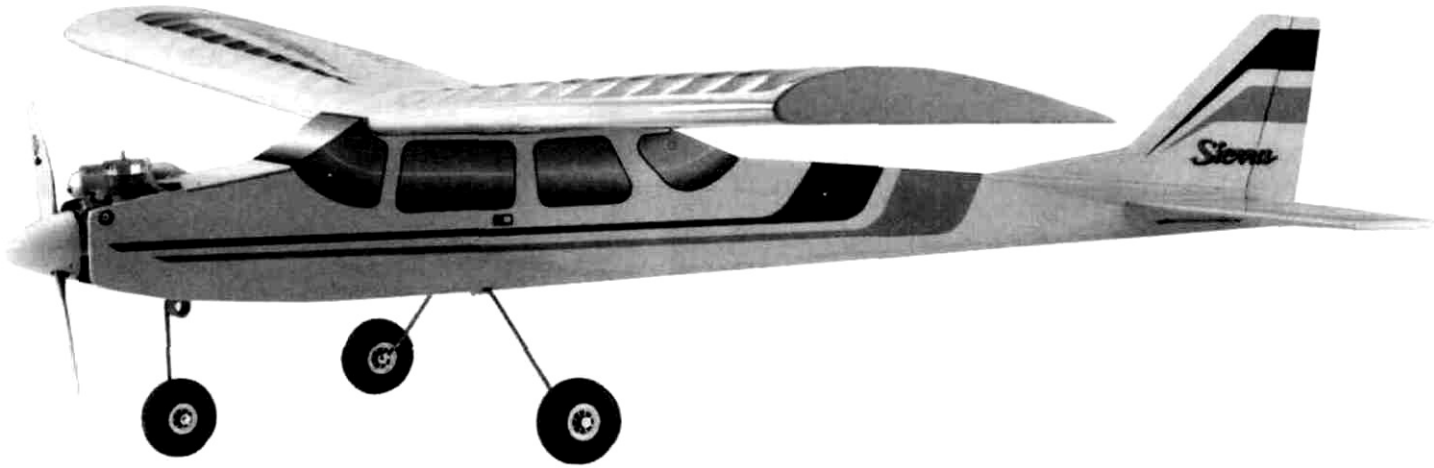
INSTRUCTION BOOK

Sierra™



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

In that Top Flite 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.

TOP FLITE®

TOP FLITE MODELS, P.O. BOX 721, URBANA, IL 61801

TECHNICAL ASSISTANCE - CALL (217) 398-6300

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

TABLE OF CONTENTS

WARNING! THIS IS NOT A TOY!

The model you will build from this kit 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 to test fly 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 to become properly insured before you attempt to fly the 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 FLYING INSTRUCTOR IN YOUR AREA.

Academy of Model Aeronautics
1810 Samuel Morse Drive
Reston, VA 22090 (703) 435-0750

INTRODUCTION

Thank you for purchasing the Top Flite ***GOLD EDITION*** **Sierra.**

The Top Flite Sierra is an excellent trainer model designed to get you off to a great start in learning to build and fly. After you learn to fly, the Sierra also has enough maneuverability to perform most basic aerobatics and provide many hours flying enjoyment.

The easy construction, great lines, and included decals make it easy for you to build a great-looking model.

The Top Flite Sierra is designed to fly as good **as** it looks. Its thick, flat-bottom wing offers strong lift **at** slow speeds and great strength. The computer-designed, interlocking structure allows you to build a straight and true model with smooth confidence-boosting flight qualities.

Please inspect all parts carefully before starting to build! If any parts are missing, broken or defective, or if you have any questions about building or flying this model, please call us at (217) 398-6300 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 your time to **build straight true** and **strong.**

3. You must use a proper R/C **radio** that is in first class condition, the correct **engine** size 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 to make certain that the model has remained structurally sound. Be sure to check external nylon clevises often. Replace them if they show signs of wear.

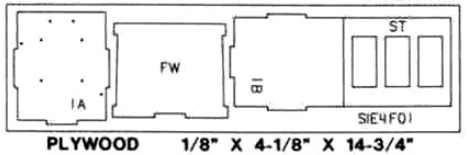
6. You must **fly** the model **only with the competent help** of a well experienced R/C pilot, if you are not already an experienced R/C pilot at this time.

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

Remember: Take your time and follow the directions to complete a well-built model that is straight and true.

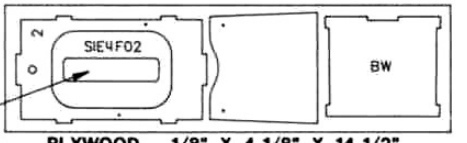
DIE PATTERNS

SIE4F01 — 1 PER KIT



PLYWOOD 1/8" X 4-1/8" X 14-3/4"

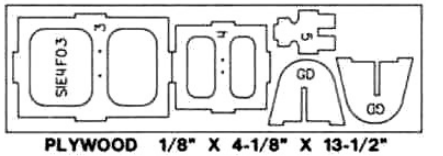
SIE4F02 — 1 PER KIT



HATCH RETAINER

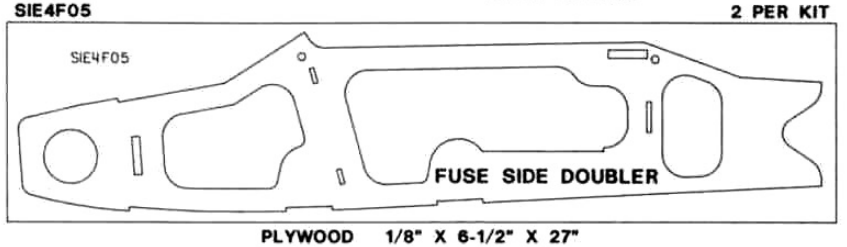
PLYWOOD 1/8" X 4-1/8" X 14-1/2"

SIE4F03 — 1 PER KIT



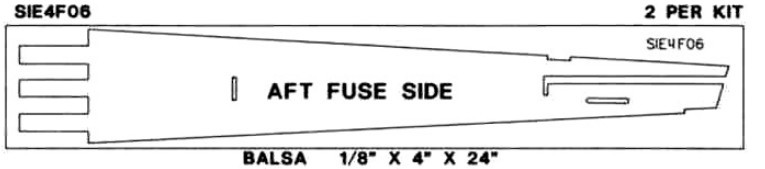
PLYWOOD 1/8" X 4-1/8" X 13-1/2"

SIE4F05 — 2 PER KIT



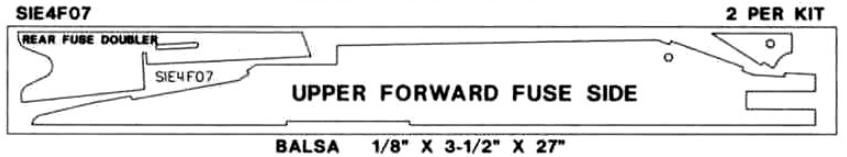
PLYWOOD 1/8" X 6-1/2" X 27"

SIE4F06 — 2 PER KIT



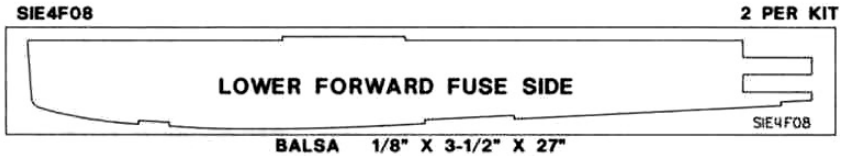
BALSA 1/8" X 4" X 24"

SIE4F07 — 2 PER KIT



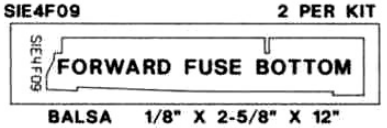
BALSA 1/8" X 3-1/2" X 27"

SIE4F08 — 2 PER KIT



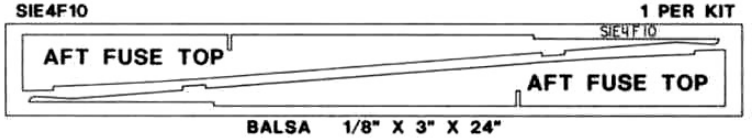
BALSA 1/8" X 3-1/2" X 27"

SIE4F09 — 2 PER KIT



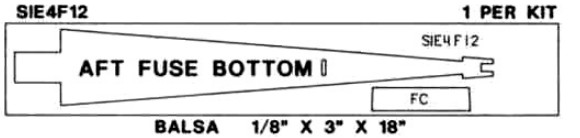
BALSA 1/8" X 2-5/8" X 12"

SIE4F10 — 1 PER KIT



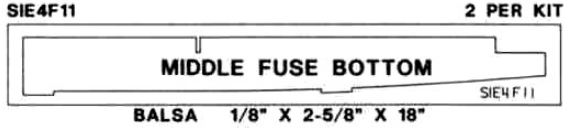
BALSA 1/8" X 3" X 24"

SIE4F12 — 1 PER KIT



BALSA 1/8" X 3" X 18"

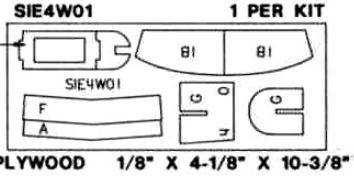
SIE4F11 — 2 PER KIT



BALSA 1/8" X 2-5/8" X 18"

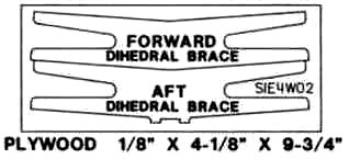
SIE4W01 — 1 PER KIT

AILERON SERVO TRAY PARTS



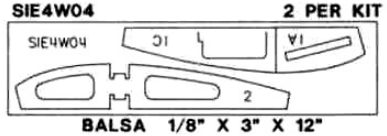
PLYWOOD 1/8" X 4-1/8" X 10-3/8"

SIE4W02 — 1 PER KIT



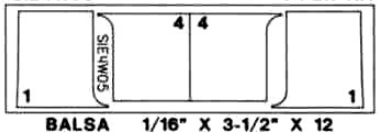
PLYWOOD 1/8" X 4-1/8" X 9-3/4"

SIE4W04 — 2 PER KIT



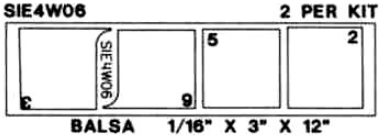
BALSA 1/8" X 3" X 12"

SIE4W05 — 1 PER KIT



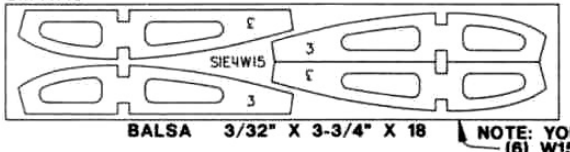
BALSA 1/16" X 3-1/2" X 12

SIE4W06 — 2 PER KIT



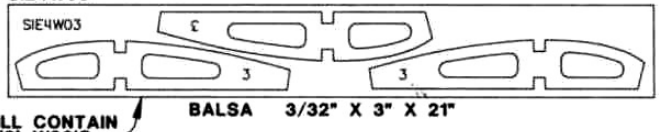
BALSA 1/16" X 3" X 12"

SIE4W15



BALSA 3/32" X 3-3/4" X 18

SIE4W03



BALSA 3/32" X 3" X 21"

NOTE: YOUR KIT WILL CONTAIN (6) W15'S --OR-- (8) W03'S DEPENDING ON WOOD AVAILABILITY

EARLY IN THE BUILDING SEQUENCE

ENGINE AND MOUNT SELECTION

The recommended engine size range is as follows:

.28-.40-.46 cu. in. 2-cycle
.40-.48-.60 cu. in. 4-cycle

NOTE: The displacement in bold type is the most highly recommended. However, all of these engines will fly the Sierra well.

The supplied MM40 motor mount should hold most of the two strokes in the range and some of the four strokes. It is permissible to file the inside of the mount slightly to fit larger engines (see photo on page 28). Some engines may require you to buy a different mount from your hobby dealer. Study the plans and the engine mounting section of this bookformore information and sample installations.

BOLT-ON OR RUBBER BAND-ON WINGS

The Sierra has been designed and tested with rubber band-on or bolt-on wings. The rubber band on wings will better absorb the shocks of a crash or landing accident such as a cartwheel. If you have a good instructor and flying site or already have some flying experience, you may want to use the bolt-on wing option.

3 OR 4 CHANNELS

The Sierra flies very well with or without ailerons. The 3-channel version will be cheaper and easierto build. The 4-channel version offers the extra flexibility of aileron control. Ailerons make cross wind take offs and landings easier to control, so many instructors recommend ailerons.

TRICYCLE OR TAILDRAGGER GEAR

The tricycle landing gear is considered standard. We recommend the tricycle gear if this is your first airplane because it offers the best ground handling as well as straight ahead take offs and landings. The tricycle gear also does a better job of protecting the propeller during bouncy take offs and landings. If you are sport flying the Sierra or want to learn to fly a taildragger, provisions have been made to allow you to build the Sierra as a taildragger. The Great Planes #L-7 tail wheel assembly may be purchased from your dealer and modified slightly to match the drawing on the fuselage plans.

SELECTION OF WHEELS

The standard recommended wheels are two 2-3/4" main wheels and one 2-1/2" nose wheel. If you are flying off grass or an uneven surface, you may wish to use larger wheels than those recommended. The standard wheels have been tested off of grass and work fine, but 3" wheels all the way around would work even better.

If you will be flying a taildragger off of grass, we recommend using 3" to 3-1/4" main wheels and a 1" to 1-1/4" tailwheel.

OTHER ITEMS REQUIRED

- ❏ Three or Four-channel radio with 3 or 4 servos
- ❏ Engine
- ❏ Propellers (Top Flite Power Point recommended-see engine instructions for sizes)
- ❏ 2-1/4" Prop Spinner
- ❏ Fuel Tank (Most 6 to 10 oz. tanks will tit)
- ❏ 2-3/4" Main Wheels (2)
- ❏ 2-1/2" Nose Wheel (1) (or 1" Tailwheel)
- ❏ 5/32" Wheel Collars - (4-6)
- ❏ Top Flite MonoKote"

*Model shown covered with 2 rolls of Yellow, plus Missile Red, and Orange for trim

- ❏ Silicone Fuel Tubing
- ❏ Latex Foam Rubber Padding (1/4" thick)
- ❏ #64 Rubber Bands (10-12 for rubber band-on wings)
- ❏ 1/8" Foam Wing Seating Tape (optional)

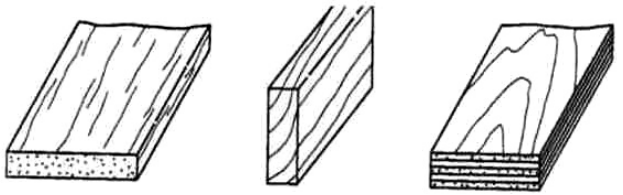
SUGGESTED SUPPLIES AND TOOLS

- ❏ 2 oz. Thin CA Adhesive (Hobbico Bullet Glue is Recommended)
- ❏ 2 oz. Medium CA Adhesive (Hobbico Bullet Glue is Recommended)
- ❏ 15-Minute Epoxy (Hobbico Bullet Glue is Recommended)
- ❏ Hand or Electric Drill
- ❏ Drill Bits: 1/16", 3/32", 1/8", 5/32", 3/16", 1/4"
- ❏ Top Flite Heat Sealing Tool
- ❏ Top Flite Heat Gun
- ❏ Hobby Saw (X-acto Razor Saw)
- ❏ X-acto Knife, #11 Blades
- ❏ Pliers
- ❏ Screw **Drivers**
- ❏ T-Pins
- ❏ Straightedge
- ❏ Short ruler
- ❏ Masking Tape (Suggested **for construction)**
- ❏ Sandpaper (coarse, medium, fine **grit)***
- ❏ T-Bar Sanding Block (or similar)
- ❏ Waxed Paper
- ❏ Lightweight Balsa Filler
- ❏ 1/4-20 Tap. Tap Wrench (optional bolt **on wings)**
- ❏ Isopropyl Rubbing Alcohol (70%)
- ❏ Dremel Moto Tool or similar (optional)

NOTE: On our workbench, we have four 11" T-Bar sanders, equipped with #80, #100, #150, and #220-grit sandpaper. This setup is all that is required for almost any sanding task. Sanding blocks can be made from balsa for sanding hard to reach spots. We also keep some #320-grit wet-or-dry sandpaper handy for finish sanding before covering

COMMON ABBREVIATIONS USED IN THIS BOOK AND ON THE PLANS:

Deg. = Degrees
Elev = Elevator
Fuse = Fuselage
LE = Leading Edge (front)
LG = Landing Gear
❑ = Box to check after step is completed.
Lt = Left
Ply = Plywood
Fit = Right
Stab = Stabilizer
TE = Trailing Edge (rear)
" = Inches



Balsa **Basswood** **Plywood**

GET READY TO BUILD

❑ 1. Unroll the plan sheets. Re-roll the plans inside out to make them lie flat. The wing plan sheet has a cut-line across it. If you have a small building space you may cut the wing plan into two pieces along this line.

The fuselage plan sheet does not have a cut-line across it. It is used mostly for reference and not much building is done over it. There is not much benefit in cutting it apart, but you may do so if you wish.

❑ 2. Remove all parts from the box. As you do, figure out the name of each part by comparing it with the plans, die-cut patterns, 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 4 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 X-acto 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.

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

USING GLUE

There are two types of glue that are recommended for building this model: **CA** and **Epoxy.**

CA (cyanoacrylate) glue is used for general construction. It is available in a variety of viscosities. We recommend you have the following two types.

Thin CA has a viscosity similar to water and is used to glue together parts that fit together **very** well **and** do not require repositioning after glue is applied. Thin CA is especially effective for gluing balsa to balsa. It can be used to glue hardwoods such as plywood, spruce, or bass but it is usually necessary to fillet the joint afterwards with some medium CA. Thin CA has the ability to "wick" into joints. This means it will be drawn into very fine gaps between parts. This characteristic makes thin CA very useful for a lot of tasks, such as gluing seams that are already clamped together or installing CA hinges. Thin CA usually sets very rapidly, so do not expect to move parts at all after glue is applied. This rapid reaction may also produce fumes and a significant amount of heat. Always use CA glues in a well-ventilated area.

The other type of CA glue we recommend **is medium** (or gap filling). **Medium CA** is used in general construction for parts which have gaps, require slight repositioning, or involve hardwoods. Medium CA can be used to make small fillets between parts in high stress areas. Medium CA is a very good general purpose glue and many people use it for the majority of their building.

Some medium CA glues can be slow to set, especially when used to fill gaps. A product known as **CA accelerator** is available to speed things up. It is sprayed onto the joint **after** the glue is applied and chemically reacts with the glue causing it to set **very** rapidly. There are a few precautions to consider when using an accelerator...

Use it in a well ventilated area. The rapid reaction can release irritating fumes at a higher rate than normal. Do not use CA accelerator on thin CA!

Be careful when using the accelerator around plastics. Certain accelerators may attack some plastics and the vapors may **fog** clear canopies. It is best to test the glue and accelerator on a scrap piece of plastic if one is available.

Using too much accelerator may cause the CA glue to react very rapidly and literally boil. This will result in a joint with a chalky white color which is not nearly as strong as a normal joint.

Epoxy is used on high-stress joints that require toughness and vibration resistance. Epoxy also works well in areas that may encounter fuel. Its slower cure time allows parts to be clamped, checked, and realigned if necessary before the epoxy sets. Epoxy is available in many different formulas having different cure times. The single best type of epoxy to have available when building your Sierra is one that sets in 15 minutes, but you may also find 5-minute epoxy handy to have around.

NOTES ON SANDING

1. Use a block orT-barwhereever possible when sanding. The flat block will "ignore" glue and changing wood density and give you a true and even shape.

2. Always use fresh, sharp sandpaper. Sharp sandpaper will cut through glue and hard materials easily, giving an even surface. Older, dull sandpaper will require more pressure and may gouge the surface.

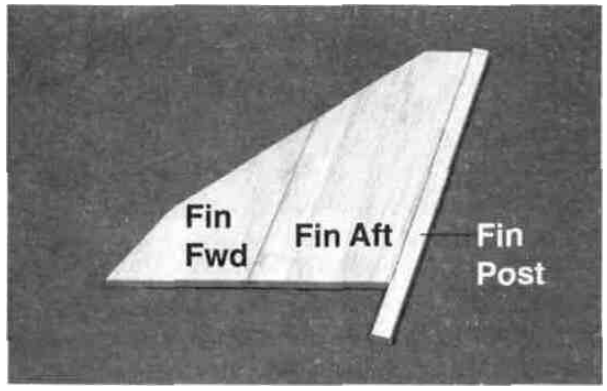
BUILD THE TAIL SURFACES

To build the tail surfaces, you will need **the following:**

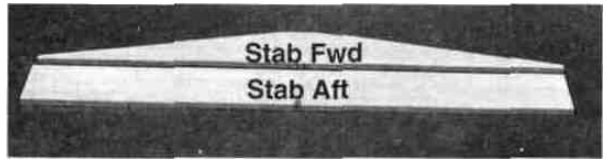
1/4" shaped balsa **fin fwd**
1/4" shaped balsa **fin aft**
1/4" shaped balsa **rudder**
1/4" shaped balsa **stab fwd**
1/4" shaped balsa **stab aft**
Tapered balsa **elevator**
1/8" bent wire **elevator joiner**

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

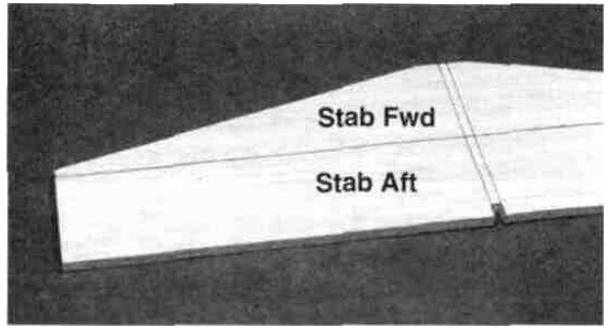
❑ 2. Put the shaped 1/4" balsa **fin fwd, fin aft,** and the 1/4" x 3/8" x 8-7/8" balsa **fin post** together and check how the parts fit. Block sand the mating surfaces until they fit well. Hold the parts together tightly and glue them together with thin CA. Immediately wipe off any excess glue with a quick stroke



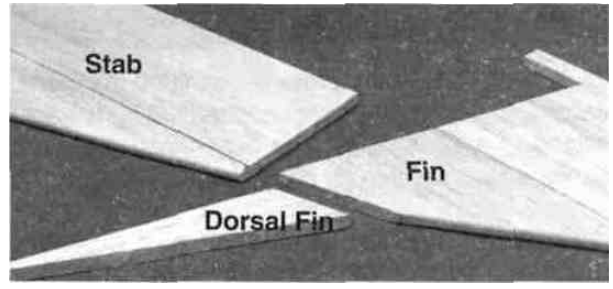
of a paper towel to make sanding easier. Flip the parts over and apply some thin CA to the other side of the joint.



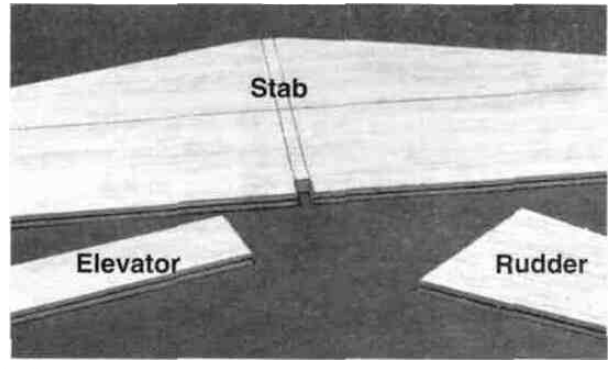
❑ 3. The notch in the shaped 1/4" balsa **stab aft** piece is positioned at the back edge of the stab so the fin post can protrude through the notch later when you are told to attach the tail surfaces to the fuselage. Glue the shaped 1/4" balsa **stab (stabilizer) fwd to** the **stab aft** in the same manner as the fin parts.



❑ 4. Block sand the surfaces of the fin and stab with 150 grit sandpaper to smooth out any unevenness. Carefully block sand the edges and ends to correct any slight bumps or mismatches. Align the notch at the back edge of the stab and the stab TE with the plans. Mark the fin location on the front edge of the stab. Draw two lines from these marks to the notch in the aft edge of the stab.

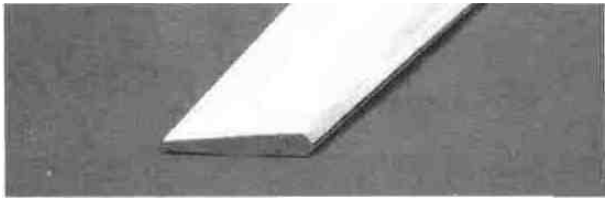


❑ 5. Refer to the cross section on the plans. Use a sanding block to round the stab leading edge (except the flattened center portion). Mark the location of the dorsal fin on the forward edge of the fin using the plans as a guide and round the fin only above the dorsal fin. The fin, rudder, and stab should have their tip edge corners rounded slightly for easier covering (see the cross sections on the fuselage plans).



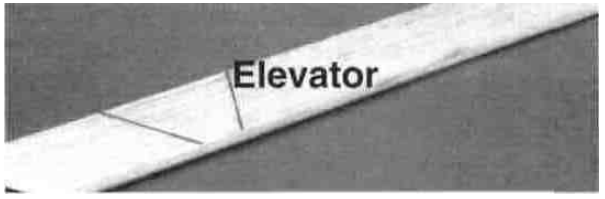
❑ 6. Use a smooth ball point pen to draw a

centerline along the **stab** trailing edge, tapered balsa **elevator** leading edge, fin trailing edge, and shaped 1/4" balsa **rudder** leading edge.



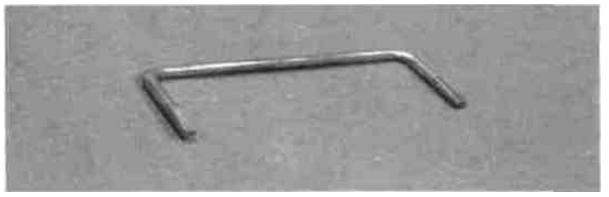
❑ 7. Referring to the cross sections on the plans, carefully block sand the elevator and rudder **leading edges** to a "V" shape. The centerlines you drew earlier should remain for hinging later.

NOTE: The rudder may be left at a constant thickness of 1/4" or you may taper it with a sanding block to match the top view on the fuselage plans. For a model that travels at a relatively slow speed such as this one, it is not necessary to taper the rudder to make the aircraft fly properly. If you want to taper it for appearance reasons, that is fine.

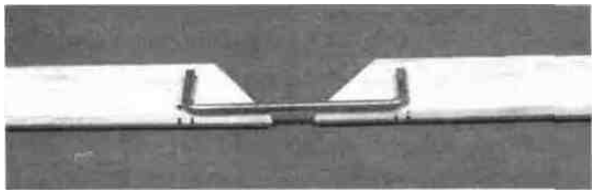


❑ 8. Hold the tapered **elevator stock** over the plans and mark the locations of the cuts at the center where the elevator is cut away to allow for rudder movement. Use a razor saw to cut away the right and left elevators.

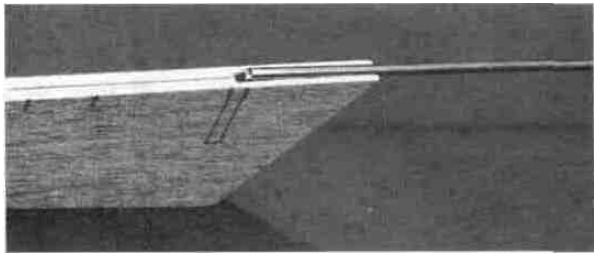
❑ 9. Locate the bent 1/8" wire elevator joiner. Use a flat file or a grinder to taper the ends slightly as



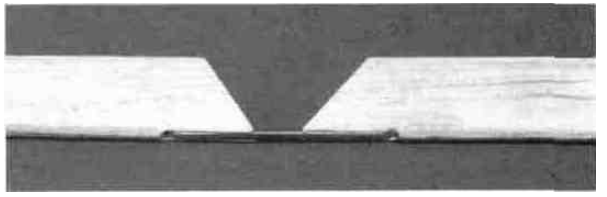
shown on the plans and in the photo. This will **make** it easier to align the elevators.



❑ 10. Lay the elevators and the elevator joiner over the plans. Mark where the joiner will insert into the elevators. Start the hole in the elevators by cutting a small 1/8" square notch with a sharp #11 knife. Carefully drill a 1/8" hole into each elevator to the depth shown on the plans. Use the knife to cut a groove in the front of the elevator at the root end for the joiner (as shown in the photo).



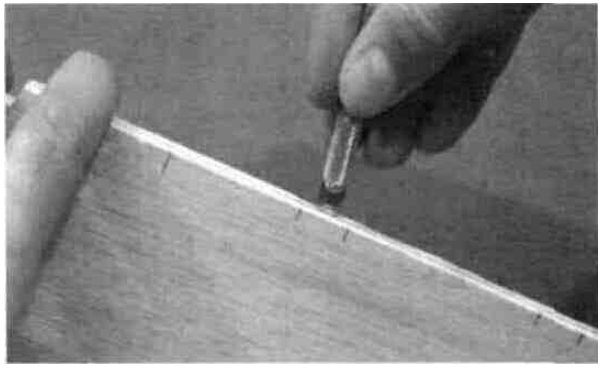
An alternate method to make a groove in a surface for a torque rod is to sharpen the end of an appropriately sized (1/8") brass tube from the inside with a #11 knife, then use the tube to cut out the notch for the torque rod.



❑ 11. Make sure the joiner wire will fit all the way into each elevator and that both elevators lie flat on the work surface with the joiner installed. Bend the joiner wire if necessary to make the elevators line up with each other. Rough up the joiner wire with coarse sandpaper and clean it with alcohol. Mix some 5-minute epoxy and use a tooth pick or piece of wire to push the epoxy into the hole and groove in the elevator. Push the joiner into the elevators and wipe away any excess glue. Lay the parts over the plans to aid in alignment while the glue sets. It is important that the elevator LE is straight so you will not have problems when you hinge it later.

❑ 12. After the epoxy is cured apply some thin CA to both sides of the balsa elevator over the joiner to 'harden' the area. Sand the cured glue smooth.

❑ 13. Place the fin and stab over the plans and mark the hinge locations on the trailing edges. Transfer the locations onto the elevator and rudder leading edges.



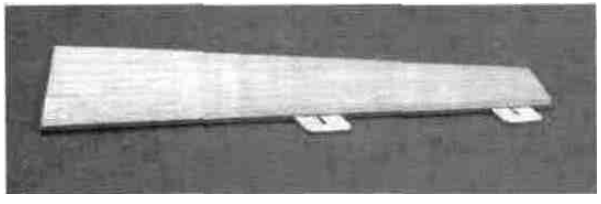
❑ 14. Cut the hinge slots using the technique described on the following page.

CAUTION!!! You must use extreme care to avoid cutting yourself when cutting hinge slots with an X-acto knife. If the balsa breaks while you are pushing on the knife, the blade could go into your hand before you know it! A good precaution is to wear leather gloves while performing this step.

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

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 forward and backward until the blade has reached the proper depth for the hinge.

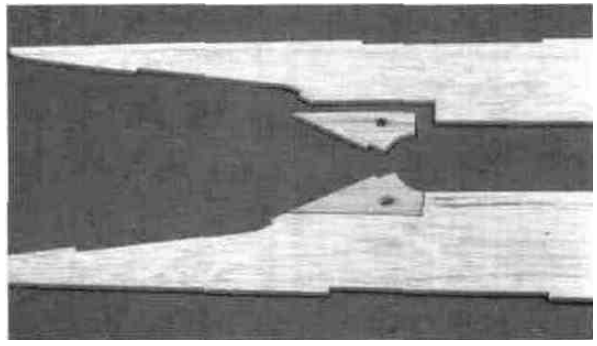
C. Trial fit the hinge into the slot. If the hinge is difficult to push in, re-insert the knife and move it back and forth in the slot a few times to enlarge the slot.



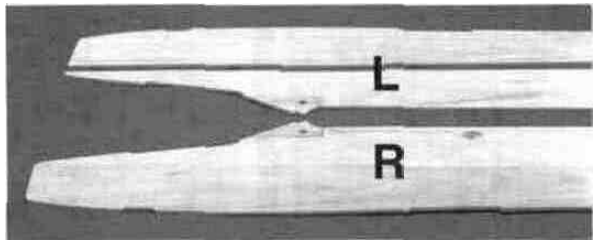
❑ 15. Trial fit the hinges in the slots and trial fit the rudder and elevator in place on the fin and stab. **Do not glue the hinges until after you have covered the model.**

BUILD THE FUSELAGE

❑ 1. Place the fuselage plan side view **on your work** table. Cover it with waxed paper.

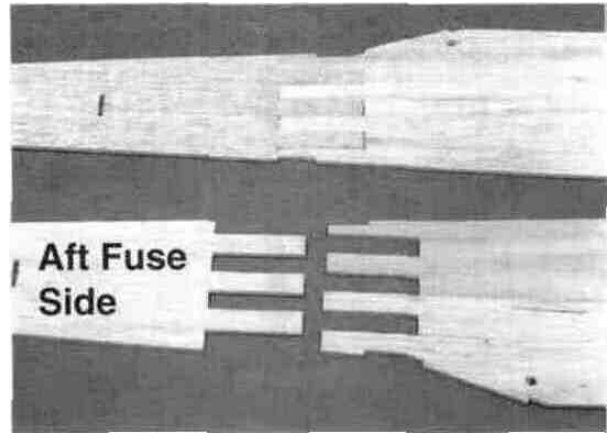


❑ 2. Use thin CA to glue the separately die-cut corner of the die-cut 1/8" balsa **upper forward fuse sides** in place as shown in the photo. These parts are located in the same die-cut sheets (SIE4F07). Remember that you will be making a right and a left fuselage side. You may wish to glue from opposite sides of the wood in order to reduce sanding.



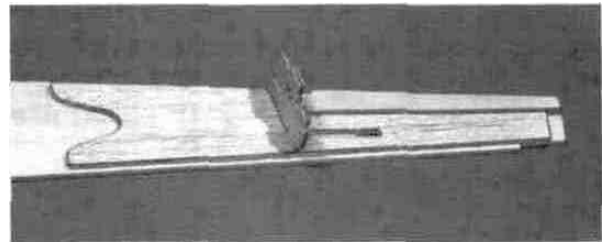
❑ 3. Glue the upper forward fuse sides to the die-cut 1/8" balsa **lower forward fuse sides** using thin CA. Mark the inside surface of the fuse sides with the letters **'R'** and 'L to designate the inside of the Right and Left fuselage sides. **Be sure to make a RIGHT and a LEFT fuselage side.**

NOTE: The plans may shrink or expand slightly due to humidity. Do not worry if the parts are not exactly the same size as the plans.



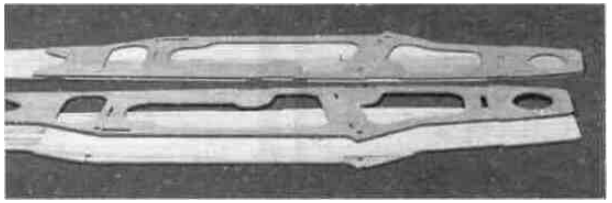
❑ 4. Plug the die-cut 1/8" balsa **aft fuse sides** into the forward fuse sides. Sand them lightly if necessary to make them fit. Before gluing be sure to align the parts over the plans. Any "bend" in the fuse sides will cause the fuselage to twist later. When the fuse sides are well aligned with the plans, glue the forward and aft pieces together with thin CA. Add medium CA to any joints that are not tight fitting.

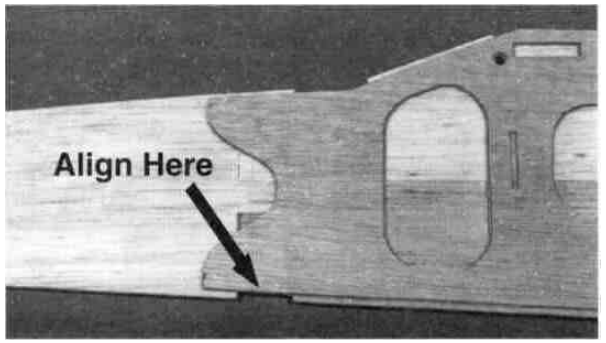
❑ 5. Use a sanding block to sand smooth all of the joints you have made on the fuse sides.



❑ 6. Position the die-cut 1/8" balsa **rear fuse doubler** in its place on the **inside** surface at the rear

of the fuselage side. Use the die-cut 1/8" plywood former F-5 to help you position the doubler (do not glue the former in until told to do so later). Notice that the pushrod exit holes do not line up (this is normal and makes the pushrod installation in later steps easier). Apply several beads of medium CA to the doubler and position it on the fuselage side. When it is aligned properly, press it firmly down to spread out the beads of glue. Repeat this step for the other side. **Be sure to make a RIGHT and a LEFT.**

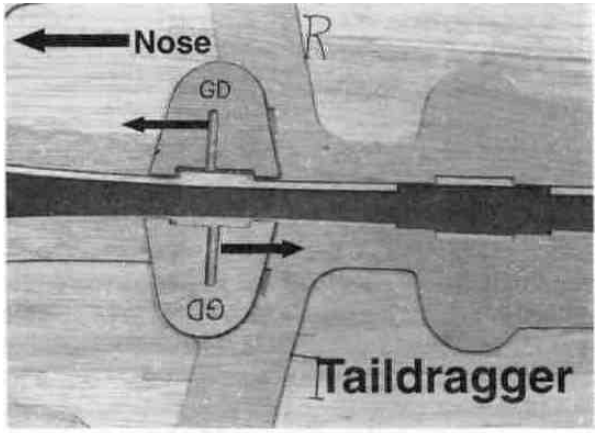


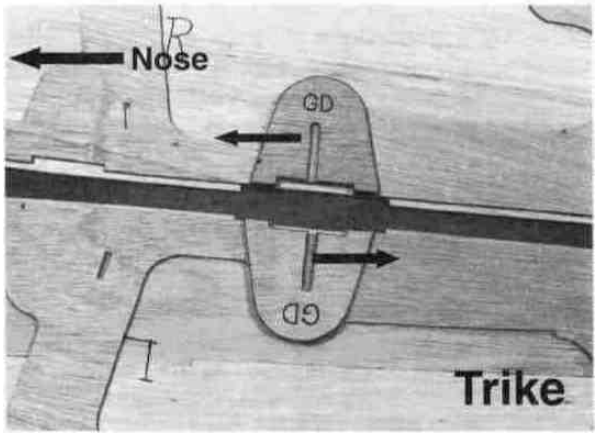


❑ **fuselage doubler** over the **inside** of the fuselage sides. Notice that it should fit perfectly at the very front of the fuselage, and then be offset 1/8" in from the edge of the fuselage sides most of the rest of the way back. The photos and plans will help you determine the proper location of the doublers. Use the front edges and the lock notch in the fuse side near the lower aft portion of the doubler to align the doubler.

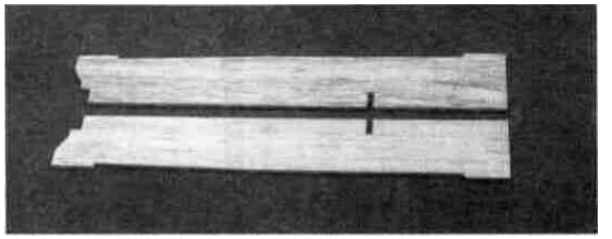
❑ 8. Apply medium CA to the doubler and press it carefully in position. Apply thin CA around the all edges of the doubler to reinforce it. Glue the doublers to the **inside** of both the **left** and the **right** fuse sides.

AT THIS POINT YOU MUST DECIDE WHETHER YOU ARE GOING TO BUILD A TAILDRAGGER OR A TRIKE GEAR MODEL. THE POSITION OF THE LANDING GEAR DOUBLER (GD) DEPENDS ON THIS.

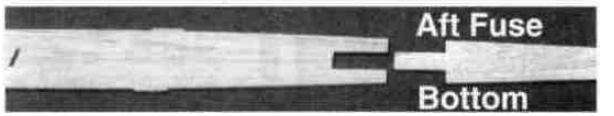




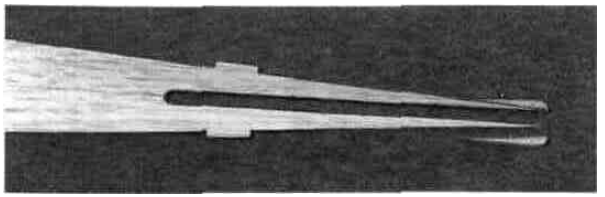
❑ 9. Study the fuselage plans in the landing gear area. The die-cut 1/8" plywood **gear doublers** (GD) may be placed in two different positions (forward for taildragger gear, aft for trike gear). Note also the off-center slot in the doubler. The slot should be off-center toward the aft end of the left fuselage side, and the forward end of the right fuselage side. Glue the gear doublers in the position chosen.



❑ 10. Glue the right and left die-cut 1/8" balsa **forward fuse bottom** pieces together with thin CA. Add medium CA to any gaps.



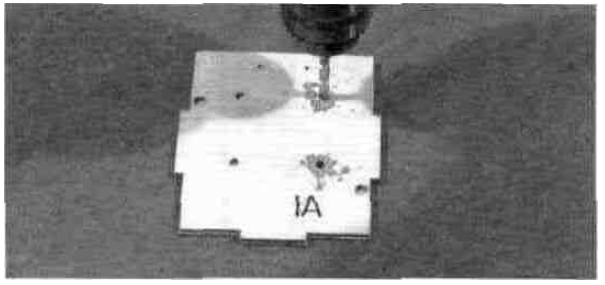
❑ 11. Glue the right and left die-cut 1/8" balsa **middle fuse bottom** pieces together with thin CA. Place the die-cut 1/8" balsa **aft fuse bottom** piece into the notch at the back end of the middle fuse bottom. Notice that there is a gap in the middle. This is for former F-4 to key into later. Check that these parts are properly aligned by positioning them over the fuselage top view on the plans. Glue with thin CA. Add medium CA to any gaps.



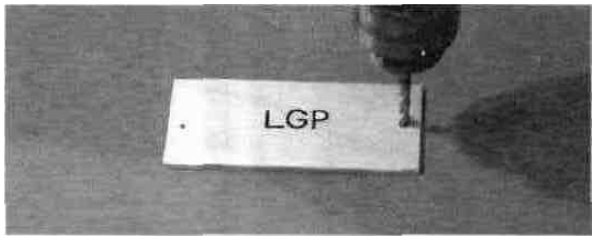
❑ 12. Glue the right and left die-cut 1/8" balsa **aft fuse top** pieces together with thin CA. Note the die-cut "bumps" at the aft end of the aft fuse top. Trim these off with a straightedge and a sharp knife.

❑ 13. Use medium CA to glue the die-cut 1/8" plywood firewall **F-1A (1A)** to **F-1B (1B).** F-1A is centered on the **slightly** larger F-1 B. Make sure the side of F-1A with the punch marks on it remains visible. (See the photo at step 14).

NOTE: For the following steps, refer to the firewall cross section drawing on the fuselage plans. At this point you must know which engine you will use. If you are using a recommended 2-cycle engine which fits into the supplied mount, all the punch marks on F-1A will be drilled to their appropriate size (in the following steps). If you are using a 4-cycle engine or an engine that requires a different mount, you will need to determine the mounting, throttle pushrod exit, steering pushrod exit, and fuel line exit hole locations for your installation. (HINT: Use the four standard mount punch marks on F-1A to help you locate an alternate mount by drawing an "X" between them to find the engine centerline). Regardless which engine you are using, mount it on this centerline.



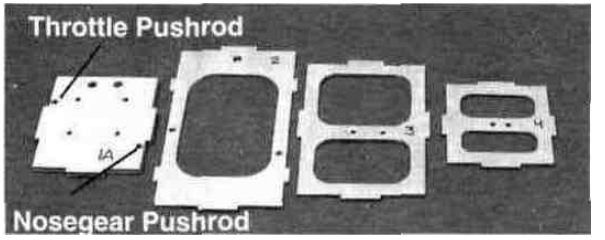
❑ 14. If you are using the supplied mount, drill the four punch marks in the middle of **F-1** with a 5/32" drill. Use the firewall (F-1) cross-section on the fuselage plans to positively identify these hole locations. While you have the 5/32" drill bit out, drill 5/32" holes through the two punch marks in the die-cut 1/8" ply **landing gear plate (LGP).**



❑ 15. Drill 1/4" fuel line exit holes at the top edge of F-1. The punch mark locations should be OK for most engine installations.

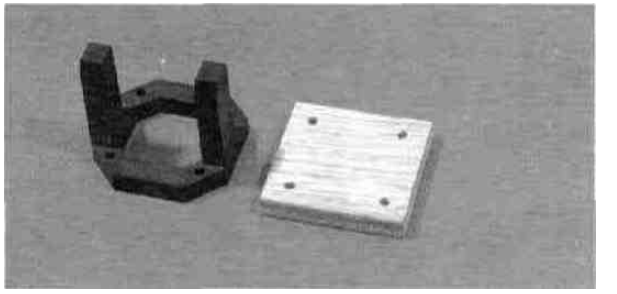
❑ 16. Drill a 3/16" throttle pushrod hole in F-1 in the location you determined. A punch **mark indicates** the "standard" pushrod exit location.

❑ 17. If you are using the tricycle landing gear, drill a 3/16" pushrod exit hole in F-1 at the appropriate punch mark location.

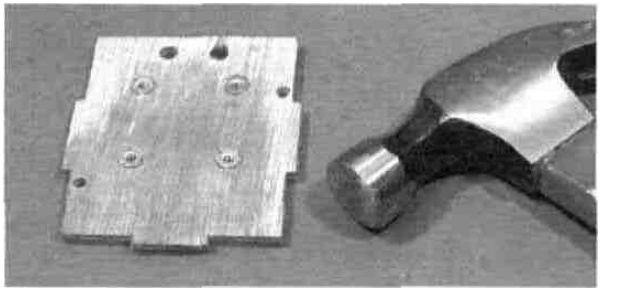


❑ 18. Drill 3/16" pushrod holes at the punch marks in die-cut 1/8" plywood formers **F-2 (2), F-3 (3),** and **F-4 (4).** Refer to the cross-sections on the fuselage plans to confirm the pushrod locations.

NOTE: At this point you should determine if you need to use the 9mm x 2" x 2" plywood spacer plate in your engine installation. Study the engine installation drawings on the fuse plan sheet. Short engines such as the OS .40 FP require the use of this plate. Longer engines such as the OS .40 SF or 4-cycle engines do not require the use of this plate.



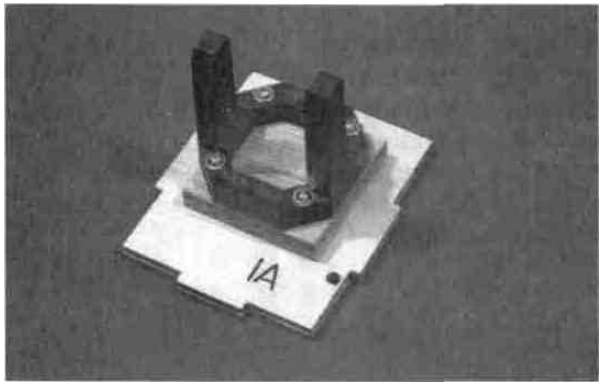
❑ 19. If you are using the 9mm spacer plate, center the MM40 motor mount on one side of the plate and mark the four mounting hole locations. Drill the holes in the spacer plate with a 1/8" drill bit.



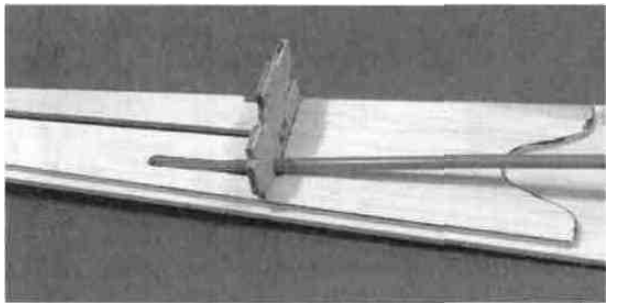
4-40 x 1" Machine Screw

No. 4 Flat Washer

❑ 20. Gently tap the **4-40 blind nuts** into the back (F-1 B) side of the firewall. Bolt the motor mount (and the 9mm spacer if required) to the firewall using the supplied **4-40 x 1" machine screws** and **#4 washers. Carefully** apply a small drop of thin CA to the

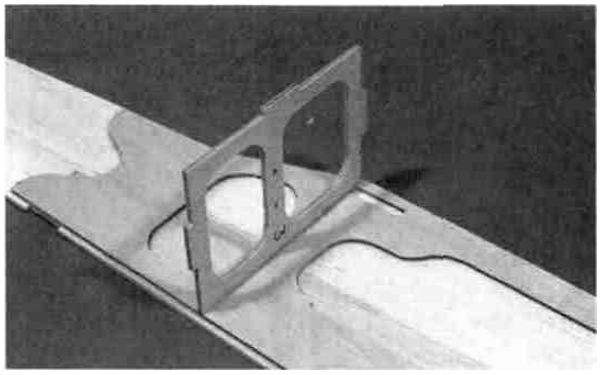


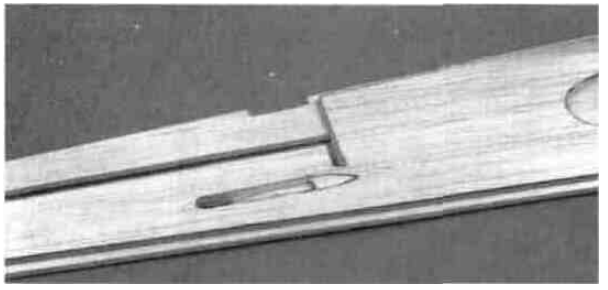
perimeter of the flange on each 4-40 blind nut. Remove the motor mount.

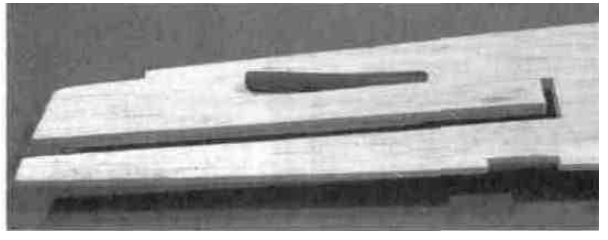


1/8" plywood former **F-5 (5)** in place to confirm a good fit.

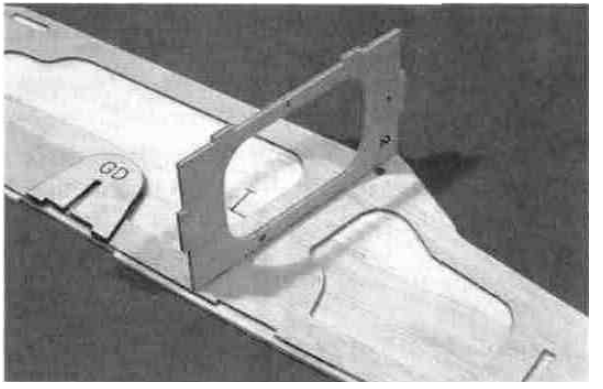
IMPORTANT NOTE: All formers (F-1 through F-5) are glued in with the stamped numbers facing **forward** and upright as shown in the photos. This is necessary to maintain proper pushrod routing.





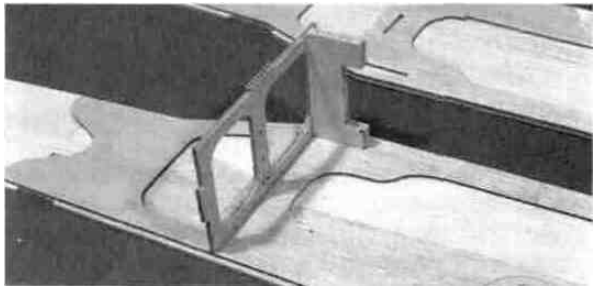


❑ 21. Use a small round file to blend the pushrod exits at the aft end of both the fuselage sides to allow the **outer pushrod tubes** to exit at the proper angle as shown on the fuselage top view and in the photos. If you do not have a file, use a #11 knife to shape the pushrod exits as shown in the photo. Hold die-cut

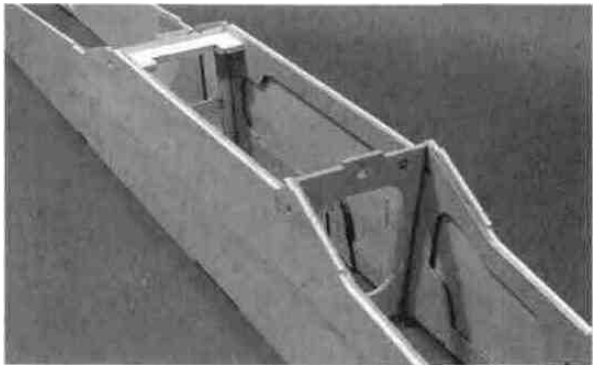


❑ 22. Use medium CA to glue the die-cut 1/8" plywood former **F-2B** to the left fuselage side. Use a 90 degree triangle to keep the former **perpendicular** to the fuse side while gluing.

❑ 23. Glue the die-cut 1/8" plywood former **F-3** to the left fuse side in the same manner as F-2. (The photo for this step is at the top of the next column).



❑ 24. Push the 1/4" ply **wing bolt plate** into position just ahead of F-3 but do **not** glue yet. If the fit of this plate is too tight, sand it slightly till it fits comfortably. (Install this plate for strength even if you are using rubber band-on wings.)

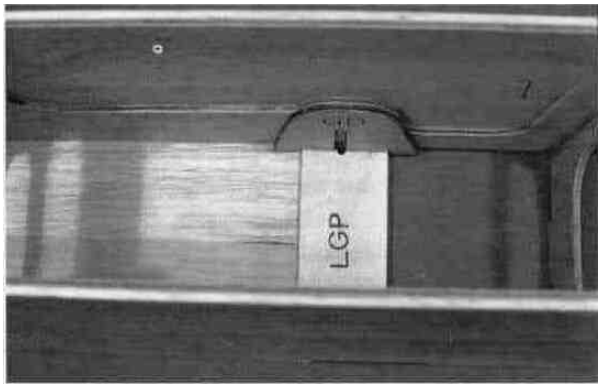


❑

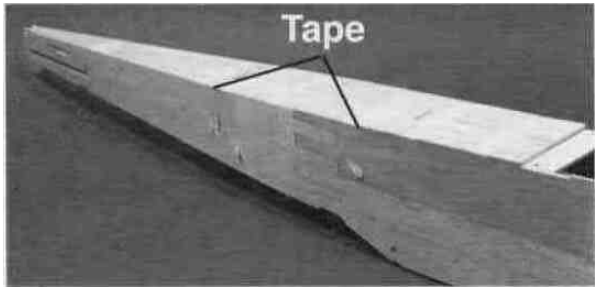
side structure. When all the alignment tabs on F-2

and F-3 are thoroughly engaged by the right fuselage side, turn the fuselage upright as shown in the photo and apply medium CA glue to the joints of the right fuse side and F-2 and F-3.

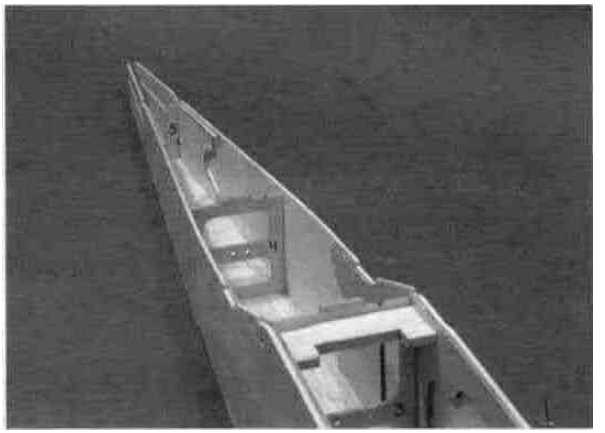
❑ 26. See the photo above step 29 for the proper position and orientation of the die-cut 1/8" plywood former **F-4.** Use medium CA to glue former F-4 in its place between the fuselage sides. Snap the die-cut 1/8" plywood former **F-5** into position at the back of the fuselage but **do not glue yet;** instead, use some masking tape to hold the fuselage together. Remember all of the former I.D. numbers face forward.



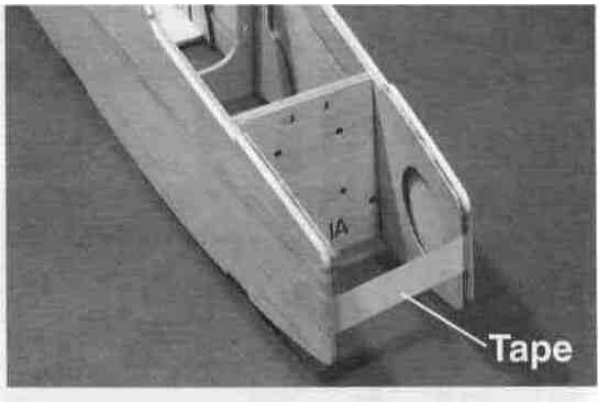
❑ 27. Snap the landing gear plate (LGP) into position at the fuse bottom. If you are building a taildragger, make a duplicate of LGP (but without the holes) out of scrap 1/8" balsa and substitute it at the tricycle LGP location. The plywood LGP will be installed in step 31 for the taildragger. Check to see that the holes for the landing gear line up with the slots in the gear doublers (GD). **Do not glue yet.**



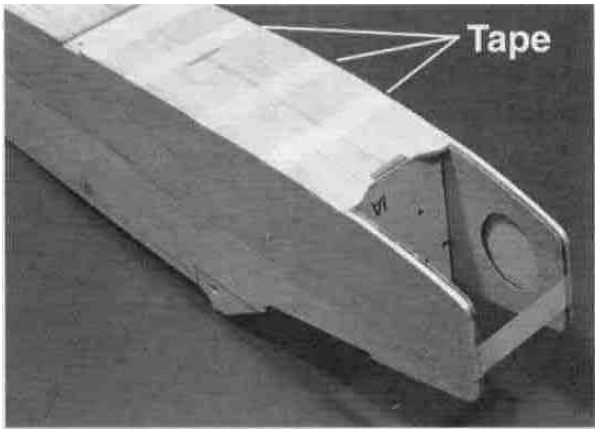
❑ 28. Work the aft fuselage bottom **pieces** (assembled earlier) into position between the fuselage sides, sanding if necessary for a good fit. Use some masking tape to hold the fuse together.



❑ **29.** Check the previously assembled, unglued parts for fit and alignment. Correct any problems. Apply medium CA from the inside of the fuselage to any unglued joints involving the following parts: F-3, F-4, F-5,and LGP. Use thin CA to glue the fuse bottom to the fuse sides from its front edge back to F-5. The very aft portion will be glued later when the tail surfaces are installed.



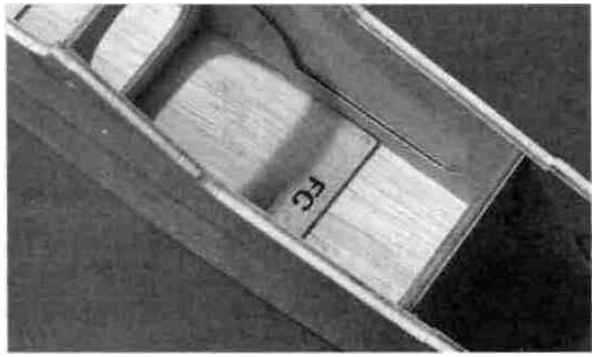
❑ 30. Position the firewall (F-1A/B) in place between the fuselage sides. Use a strip of masking tape to hold the fuse sides together at the front. Do not glue the firewall yet.



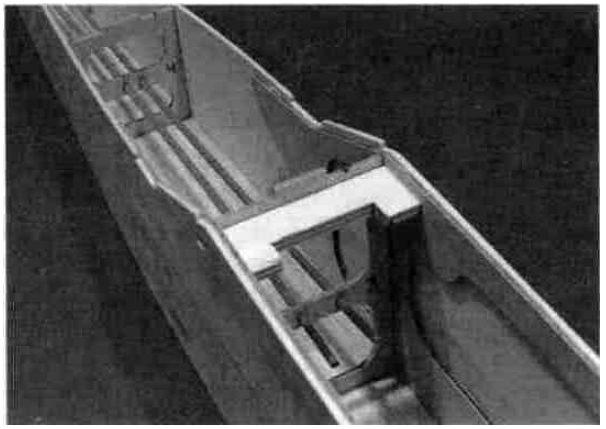
❑ 31. (If you are making the taildragger version, put the 1/8" plywood LGP in place between the fuselage sides at the taildragger position shown on the fuselage plans.) Work the 1/8" forward fuse bottom sheet joined earlier into position between the fuselage sides. Use masking tape to hold the fuse bottom in place.

❑ 32. Flex the fuselage sides outward and apply medium CA or epoxy to the edges of the firewall. Use masking tape to hold the joint closed while the

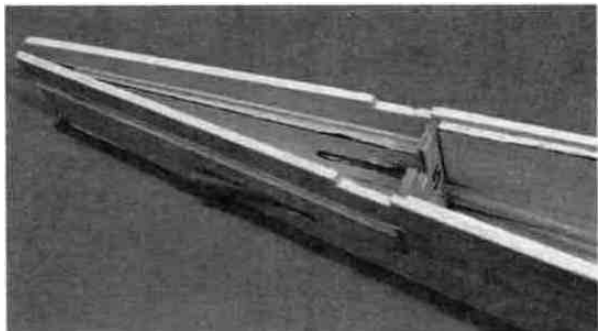
glue cures. Glue the forward bottom sheeting to the fuse sides, the firewall, LGP, and former F-2 with thin CA followed with a fillet of medium CA.

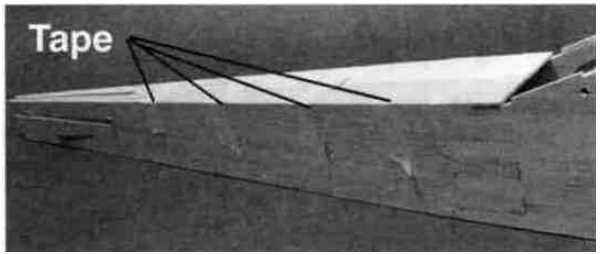


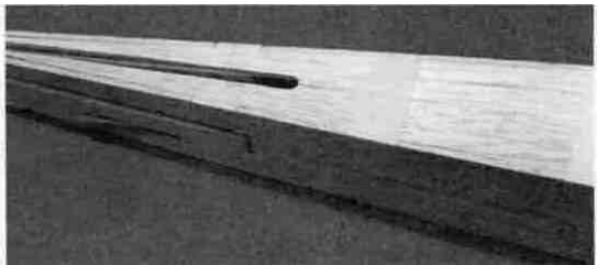
❑ 33. Glue the die-cut 1/8" balsa **fuselage cross member (FC)** to the forward bottom sheeting as shown on the fuse plan side view. This piece simply stiffens the fuselage floor in the tank area.



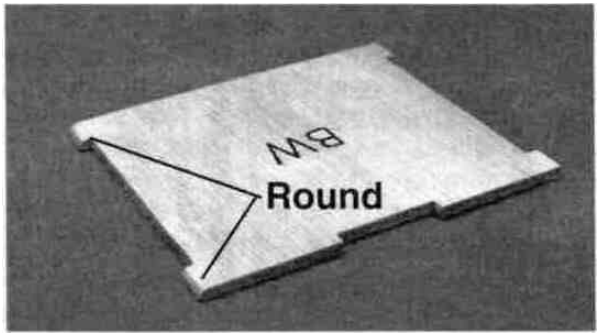
❑ 34. Sand the outside of two of the 24" **outer pushrod tubes** so glue will stick to them. Work these into position as shown on the plans for the rudder and elevator pushrods. Glue them securely to the fuselage sides, F-5, F-4, and F-3.

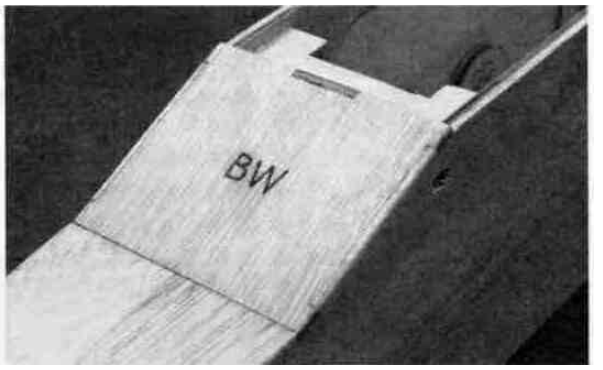






❑ 35. Snap the previously joined aft fuse top into place on top of the fuselage. Use masking tape to hold the fuse top in place. Wick thin CA glue into its joints with the fuse sides and the formers. **Do not glue the area behind F-5 yet.** Remove the tape and run thin CA down the joints again to make sure they are thoroughly glued.

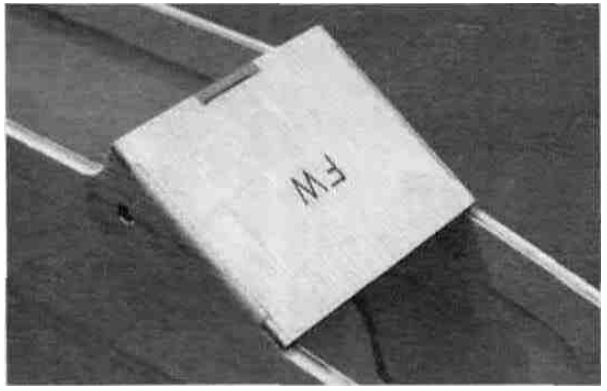




❑ 36. Trial fit the die-cut 1/8" plywood **back window (BW)** in its place on the fuse top. Refer to the fuselage side view; for best results, bevel the fore and aft edges of the window to provide a better fit. **HINT:** To eliminate difficult sanding later, round the "lock tabs" on the outside edges of the plywood windows to a radius similar to that shown on the plan cross-sections before gluing the windows in.

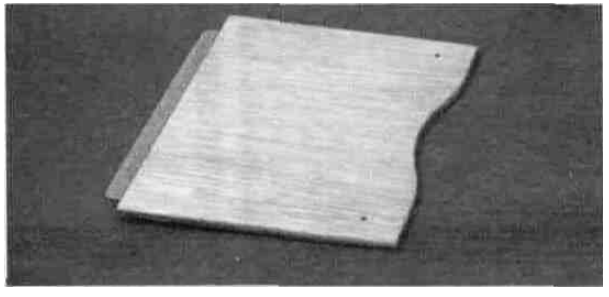
❑ 37. Glue the back window in with thin CA. Then add some medium CA if required.

❑ 38. Wick thin CA into all joints involving the **wing bolt plate.** After this has cured, apply a fillet of epoxy or medium CA around the wing bolt plate.

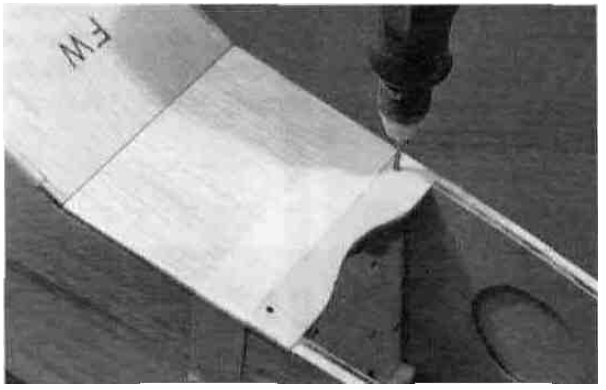


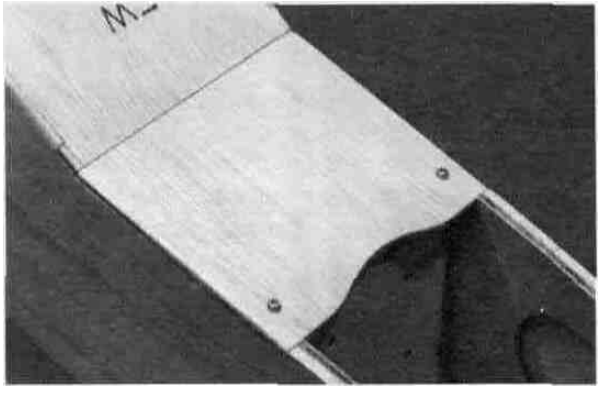
❑ 39. Round the outside of the "lock tabs" on the die-cut 1/8" plywood front window (FW) as you did on the back window. Fit the front window into place. Glue with thin and medium CA. You may round the corners of the fuselage to match the cross sections as you go, or you may wait until the fuselage is done.

❑ 40. Sand the edges of the die-cut 1/8" plywood **fuel tank hatch** till they are smooth. Test fit the hatch in place. Trim the hatch or trim back the notch in the front of the fuse side doublers until the hatch fits well. Round the right and left edges of the hatch to a radius like that shown in the firewall (F-1) cross section.



❑ 41. Use CA to glue the die-cut 1/8" plywood **hatch retainer** tab to the inside of the hatch as shown in the photo and on the fuse side view.

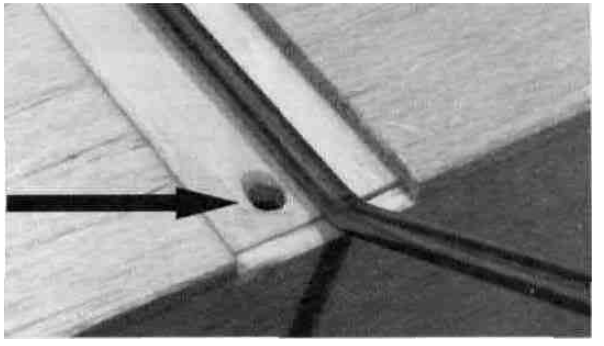




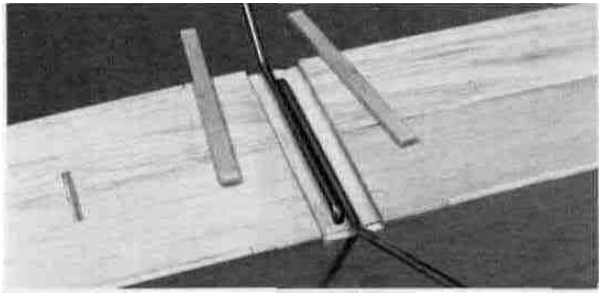
No. 2 x 3/8 Sheet Metal Screw

❑ 42. The punch marks in the front of the hatch indicate the location of the **No. 2 x 3/8" sheet metal screws** used to hold the hatch on. Check to make sure these will direct the screws into the firewall. Tape the hatch in place on the fuselage. Drill a 1/16" hole through the punchmarks into the firewall. Remove the hatch and enlarge the holes in the hatch only to 3/32". Screw the hatch down with the sheet metal screws to confirm a good fit.

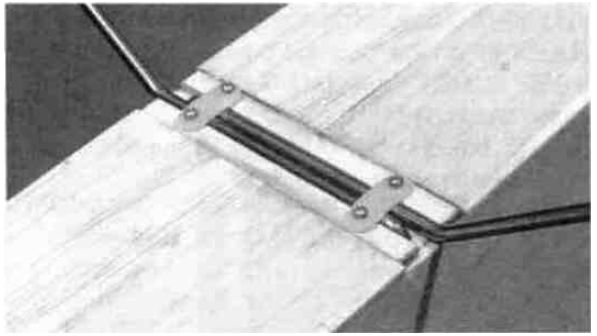
❑ 43. If you are building a **taildragger,** you need to cut a gap in the forward fuse bottom sheeting under the LGP to allowthe main landing gearto be installed (as shown on the fuselage plans). The pre-cut 1/8" x 9/32" x 3-3/4" plywood **LG aligner strips** are the same ones used for the tricycle gear. Fill the gap in the 1/8" balsa bottom sheeting at the tricycle gear location with scrap 1/8" balsa.



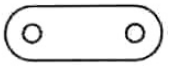
❑ 44. Test fit the wire **main landing gear** into the holes in the fuse bottom. In orderforthe landing gear to lie flat on the bottom of the fuse, it is necessary to remove a little material from the inside edge of the 5/32" holes to allow for the bends in the wire. Do this with a round file or a knife.



❑ 45. Put the two bent wire main landing gear pieces in place on the fuselage bottom. Slide the pre-cut 1/8" x 9/32" x 3-3/4" plywood **LG aligner strips** in place fore and aft of the main landing gear. Sand the edges of the strips if necessary for a good fit. Glue these strips in place with medium CA, being careful not to glue in the landing gear wires.



No. 2 x 3/8 Sheet Metal Screw



Nylon Landing Gear Strap

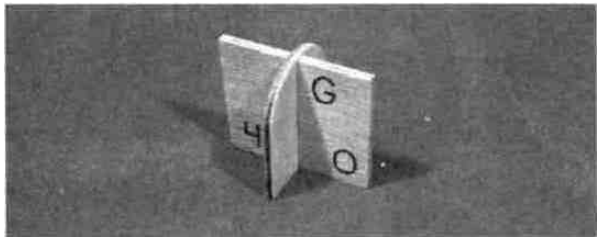
❑ 46. Put the main landing gear back in position and place two molded nylon **landing gear straps** over the wire LG as shown in the picture. Mark, then drill four 1/16" pilot holes. Use four No. 2 x 3/8" **sheet metal screws to** hold down the LG straps. The landing gear may be removed until after covering.

This completes the basic construction of the fuselage.

BUILD THE WING

NOTE: The SIERRA wing, much like the fuse, is designed so all the major components can be fit together without glue. This allows you to check that the pieces are properly fit and aligned before applying glue to the joints. The wing plan may **be** cut in half along the line provided if you wish.

❑ 1. Tape the **LEFT WING PANEL** portion of the plan over your work surface. (The best work surface is a very flat board that you can pin into. "Celotex," a type of board you can find at a hardware store or home center, is an example of one). Cover the left wing panel section with waxed paper so you won't glue the wing to the plan.

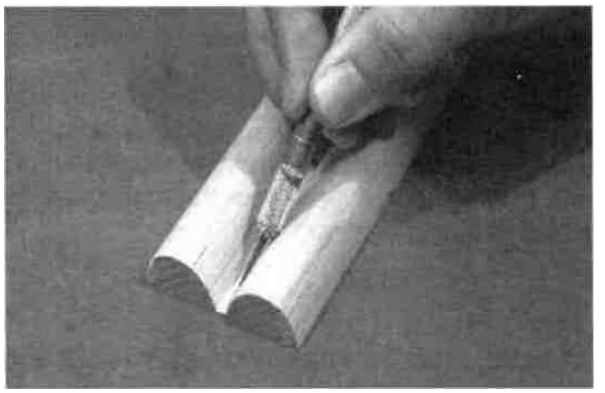


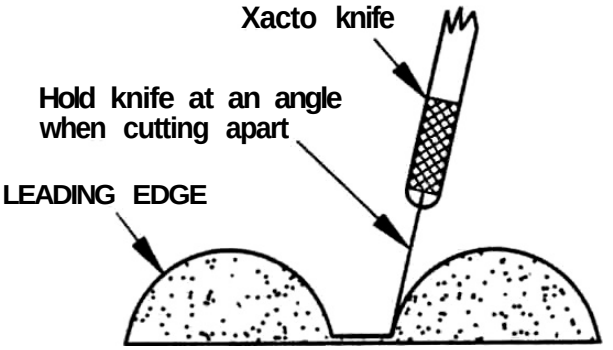
❑ 2. Assemble the wing **guide tool** from the die-cut 1/8" plywood pieces marked "G". The "0" degree (from vertical) side of the tool can be used to check the ribs to see if they are vertical. The "4" degree side will be used later. **Do not glue the tool together.**

❑ 3. The shaped and notched balsa **leading edges** and **trailing edges** are joined by a thin layer of balsa. These are cut apart in one of two ways:

A. Break the pieces apart and clean up the rough edges with a sanding block.

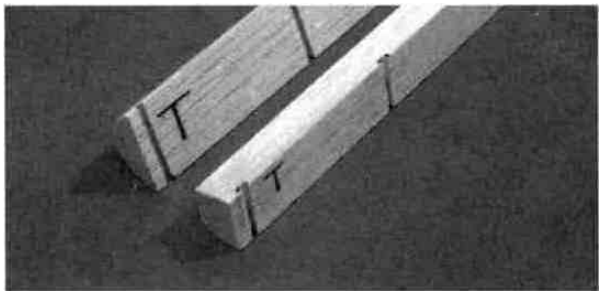
-OR-



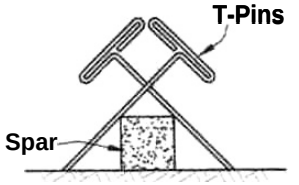


B. Carefully run a knife down the edge between the parts to cut them cleanly apart.

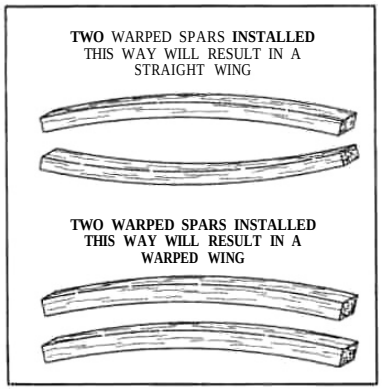
NOTE: The Sierra was designed to use symmetrical leading and trailing edges (they have no top or bottom). They do, however, have a root end and a tip end.



❑ 4. The tip ends of the leading and trailing edges are the ends with a notch very close to the end. Mark the leading and trailing edges with a "T" to designate the tip.



❑❑ 5. Use the criss-cross pin technique shown in the illustration to pin a 3/8" x 3/8" x 30" balsa **spar** over its location on the plans. Pin the spar in 3 or 4 places. (The photo for this step is at the top of the next column)



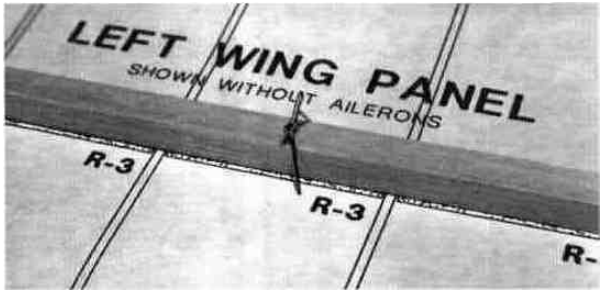
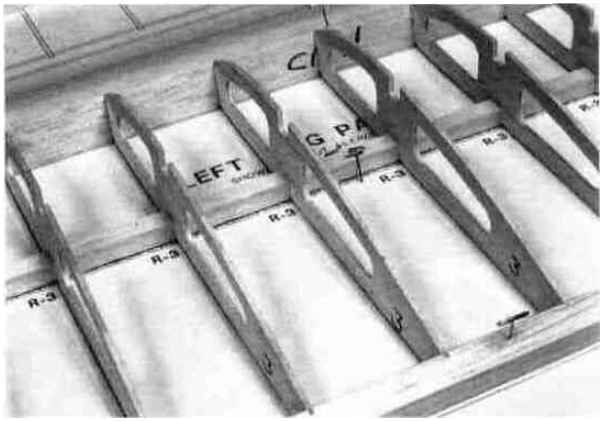


Photo for Step 5

❑❑ 6. Remove the wing ribs **R-1's, R-2's,** and **R-3's** from the die-cut sheets. Slide twelve 3/32" balsa R-3 ribs into place on the bottom spar.

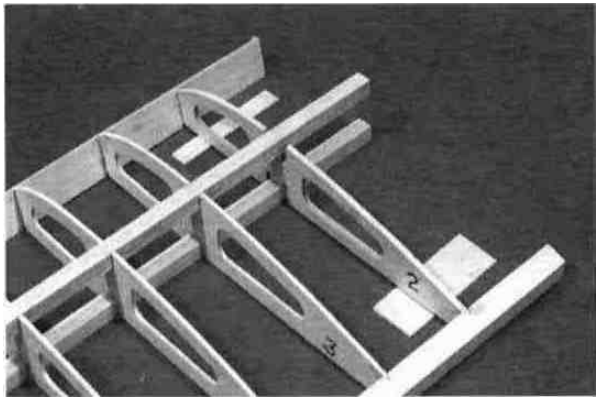


❑❑ 7. Insert the front of the ribs into the notches **in the** leading edge. **Remember to orient the LE with the "T" at** the tip.

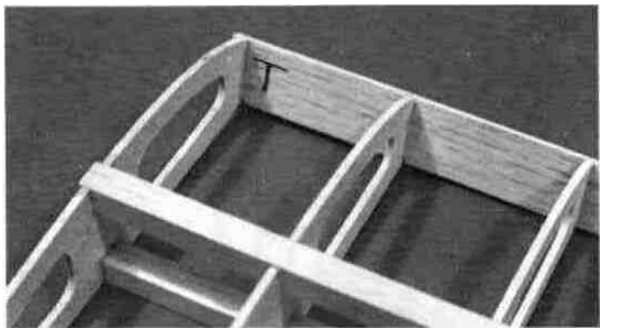
❑❑ 8. Insert the **back of the ribs into the notches** in the trailing edge.

NOTE: The plans may shrink or expand slightly due to humidity. Do not worry if the parts are not exactly the same size as the plans.

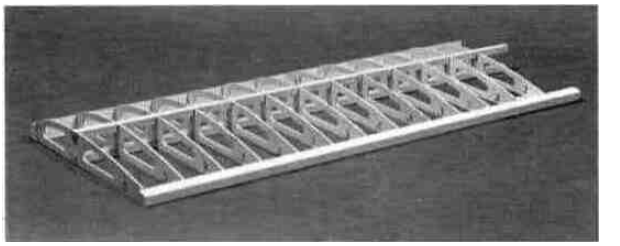
❑❑ 9. Adjust the positions of the leading and trailing edges left or right until the ribs line up with the plans. Pin the leading and trailing edges tothe board so they won't move.



❑❑ 10. Lay two pieces of scrap 1/16" balsa (from the die-cut **center section sheeting** SIE4W05 or SIE4W06) near the leading and trailing edges under the location of rib R-2 (this will shim up the rib to allow for the sheeting later). Push rib R-2 into place as shown on the plans. Make sure the ends of the rib engage the notches in the leading and trailing edges.



❑❑ 11. Insert the 3/8" x 3/8" x 30" **top spar** into the notches in the ribs.

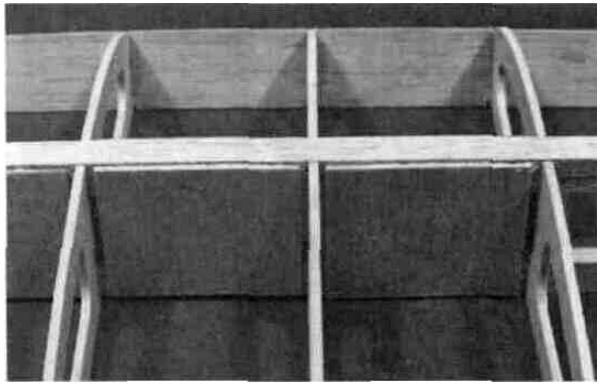


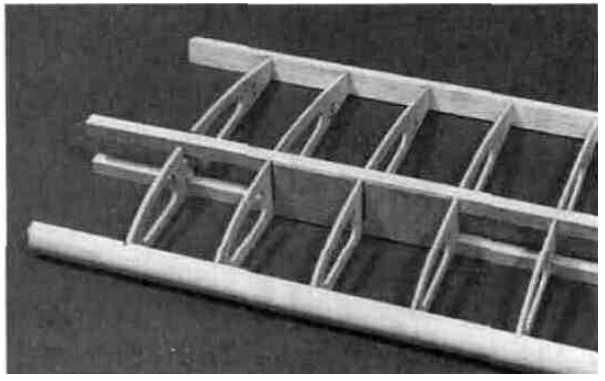
❑❑ 12. Make sure all the R-3 ribs and the leading and trailing edges are resting on the flat work surface. Make sure the ribs are inserted all the way into the notches. The "guide tool" is used to check that the ribs are vertical.

❑❑ 13. Apply thin CA to all the joints involving the ribs, spars, leading edges, and trailing edges.

NOTE: When gluing the spars to R-2, make sure the spars are centered between the dihedral brace notches in R-2.

❑❑ 14. Remove the pins holding the spar in place but leave the panel pinned flat on the board by the leading and trailing edges.

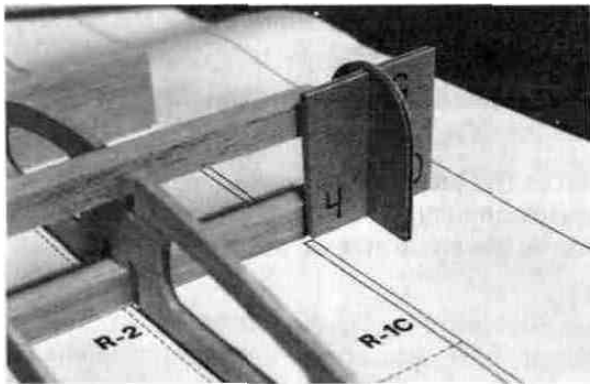




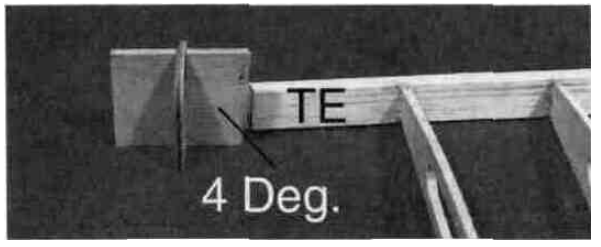
❑❑ 15. With the panel held flat on the table, use medium CA to glue in the pre-cut 1/16" x 1-1/2" x2" balsa **shear webs** between the R-3 Ribs. Refer to the plans. Notice there are shear webs on **both** sides of the spars outside the first two R-3 ribs and only **behind** the spars between the remainder of the R-3's.

NOTE: The function of the shear webs is to keep the spars from collapsing. They will not and need not touch or be glued to the ribs. They should be thoroughly glued to the spars.

❑❑ **16.** Make sure the **wing panel is still lined up** properly over the plan.



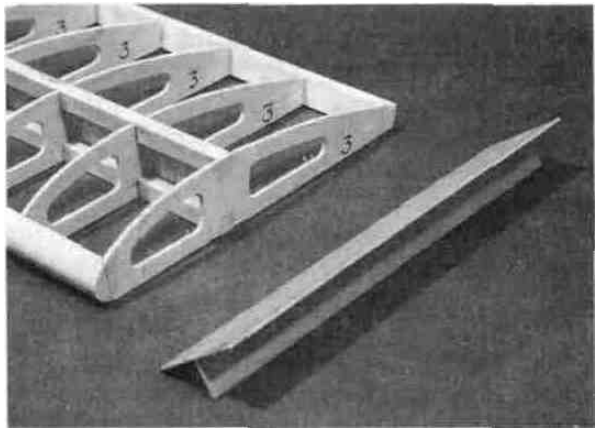
❑❑ 17. Position the 4 deg. side of the guide **tool** exactly where the end of the bottom spar is shown **on** the plans. Use a pen to mark an angled line on the top and bottom spars.



❑❑ 18. Use the guide tool to mark angled lines on the leading and trailing edges from where their bottom ends are shown on the plans.

❑❑ 19. Use a razor saw to cut off the spars and the leading and trailing edges at the marked angles. A T-bar is used to "clean up" the angled ends of the spars, leading edges, and trailing edges.

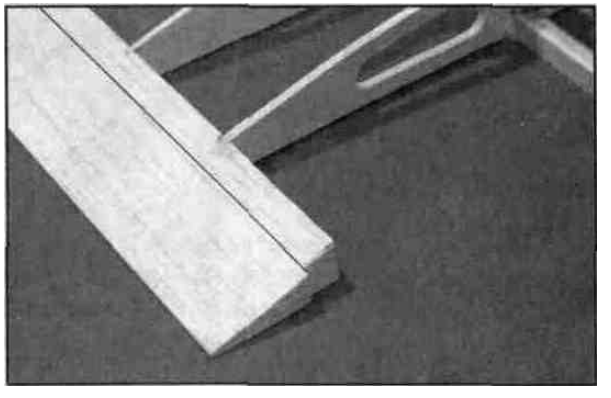
❑❑ 20. Use a razor saw and a T-bar to trim the tip



ends of the spars and leading and trailing edges flush with the outermost R-3 rib.

If you are building the 3-channel wing (without functioning ailerons), follow the instructions in the shaded box. If you are building the 4-channel wing, skip to step 24.

NOTE: The LEFT WING PANEL plan and its cross-sectional view show the "no aileron" version.

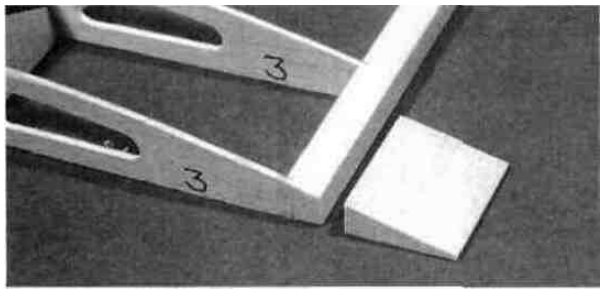


❑ ❑ 21. The 17/32" x 1-1/2" x 30" tapered balsa **aileron stock** fits against the trailing edge stock with its lower surface flat on the table. Glue the aileron stock to the trailing edge of the wing. (See the photo on the previous page.)

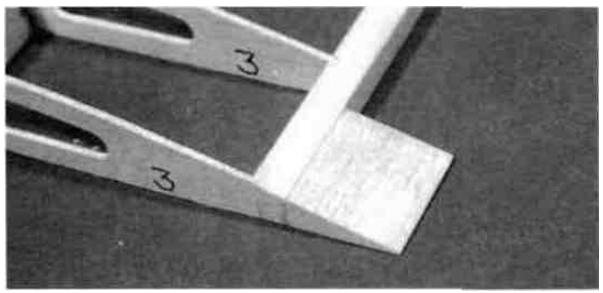
❑ ❑ 22. Trim the tip end of the aileron stock flush with the end of the wing.

❑ ❑ 23. Trim and sand the root end of the aileron to match the 4-degree angle of the TE and spars.

SKIP TO STEP 27



❑ ❑ 24. Carefully cut a 1-5/8" long piece off the 17/32" x 1-1/2" x 30" tapered balsa **aileron stock .**

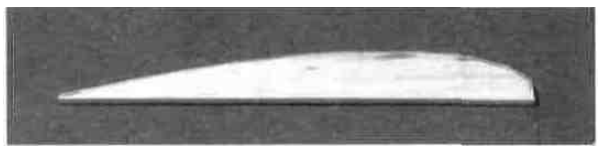


❑ ❑ 25. Glue the 1 -5/8" long piece of aileron stock to the wing trailing edge at the tip as shown on the RIGHT WING PANEL drawing. (This is done to the right and left wing.)

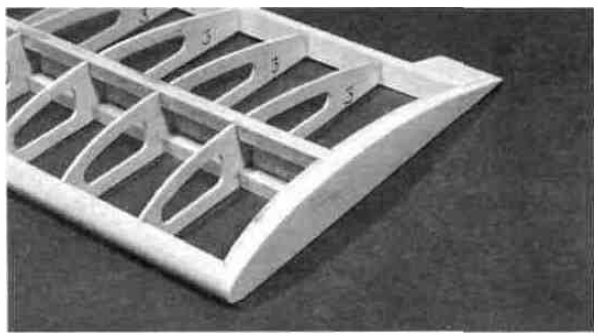
❑ ❑ 26. Trim and sand the aileron stock flush with the tip of the wing.

MAKE THE WING TIPS

❑ ❑ 27. Look at the FRONT VIEW of the wing on the plans to see the proper orientation of the 15/32" x 1-5/8" x 11-1/4" tapered balsawingtips. Thesmall end of the taper is positioned at the bottom edge of the wing.



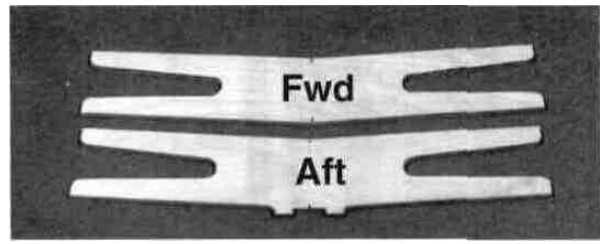
❑ ❑ 28. Hold the wing tip up to the end of the wing. Trace the top of the airfoil onto the wing tip. Saw or carve the wing tip to the rough shape of the wing, leaving it slightly oversized.



❑ ❑ 29. Glue the wing tip to the wing. Block sand it to final shape. **HINT:** Put masking tape over the surrounding structure when sanding items such as the wing tips to protect areas you don't want sanded.

REPEAT STEPS 5-29 OVER THE RIGHT WING PANEL PLANS TO BUILD THE RIGHT WING.

JOIN THE WING



❑ **braces.** Put reference marks at the **center** of the braces. **NOTICE:** The dihedral brace with the "lock bumps" for the aileron servo tray is positioned on the **aft** side of the spars (these bumps may be trimmed off if you are not using ailerons).

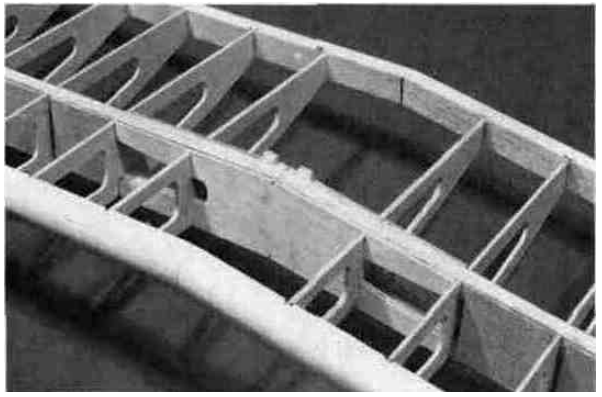
❑ 31. Test fit the two wing panels together with the dihedral braces in place. Check to see that the spars, leading edges, and trailing edges match up well. Make adjustments if necessary.

The dihedral angle (the angle at which the wings are "bent up") is not considered critical. This angle is established by aligning the spars with

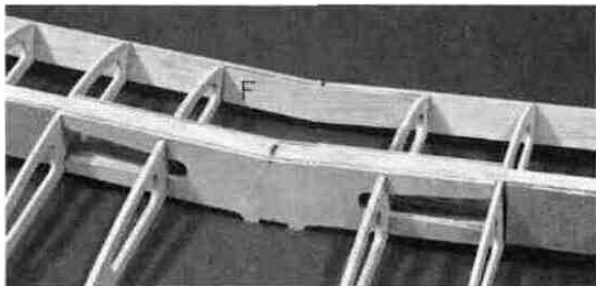
the dihedral braces. For your reference, if one wing panel is resting flat on the table, the other wing tip should be approximately 4" off the table.

❑ 32. Look ahead to the photos with steps 33 and 34 for a view of the joined wing. Spread a layer of 15-minute epoxy onto the matching surfaces of the **dihedral braces** and the **LEFT** wing panel spars. Align the dihedral braces with the top and bottom edges of the spars. Clamp or tape the braces in position until the glue sets.

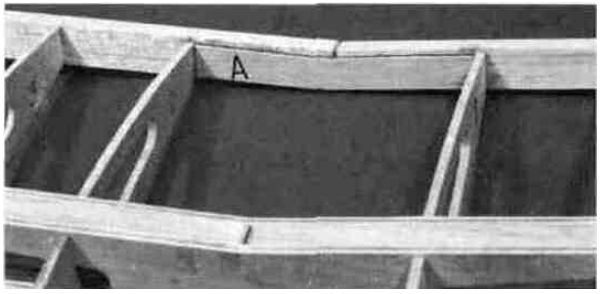
NOTE: If there are any small gaps between the ends of the spars or LE's or TE's, do not be overly concerned. They will not significantly weaken the structure. After the wing joining process is complete, fill them with scrap balsa and medium CA glue.



❑ 33. When the epoxy is set, apply a thin film of epoxy to the **dihedral brace** and the **right wing spars,** slide the two wing panels together, and carefully align the spars with the dihedral braces. After the epoxy is cured, if any of the dihedral brace joints do not appear to be thoroughly glued, apply an extra fillet of epoxy to them.



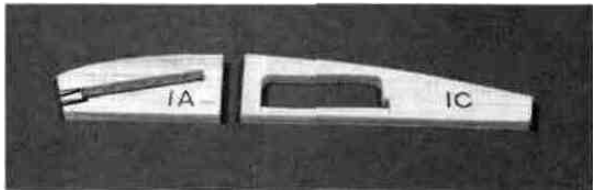
❑ 34. The die-cut 1/8" plywood **forward center brace (F)** is glued in next. It should be centered on the leading edge so the 1/16" balsa top and bottom center sheeting will lap onto it. Align the left and right leading edges and glue the brace in place with CA or epoxy.



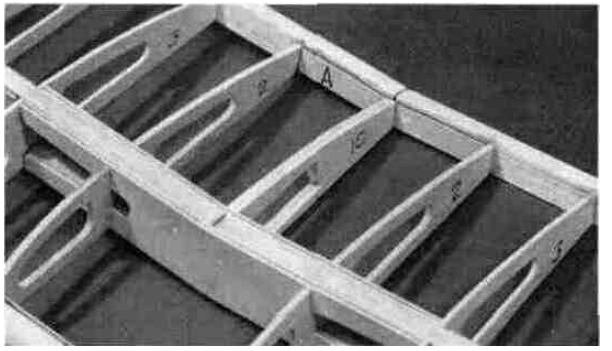
❑ 35. The die-cut 1/8" plywood **aft center brace (A)** is centered on the trailing edges. Align the left and right trailing edges and glue the brace in with CA or epoxy (if you are building the 3-channel version, the fixed aileron stock should be aligned and glued together at this time).

NOTE: If you are building the 3-channel version, do not punch out the cutout for the aileron servo in R-1C. Instead, glue it permanently in place. Punch it out as shown in the photo at the top of the next column for the 4-channel version.

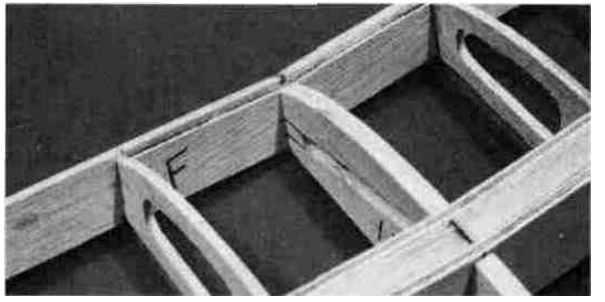
❑ 36. Glue the two die-cut 1/8" balsa **R-1A's (1A)** together to form a 1/4" thick part. Glue the two die-cut 1/8" **R-1C's (1C)** together to form a 1/4" thick part.



❑ 37. If you are using the bolt-on wing option, draw two lines forward from the slot in R-1A as shown in the photo, for later reference.



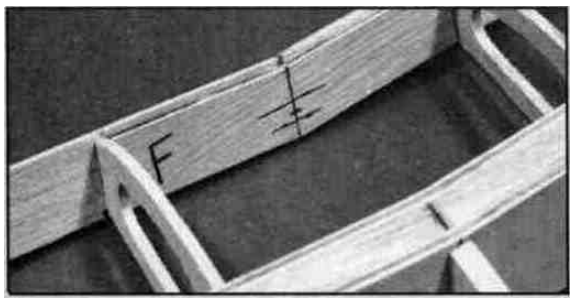
❑ 38. Use medium CA to glue R-1C in place. It is centered to allow for the top and bottom center section sheeting as shown in the cross-section drawing beside the right wing panel.



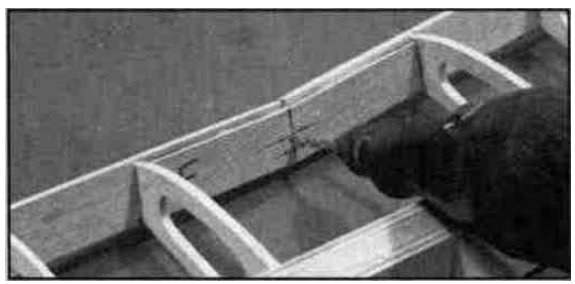
❑ 39. Put R-1A in place as shown in the cross

section. If you are using rubber band on wings, glue it with CA. If you are using bolt on wings, transfer the marks from R-1A onto the forward center brace (F) and remove R-1A.

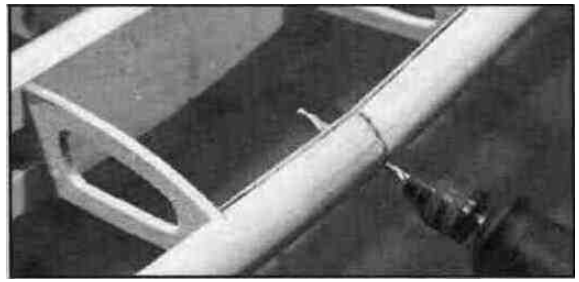
DO STEPS 40 - 49 FOR BOLT ON WINGS



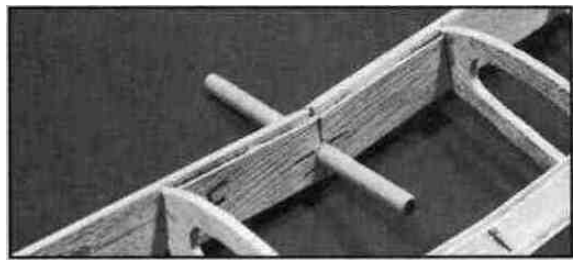
❑ 40. Draw a vertical center line on the forward center brace.



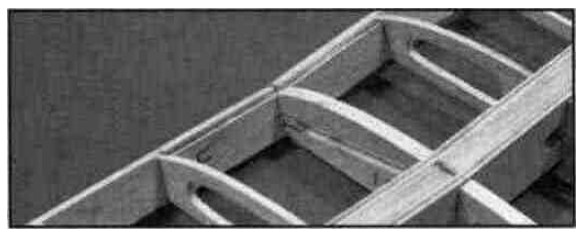
❑ 41. Drill a 1/8" pilot hole into the forward center brace (see the photo). The angle of this hole will obviously not be correct, so you need not go all the way through the balsa leading edge. Just go through the plywood.



❑ 42. Use the R-1 cross section on the wing plan to determine where the dowel will exit the leading edge, and mark this location. Drill a 1/8" pilot hole from the front of the wing through this mark, then through the previously drilled pilot hole in the forward center brace.

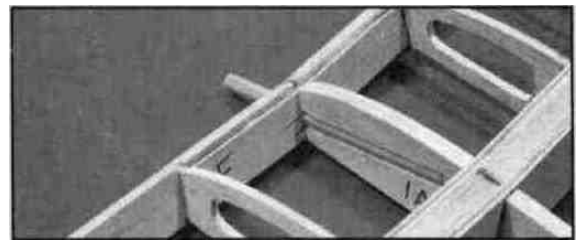


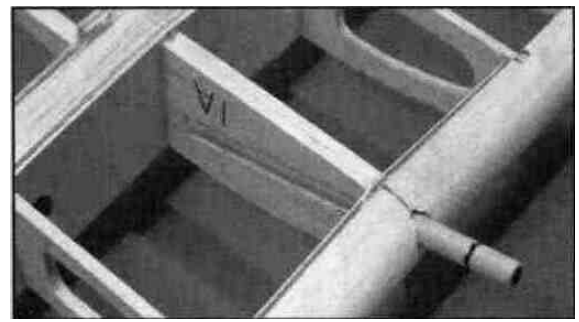
❑ 43. Gradually increase the size of the **drill** until you reach 1/4". Test fit a 1/4" wing dowel through the hole.



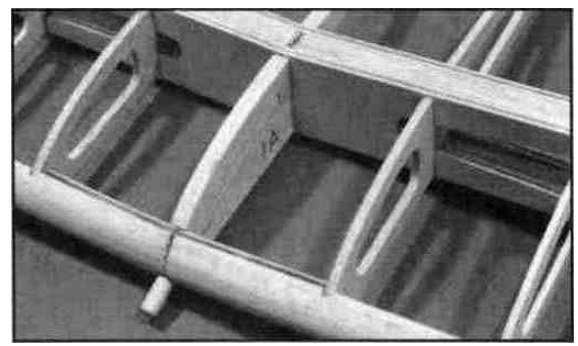
❑ 44. Replace R-1 A and glue with medium **CA.** Remember that it is centered vertically to allow for the 1/16" sheeting.

❑ 45. Cut away the material in front of the slot in R-1A to allow the dowel to pass through the front of the wing into the slot.



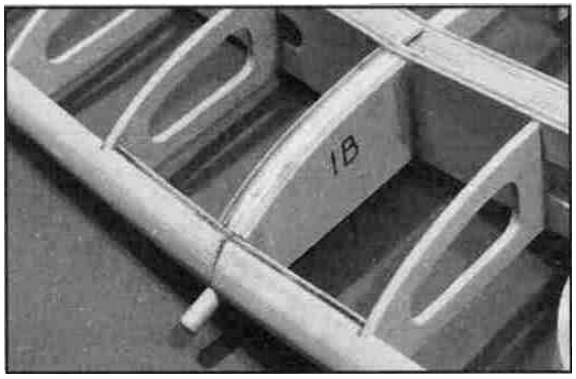


❑ 46. Insert a 1/4" dowel into the leading edge and push it all the way into the slot. Put a mark on the dowel 1/2" ahead of the leading edge of the wing. Remove the dowel and cut it at the mark. Round the end of the dowel slightly to allow easy wing mounting.



❑ 47. Glue the dowel in place with thin **CA.**

❑ 48. Test the fit of the die-cut 1/8" plywood R-**1 B's (1 B)** against the R-1 A's. Trim the Ft-1 B's if necessary for a good fit. The dowel may also need to be flattened **slightly** with a sanding block to allow the R-1 B's a good fit.



❑ **49.** Glue in the R-1 B's with 15-minute epoxy.

❑ 50. For rubber band on wings, glue the die-cut 1/8" plywood **R-1 B's** to the R-1 A's, forward center brace (F), and dihedral brace with epoxy.

DO STEPS 51 - 62 IF INSTALLING AILERONS

❑ 51. Cut out and remove the remaining piece of balsa from across the servo bay in the bottom side of R-1 C using a knife or razor saw (see photo at top of next column).

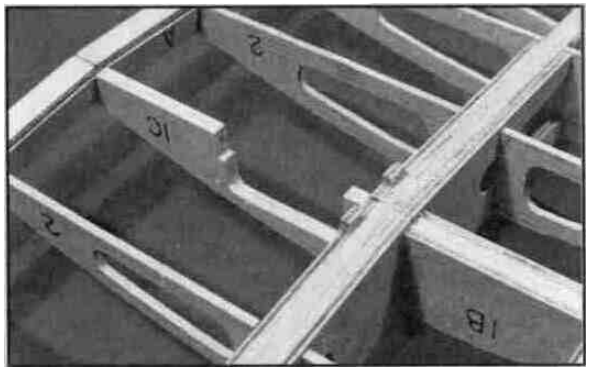
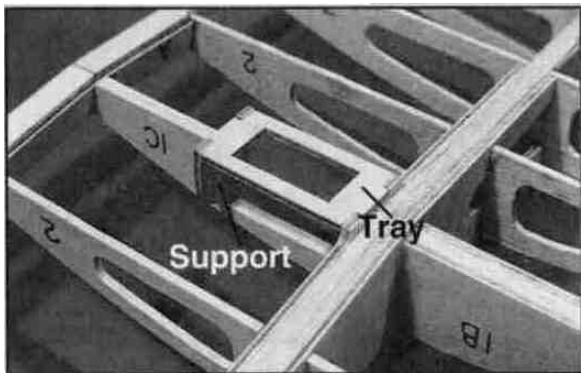
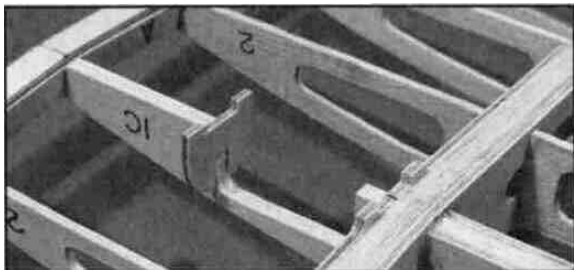
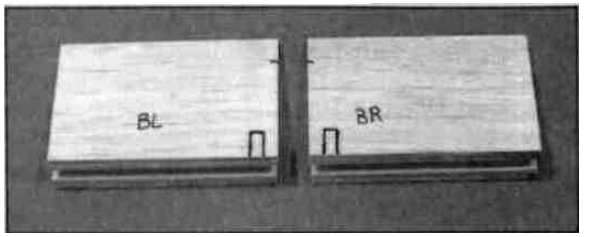


Photo for Step 51

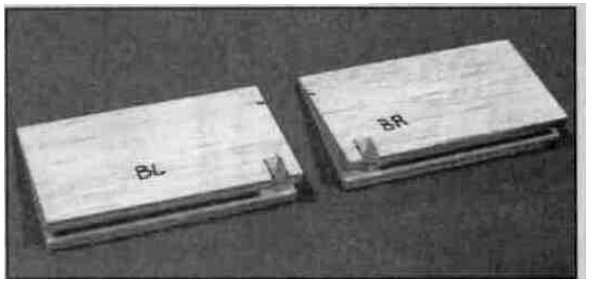




❑ 52. Snap the die-cut 1/8" plywood **aileron servo tray** and **servo tray support** in place as in the photo. Use medium CA to glue in the servo tray **support** while using the servo tray to hold it in position. Do **not** glue the servo tray in at this time.



❑ 53. Sand the root ends of the tapered and grooved balsa **trailing edge center** pieces so they will meet properly when they are held together against the TE. Mark the parts so you can identify the bottom of the left and right parts.



❑ 54. Hold the trailing edge center pieces **over** the right wing panel plan. Mark where the torque rods will exit the **bottom** of the trailing edge. The root cross-section gives a view of the cut-out. Cut a notch in the trailing edge center pieces to allow the torque rod to exit.

❑ 55. Hold the trailing edge center pieces up to the wing. Transfer the notch locations onto

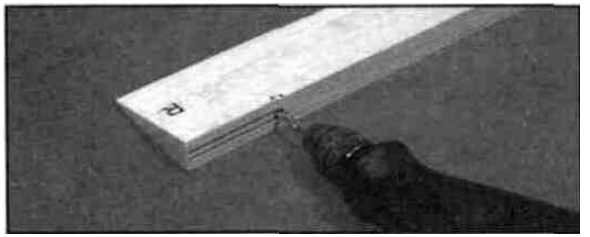
the wing. Use a knife to cut small notches into the wing **TE.**

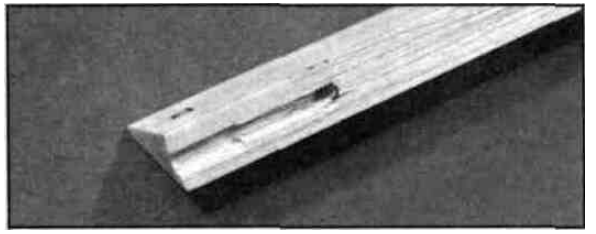
❑ 56. Use coarse sandpaper to roughen the nylon tube on the bent wire **aileron torque rod.** Slide the tube toward the threaded end of the rod. Apply a **small** amount of petroleum jelly to the ends of the nylon tube to prevent glue from wicking into the bearing tube.

❑ 57. Assemble the parts as shown in the photo. Apply a small amount of medium CA to glue the torque rod bearing tube to the balsa trailing edge center.

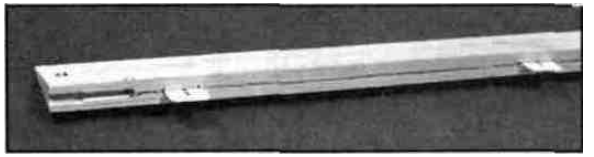
❑ 58. Use medium CA to glue the trailing edge center assemblies to the trailing edge of the wing. Do **not** get glue in the bearing tube.

❑ 59. Trim the left and right tapered **aileron stock** pieces to length so they fit between the wing tip and the center pieces with about a 1/16" gap at each end.

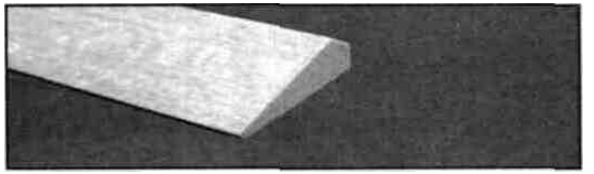




❑ 60. Following the instructions **on** page 8, step 10 for installing the elevator joiner, transfer the location of the aileron torque rods onto the ailerons. Drill a 3/32" hole into each aileron to accept a torque rod. Notch the front edge of each aileron to accept the rest of the torque rod.



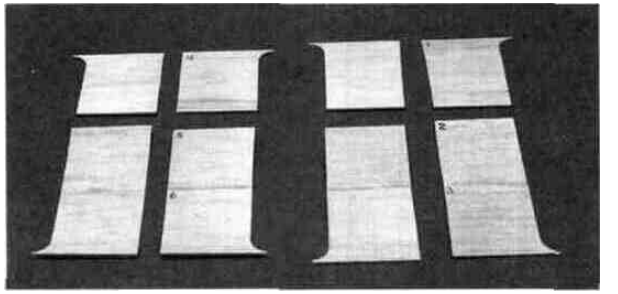
❑ 61. Draw a center line on the LE of the ailerons and the trailing edge of the wing, use the plans as a reference to mark the location of the hinges. Make slots for the hinges using the same technique as you did for the elevator and rudder.



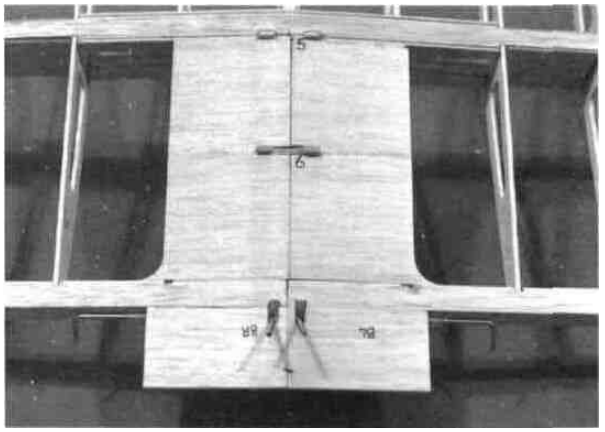
❑ 62. Use a razor plane (if available) and a T-bar to sand the front edge of the ailerons to a "V" shape to match the cross section on the plans.

WING CENTER SECTION SHEETING

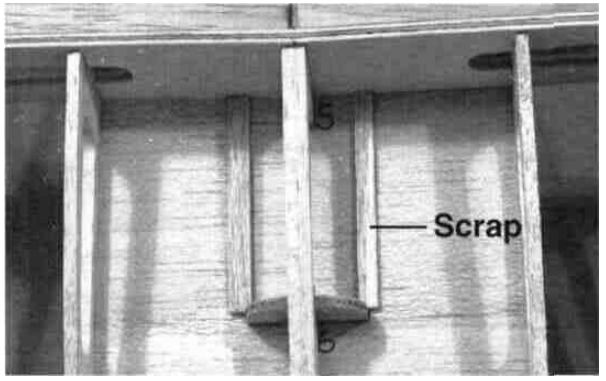
❑ 63. Lightly write the identity **(1-6)** of each piece of die-cut 1/16" balsa **wing sheeting** using the cut patterns on page 4 as a reference. Remove the individual sheets from the blanks.



❑ 64. Pieces 1, 2, and 3 form the top wing skins; 4, 5, and 6 form the bottom wing skins. Over waxed paper, glue the 2's and 3's together to form a left and a right top aft wing skin (as shown in the photo). Glue the 5's and 6's together to form a left and right bottom aft wing skin.

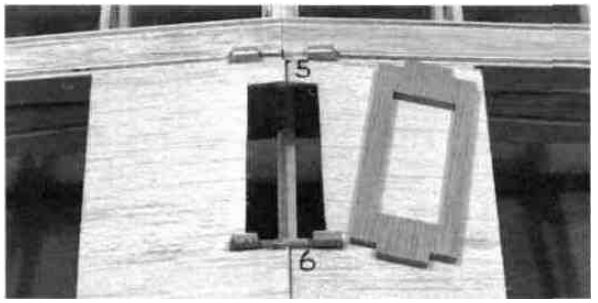


❑ 65. Fit the pieces 5-6 in place behind the spar **on** the bottom of the wing. Cut a notch to go around the aileron servo tray support if present. Glue the wing skin in place.

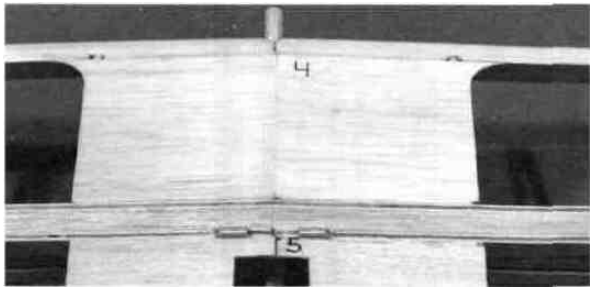


❑ 66. If you are using ailerons, cut a couple **of** 1/4" wide strips from scrap 3/32" balsa, glue them in **as** shown in the photo to stiffen the bottom wing skin where the servo cut-out will be made.

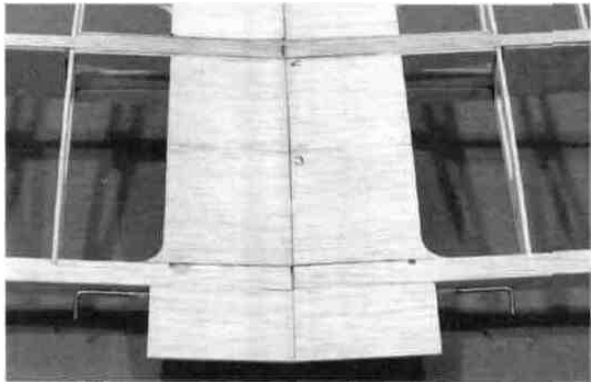
❑ 67. For planes with ailerons, snap the aileron servo tray in position and trace the shape of the cut-out on the bottom wing skin. Remove the servo tray



and cut out a slightly oversized opening for the aileron servo.



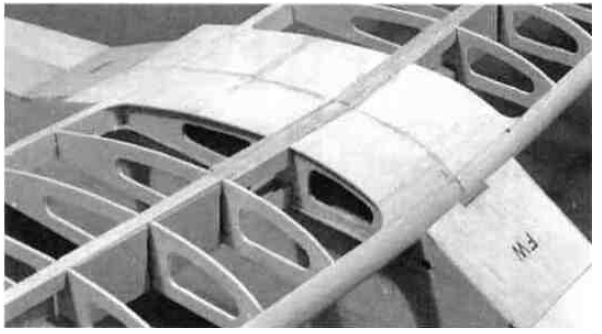
❑ 68. Fit the forward bottom wing skins (4) to the wing, and glue in place.



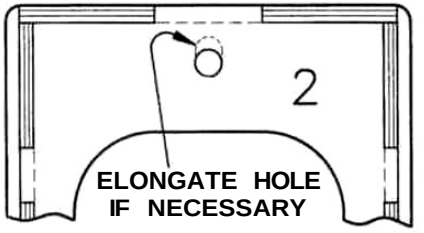
❑ 69. Fit and glue on the top wing skins (1 and 2-3).

❑ 70. Sand the joints in the center of the wing with a block and sharp 220 grit sandpaper.

FINAL ASSEMBLY

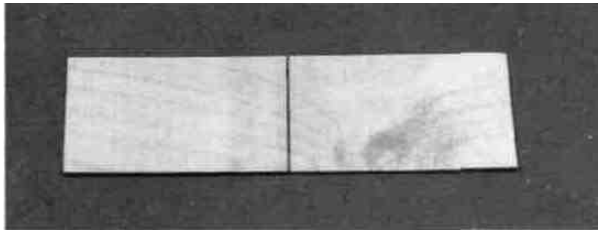


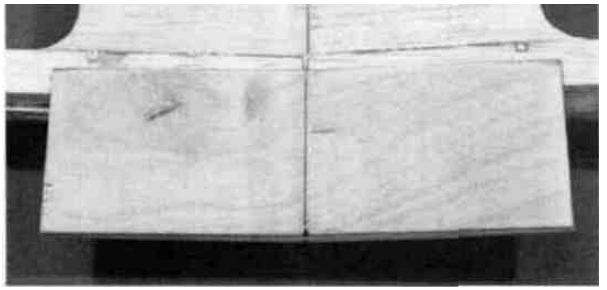
❑ 1. Fit the wing on the fuselage wing saddle. Trim the aft edge of the wing trailing edge at the center with a sanding block if necessary for a good fit.



NOTE: For bolt on wings, the wing dowel hole in F-3 may be oblonged some if required to let the wing sit flat on the saddle or to allow for wing seating tape. If the hole requires oblonging, do so with a round file or a #11 knife.

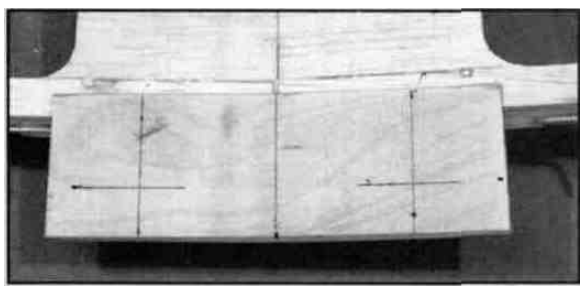
❑ 2. Remove the wing from the fuselage. Mark a centerline on the 1/16" x 1-7/8" x 5-1/2" plywood



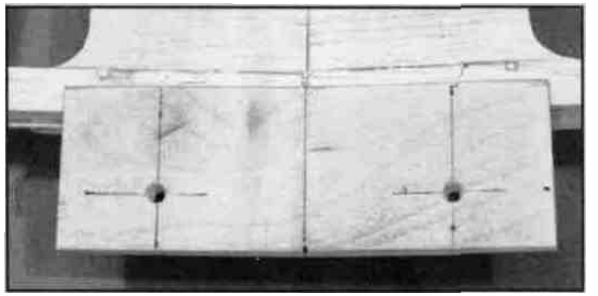


trailing edge plate. Use a knife and a straightedge to cut about 1/2 way through the plate on the centerline. Bend the plate away from the cut until it starts to break. Place the plate on top of the wing, and adjust if necessary. Glue the plate to the wing with medium CA.

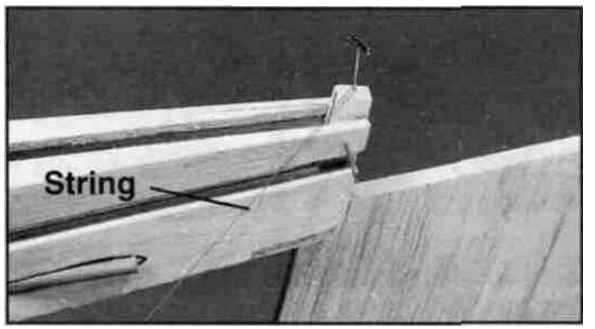
DO THESE STEPS FOR BOLT ON WINGS

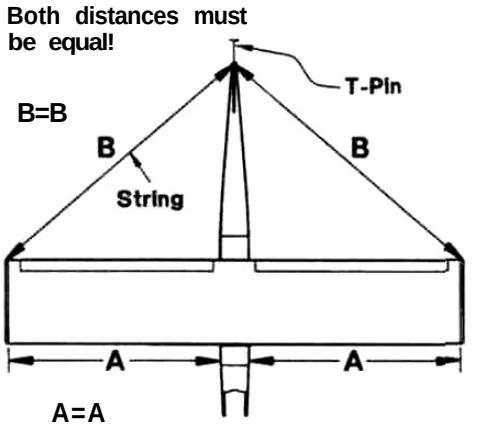


❑ 3. Referring to the right wing plan. Mark a line 5/8" from the trailing edge. Mark two lines 1-3/8" from the wing centerline as shown.



❑ 4. Drill two 3/16" pilot holes through the trailing edge plate and wing TE at the intersection of the lines. Be sure to drill **perpendicular** to the surface of the trailing edge plate.

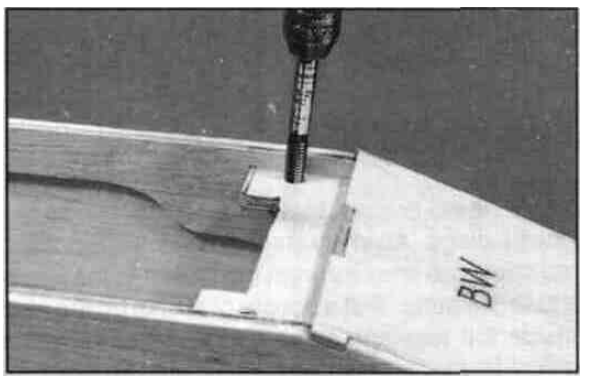




❑ 5. Place the wing on the fuselage. Pin a piece of scrap 1/4" balsa (or the fin as shown in the photo) in the slot at the back end of the fuse. Put a pin vertically into the piece on the fuselage centerline. Attach a length of string to the pin. Use the string to check if the wing is on straight (see diagram).

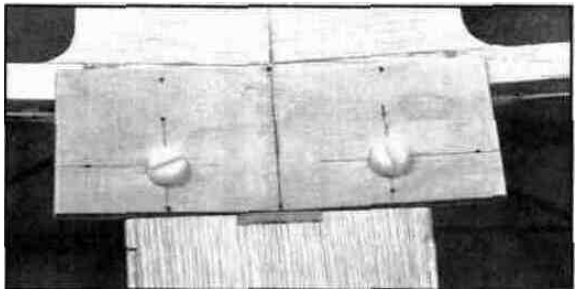
❑ 6. Once the wing is straight, use some masking tape hold it in place. Drill through the 3/16" pilot holes **perpendicular** to the trailing edge plate and through the **wing bolt plate** in the fuselage with a #10 (or 13/64") drill.

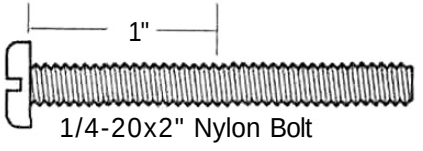
❑ 7. Remove the wing and re-drill the holes **in the wing only** to 1/4" or 17/64".



❑ 8. Use **a 1/4-20 tap** and a **tap wrench** to **cut** threads in the plywood **wing bolt plate.**

❑ 9. **Harden** the threads in the wing bolt plate with thin CA glue, then re-tap the threads after the glue has **completely** hardened.





❑ 10. Cut approximately 1" **off the threaded** portion of the 1/4-20 x 2" **nylon wing bolts.** Bolt the wing onto the fuselage.

If you are using rubber band on wings, temporarily slide the dowels into the holes in the fuselage sides (enlarge the holes in the fuselage with a round file if the fit is too tight). Align the wing and attach it with several # 64 rubber bands.

MOUNT THE TAIL SURFACES

❑ 1. Slide the horizontal stabilizer (stab) into its slot in the fuselage. Align the stab by looking down at the stab reference lines through the fin slot in the upper aft fuse sheeting. Put a couple of marks on the stab outside the fuselage sides for reference after the vertical fin (fin) is installed. (The photo for this step is at the top of the next column)

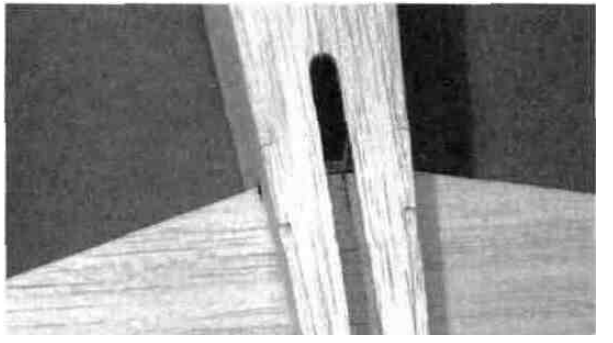
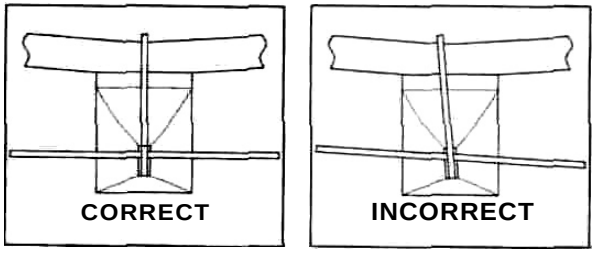
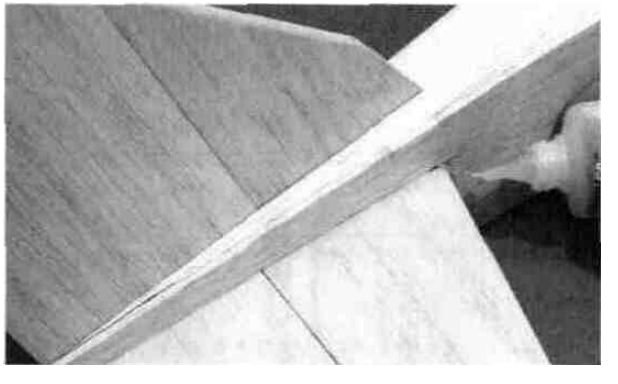


Photo for Step 1

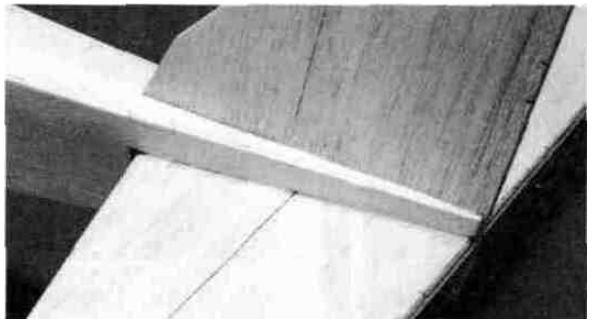
❑ 2. Temporarily slide the fin into place. Check the fit of the parts. The bottom edge of the fin should rest on the stab.



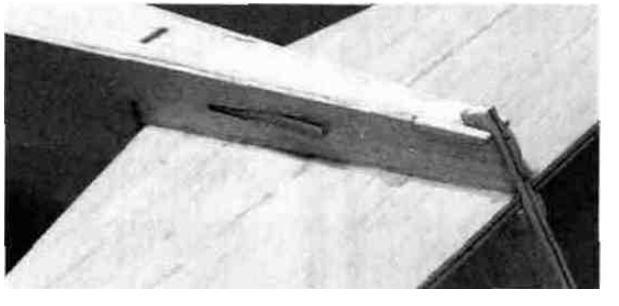
❑ 3. Sight the alignment of the fin and stab from the front and back of the model with reference to the wing. Also sight the fin and stab from the top to check alignment. Make adjustments to the fuse slots **if** necessary so the surfaces are not twisted or skewed.



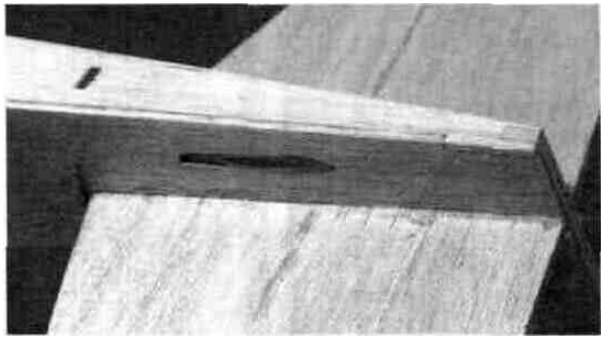
❑ 4. Put a small amount of thin CA on the forward two inch portion of the stab/fuse junction only. Remove the fin. Thoroughly glue the forward two inches of the stab to the fuselage from the inside (through the fin slot) and outside (do not go all the way back to the aft end of the fuse until you are told to). Be sure to also glue the stab to former F-5.



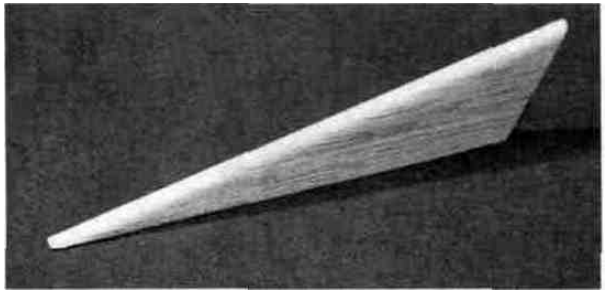
❑ 5. Apply a **generous** bead of medium CA to the bottom edge of the **fin** and to the **fin slot in F-5.** Slide the fin into the slot in the fuselage. Check the alignment to make sure the fin is not leaning. Also glue the fuse joints at the top corners.

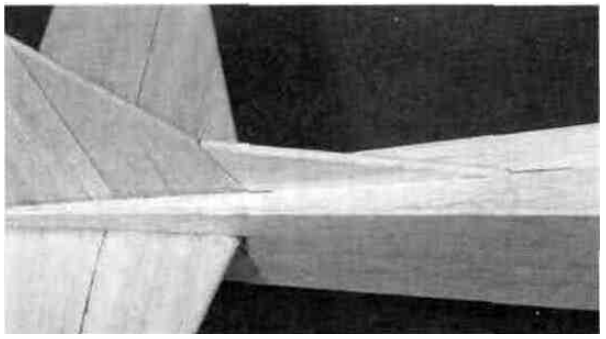


❑ 6. Wick thin CA into any remaining fin, stab, **and** fuselage joints that are not thoroughly glued. Be sure to flip the fuselage over and glue all stab, fin post, and fuselage joints from underneath.

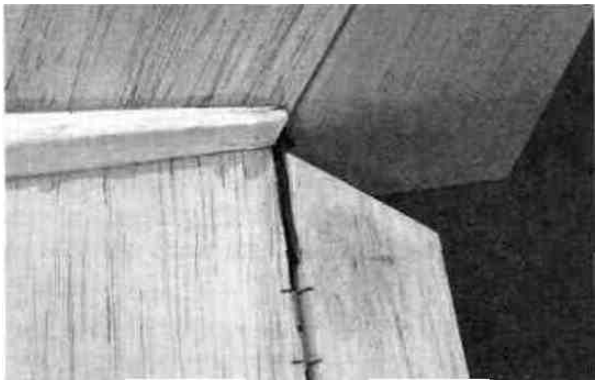


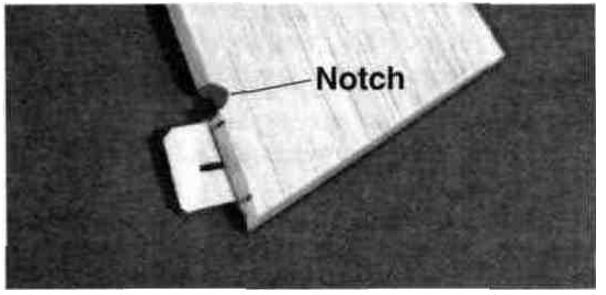
❑ 7. Sand the joints at the back of the fuselage smooth. For a nice touch, sand the outer pushrod tubes flush as shown in the photo.





❑ 8. Round the top edge of the shaped 1/4" balsa **dorsal fin.** Use the seam on the top of the fuselage to help you center the dorsal fin. Glue it on with thin CA followed by a small fillet of medium CA.





❑ 9. Slide the elevator into position using its hinges to support it **(do not glue the hinges yet.)** Slide the rudder into its place. Mark the location where the elevator joiner contacts the rudder. Cut and sand a notch in the rudder large enough so the elevator joiner wire and the rudder do not contact each other when the surfaces are moved through their range of motion.

DO STEPS 10-14 IF YOU ARE BUILDING A TAILDRAGGER

NOTE: Refer to the tailwheel section on the fuselage plans for details and drawings.

❑ 10. You may make a tail wire from scratch or purchase a Great Planes L-7 tail wire from your hobby dealer.

❑ 11. If you use a Great Planes L-7 tailwheel wire, modify it slightly as shown on the fuselage plan sheet.

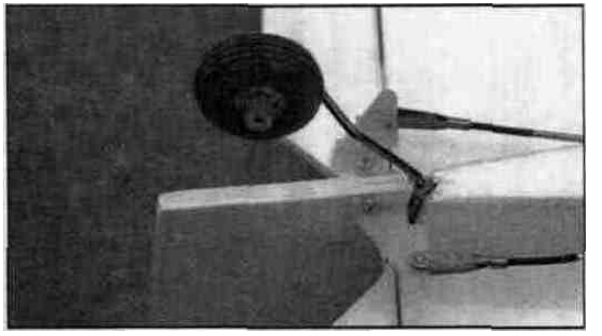


Photo of completed tailwheel.

❑ 12. Drill into the rudder at the location shown on the drawing with a 3/32" drill to allow the tail wire to be inserted into it. Notch the LE of the rudder to accept the nylon bearing. Harden the bottom portion of the rudder around the tail wire with thin CA before covering.

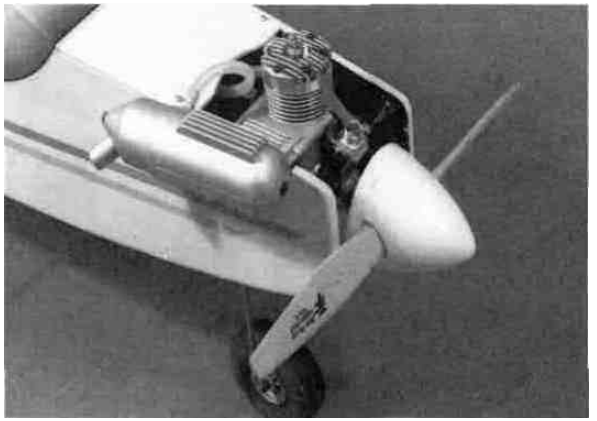
NOTE: Do these steps after the model is covered with Monokote.

❑ 13. Place a small amount of petroleum jelly at both ends of the nylon bearing to keep glue out. Use a toothpick to push glue into the 3/32" hole in the rudder. Insert the tail wire and wipe away any excess glue.

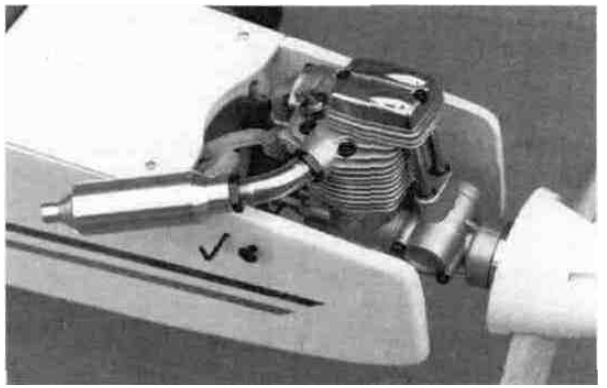
❑ 14. Roughen the forward tab of the nylon bearing and epoxy it into the fuselage during the hinging process.

MOUNT THE ENGINE

See the ENGINE AND MOUNT SELECTION section on page 5 for additional information.



THIS PHOTO SHOWS THE INSTALLATION OF AN **OS .40 FP** ON THE SUPPLIED MOUNT.



THIS PHOTO SHOWS THE INSTALLATION OF AN **OS .48 SURPASS** ON A **DAVE BROWN 60 FS MOUNT.** THIS MOUNT MAY BE PURCHASED FROM YOUR HOBBY DEALER. IT MAY BE DRILLEDTOINSTALLTRICYCLE LANDING GEAR.

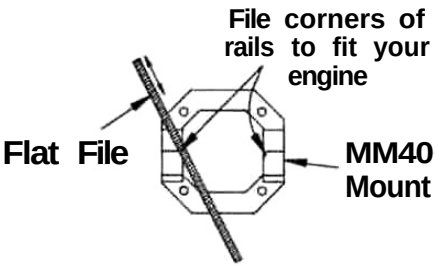
THE FOLLOWING SEQUENCE SHOWS THE IN-STALLATION OF AN **IRVINE 40** ON THE SUPPLIED MOUNT.

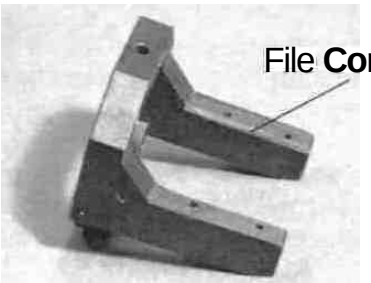
NOTE: The assembly and installation of the fuel tank and fuel lines is covered on page 36-37. You may assemble and trial fit your tank while installing the engine.

❑ 1. Study the different drawings on the fuselage plans that show engine installations. Find the one that matches your installation closest.

❑ 2. You should already have determined if you need to use the 9mm spacer plate during fuselage construction. Use it as required.

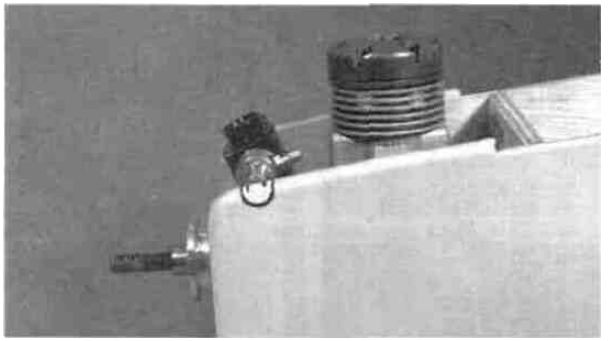
NOTE: If the engine mount supplied in the kit does not appear to fit your engine (example OS 40 SF), you may have to file the corners of the engine mount rails to make room for the crankcase. (See sketch and photo.)





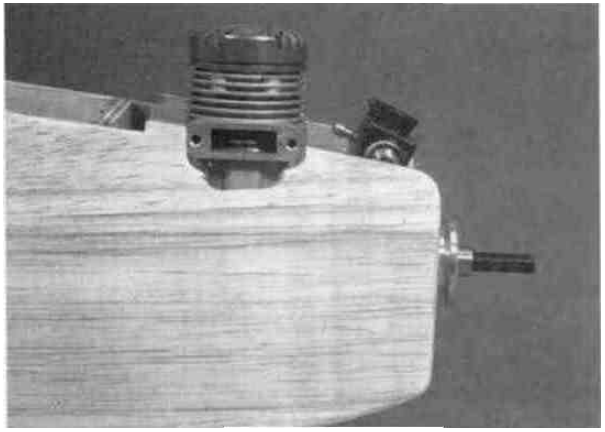
❑ 3. To determine the best fore and aft position of your engine on the engine mount, install the spinner on the engine. Using the plans as referance, place the engine on the engine mount so that the spinner is the same distance from the fuselage. Mark the location of the mounting bolts and drill the holes with a 7/64" (or #36) drill. **NOTE:** If you have access to a drill press, use it for drilling these holes to insure they are drilled vertically (See previous photo).

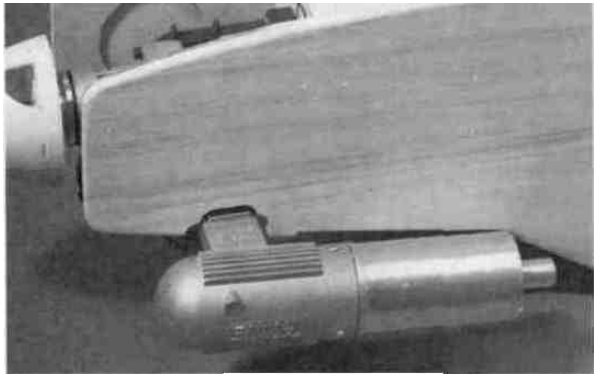
❑ 4. Mount the engine with the four #6 x 3/4" **sheet metal screws.** (An alternate method is to drill the holes with a #43 drill, tap them 4-40, then mount the engine with 4-40 x 3/4" socket head cap bolts, not included).

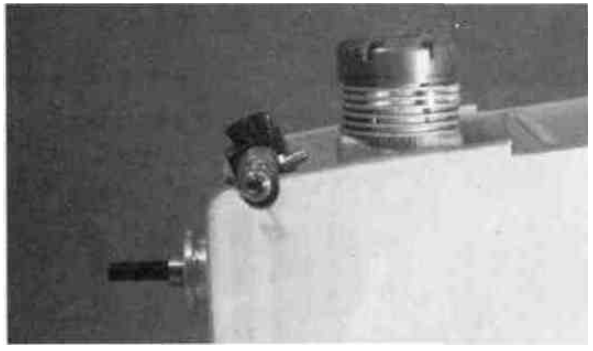


❑ 5. Remove the muffler and needle valve (if necessary) from the engine. Bolt the engine and mount to the fuselage. Determine if any cutouts are necessary for the needle valve or muffler (see the photos for ideas). Mark any cutouts that are required.

NOTE: It is best to remove the engine before cutting out clearance holes, but at least plug the carburetor intake and the exhaust output port before making dust.

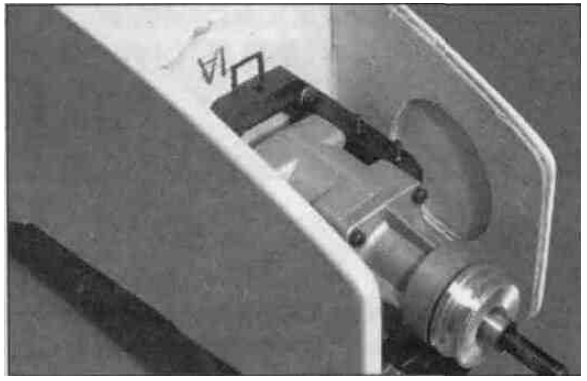


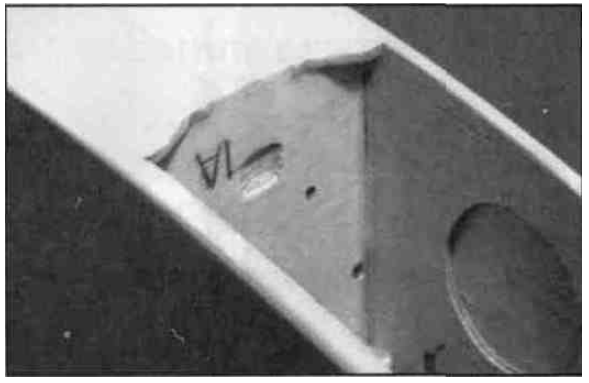




❑ 6. Cut out any clearance holes or notches **you** marked in the previous step. Mount the muffler.

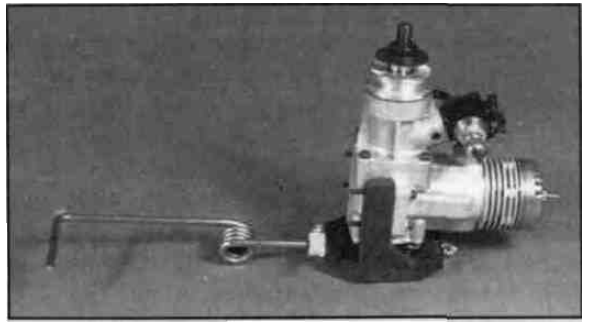
DO THESE STEPS FOR TRICYCLE LANDING GEAR

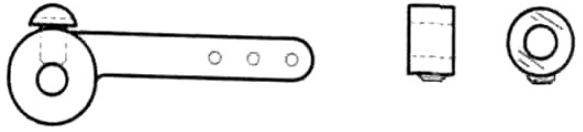




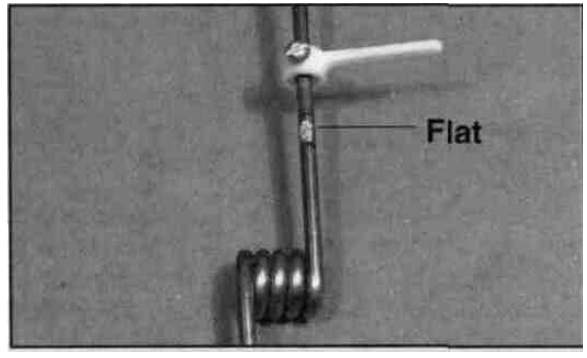
❑ 7. If you are building a trike gear and are **not** using the 9mm spacer, you will need make **an** indentation into the firewall to provide clearance for the **nylon steering arm.** Mark the location of this cutout under the mount. After the mount is removed, relieve the area enough to clear the steering arm (a Dremel Moto-Tool is handy for this job).

NOTE: The steering arm is rotated away from the firewall when the axle is aligned for straight ahead steering. Refer to the photos and plans for proper orientation.





❑ 8. One 5/32" **wheel collar** is pressed into the **nylon steering arm;** then the **6-32 x 3/16" machine screw** is threaded in. This assembly is used below the mount. The other 5/32" **wheel collar** and the **6-32 socket head screw** are used above the mount to retain the nose gear. Assemble the parts as shown to determine the location of a flat which will be made under the 6-32 x 3/16" machine screw. Disassemble the parts.



❑ 9. Clamp the wire nose gear in a vise and use the side of a flat file to make a flat spot at the location you marked.

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.

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:

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

❑ 2. With the wing level, lift the model by the engine propeller shaft and the aft end of the fuselage (this may require two people). Do this several times.

❑ 3. 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

Carefully examine your fuselage comparing the "corners" with the cross sectional drawings on the plans. Sand (using a block where possible) the corners of your fuselage until they match those shown on the plans.

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 dents with a lightweight filler, then sand the entire structure smooth using progressively finer grades of sandpaper. Sand major areas to be covered using MonoKote" with #320 sandpaper just before covering

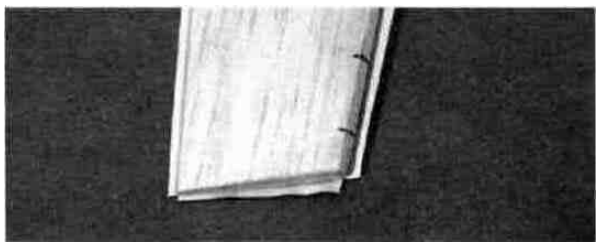
HINT: Small dents in balsa wood can often be swelled back out by applying a small drop of water to them.

COVERING

Follow the instructions included with your covering material. Thoroughly read through them before beginning.

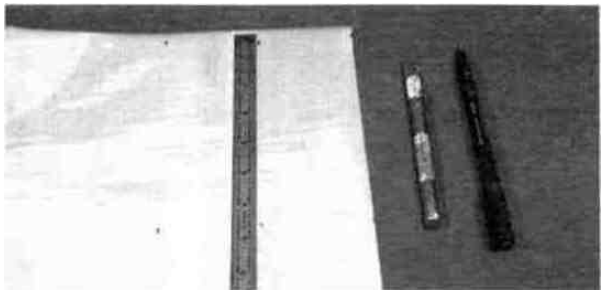
TIPS FOR COVERING WITH MONOKOTE:

Make copies of the 2 view drawing on page 44 of this manual and use it to plan your trim scheme.

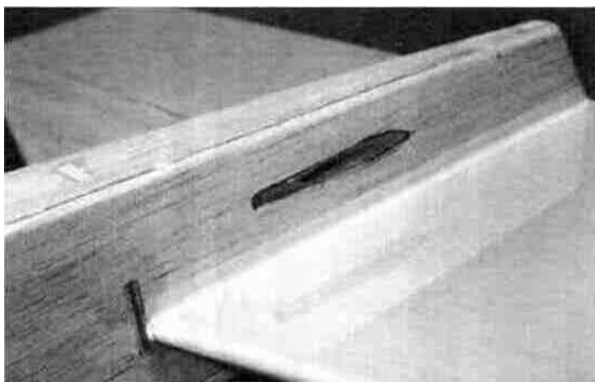


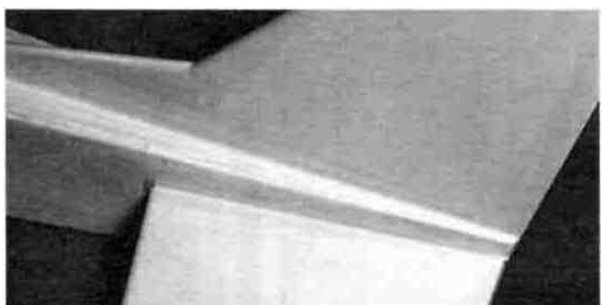
When covering surfaces with corners, cut the material as shown to allow it to fold up and cover the corners without gaps or bumps.

Precut strips for covering objects such as elevators. A permanent marker will put reference marks on

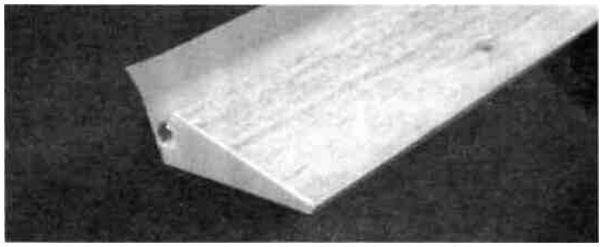


MonoKote, and alcohol will remove them later (for some tasks, you may be able to put your marks on the backing where they will not need to be removed). A metal straightedge and a sharp knife are great tools to have around for cutting MonoKote.

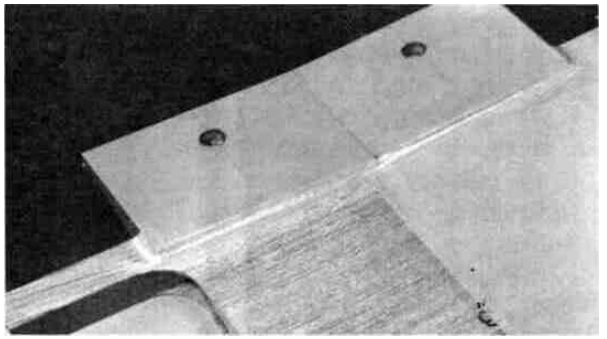




When covering with Monokote® the top and bottom of the stab, and the sides of the fin, allow about 1/8" to 3/16" of covering to lap onto the fuselage as in the photo.



Cover the tips of the ailerons before the bottom and top.



Cover the wing TE Plate before the rest of the wing.

NOTE: 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. Rudder left side
2. Rudder right side
3. Bottom of elevators
4. Top of elevators
5. Stab bottom
6. Stab top
7. Fin left side
8. Fin right side
9. Fuse bottom
10. Fuse sides
11. Fuse top
12. Fuel tank hatch
13. Ends of ailerons
14. Bottom of ailerons
15. Top of ailerons
16. Wing TE plate
17. Bottom of left wing panel
18. Bottom of right wing panel
19. Top of left wing panel
    (overlap covering 1/4" at wing LE)
20. Top of right wing panel
    (overlap covering 1/4" at the LE)

When covering concave surfaces, follow the iron with a damp cloth, pressing the covering down.

FUEL PROOFING

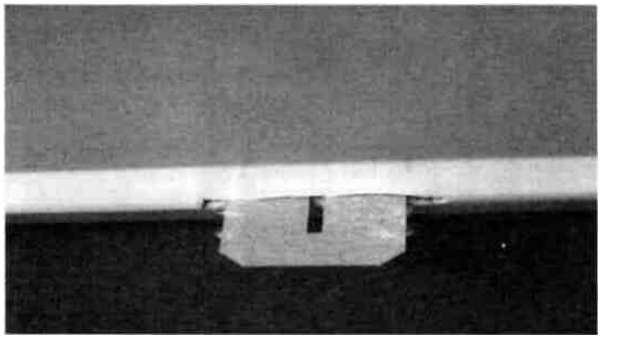
❑ 1. Fuel proof the firewall area and the engine compartment. Black K&B epoxy paint was used for this on one of the prototypes. Thirty minute epoxy, polyester resin, or polyurethane-based paints will also work here.

❑ 2. Fuel proof the inside of the fuselage forward of F-2. K&B polyester resin and a bent epoxy brush were used for this on the prototypes. 30 minute epoxy also works well for fuel proofing.

❑ 3. Fuel proof any external exposed wood. MonoKote matching brush on Chevron Perfect Paint works nicely here.

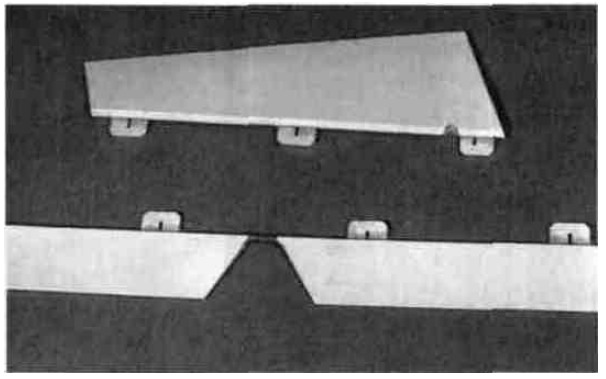
HINGING (using CA hinges)

NOTE: CA Hinges are hinges made specifically to be used with CA glue. These hinges have a plastic core which is laminated with fibers **to** allow the CA to adhere to them.



❑ 1. Find the slots you made earlier. Open them up by cutting a small rectangle of MonoKote away with a sharp X-acto knife.

NOTE: Keep a folded tissue handy to absorb any thin CA that may drip onto the MonoKote by accident. Any glue residue can be completely removed with CA Debonder



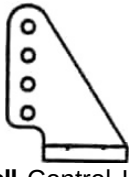
❑ 2. Push the hinges half way into the control surfaces. Wick several drops of thin CA into the slot from both sides of the hinges.

❑ 3. Fit the elevator and rudder onto the airframe. Make sure that all of them fit and line up properly. Wick several drops of thin CA into the hinge slots on the elevator, then the rudder. Be **sure** to glue the hinges in from **both** sides of the surface.

❑ 4. Use a toothpick to push 15-minute epoxy into the torque-rod holes in each aileron. Fit the aileron in place. Then glue in the hinges using the technique described above.

FINAL CONTROL HOOKUPS

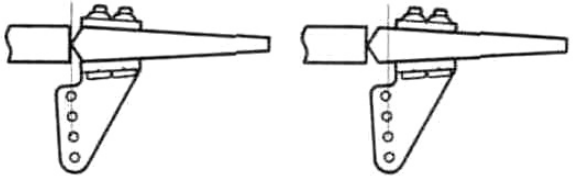
2 - 56 x 5/8 Machine Screw



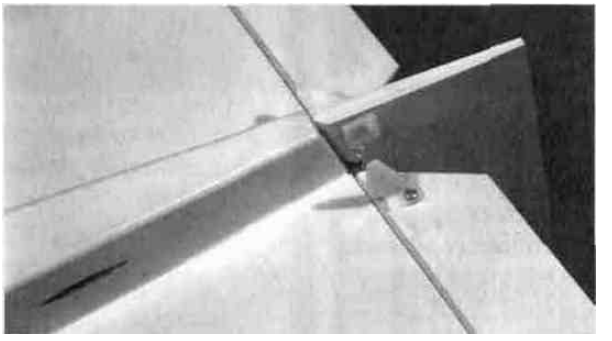
Nut Plate

Small Control Horn

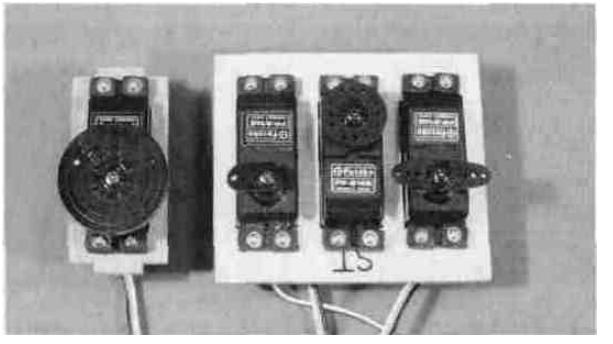
❑ 1. Install the elevator and rudder **small nylon control** horns in line with the pushrod exits as shown on the plans. Hold the horns in position and



RIGHT **WRONG**

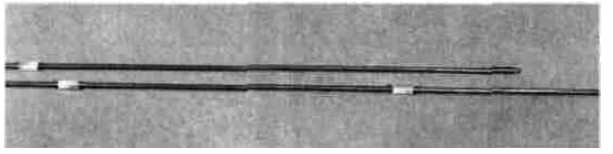


mark the location of the mounting holes. Drill 3/32" mounting holes through the marks. Then wick some thin CA glue into them to 'harden' the balsa. The horns are screwed in place using **2-56 x 5/8" machine screws** and **nylon nut plates.**

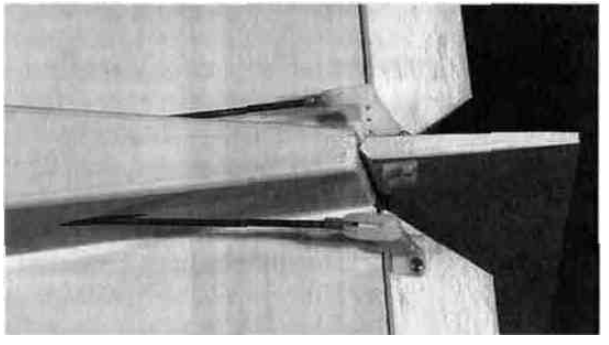


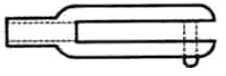
❑ 2. Mount the servos into the main servo tray oriented as shown on the fuselage plan top view. Mount the aileron servo (if used) in the aileron servo tray.. Since the main servo tray is adjustable fore and aft for small CG corrections, do not glue it in until told to do so.

❑ 3. For easy setup and good control response, we recommend you start off using servo horns resembling those shown on the plans. The rudder and throttle use horns made out of large, "four armed" horns. The aileron horn is set up to provide "differential throw." In this case it will cause the ailerons to deflect "up" more than they deflect "down." The horn shown is made out of a large, round Futaba horn that is drilled on the "1" and "4" radial lines where they intersect the "12.5mm" radius line. (See the drawing on the wing plan).



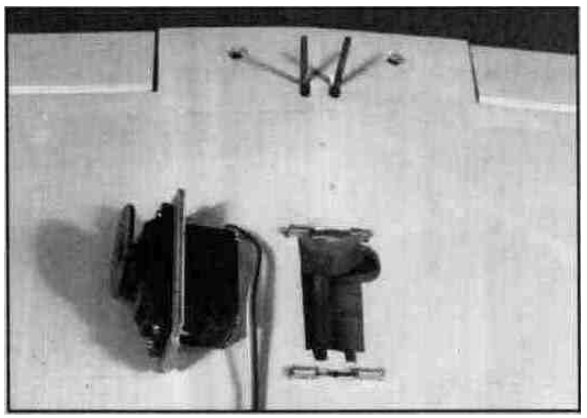
❑ 4. Make the rudder and elevator pushrods: Cut ten 5/16" lengths of the inner pushrod tube to act as spacers. Distribute these on the 34" threaded end .074" wire pushrods as shown on the fuselage top view. Note: If the spacers are extremely tight on the .074 wire, you may cut them down to 3/16". If the spacers are loose on the .074 wire, use a tiny drop of CA to glue them to the .074 wire. In any case, they should not easily move on the wire.



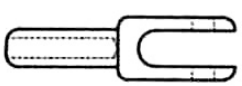


❑ 5. Screw the **nylon clevises** well onto the ends of the pushrods, insert the pushrods into their guide tubes, and temporarily hook the clevises up to the control horns. The pushrods will later be marked and removed so you can make the z-bends.

AILERON HOOKUP



❑ 6. Cut away the bottom wing skin as shown to provide an aileron lead exit. Use medium CA to glue the aileron servo tray (with servo) in its place as shown on the plans.

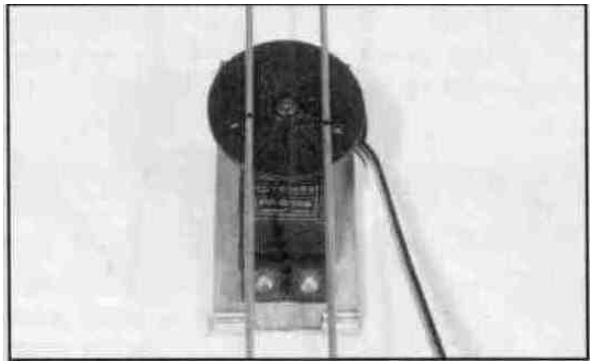


Nylon Swivel Clevis

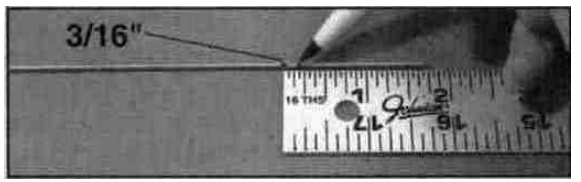
Nylon Swivel

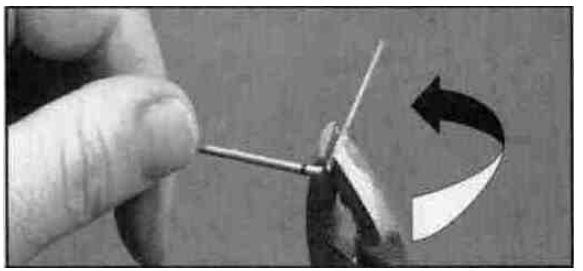
❑ 7. Hook up the **nylon swivel clevises** to the nylon swivels. Thread a 12" threaded end rod into each swivel clevis. Screw these assemblies onto the aileron torque rods down to the height shown on the "Cross Section At Centerline: (See the photo at step 9.)

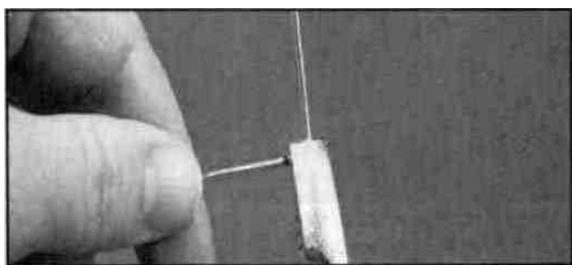
❑ 8. Mark the locations for the Z-bends in the aileron pushrods by holding the ailerons neutral

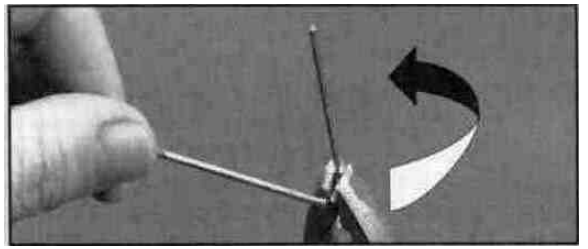


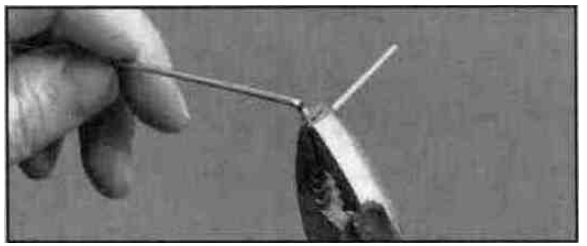
with tape and putting marks on the pushrods even with the holes in the servo wheel.
NOTE: When attaching the Z-bends to the servo wheels, you'll need to use a 5/64" drill to enlarge the holes in the servo wheels. Make the Z-bends as shown in the following sequence.

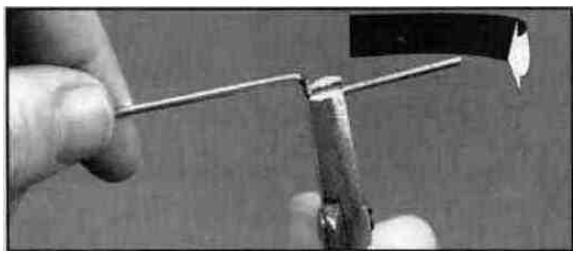


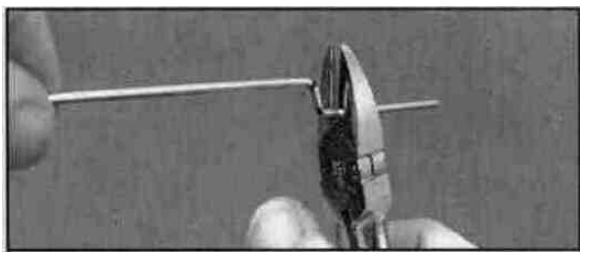


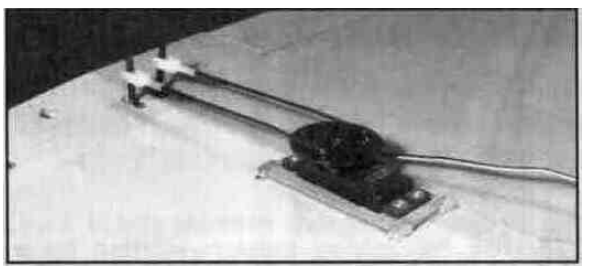












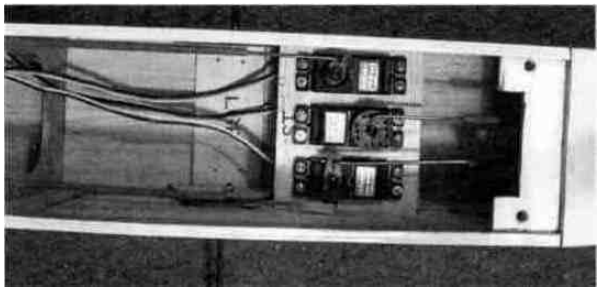
❑ 9. Hook up and make final adjustments to the aileron linkage.

❑ 10. Mount the wire main landing gear. Install your wheels and tires using wheel collars (not included) **as** shown on the plans.

❑ 11. Mount the engine, muffler, and nose gear. Temporarily put all the equipment, such as the fuel tank, receiver, battery, etc., in place so you can do a preliminary Center of Gravity check to determine the location of your servos.

❑ 12. Put the main servo tray on its shelf and mount the wing. Check the center of gravity using the technique described on page 37 "Balance Your Model". First decide whether the receiver and battery will go under the fuel tank or under the wing in front of the servos. Then slide the servo tray fore **and** aft to fine tune the balance.

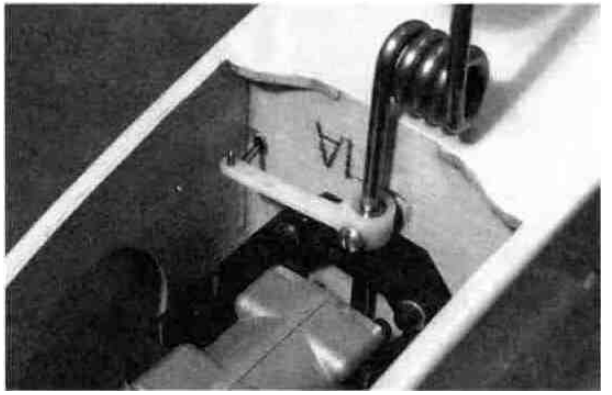
NOTE: Most 2-cycle installations will require the equipment to be positioned forward.



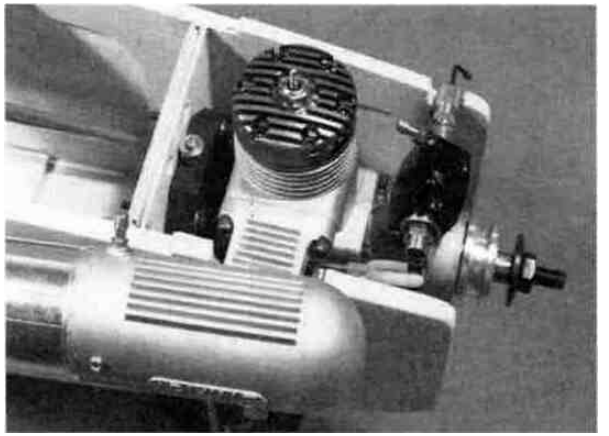
❑ 13. Glue in the main servo tray with medium **CA.** Mark the locations for Z-bends on the elevator and rudder pushrods.

NOTE: See the aileron hookup section for a description of how to make a Z-bend.

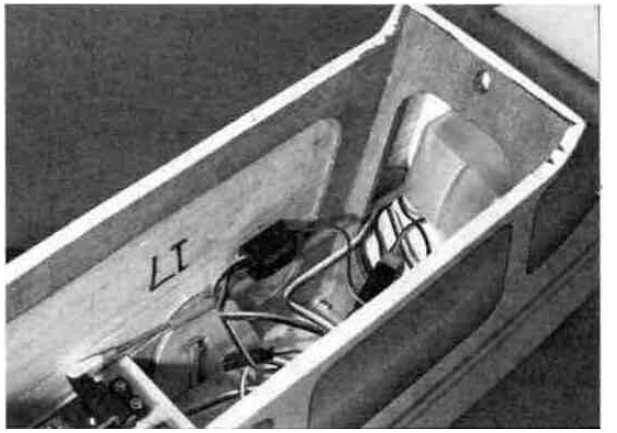
❑ 14. Remove the nylon clevises from the aft end to the pushrods. Remove the pushrods. Make the Z-bends at the servo end of the wire and reinstall the pushrods from the front through the fuel tank hatch.



❑ 15. Make the nose wheel steering pushrod (if required) from half of the 36" **double threaded end rod** and half of the remaining 24" outer pushrod tube (see the fuselage plans and photos for details). The nose wheel steering pushrod uses a **nylon clevis** on its servo end. Make a 90 deg. bend in the steering arm end of the pushrod as shown on the fuselage plans. The nose wheel and throttle pushrods do **not** require spacers made from inner pushrod tube.



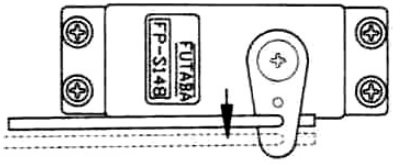
❑ 16. Make the throttle pushrod from the **remainder** of the nose wheel steering pushrod (the photos and plans show typical throttle pushrod installations).



❑ 17. Install the switch harness in the location you desire. The prototype switch location can be seen in **the** photos. Always install your switch on the opposite side of the muffler to keep it away from the oily exhaust residue.

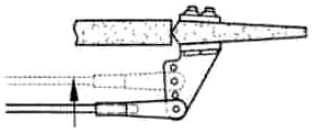
We recommend the following CONTROL SURFACE THROWS:

Some radios have adjustable travel volumes **(ATV).** This feature allows the user to electronically adjust the travel of the control surfaces. Most low cost radios used in trainers do not have this feature so we will describe the "mechanical" method here.



More Throw

(Continued on next page)



More Throw

Move the linkages in the direction shown by the arrows to increase the throw of that surface. Move the linkages in the opposite direction to decrease the throws. Always configure the linkages toward the outside of the horns when possible. This will tend to reduce the amount of slop that adds up.

NOTE: Throws are measured at the widest part of the elevators, rudder, and ailerons.

ELEVATOR:	**NORMAL**	**....1/2" UP**	**1/2" DOWN**
		(High Rate) 5/8" up	5/8" down
		(Low Rate) 3/8" up	3/8" down
RUDDER:	**NORMAL**	... .7/8" RT	7/8" LFT
		(High Rate) 1" right	1"left
		(Low Rate) 3/4" right	3/4" left
AILERONS:	**NORMAL**	... .9/16" UP	3/8" DOWN
		(High Rate) 5/8" up	7/16" down
		(Low Rate) 3/8" up	1/4" down

NOTE: "Dual Rates" is a feature on some radios which allows you to switch the control surface throws in flight. This allows you to change the responsiveness of your aircraft depending on what maneuvers you are doing. If your radio does not have "dual rates", then set up the control surfaces to move at the **NORMAL** throws. The **SIERRA** can be safely flown with any of the control surface throws listed above. The higher throws just offer a little quicker response.

APPLY TRIM

The main pictures show a Sierra covered in MonoKote **yellow, red,** and **orange.** Another attractive option, as shown on the side panel, is covered in MonoKote **jet white, pearl red,** and **pearl copper.**

NOTE: This section gives an overview of how we often trim our models. Some of the techniques may seem slightly advanced for beginners, but they are not really difficult.

NOTE: We use standard MonoKote for almost all of the trim on our models. "Trim sheets" are not completely fuel proof, and over time they will begin to peel up. MonoKote is very thin and lightweight. When ironed on, it wilt almost never come off. MonoKote has the added advantage of being able to go over compound curves since it is applied with heat.

❑ 1. Patterns are provided in dashed lines on the plan sheets. You may wish to trace these so you do not destroy the plans. Only one pattern is required **to** make the left and right trim pieces using the technique described here.

NOTE: The better the quality of the cutting board you use, the better your results will be.

❑ 2. The model is first covered completely in its base color.

❑ 3. Choose a piece of trim to start with... for instance, the forward stripe on the stab. Securely tape an oversized piece of normal MonoKote, **backing side down,** to your cutting board. Tape another piece of MonoKote, **backing side up,** on top of the first piece (this one will be for the opposite side of the stab).

❑ 4. Cut the pattern from the plan sheet, leaving a healthy border around the lines where possible.

❑ 5. Tape the pattern over the MonoKote-covered cutting board (an alternative is to use a spray glue such as 3M-77 to hold the pattern to the MonoKote backing).

❑ 6. Always use a very sharp knife and enough pressure to cut through all of the layers of covering in one stroke.

❑ 7. Use a straightedge to cut all of the straight lines first.

❑ 8. Next, free hand cut all of the curved sections.

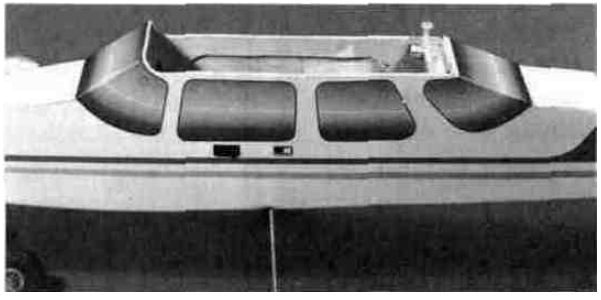
❑ 9. Separate the trim pieces and clean up any snags or mismatches.

❑ 10. Use the dashed lines on the plans to locate the trim on the aircraft. Apply the trim in the same way as normal MonoKote, but reduce the temperature some to reduce the occurrence of air bubbles.

❑ 11. Repeat this process for all of the trim.

APPLY DECALS

NOTE: The decal sheet does not give you everything you need to completely trim your model, but it does provide all the difficult items.



❑ 1. Study the plans and the photos on the box to determine where to place the decals.

❑ 2. Thoroughly clean your airplane before applying decals.

❑ 3. Cut out the individual decal items and apply them in the appropriate locations. **NOTE:** Certain decals are provided which you may use at your discretion, such as the "TOP FLITE" logo and the small "SIERRA" decals.

❑ 4. The following sequence is recommended for applying the window decals:

A. Carefully cut out the windows with a sharp knife allowing about a 1/16" border. Use a sharp X-acto knife and a straight edge to trim the decal edges that will lap together at the fuselage corners **exactly** at their edges.
NOTE: Do not cut the side windows apart. Applying them as a single piece will allow you to keep them lined up with each other.

B. Use a couple of small pieces of masking tape to hold the side windows in their position on the fuselage.

C. Use a permanent fine tip marker, such as a "Staedtler Lumocolor 313 Permanent" available at art and drafting stores, to **lightly** mark the location of the front window. Mark the location of the aft edge of the side windows for future reference.

D. Remove the side windows. Peel the backing off the front window and stick it to the fuselage, aligning it with the marks you made at the front window location.

E. Peel the backing off the side windows. Carefully align them with the front windows and the marks you made for the aft edge of the side windows.

F. When both side windows are in place, peel the backing off the back window. Align it with the side windows and stick it in place.

HINT: Use a fine tipped permanent marker to blend away any slight mismatches or gaps.

HINT: You may carefully apply some thin **CA** to the window lap joints with a toothpick **to** prevent them from peeling up.

INSTALL THE RECEIVER AND BATTERY

❑ 1. Wrap your receiver and battery in plastic bags, followed with foam rubber.

❑ 2. Install the battery and receiver in the fuselage.

NOTE: These were put under the fuel tank in the prototypes as shown on the plans. Additional foam was put between them and the fuel tank to hold the fuel tank at the proper height. The position of the battery and receiver may be changed to balance the aircraft. There is plenty of room under the wing ahead of the servos for the receiver and battery if necessary.

NOTE: If it is necessary to install the receiver and/or battery in the compartment under the wing, glue a piece of scrap balsa over the top of their foam padding to keep them securely in place.

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

A. Route the antenna along the inside of the fuse side and out of the fuse top, just behind the wing. Anchor the antenna to the top of the fin with a rubber band.

B. Install another "pushrod guide tube" along the inside of the fuse, along the bottom, exiting just ahead of the rudder. Insert the antenna through the tube, and leave the excess length trail behind.

NOTE: DO NOT EVER CUT YOUR RECEIVER ANTENNA OR ATTEMPTTO FLY A MODEL WITH THE ANTENNA FOLDED OR COILED UP. THESE CONDITIONS WILL DRASTICALLY REDUCE THE RANGE OF YOUR RADIO.

INSTALL THE FUEL TANK

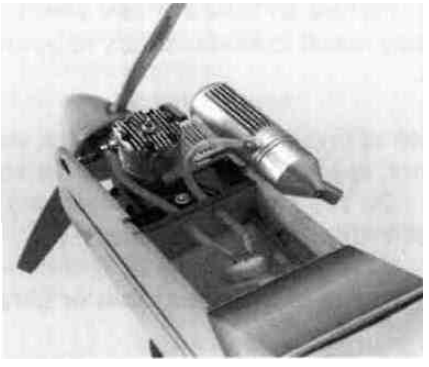
❑ 1. Assemble the fuel tank as per the manufacturer's instructions. Be sure the "clunk" cannot contact the back wall of the tank and interrupt the fuel flow.

❑ 2. The tank should be mounted as high in the fuel tank compartment as is practical. Use foam rubber to surround the tank on all sides and hold it in position.

NOTE: There is a fitting on the muffler of most model engines (especially 2-cycles) known as a "muffler pressure tap". When the vent line from yourfuel tank is attached to this fitting, it supplies the fuel tank with a mild amount of air pressure. This pressure provides a more consistent flow of fuel to the carburetor. The result of using this "muffler pressure tap" is usually an engine that will run properly whether the plane is climbing, diving, upside-down, or right-side-up.

❑ 3. Route the fuel line from the clunk to the carburetor fuel intake. Route the fuel line from the tank vent to the muffler pressure tap, or leave it open if no pressure tap is available.

NOTE: The fuel system should be completely free of kinks or leaks. Any of these will cause the engine to run erratically or not at all.



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.

❑ 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 **3-3/4 inches** back from the wing leading edge (1/8" inch back from the center of the spar). This is the balance point at which your model should balance foryourfirstflights. Later, you may wish to experiment by shifting the balance up **to 5/16" forward or back** to change the flying characteristics. Moving the balance **forward** may improve the smoothness and provide arrow-like tracking, but it may then require more speed for take off and make it more difficult to slow down for landing. Moving the balance **aft** makes the model more agile with a lighter and snappier "feel." In any case, **do not balance your model outside the recommended range.**

❑ 2. With the wing attached to the fuselage, all parts of the model installed (ready to fly), and an **empty** fuel tank, position the model with the stabilizer level.

❑ **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 for balance. If the nose drops, it is "nose heavy" and you must add weight* to the tail for balance. **NOTE:** Nose weight may be easily installed by sticking strips of lead into the engine compartment beside the engine. Tail weight may be added by using "stick-on" lead weights, available from your hobby dealer.

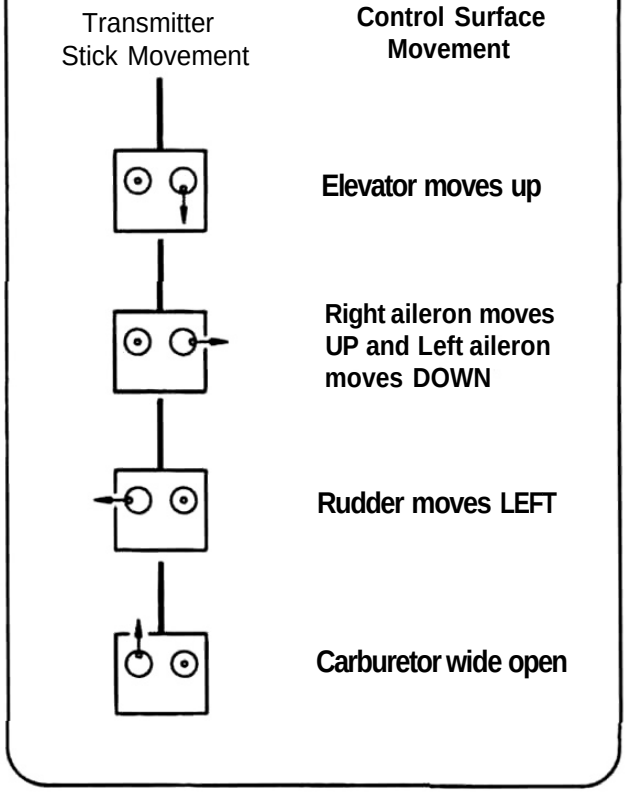
*If possible, first attempt to balance the model by changing the position of the receiver and battery. If you are unable to obtain good balance by doing so, then it will be necessary to add weight to the nose or tail to achieve the proper balance point.

FINAL CHECKS

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

RADIO SET-UP

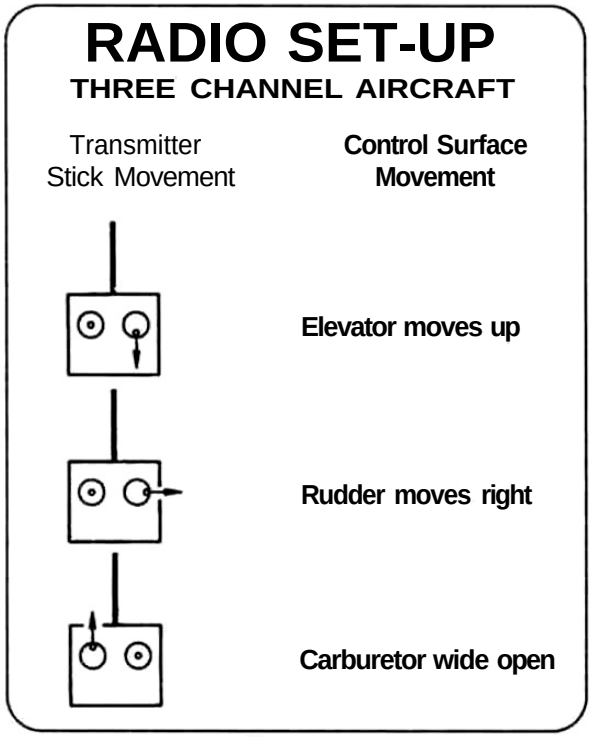
FOUR CHANNEL AIRCRAFT



See the following page for 3 channel set up.

❑ 2. Adjust your pushrod hookups as necessary to provide the proper control surface movements as listed on page 34. Make sure all of the clevises are securely "snapped" together.

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



❑ 3. Make sure none of the pushrods are binding.

❑ 4. Make sure all of the screws and bolts on your model are tight. Check to see that all of the servos are secure and all of the servo wheels are screwed on firmly.

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 the 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 each flight. 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. Ask them to 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.

NOTE: ATTACH A RUBBER BAND-ON WING WITH A MINIMUM OFTEN #64 RUBBER BANDS.

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 with 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 following 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 take off 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.

FIRST FLIGHTS

The Top Flite Sierra is a great flying airplane that flies smoothly and predictably. It is a primary trainer with a very gentle stall and excellent self-recovery characteristics. For your best chance at complete success, we strongly recommend you seek the assistance of a competent R/C pilot to help you with your first flights. It is possible to teach yourself to fly, but why subject your plane to an unnecessary risk?

One technique people often use to familiarize themselves with the model's controls is to drive the airplane around on the ground. This can be helpful for modelers with virtually no previous R/C experience but you must be careful. If you "drive" it without the wing mounted and it tips up, the aircraft is likely to flip all the way over and become scuffed. If you drive it around with the wing on , a sudden gust of wind may lift the model into the air before you are ready. In any case, make sure you have the ability to "kill" the engine with the throttle trim on the transmitter and keep the speeds low.

One thing to keep in mind with R/C models (whether it be cars, boats, or planes) is that the steering controls may seem to "reverse" when the model is moving toward you. For example, if you are flying toward yourself, and you give a **right** control input (ailerons or rudder), the model will move off to your **left.** The fact of the matter is, of course, that the controls are not reversed and the aircraft did actually enter a right turn. The plane does move off to your left from your vantage point, but if you imagined yourself in the cockpit you would realize the plane turned to the right as commanded. All it takes is a little practice to maintain proper orientation of your aircraft, but that is why we recommend finding an instructor.

Before going to the field, make sure you have charged your batteries and have done all the other checks described in the manual. Break in the engine following the manufacturer's instructions. This usually involves running a couple of tanks of fuel through the engine prior to flying. Run the engine set a little rich for the first few flights in order to finish the break-in process.

TAKE OFF

If you have dual rates on your transmitter, set the switches to "high rate" for take off, especially when taking off in a crosswind. For your first flights, it is best to pick a day when the wind is light, and coming down the runway. The Sierra handles crosswinds better than most other trainers, but you do not want to complicate your first flights. Remember, you should always take off into the wind. Although the Sierra has good low speed characteristics, you should build up some extra speed before lifting off, as this will give you a safety margin in case of a "flame-out." When the plane has sufficient flying speed, lift off by smoothly applying a **little** up elevator (don't "jerk" it off into a vertical climb!), and climb out gradually. Let your Sierra climb into the wind, making only minor corrections to keep it going straight until it is at a comfortable altitude. Then make a gradual turn.

The Sierra will climb out at a 20 or 30 degree angle under full throttle. It is designed to fly level with neutral elevator trim at approximately 1/2 to 2/3 throttle. This is the best speed for learning to fly. On later flights, if you want the Sierra to maintain level flight at full throttle, you will need to give it a little down trim.

FLYING

We recommend that you take it easy with your Sierra for the first several flights and gradually "get acquainted" with this great plane as your engine becomes fully broken-in. Your first flights should consist of mostly gentle turns. These will give you practice at coordinating your control inputs and maintaining the proper orientation of the airplane.

Turns are accomplished by banking the aircraft with the ailerons (rudder will accomplish this on a 3-channel airplane), then gently giving some back stick (up elevator). Enough back stick should be held in to keep the aircraft at a constant altitude. When you wish to stop turning, apply opposite aileron (or rudder) to level the wings. Then release the sticks. When you are comfortable flying the aircraft, you can practice using the rudder along with the ailerons to "coordinate" the turns. Usually, a small amount of rudder applied in the direction of the turn will keep the tail following in the exact same track as the nose.

Add and practice one maneuver at a time, learning how your Sierra behaves in each one. For ultra-smooth flying and normal maneuvers, we recommend using the "low rate" settings as listed on page 34. High rate control throws will give your Sierra enough control for loops, barrel rolls, axial rolls, and many other basic aerobatic maneuvers.

After you have several flights on your Sierra, it's time to reward yourself with your first aerobatic maneuver. A loop is a good choice. Climb to a safe altitude and turn into the wind. Lower the nose with a little down elevator into about a 5 degree dive and apply full throttle. After you dive for a couple of seconds, slowly pull back on the elevator stick to about 1/2 to 3/4 up elevator (depending on your throws). Hold this control input. After you "go around the top" and start down the back side of the loop, pull the throttle back to about half. This will keep the stresses on the airplane low and the airspeed relatively constant. Keep holding the up elevator until the plane is nearly level. Then slowly release the sticks. Your done!!! It's really that easy!

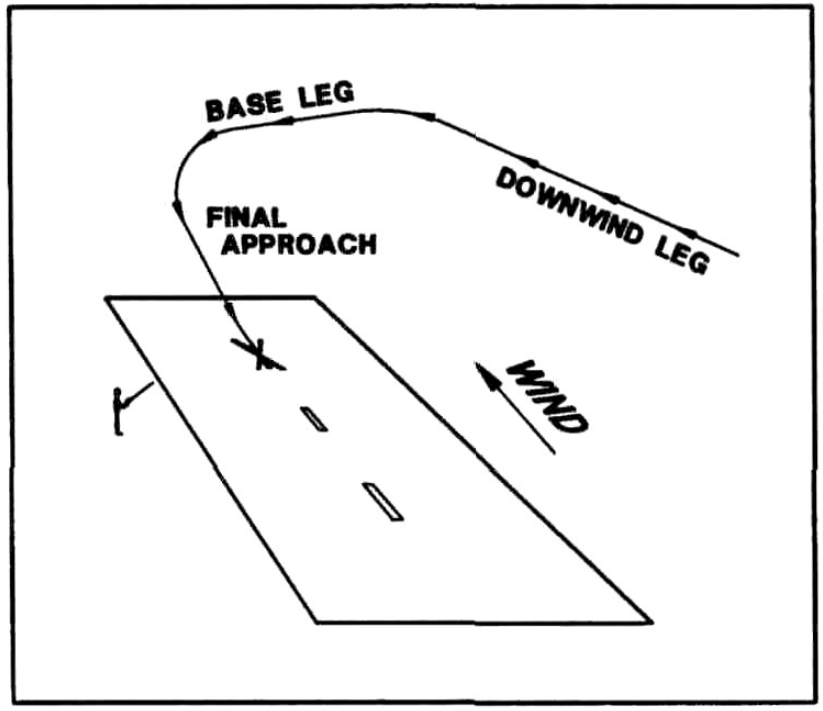
CAUTION (THIS APPLIES TO ALL R/C AIRPLANES): If, while flying, you notice any unusual sounds, such as a low-pitched "buzz," this may be an indication of control surface "flutter." Because flutter can quickly destroy components of your airplane, any time you detect flutter you must **immediately** cut the throttle and land the airplane! Check all servo grommets for deterioration (this will indicate which surface fluttered), and make sure all pushrod linkages are slop-free. If it fluttered once, it will probably flutter again under similar circumstances unless you can eliminate the slop or flexing in the linkages. Here are some things which can result in flutter: Excessive hinge gap; not mounting control horns solidly; sloppy fit of clevis pin in horn; elasticity present in flexible plastic pushrods; side-play of push-rod 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.

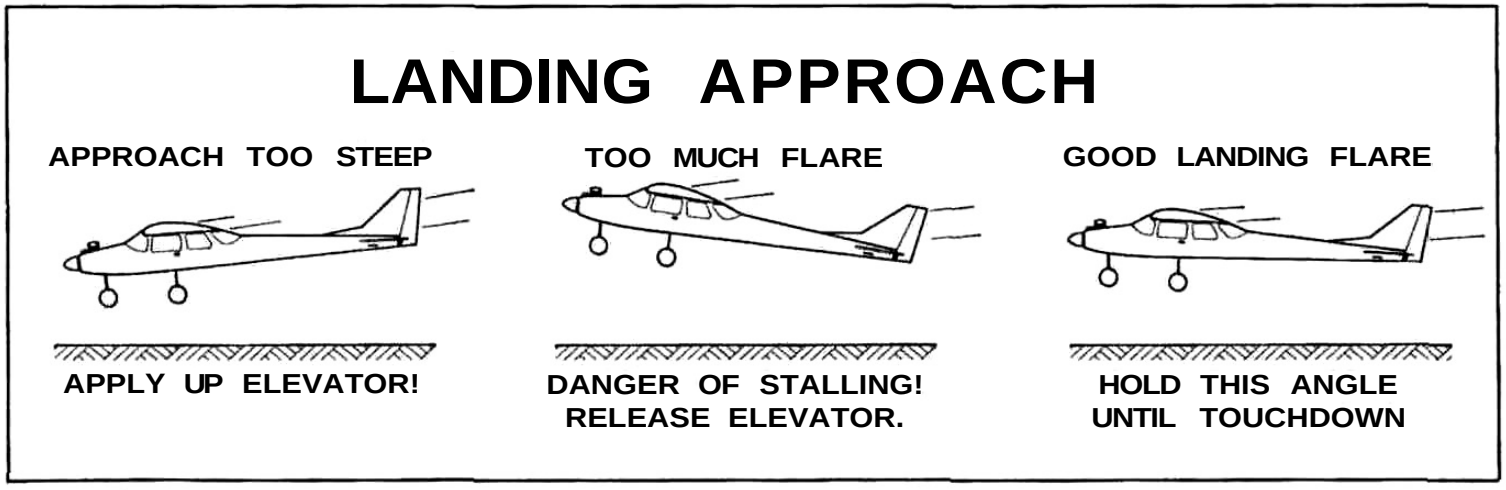
LANDING

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

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

GOOD LUCK AND HAVE FUN FLYING!





TRANSPORTING CHECKLIST

- ❑ Make sure radio batteries are all charged. We suggest checking the batteries with a ESV Meter to make sure they are fully charged.
- ❑ Make sure the transmitter and receiver are on the same frequency.
- ❑ Glow plug driver to power the glow plug.
- ❑ Fuel and fuel pump or fuel bulb. A good quality 10-15% nitro fuel is recommended.
- ❑ Extra props and a prop wrench
- ❑ Screwdrivers, knife, pliers, and wrenches
- ❑ Epoxy and something to mix it on, A thick CA and accelerator.
- ❑ Paper towels
- ❑ Cleaner to remove fuel residue from the plane.
- ❑ Extra glow plugs
- ❑ "Chicken stick" or electric starter and 12 volt battery.
- ❑ Wing bolts or #64 rubber bands.
- ❑ Fuselage, Wing
- ❑ Transmitter
- ❑ AMA license

AFTER-FLIGHT MAINTENANCE

- ❑ Remove all excess fuel from the fuel tank, as this fuel can become jelly-like and cause clogging of fuel lines, as well as clogging the engine's carburetor.
- ❑ Always use after-run oil in the engine to prevent corrosion.
- ❑ Check and double check that the transmitter and receiver switches are switched to the off positions.
- ❑ Wipe off the excess oil that will collect on the wing and fuselage. Use a light-duty cleaner to help cut through the oil.
- ❑ Remove fresh fuel from the surface of the plane immediately, as different brands can cause clouding of the surface.
- ❑ Replace any bent, marred or dinged props as they can fly apart at any time when the engine is running.
- ❑ Completely check the airplane for damage to the wings, landing gear and covering. Repair as needed before your next flight.

BUILDING NOTES.

Kit Purchase Date _____

Where Purchased _____

Price _____

Date Construction Started _____

Date Construction Finished _____

Date of First Flight _____

Finished Weight _____

Comments _____

SIERRA PARTS LIST

PART#	QTY.	DESCRIPTION
PACKED LOOSE IN KIT		
MM40D	1	.40 SIZE ENGINE MOUNT (DRILLED)
PLTB011	3	24" PLASTIC OUTER PUSHROD TUBE
SIE4D01	1	SIERRA DECAL SHEET
SIE4F05	2	PLYWOOD DC FUSELAGE DOUBLER
SIE4P01	1	SIERRA FUSE PLAN SHEET
SIE4P02	1	SIERRA WING PLAN SHEET
SIE4P03	1	INSTRUCTION BOOK
SIE4R04	1	BALSA 1/4" FIN POST
SIE4W12	2	15/32x1-5/8x11-1/5 TAPERED WING TIP
WIRES10	**1**	.074 X 36" WIRE THREADED BOTH ENDS
WIRES17	**2**	.074 X 34" WIRE THREADED ONE END
SIE4AQ1	**1**	**SUB-PACK. DIE-CUT BALSA FUSELAGE PARTS**
SIE4F06	2	BALSA 1/8" DC AFT FUSELAGE SIDE
SIE4F07	**2**	BALSA 1/8" DC UPPER FWD FUSELAGE SIDE
SIE4F08	2	BALSA 1/8" DC LOWER FWD FUSELAGE SIDE
SIE4F09	2	BALSA 1/8" DC REAR FUSE DBLR. & FWD FUSE BOTTOM
SIE4F10	1	BALSA 1 /8" DC AFT FUSE TOP
SIE4F11	2	BALSA 1/8" DC MIDDLE FUSE BOTTOM
SIE4F12	1	BALSA 1/8" DC AFT FUSE BOTTOM
SIE4A02	**1**	SUB-PACK. DIE-CUT **PLYWOOD** FUSELAGE PARTS
SIE4F01	1	PLYWOOD 1/8" DC F-1A, F-1 **B,** ST.AND FW
SIE4F02	1	PLYWOOD 1/8" DC F-2, BW, AND HATCH PARTS
SIE4F03	1	PLYWOOD 1/8" DC F-3, F4, F-5, AND GD'S
SIE4AQ3	**1**	**SUB-PACK. DIE-CUT WING PARTS**
SIE4W01	1	PLYWOOD 1/8" DC W-1B, F, A, GUIDE, AIL. ST
SIE4W02	**1**	PLYWOOD 1/8" DC DIHEDRAL BRACES
SIE4W04	2	BALSA 1/8" DC W-1A, W-1B
SIE4W05	1	BALSA 1/16" DC WING CENTER SHEETS 1,4
SIE4W06	2	BALSA 1/16" DC WING CENTER SHEETS 2, 3, 5,6
SIE4W15	6	BALSA 3/32" DC RIBS W-3*
*MAY SUBSTITUTE **(8)** W03'S		
SIE4A04	**1**	**SUB-PACK. SHAPED BALSA TAIL PARTS**
SIE4S01	1	BALSA 1/4" STAB FORWARD
SIE4S02	1	BALSA 1/4" STAB AFT
SIE4S03	1	BALSA TAPERED ELEVATOR
SIE4A05	**1**	**SUB-PACK. LONG WING PARTS**
SIE4W07	4	BALSA 3/8" X 3/8" X 30" SPARS
SIE4W08	2	BALSA 30" TAPERED AILERON
SIE4W09	1	BALSA 30" SHAPED AND NOTCHED LE PAIR
SIE4W10	1	BALSA 30" SHAPED AND NOTCHED TE PAIR
SIE4A06	**1**	SUB-PACK. SHAPED VERTICAL FIN PARTS
SIE4R02	1	BALSA 1/4" FIN FORWARD
SIE4R03	1	BALSA 1/4" FIN AFT
SIE4R05	1	BALSA 1/4" RUDDER
SIE4A07	**1**	**SUB-PACK. SMALL WOOD PARTS**
DOWEL020	2	DOWEL 1/4" DIA. X 5-1/8"
SIE4F13	1	PLYWOOD 1/4" WING BOLT PLATE
SIE4F14	2	PLYWOOD 1/8" LG ALIGN **STRIPS**
SIE4F15	1	PLYWOOD 9mm ENGINE SPACER PLATE
SIE4F16	1	PLYWOOD 1/8" LANDING GEAR PLATE
SIE4R01	1	BALSA 1/4" DORSAL FIN
SIE4W11	2	BALSA GROOVE CENTER TE PIECE
SIE4W14	1	PLYWOOD 1/16" TRAILING EDGE PLATE
SIE4W09	**1**	**SUB-PACK. SHEAR WEBS**
SIE4	**26**	BALSA 1/16" SHEAR WEBS
SIE4M01	**1**	**SUB-PACK.HARDWARE**
NUTS001	4	4-40 BLIND NUT
NYLON03	2	SMALL NYLON CONTROL HORN
NYLON13	2	1/4--20X 2" NYLON BOLT
NYLON16	1	NYLON STEERING ARM
NYLON17	4	NYLON CLEVIS
NYLON20	2	NYLON SWIVEL
NYLON21	2	NYLON SWIVEL CLEVIS
NYLON36	1	FLAT NYLON LG STRAP
SCRW002	4	2-56X5/8" MACHINE SCREW
SCRW003	4	440 X 1" MACHINE SCREW
SCRW005	1	6-32 X 1/8" SOCKET SET SCREW
SCRW020	1	6-32X1/4" MACHINE SCREW
SCRW024	6	#2 X 3/8" SHEET METAL SCREW
WBNT002	1	3/32" AIL. TORQUE RODS L & R
WBNT101	1	1/8" ELEVATOR JOINER WIRE
WHCL015	2	5/32" WHEEL COLLAR
WSHR005	4	#4 FLAT WASHER
SCRW018	4	#6 X 3/4" SHEET METAL SCREW
SIE4M02	**1**	**SUB-PACK. LARGE HARDWARE**
PLTB004	1	6-1/2" PLASTIC INNER SPACER TUBE
WBNT163	2	5/32" MAIN LANDING GEAR
WBNT164	1	5/32" NOSE GEAR
WIRES16	2	.074X12" WIRE THREADED ONE END

SIERRA TWO-VIEW DRAWING