you have built your wing on a perfectly flat surface and used utmost care, it is possible that your wing may have a twist due to uneven shrinking of the covering material. **You must check for this condition and correct it before the First flight.**

If you do not own a **wing incidence meter**, we recommend that you purchase one from your local hobby dealer or borrow one from another modeler. With the wing mounted to the fuselage, use the incidence meter to check the angle of your wing at the root and at the tips. If the incidence meter reveals a wing twist of more than 1/4 degree, you must grasp the wing at the tip and twist it slightly, while reheating the covering material. Keep checking, twisting and reheating until the wing twist is removed. **NOTE:** If you have corrected a wing twist by this method, you should periodically re-check to make sure the correction has held.

PRE-FLIGHT

CHARGE THE BATTERIES

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

FIND A SAFE PLACE TO FLY

The best place to fly your R/C model is an AMA (Academy of Model Aeronautics) chartered club field. Ask your hobby shop dealer if there is such a club in your area and join. Club fields are set up for R/C flying which makes your outing safer and 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. (The AMA address is listed on the front cover of this instruction book).

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

GROUND CHECK THE MODEL

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

RANGE CHECK YOUR RADIO

Wherever you do fly, you need to check the operation of the radio before every time you fly. This means with the transmitter antenna collapsed and the receiver and transmitter on, you should be able to walk at least 100 feet away from the model and still have control. Have someone help you. Have them stand by your model and, while you work the controls, tell you what the various control surfaces are doing.

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

ENGINE SAFETY PRECAUTIONS

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

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

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

Use safety glasses when starting or running engines.

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

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

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

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

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

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

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

AMA SAFETY CODE

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

GENERAL

1. I will not fly my model aircraft in competition or in the presence of spectators until it has been proven to be airworthy by having been previously successfully flight tested.
2. I will not fly my model aircraft higher than approximately 400 feet within 3 miles of an airport without notifying the airport operator. I will give right of way to, and avoid flying in the proximity of full scale aircraft. Where necessary an observer shall be utilized to supervise flying to avoid having models fly in the proximity of full scale aircraft.
3. Where established, I will abide by the safety rules for the flying site I use, and I will not willfully and deliberately fly my models in a careless, reckless and/or dangerous manner.

RADIO CONTROL

1. I will have completed a successful radio equipment ground check before the first flight of a new or repaired model.
2. I will not fly my model aircraft in the presence of spectators until I become a qualified flyer, unless assisted by an experienced helper.

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

FLYING

The Great Planes FUN-ONE is a great flying sport airplane that flies smoothly and predictably, yet is highly maneuverable. It does **not** have the self-recovery characteristics of a primary trainer, therefore you must either have mastered the basics of R/C flying or seek the assistance of a competent R/C pilot to help you with your first flights.

TAKEOFF: If you have dual rates on your transmitter, set the switches to "low rate" for takeoff. Although the FUN-ONE has great low speed characteristics, you should always build up as much speed as your runway will permit before lifting off, as this will give you a safety margin in case of a "flame-out". When you first advance the throttle and the tail begins to lift, the plane will start to turn left (due to engine torque and P-Factor). Be ready for this, and correct by applying sufficient right rudder to hold it straight down the runway. The left-turning-tendency will quickly go away as soon as the tail is up and the plane picks up speed. When the plane has sufficient flying speed, lift off by smoothly applying a little up elevator (don't "jerk" it off to a vertical climb!), and climb out gradually.

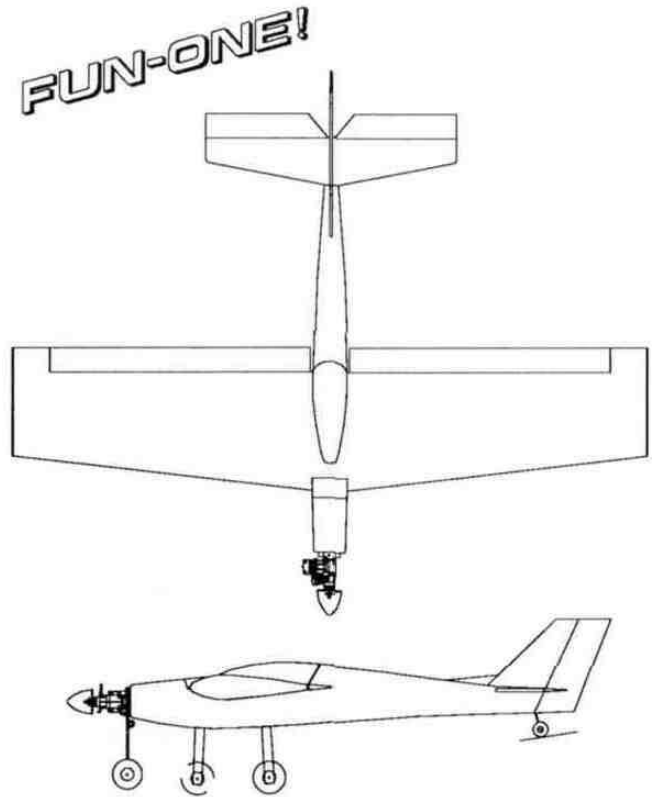
FLYING; We recommend that you take it easy with your FUN-ONE for the first several flights and gradually "get acquainted" with this fantastic ship as your engine gets fully broken-in. Practice one maneuver at a time, learning how she behaves in each one. For ultra-smooth flying and normal maneuvers, we recommend using the "low rate" settings as listed on page 33. "High rate" elevator and rudder may be required for crisp snap rolls and spins. "High rate" rudder is best for knife edge. Speed is the key to good knife-edge performance. Do not exceed the recommended "high rate" throws for the elevator, as this will only result in unstable flight when full elevator is applied.

You will learn many interesting maneuvers by just flying the FUN-ONE and trying different things. The one thing to keep in mind while "free-style" flying like this is to always stay in control and think about the control inputs so you don't get disoriented.

2-VIEW DRAWINGS

USE THIS FOR PLANNING YOUR TRIM SCHEME

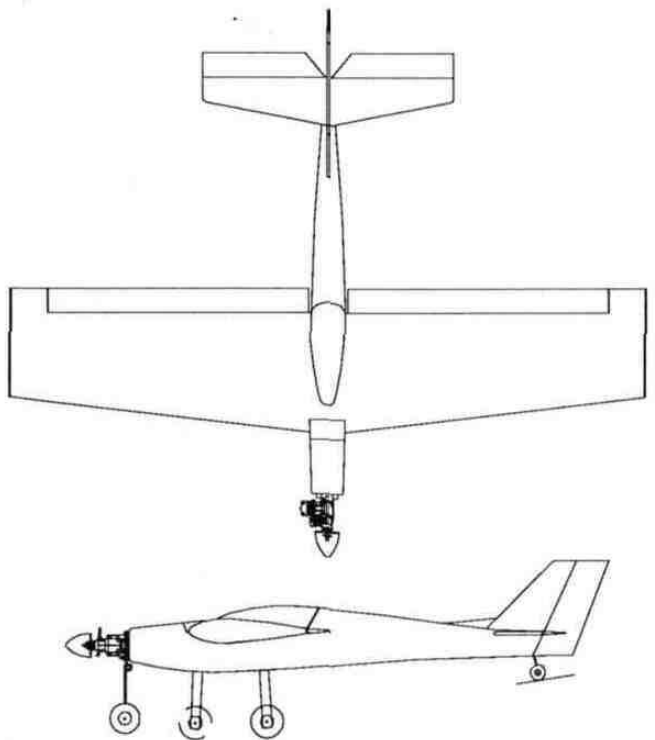
CAUTION (THIS APPLIES TO ALL R/C AIRPLANES): If, while flying, you notice any unusual sounds, such as a low-pitched "buzz", this may be an indication of control surface "flutter". Because flutter can quickly destroy components of your airplane, any time you detect flutter you must **immediately** cut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



LANDING: When it's time to land, fly a normal landing pattern and approach. You will find that the FUN-ONE will slow up very well and land very nicely and predictably. If your FUN-ONE is built straight and true, you'll find that you can really flare it out for slow, nose-high, full-stall landings without fear of tip stalling.

Have a ball! But always stay in control and fly in a safe manner.

GOOD LUCK AND GREAT FLYING!



**SEE THE FULL LINE OF GREAT PLANES
AIRPLANES AT YOUR HOBBY DEALER.
WE HOPE YOU WILL SELECT ANOTHER
"GREAT PLANE" AS YOUR NEXT PROJECT.
THANK YOU!**

PART# QTY. DESCRIPTION

ITEMS PACKED INDIVIDUALLY

FUN1P01	1	Fuselage and Wing Plan
FUN1P02	1	Instruction Book
CANPY047	1	Clear Canopy
DECAL001	1	Great Planes Decal
L-6U	1	Landing Gear
MM19D90	1	Motor Mount
PLTB011	2	Plastic Outer Pushrod Tube 24"
PTUBE001	2	1/2x 7-7/8 x .030 Paper Tube
WIRES16	2	Threaded Pushrod Wire (12")
WIRES17	2	Threaded Pushrod Wire (34")
FUN1F10	1	Balsa 3/16x3x3-3/4 Hatch
FUN1F15	1	Balsa 3/16 Turtle Deck Top
FUN1F16	1	Balsa 1/16 Turtle Deck Sheeting
FUN1F22	1	Balsa 1/8 Middle Bottom Sheet

SUB-PACK DIE-CUT PLYWOOD PARTS (FUN1A01)

FUN1F06	2	Ply 1/8 DC Front Fuselage Doubler
FUN1F08	1	Ply 1/8 DC Former
FUN1F09	1	Ply 1/8 DC Formers & Front Bottom
FUN1W01	2	Ply 1/8 DC Ribs 1A, B, D, 2A, Aligner
FUN1W06	1	Ply 1/32 DC Dihedral Braces

SUB-PACK LARGE Balsa SHEETS (FUN1A02)

FUN1F02	2	Balsa 1/8 DC Rear Fuse Side
FUN1F04	1	Balsa 1/8 DC Rear Fuse Sheet

SUB-PACK MEDIUM Balsa SHEETS (FUN1A03)

FUN1F01	2	Balsa 1/8 DC Lower Fuse Front
FUN1F03	2	Balsa 1/8 DC Upper Frt. Side/Can. Base
FUN1F05	1	Balsa 3/32 DC Rear Fuse Doubler
FUN1F07	1	Balsa 3/32 DC Misc. Fuse Parts

SUB-PACK MEDIUM WOOD PARTS (FUN1A08)

FUN1F14	6	Balsa 1/8x3/16x18 Stringers
FUN1S03	1	Basswood 1/8 Stab Brace
FUN1W17	4	Balsa 1/8 x 3/8 x 15 Spar Doubler

SUB-PACK SMALL Balsa SHEETS (FUN1A04)

FUN1W12	4	Balsa 1/16 Wing Center Sheet
FUN1W14	2	Balsa 3/32 Shear Web Sheet

SUB-PACK DIE-CUT Balsa RIBS (FUN1A05)

FUN1W02	2	Balsa 1/8 DC Ribs 1C, 2B & 2C
FUN1W03	2	Balsa 3/32 DC Ribs 3 & 4
FUN1W04	2	Balsa 3/32 DC Ribs 5, 7 & 8
FUN1W05	2	Balsa 3/32 DC Ribs 6, 9 & 10

SUB-PACK LONG WING PARTS (FUN1A06)

FUN1S05	1	Balsa 1/4 Shaped Elevator
FUN1W07	1	Balsa 3/8 Shaped LE Set

PART QTY. DESCRIPTION

FUN1W08	1	Balsa 3/8 Shaped TE Set
FUN1W10	2	Balsa 7/16 Shaped Aileron
FUN1W11	4	Balsa 1/16 Wing Sheeting

SUB-PACK LONG STICKS (FUN1A07)

BAL143	2	Balsa Triangle 1/4x30
FUN1S01	3	Balsa 1/4 Stab/Fin Frame
FUN1S02	1	Balsa 1/4 Stab/Fin Ribs
FUN1S04	1	Balsa 1/4 Stab/Fin Ends
FUN1W09	4	Balsa 1/4 x 3/8 x 28 Spar

SUB-PACK SMALL WOOD PARTS (FUN1A09)

DOWEL037	2	1/4Dia. x 5-3/4 Dowel
FUN1F11	1	Balsa 3/16 Hatch Front
FUN1F12	1	3-Ply 1/16 Hatch Hold Down
FUN1F13	1	5-Ply Landing Gear Plate
FUN1F17	1	Basswood 1/4 Hatch Hold Down Block
FUN1F18	1	5-Ply 1/4 Wing Bolt Block
FUN1F19	2	Basswood 1/4 Servo Rail
FUN1F20	1	5-Ply Shaped Firewall
FUN1F21	1	Balsa 1/8 Sq. x 4 Filler
FUN1W13	1	5-Ply 1/8 Shaped Wing Joiner
FUN1W15	1	5-Ply 1/4 Wing Bolt Plate
FUN1W16	4	Basswood 1/4 Wing Servo Rail

SUB-PACK HARDWARE (FUN1M02)

NUTS001	6	4-40 Blind Nut
NUTS010	4	6-32 Hex Nut
NYLON02	4	Nylon Control Horn
NYLON13	2	Nylon 1/4-20 x 2 Bolt
NYLON16	1	Nylon 5/32 Steering Arm
NYLON17	4	Nylon Clevis
NYLON20	2	Nylon Non-Threaded Swivel
NYLON21	2	Nylon Clevis
NYLON53	1	Nifty Hinges - Strip of 20
PLTB014	1	Yellow Inner Pushrod Tube 4-1/4"
SCRW002	8	2-56 x 5/8 Machine Screw
SCRW004	4	#4 x 1/2 Sheet Metal Screw
SCRW005	1	6-32 x 1/8 Socket Head Set Screw
SCRW020	1	6-32 x 1/4 Machine Screw
SCRW024	2	#2 x 3/8 Pan Head Screw
SCRW031	2	4-40 3/8 Round Head Screw
SCRW052	4	4-40 x 5/8 Machine Screw
SCRW055	2	6-32 x 1-1/2 Socket Head Screw
WBNT075	1	Nose Gear
WBNT128	1	Tail Gear
WBNT145	1	Elevator Joiner
WBNT153	1	Aileron Torque Rods (L & R)
WHCL005	2	Wheel Collar 5/32
WSHR005	4	#4 Flat Washer