Learjet®

INSTRUCTION MANUAL

Engine and propeller removed for dramatic effect.

WARRANTY

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

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

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

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

GREAT PLANES® MODEL MANUFACTURING COMPANY

P.O. Box 788 Urbana, IL 61801 (217) 398-8970

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

Your Great Planes Learjet is not a toy, but rather a sophisticated, working model that functions very much like an actual airplane.

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

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

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

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

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN 47302-9252
Tele. (800) 435-9262
Fax (317) 741-0057

INTRODUCTION

Congratulations! Thank you for purchasing the Great Planes Learjet!

This Learjet is a sport model of the full-size Learjet 35A. It was designed by noted Ultra Sport'" modeler Jim Feldmann It's easy to build and fly, predictable, fairly aerobatic and has no "bad habits," making it a great sport airplane. Traditional Great Planes quality and ruggedness is evident throughout this kit, making this an airplane you'll want to take along every time you go to the flying field.

This is not a beginner's airplane! While the Learjet is fairly easy to build and flies great, we must discourage you from selecting this kit as your first R/C airplane It can be fast, highly maneuverable and lacks the self-recovery characteristics of a good **basic trainer** such as the Great Planes **PT Series** On the other hand, if you have already learned the basics of R/C flying and you are able to safely handle a "trainer" airplane, the **Learjet** is an excellent choice to improve your skills and learn new maneuvers.

Please inspect all parts carefully before starting to build! If any parts are missing, broken or defective, or if you have any questions about building or flying this airplane, please call us at (217) 398-8970. If you are calling for replacement parts, please reference 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 plan 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 plan and instructions may **differ slightly from the photos** In those instances you should assume the **plan and written instructions are correct**

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

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

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

5. You must **test** the operation of the model before the first and each successive flight to insure that all equipment is operating, and you must make certain that the model has remained structurally sound Be sure to check the nylon clevises often, and replace if they show signs of wear.

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

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

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

DECISIONS YOU MUST MAKE

Engine And Mount

The recommended engine size range is as follows'
40 - .50 cubic inch displacement **2-stroke.**

This kit includes a Great Planes **EM2840** engine mount that fits nearly all 2-stroke engines in the recommended range If you prefer, you may purchase a **custom** engine mount for your engine, or you may choose to install shock-absorbing, rubber-cushioned mounts.

Fixed or retractable landing gear

The Great Planes Learjet includes prebent wire landing gear for fixed installation To add to the sleek and realistic appearance of your model in flight, you may want to install retracts We have included instructions for both installations However, you will need to purchase a set of three mechanical retracts, two servos, and a "Y" harness if you choose the retract option Pneumatic retracts may be used in place of the suggested mechanical units if you prefer

PREPARATIONS

Accessories & Additional Items

- D Four or five channel radio with 4 to 6 servos (optional retracts)
- D 6" Servo extension cord
- D Propellers (See engine instructions)
- D 2-1/4" Jet spinner (white GPMQ4542) (black GPMQ4540)
- D 6 to 8 oz Fuel tank (6 oz GPMQ4102 8 oz GPMQ4103)
- D 2 oz Thin CA adhesive (GPMR6015)
- D 2 oz Medium CA adhesive (GPMR6009)
- D 1 oz Thick CA adhesive (GPMR6014)
- D 6-Minute epoxy (GPMR6045)
- D 30-Minute epoxy (GPMR6047)
- D 1-3/4" Nose wheel (GPMQ4220)
- D 2" Main wheels (GPMQ4221)
- D 5/32" Wheel collars (6) (GPMQ4306)
- D Model covering (2 - 3 rolls) (Top Flite MonoKote" Covering)
- D Medium fuel tubing (GPMQ4131)
- D 1/2" thick Latex foam rubber padding (HCAQ1050)
- D Sliver solder (recommended) (GPMR8070 w/flux)
- D Switch & charge jack mount (optional) (GPMM1000)
- D Fuel filter (optional) (GPMQ4150)
- D Fuelproof paint (see "Painting" section of instructions on page 32)

Optional Retracts

- D Tricycle retract gear - (HCAP4000)
- D Retract servo (Futaba S136G or similar)
- D Standard servo for nose gear retract
- D Servo "Y" harness
- D 1-1/4" x 5/32" Wheel axles (3) (GPMQ4280)
- D 2-56 x 12" Threaded wire pushrods (2) (GPMQ3750)
- D 2-56 x 36" Threaded wire pushrods (1) (GPMQ3716)
- D Screw-Lock pushrod connector (3) (GPMQ3870)
- D 4-40 x 1/8" Set screws

*Items in parentheses *(GPMQ1234)* are suggested part numbers recognized by distributors and hobby shops and are listed for your convenience **GPM** is the Great Planes brand, **HCA** is the Hobbico® brand, **TOP** is Top Flite

Building Supplies and Tools

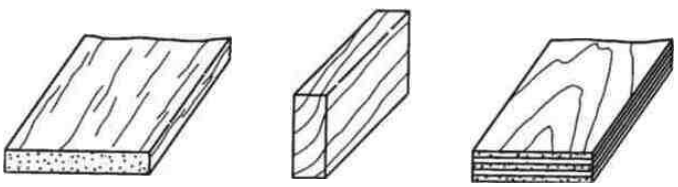
- D Hand or electric drill *
- D Drill bits 1/16", 3/32", 7/64" or #35, 1/8", #29 or 9/64", 3/16", #10 or 13/64", 15/64", 17/64" and 1/4"
- D Sealing iron - (TOPR2100)
- D Hot sock (optional) - (TOPR2175)
- D Heat gun (optional) - (TOPR2000)
- D Razor saw
- D #1 knife handle - (XACR4305)
- D #11 Blades - (HCAR0311 pkg of 100)
- D Common and needle nose pliers
- D Screwdrivers (phillips and flat)
- D T-Pins - (HCAR5100 small, HCAR5150 medium, HCAR5200 large)
- D Straightedge - (Fourmost Non Slip FORR2149)
- D Masking tape
- D Sandpaper (coarse, medium, fine grit)
- D Sanding blocks or Great Planes Easy-Touch" Bar Sander (GPMR6170 -11" & GPMR6172 - 22")
- D Waxed paper
- D Lightweight balsa filler - (HCAR3401)
- D 5/32" brass tube (optional)
- D 1/8" brass tube (optional)
- D Tap wrench
- D 1/4-20 Tap - (GPMR8105 w/dnll bit)
- D Isopropyl rubbing alcohol (70%)
- D Dremel® Moto Tool® or similar w/sanding drum and cutting burr (optional)
- D Kyosho" curved scissors (optional) - (KYOR1010)

EXPERT TIP

On our workbench, we have four 11" Easy-Touch Bar Sanders, equipped with #50, #80, #150 and #220-gnt sandpaper This setup is all that is required for almost any sanding task Custom sanding blocks can be made from balsa for sanding hard to reach spots We also keep some #320-gnt wet-or-dry sandpaper handy for finish sanding before covering

Great Planes Easy-Touch Bar Sanders are made from light-weight extruded aluminum and can be found at most hobby shops The sanders are available in two sizes - 11" (GPMR6170) for most general purpose sanding and 22" (GPMR6172) for long surfaces such as wing leading edges We recommend using the 2-1/4" wide self adhesive sandpaper sold in 12' rolls by Great Planes The sandpaper is available in three different grit sizes - #80-grit (GPMR6180), #150-grit (GPMR6183) and #220-grit (GPMR6185) Standard sandpaper can be attached by gluing it to the sander with rubber cement. Apply the rubber cement to both the bottom of the sander and the back of the sandpaper When both surfaces are dry to the touch, press the sandpaper firmly onto the sander Spray adhesive can be used for this purpose but it's much harder to remove the sandpaper when you need to replace it Use a knife blade for cutting sandpaper, not your good scissors!

Types of Wood



Balsa **Basswood** **Plywood**

Common Abbreviations

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

What About Adhesives?

We understand that the caliber of modelers likely to build the Great Planes Learjet may be rather high You may already know all about the types of adhesives you like to use However, due to its easy building features, many new builders may try their hand at the Great Planes Learjet For those modelers (experts may read along), we have provided some explanation about the variety of adhesives used during construction of a model.

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

Thin CA is also known simply as **CA** This is the adhesive that has revolutionized model building because it allows you to assemble the parts first, then apply the adhesive The thin formulation flows or "wicks" into the joints and sets almost instantly, eliminating the need to hold things together while the glue dries You will often use Thin CA for the initial bond, then follow with medium or thick CA for extra strength, especially when gluing plywood or hardwood.

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

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

Accelerator is a liquid chemical that comes in a spray bottle for use in speeding up the cure time of all CA types It should be misted on, not sprayed heavily on the joint Accelerator may cause exposed CA to bubble and sometimes change color If accelerator is sprayed on too heavily it may weaken the glue joint, so use it sparingly

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

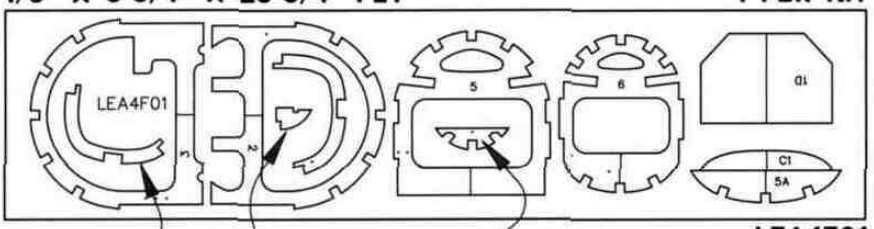
Epoxy
Great Planes has two epoxy formulations available for the modeler Both offer exceptional strength and convenient working times Use epoxy when the joint requires exceptional strength, such as when installing the firewall, when joining the wing panels, and when installing wing hold-down blocks As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

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

(Continued on page 8)

DIE-CUT PATTERNS

1/8" X 5-3/4" X 23-3/4" PLY — 1 PER KIT



LEA4F01

COWL RING

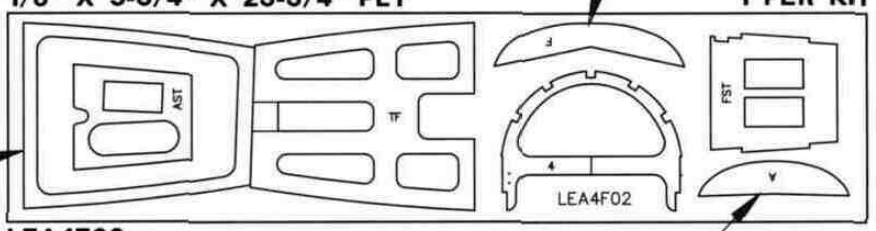
CANOPY HOOK

H2

NOT USED

1/8" X 5-3/4" X 23-3/4" PLY — 1 PER KIT

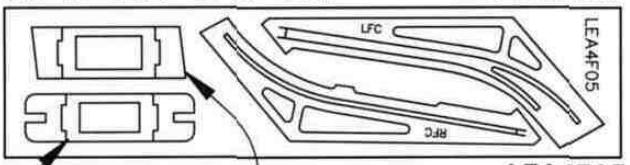
CANOPY BASE



LEA4F02

NOT USED

1/8" X 4-1/8" X 17" PLY — 1 PER KIT



LEA4F05

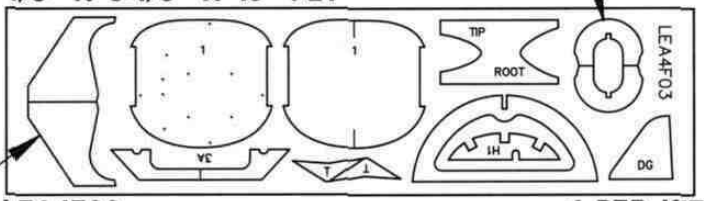
AILERON SERVO TRAY

RETRACT SERVO TRAY

TIP TANK FORMERS

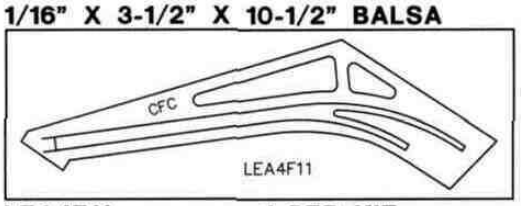
1/8" X 5-1/8" X 19" PLY

TIP TANK FINS



LEA4F03 — 1 PER KIT

1/16" X 3-1/2" X 10-1/2" BALSA

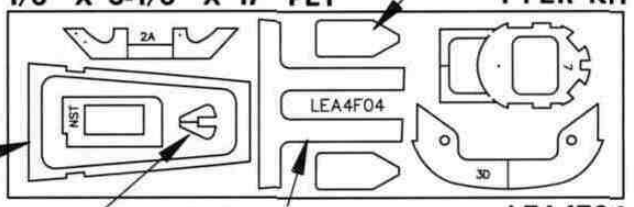


LEA4F11 — 1 PER KIT

TIP TANK TONGUE

1/8" X 5-1/8" X 17" PLY — 1 PER KIT

HATCH BASE

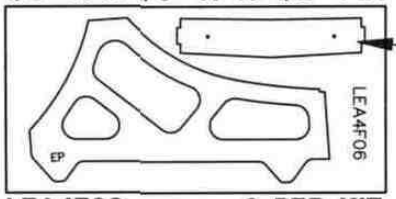


LEA4F04

TANK FLOOR DOUBLER

HATCH LOCKING TABS

1/8" X 5-1/8" X 10-1/2" PLY



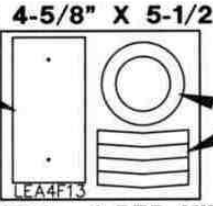
WING JOINER

LEA4F06 — 2 PER KIT

1/16" X 4-5/8" X 5-1/2" PLY

COWL RING

WING BOLT PLATE



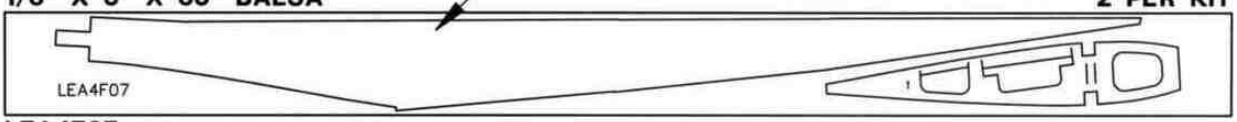
SPAR JOINERS

LEA4F13 — 1 PER KIT

DIE-CUT PATTERNS

AFT FUSE SIDE

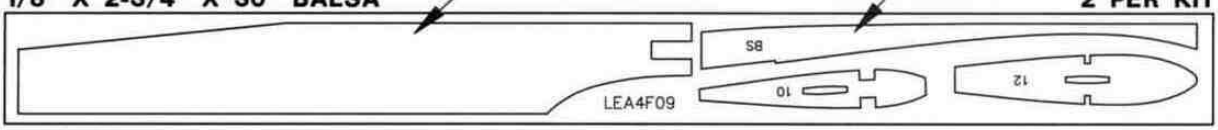
1/8" X 3" X 36" BALSA — 2 PER KIT



LEA4F07

FORWARD FUSE SIDE — NOT USED

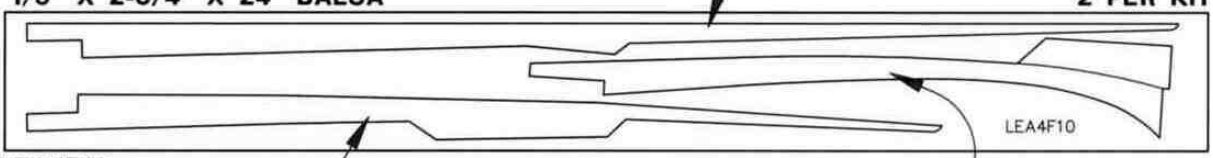
1/8" X 2-3/4" X 30" BALSA — 2 PER KIT



LEA4F09

UPPER AFT FUSE DOUBLER

1/8" X 2-3/4" X 24" BALSA — 2 PER KIT



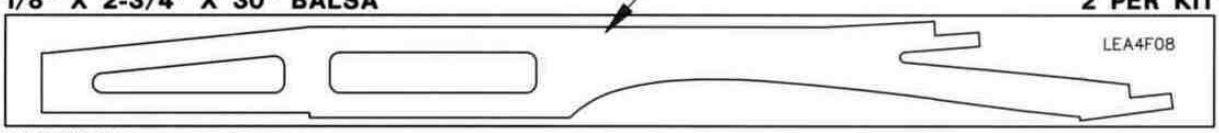
LEA4F10

FUSE TRIPLER

LOWER AFT FUSE DOUBLER

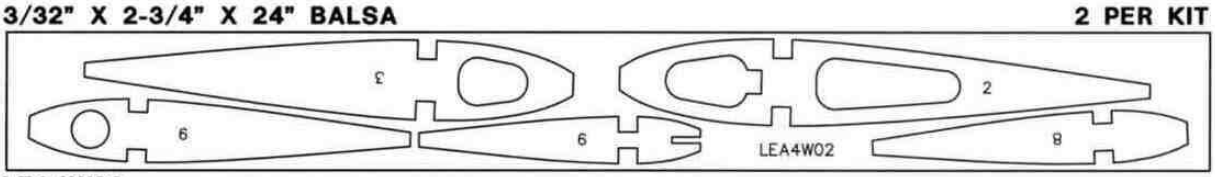
FORWARD FUSE DOUBLER

1/8" X 2-3/4" X 30" BALSA — 2 PER KIT



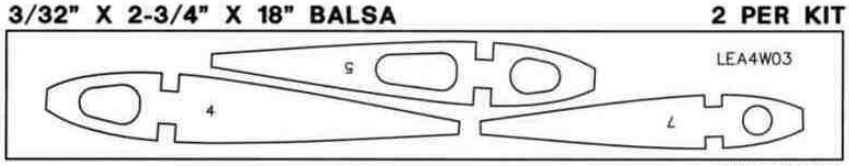
LEA4F08

3/32" X 2-3/4" X 24" BALSA — 2 PER KIT



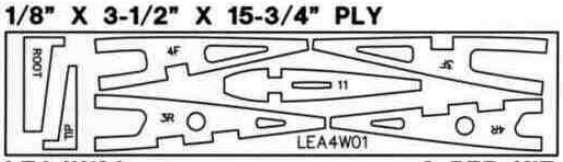
LEA4W02

3/32" X 2-3/4" X 18" BALSA — 2 PER KIT



LEA4W03

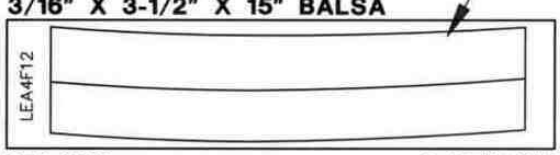
1/8" X 3-1/2" X 15-3/4" PLY



LEA4W01 — 2 PER KIT

LOWER FUSE CORNERS

3/16" X 3-1/2" X 15" BALSA



LEA4F12 — 2 PER KIT

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

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

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

Get Ready to Build

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

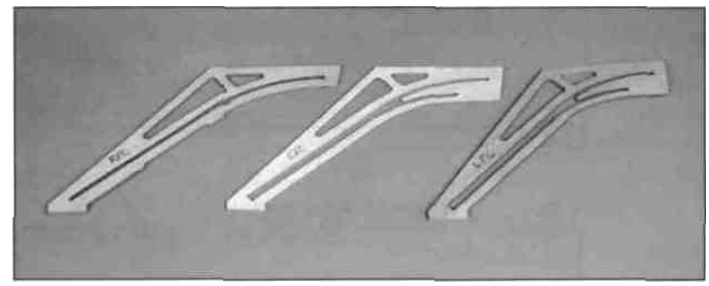
D 2. Remove all parts from the box. As you do, determine the name of each part by comparing it with the plan and the parts list included with this kit. Using a felt-tip or ball point pen, lightly write the part **name** or **size** on each piece to avoid confusion later. Use the die-cut patterns shown on pages 6 and 7 to identify the die-cut parts and mark them **before** removing them from the sheet. Save all scraps. If any of the die-cut parts are difficult to punch out, do not force them! Instead, cut around the parts with a hobby knife. After punching out the die-cut parts, use your T-Bar or sanding block to **lightly** sand the edges to remove any die-cutting irregularities.

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

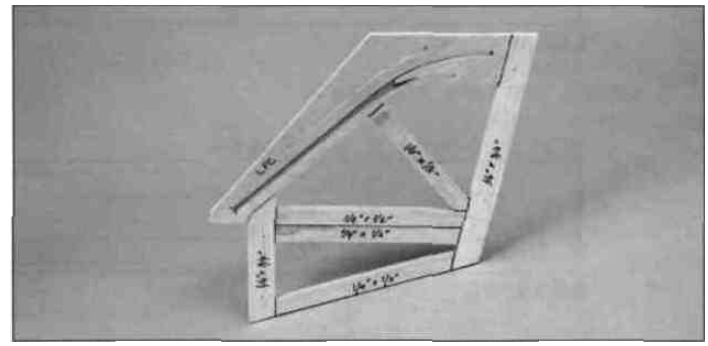
Zipper-top food storage bags are handy to store your parts as you sort, identify and separate them into subassemblies.

BUILD THE TAIL SURFACES

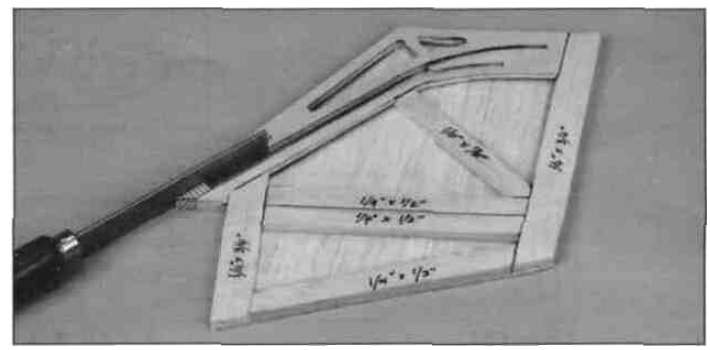
Vertical Fin and Rudder



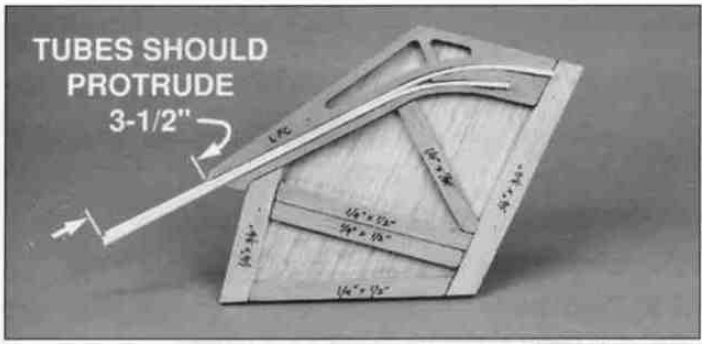
D 1. The fin core is made up of left and right die-cut 1/8" plywood fin cores **(LFC, RFC)** and a die-cut 1/16" balsa center fin core (CFC). Place the fin plan on your building board and cover it with waxed paper. Place the 1/8" **RFC** (with one slot) over the plan and glue the 1/16" **center fin core** on top of it. Glue the 1/8" **LFC** (two slots) on top of the center fin core.



D 2. Sand the front and top edges of the fin core smooth, then pin the core over the plan. Assemble the balsa **fin framework** from 1/4" x 1/2" and 1/4" x 3/4" balsa sticks on the core as shown on the plan. **Note:** The frame is thinner than the fin core but this will not cause a problem. Do **not** install the leading edge, dorsal fin or the 3/8" top and rear pieces yet.

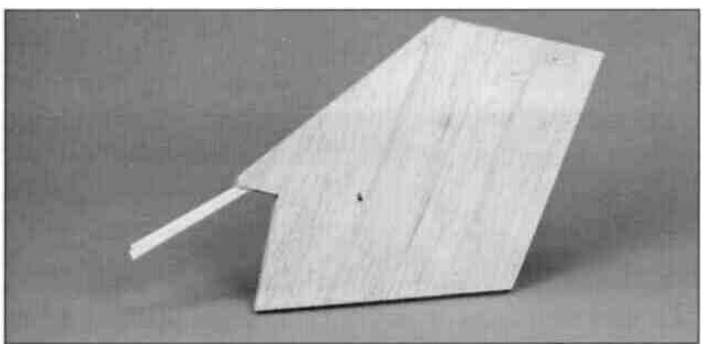


D 3. Remove the fin from the board, sand both sides smooth (it's **OK** if the plywood core is a little thicker than the balsa framing). Sheet the **right** side with 1/16" balsa sheeting. Drill a 1/8" hole through the sheeting at the **rear end of the top slot** and elongate the hole to fit the control cable tubing. Cut away the fin core below the bottom of the slots as shown on the plan.

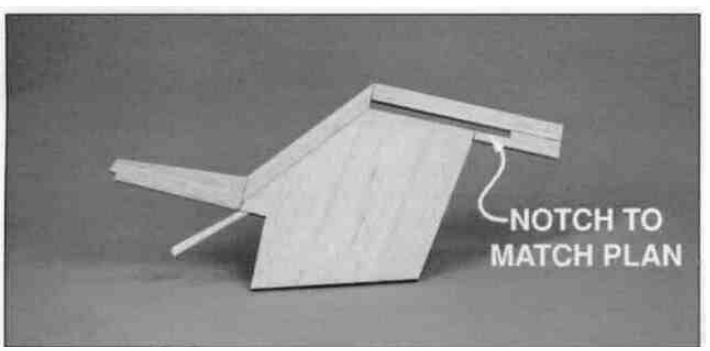


D 4. Cut three pieces of inner pushrod tube to match the plan. Fit the **right elevator cable tube** in the **top** slot of the fin core, up against the sheeting on the right side, with an inch or so extending through the sheeting hole.

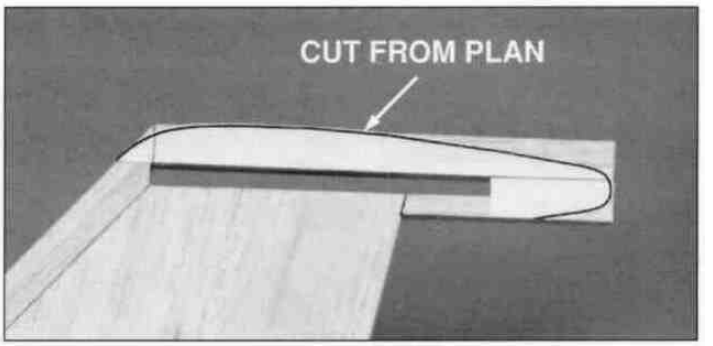
NOTE: LEAVE 3-1/2" OF ALL THREE TUBES EXTENDING PAST THE BOTTOM OF THE FIN CORE. Fit the **left elevator cable** tube in the **same** slot on top of the right one, but have it exit on the left side. Fit the **rudder cable tube** in the **lower** slot in the fin core exiting on the left side as well. When you're happy with the fit, use thick CA to hold the tubes in the slots.



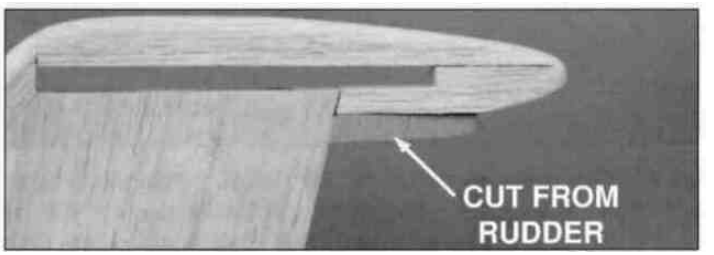
D 5. Sand the **right elevator tube** flush with the sheeting, then pin the fin assembly back on the building board. Add 1/16" balsa sheeting on the open side, fitting the sheeting around the rudder and left elevator tubes where they exit. Sand the tubes flush with the sheeting.



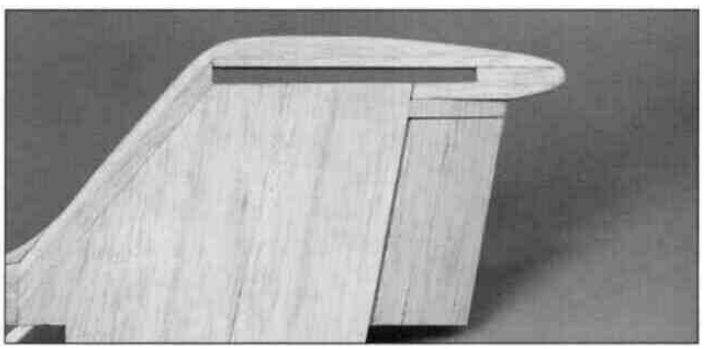
D 6. Add the 3/8" x 3/4" balsa stick **leading edge, trailing edge (TE), top** (notched to match the plan) and **shaped dorsal fin. Remove the assembly from the board.**



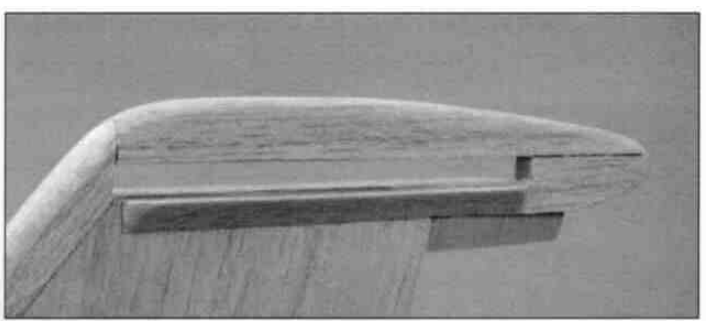
D 7. Cut the fin top pattern from the plan, then glue it to the top of the fin with spray adhesive or rubber cement. Sand the edges of the fin top to match the pattern. Round the top of the dorsal fin, front of the leading edge and **top** of the fin top.



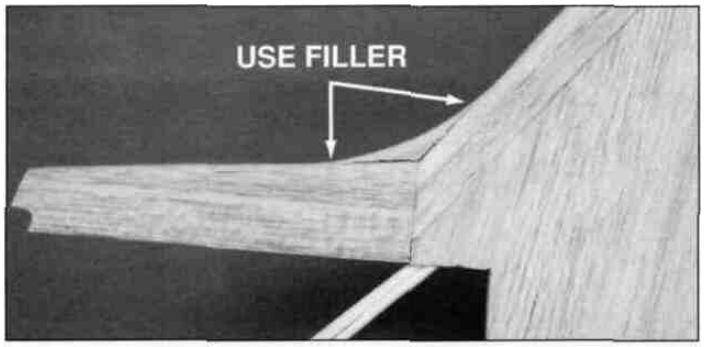
D 8. Sand one end of the shaped balsa **rudder** to match the angle shown under the stab on the plan. Cut a 3/8" piece from the sanded end to make the **rudder filler.** Glue the 3/8" piece to the bottom of the **fin's TE.** Cut the rudder to match the size and shape shown on the plan.

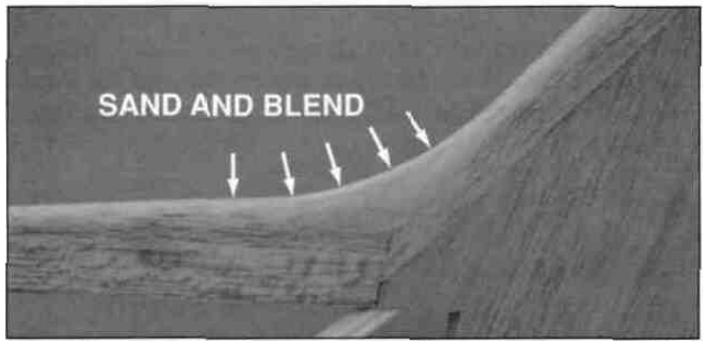


D 9. Sand a "V" on the leading edge (LE) of the rudder to match the cross-section on the plan. Use masking tape to temporarily attach the rudder to the fin. The hinges will be installed after covering.

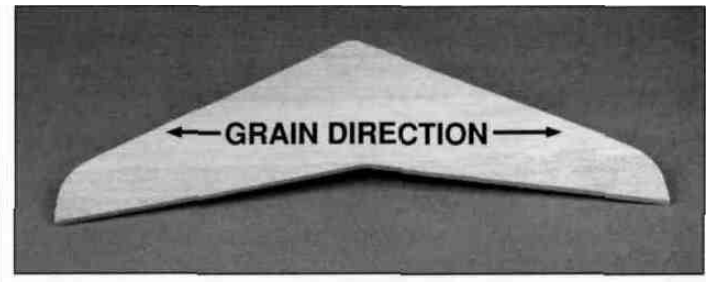


D 10. Round the ends of two 6" long pieces of 3/8" balsa tri-stock and glue them to the sides of the fin, flush with the **bottom** of the stab slot.





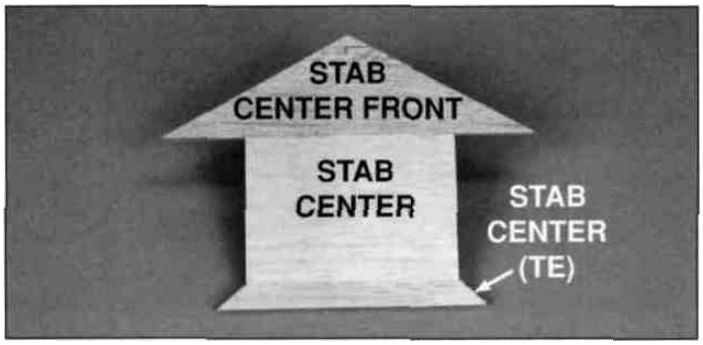
D 11. Cut a small piece of 3/8" scrap balsa stick **to** fit between the top of the dorsal fin and the vertical fin. Shape and sand this piece to match the plan. Use balsa filler (HCAR3104).



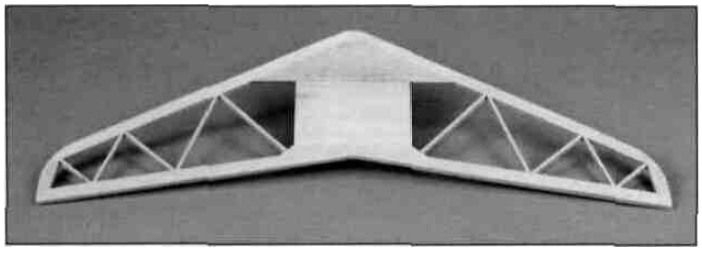
D 3. Sand the completed framework smooth, then glue 1/16" x 3" balsa **sheeting** to the top surface.

D 4. Remove the stab from the board. Sand the bottom side smooth, then sheet it with 1/16" x 3" balsa. Trim the perimeter to the shape shown on the plan and sand the assembly smooth. Sand the leading edge and tips round to match the cross section on the plan but **leave the TE flat.**

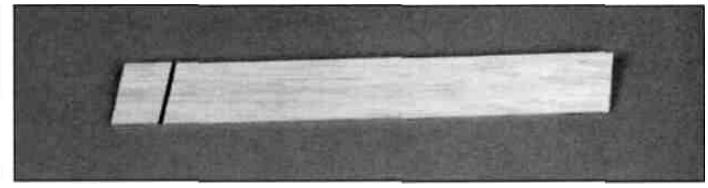
Stabilizer & Elevators



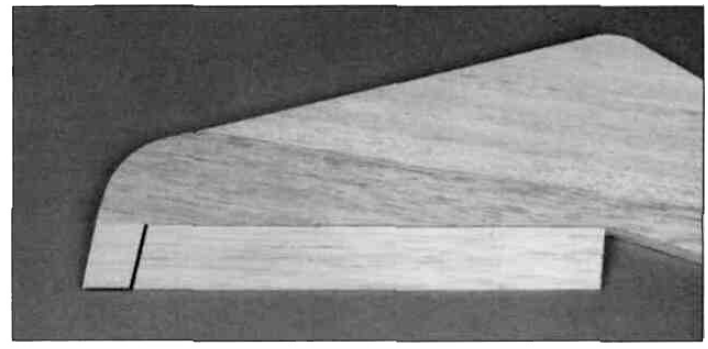
D 1. Put the stab plan on your building board and cover it with waxed paper. Pin the 1/4" shaped balsa **stab center front** over the plan, then glue the 1/4" x 3" x 4-1/4" balsa **stab center** to its aft edge. Cut the **stab center (TE)** from a 1/4" x 1/2" balsa stick to match the shape shown on the plan.



D 2. Assemble the **stab frame** from 1/4" x 1/2" balsa sticks, then cut and glue the 1/8" x 1/4" balsa trussing in position.



D 5. Cut both ends of each shaped balsa **elevator** to the angle shown on the plan, then cut a 1" piece from **each one.** Glue these short pieces to the TE of the stab **at the tips,** and sand to shape.

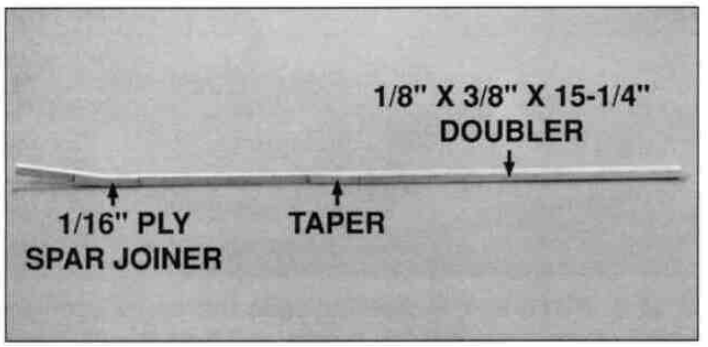


D 6. Sand a "V" on the LE of the elevators and trim the inner ends to match the plan. Temporarily attach the elevators to the stab with masking tape.

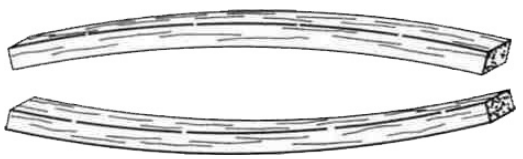
BUILD THE WING

Prepare the Subassemblies

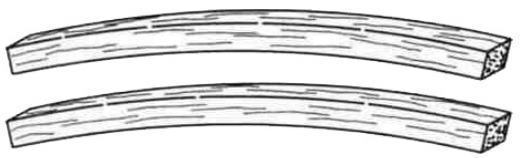
D 1. Pin the wing plan to your building board and cover it with waxed paper.



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



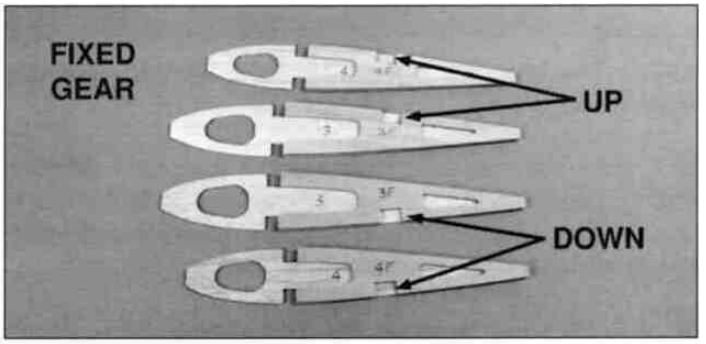
TWO WARPED SPARS INSTALLED THIS WAY WILL RESULT IN A WARPED WING

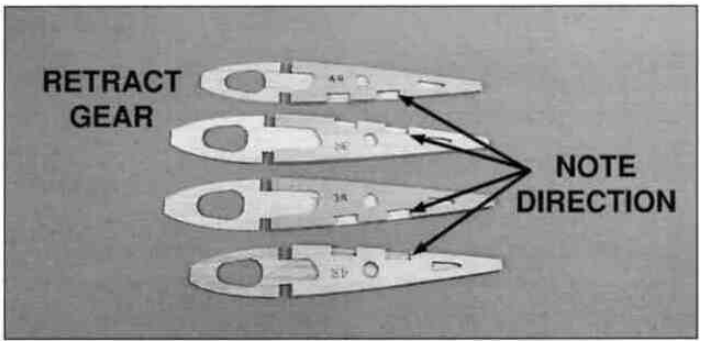


D 2. Assemble the **spars** as follows: Pin one of the 1/4" x 3/8" x 30" balsa **main spars** down over one wing plan and trim the outboard end at the **centerline of** W-9 (save the off-cut piece for use in a moment). Locate a 1/8" x 3/8" x 15-1/4" balsa **spar doubler.** Sand 2-1/4" of one end of the spar doubler to a taper (see plan). Glue the spar doubler to the inboard end of the main spar so that the untapered end is flush with the root end of the main spar. Trim the *off-cut* piece of 1/4" x 3/8" to match the plan at the outboard end of the main spar, then glue it in position. Glue the die-cut 1/16" plywood **spar joiner** on **top** of the joint.

D 3. Remove this spar from the plan, then assemble a **second** one over the **same** plan.

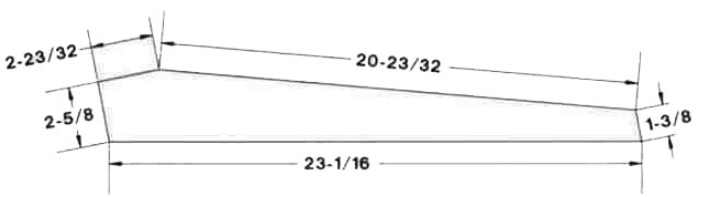
D 4. Build **two more spars** over the plan of the **other wing.** This procedure will produce *left* and *right top* and *bottom* spars.





D 5. Decide whether you will be using fixed or retractable landing gear. The rib doublers required for fixed or retract gear are different. **W-3F** and **W-4F** are used for the **fixed** gear and **W-3R** and **W-4R** are used for the retract gear. Glue the appropriate doublers to the **W-3** and **W-4** ribs, **being sure that you make a left and a right of each one.** Cut the gear block notches out of each rib using the notches in the doubler as a guide.

D 6. Align the shaped and notched **leading edges (LE)** over the plan. Cut the **LE** in two at the **centerline** of W-9. Save both pieces.



CUT LE SHEETING AS SHOWN (4 REQUIRED)

D 7. Using the plan and the pattern shown above, cut four 3/32" x 3-1/2" x 30" balsa **LE sheets. Note:** The aft edge of the sheets should fall approximately along the middle of the spar.

D 8. Glue the two die-cut plywood **dihedral braces (DB)** together with 6-minute epoxy. Be sure they are perfectly aligned along all edges. Clamp the pieces together while the epoxy cures.

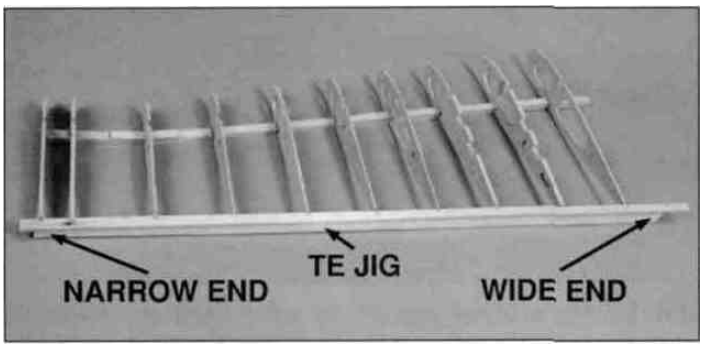
D 9. After the **DB** epoxy has cured, lightly sand the edges to remove any bumps. Drill a 1/4" hole through the **DB** at each of the two punch marks. *These holes are for the wing dowels.*

Assemble the Wings

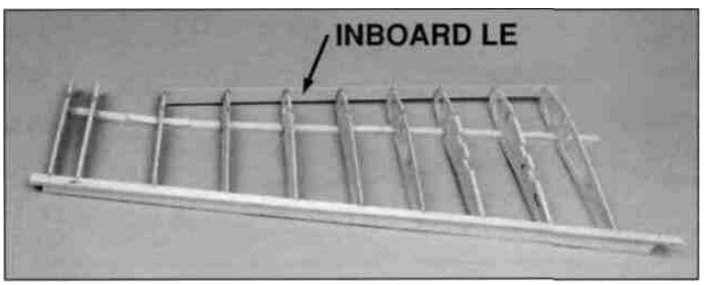
NOTE: The wings are built UPSIDE DOWN over the opposite wing plan.

D 1. Start with the wing plan which shows your **chosen landing gear.** Pin the trailing edge support jig to the board over the plan, **under** the waxed paper. The **wide end** of the jig is positioned at the **root end** of the wing.

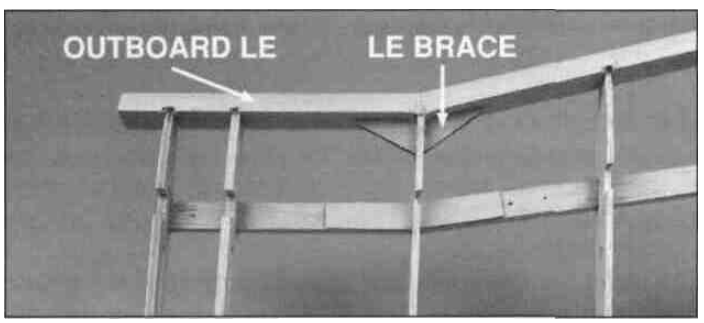
D D 2. Carefully separate the leading and trailing edges with a hobby knife.



D D 3. Pin the bottom spar down and glue **W-2, W-6** and **W-11** to the spar, then glue the shaped and notched **trailing edge** to those ribs. The ribs should be centered vertically on the trailing edge and the trailing edge must be kept level. (Since the trailing edge is tapered, it does not sit flat on the support jig.) Pin the trailing edge to the support jig. Add the rest of the ribs **(except W-1).** Be sure that the **rib doublers are on the correct side of W-3 and W-4 as** indicated on the plan.

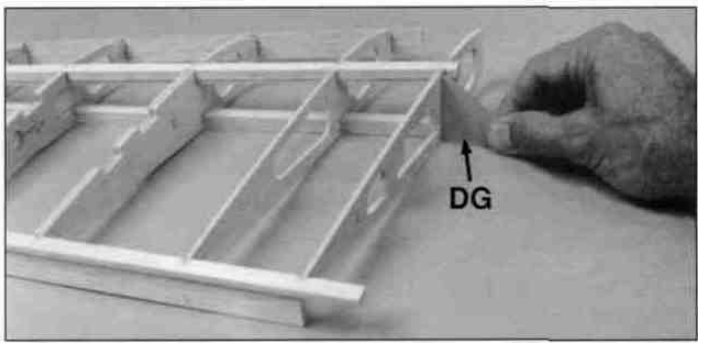


D D 4. Fit the **inboard leading edge** in place on ribs W-4 through W-9. The leading edge must extend an equal amount above and below the ribs. Glue the leading edge in place with thin CA.

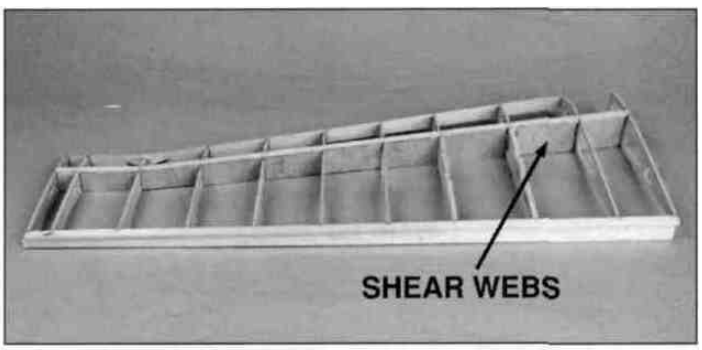


D D 5. Sand the **outboard leading edge** (the short piece you cut off) to fit against the inboard leading edge, then glue it in place on the forward edge of ribs W-9 through W-11. Glue the die cut 1/8" plywood **leading edge brace** to the **back** of the leading edge at W-9.

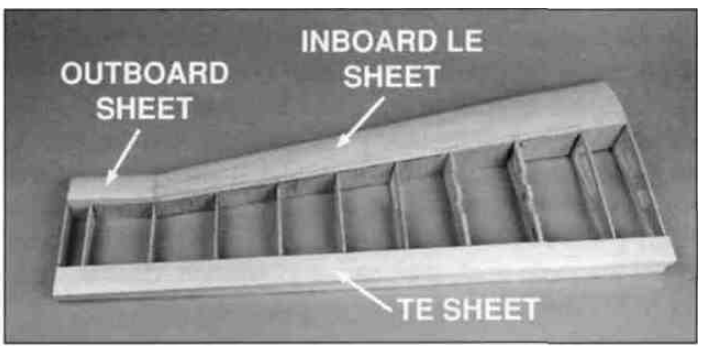
D D 6. Fit and glue the second spar in position.



D D 7. Place **W-1** in position (with the servo opening pointing toward the building board) and hold the **dihedral gauge** against the outer face to set the proper angle. Glue W-1 in place. Cut both spars and the TE flush with W-1. Trim the LE flush with W-2.



D D 8. Fit and install 1/16" balsa **shear webs** in **all** rib bays against the aft edges of the spars.

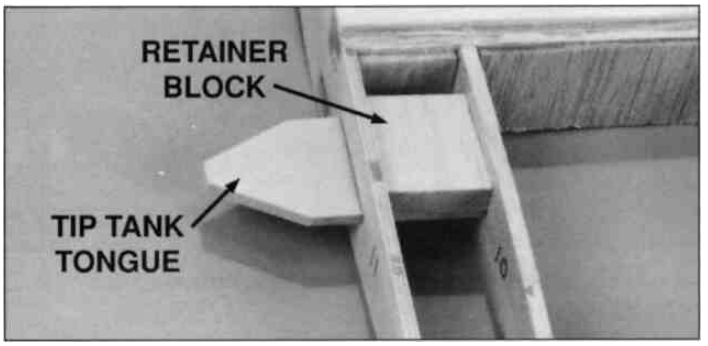


Refer to this photo for next three steps.

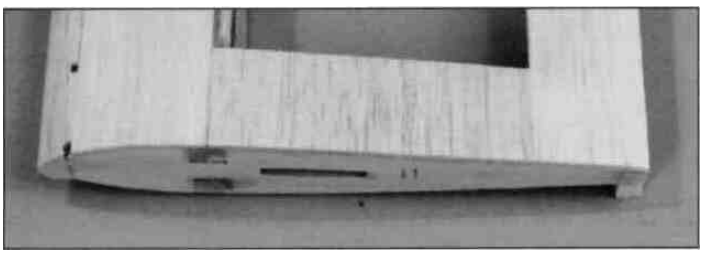
D D 9. Lightly sand the top of the ribs, spar and trailing edge to remove any irregularities. Sand the **forward** edge of the 3/32" inboard **leading edge sheeting** to match the angle made by the ribs and the leading edge. The aft edge of the sheet should fall on the centerline of the spar. When satisfied with the fit, glue it in place.

D D 10. Fit and glue the 3/32" x 1-1/4" x 30" **trailing edge sheeting** in position across the aft edge of the wing.

D D 11. Sheet the outboard leading edge with the balsa you trimmed off when cutting the LE sheets. Glue it in place.



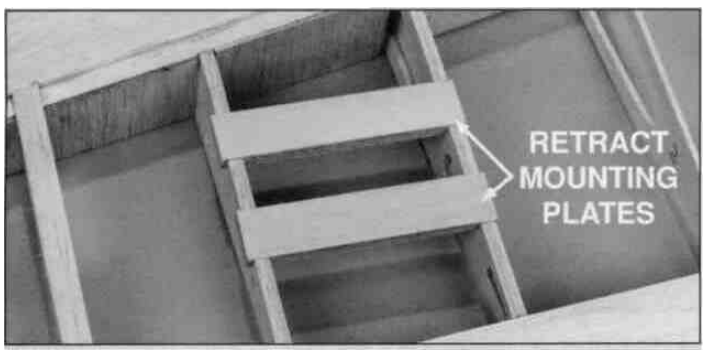
D D 12. Slide the die-cut 1/8" ply **tip tank tongue** in place through the slots in W-11 and W-10. Fit a 1/4" x 27/32" x 1" balsa **tip tank retainer block** on top of the tongue between W-10 and W-11 and carefully glue it to the **two ribs.** Remove the tongue **immediately** so that you don't accidentally glue it to the block. Glue a piece of scrap 3/32" balsa on top of the hardwood block and sand it to match the shape of the ribs.



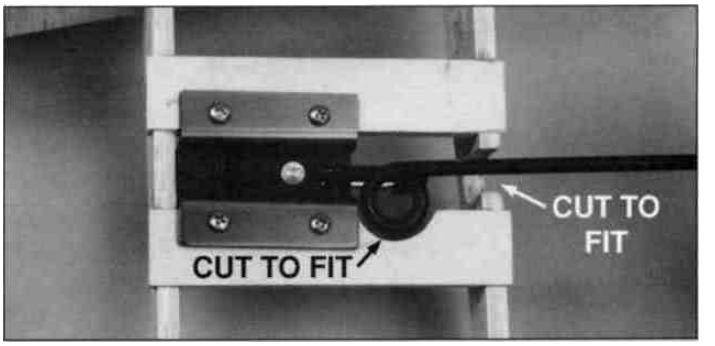
D D 13. Cut and install the **tip sheeting** (from left over 3/32" balsa) between W-10 and W-11.

*Use the instructions that follow to install the **landing gear mounting rails** of your choice (for fixed or retractable).*

Perform Steps 14 & 15 ONLY if Installing Retracts



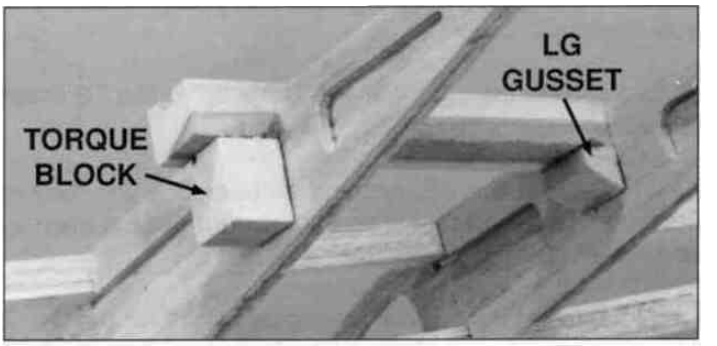
D D 14. Use 30-minute epoxy to glue the 1/4" x 3/4" x 3-5/8" plywood **retract mounting plates** into the slots in W-3 and W-4.



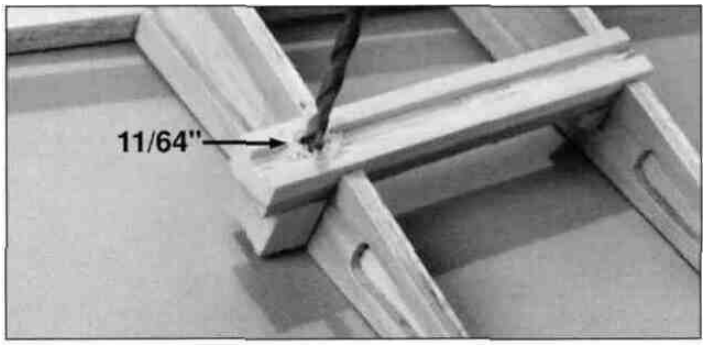
D D 15. Fit the retract mechanism in place, trimming the plywood mounting plates as required to allow the retract to function properly. Drill 3/32" mounting holes and temporarily install the retract with four #4 x 3/8" sheet metal screws.

Perform Steps 16, 17, 18 & 19 ONLY if Installing Fixed Gear

D D 16. Use 30-minute epoxy to glue the 7/16" x 5/8" x 4-5/16" hardwood **main gear block** into the notches in W-3 and W-4. The inboard end should overhang W-3 by 3/4" and the "groove" faces away from the building board.



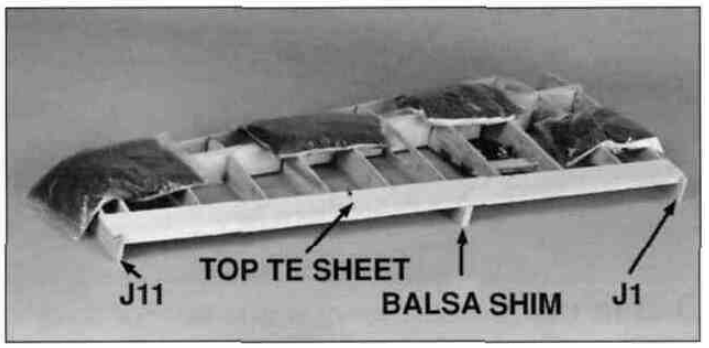
D D 17. Use 30-minute epoxy to glue the 5/8" x 5/8" x 5/8" hardwood landing gear **torque block** to the ungrooved side of the main block, against the root face of W-3F. Glue the 5/8" wedge shaped **landing gear gusset** on the ungrooved side of the main block, against the root face of W-4F with 30-minute epoxy.



D D 18. Drill an 11/64" hole through the main gear block and the torque block as shown on the plan. This hole must be drilled perpendicular to the main gear block and parallel to W-3F.

D D 19. Fit the 5/32" music wire **strut** into the blocks and fill the unused slot at either end of the main block with scrap balsa. Remove the strut.

D D 20. Remove the wing from the board and check all glue joints. Add a glue fillet to any joint that needs it. Sand off any imperfections before proceeding.



D D 21. With the wing "right side up," pin (or weight) the spar to the building board. Tack glue the die-cut 1/8" ply **TE jigs, J1** and **J11,** to the **bottom** of the TE at ribs W-1 and W-11. Pin or weight the aft portion of the wing to be sure the TE jigs and main spar are touching the building board. Add a 5/8" shim of balsa under the trailing edge center to prevent the TE from bowing downward.

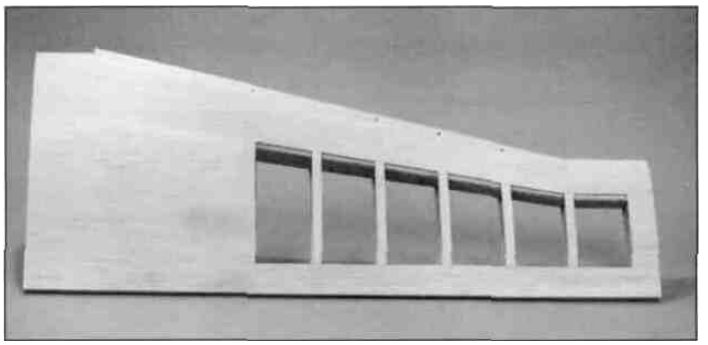
D D 22. Glue the top 3/32" x 1-1/4" x 30" balsa TE sheet in position.

D D 23. Glue the inboard and outboard LE sheeting in position. Be sure the TE jigs, shim and spar remain in contact with the building board.

D D 24. Insert the tip tank tongue and fit a 1/4" x 27/32" x 1" hardwood **upper retainer block** on top of the tongue between W-10 and W-11. Glue this block between the ribs, and remove the tongue immediately. Glue scrap balsa to the top of the block, then sand it to match the top of the ribs.

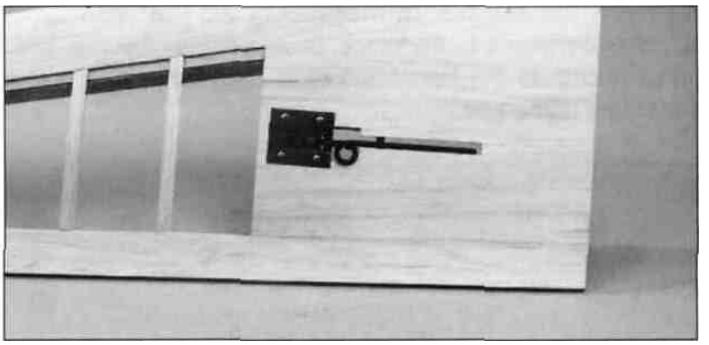
D D 25. Install the 3/32" tip sheeting (from left over 3/32" balsa).

D D 26. Cut and glue 3/32" x 3/8" balsa **cap strips** to the top of ribs W-5 through W-9.



D D 27. Sheet the wing **center section** with 3/32" x 3" balsa cut from a 36" sheet.

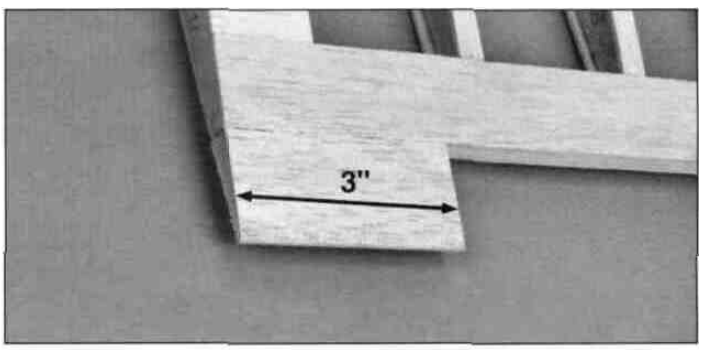
D D 28. Remove the wing from the board and sand the sheeting flush with W-1, W-11 and the trailing edge. Rough sand the leading edge to shape.



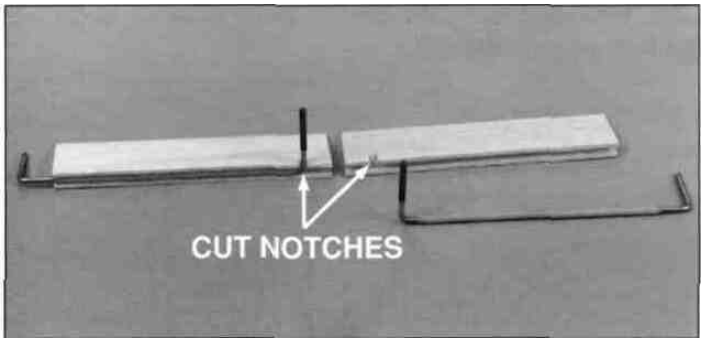
D D 29. Turn the wing panel over and sheet the bottom center section with 3/32" x 3" balsa. The sheeting must be fitted **around** the main gear block or the retract mechanism if using retracts.

*Okay, clean up your building board, then build the **second wing panel over the other wing plan.***

Completing the Wing Panels



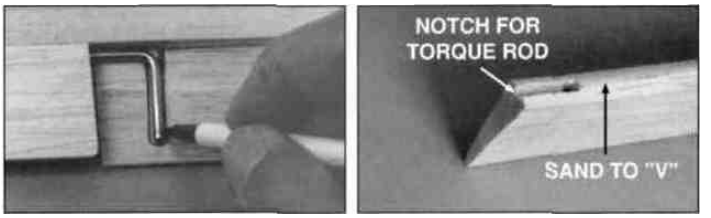
D 1. Cut a 3" piece from **each** 21" long tapered balsa **aileron.** Check that the taper of the aileron stock **matches the shape of the airfoil.** Glue the 3" pieces to the aft edge of each wing panel, at the tip.



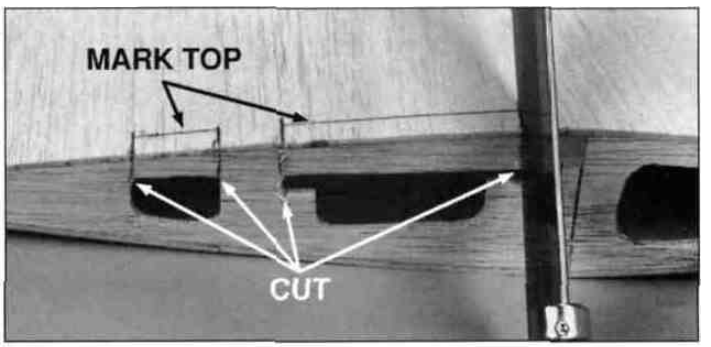
D 2. Check that the taper of the 1 -3/8" x 6" balsa **center TE piece** matches the shape of the airfoil.

NOTE: When installing the center trailing edge pieces make sure they line up with the top and bottom surface of the wing.

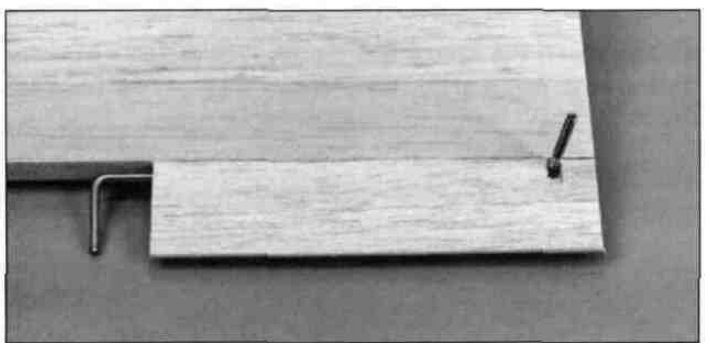
If necessary, sand the aft edge of the wing to correct the problem. Trim and sand the ends to match the angles on the wing plan. Cut a notch in the **top** surface of a balsa center TE piece 1/2" from the root end. Fit an **aileron torque rod** assembly into the groove with the threaded end protruding through the notch. Prepare another center TE for the other wing panel. **Be sure to make a left and a right side as shown.**



D 4. Cut the **ailerons** to fit between the center TE and the tip TE. Hold the aileron in position, then mark the location of the torque rod arm. Drill a 1/8" hole, 3/4" deep, into the LE of the aileron at the mark. Cut a groove for the torque rod to fit into the aileron's LE. Sand the leading edge of both ailerons to a "V" as shown on the plan.

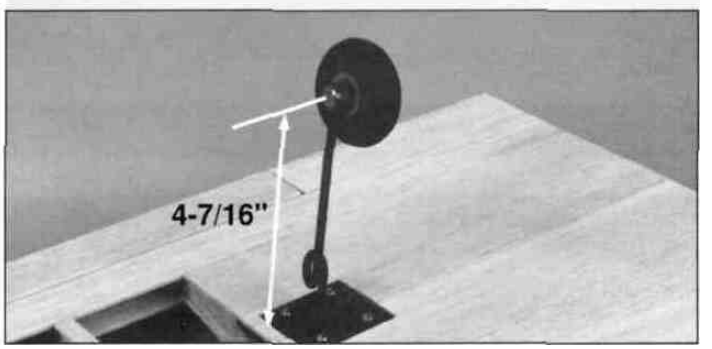


D 5. Finish cutting out the aileron servo opening (and retract servo opening if using retracts) that is partially die-cut in both W-1 ribs. Mark the location of the servo opening(s) on the top surface of both wing panels but **don't** cut out the sheeting until after the wing has been joined.

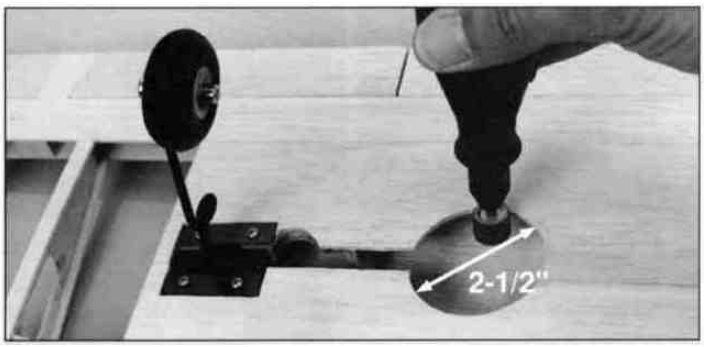


D 3. Sand the mating *root* surfaces of the center TE pieces to allow for the dihedral angle. Roughen the nylon torque rod tubes with coarse sandpaper, then apply a dab of petroleum jelly to the exposed wire at both ends of the tube. Use **6-minute epoxy** to glue the nylon torque rod tubes into the center TE, then, before the epoxy cures, glue the center TE assemblies to the aft edge of each wing at the root with the threaded ends protruding through the **top** of the wing. Be sure that the taper of the trailing edge matches the shape of the airfoil.

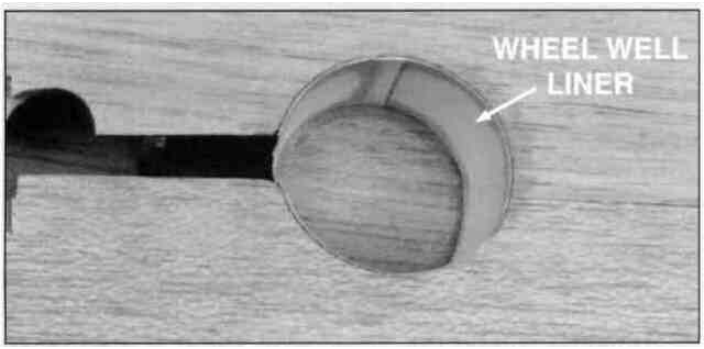
Perform Steps 6, 7, 8 & 9 ONLY if Installing Retracts



D 6. Insert the landing gear strut wire into the retract mechanism. Measure and cut the main retract struts to **4-7/16" long** (measured from the surface of the wing). Install the 2" main wheels (not included, GPMQ4221) using adjustable 1-1/4" x 5/32" wheel axles (not included, GPMQ4280) and 5/32" wheel collars (not included, GPMQ4306). Verify that there is no toe-in or toe-out when the retracts are extended, then tighten the locking screws.



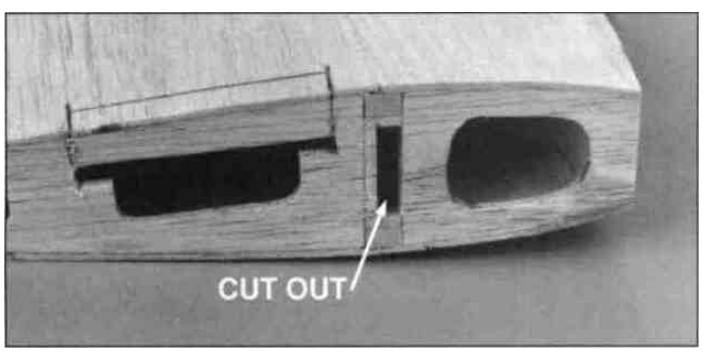
D 7. Slowly retract each strut and wheel, cutting away the bottom center sheeting and ribs for clearance as you go. Enlarge the diameter of the wheel well hole to 2-1/2" keeping the hole **centered** on the retracted wheel.



D 8. The wheel well liners can be made from proper sized foam or paper coffee cups, or from vertical grain 1/16" balsa sheeting wrapped around an appropriately sized glass jar and glued to form a cylinder. Glue the wheel wells in place, then trim the edges to match the bottom sheeting.

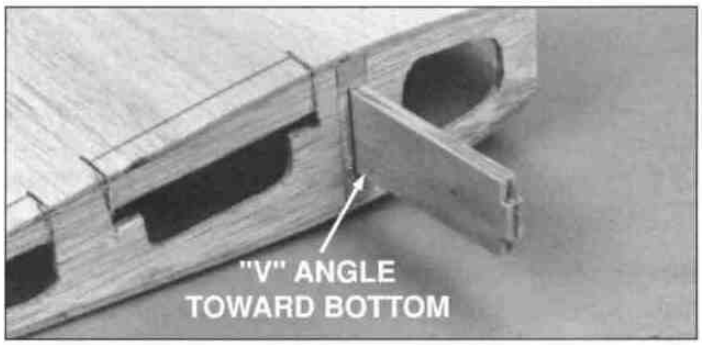
D 9. Use a 12" long x 1/4" drill bit to drill a hole from the retract servo opening, through the wheel well liners, to the retract mechanism.

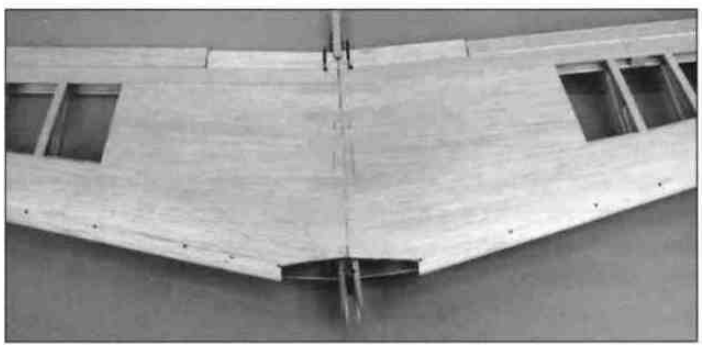
Join the Wings



D 1 Finish cutting out the **partially die-cut section** between the spars on both W-1 ribs.

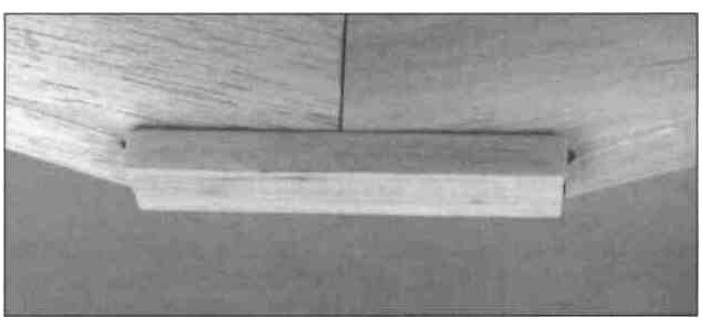
D 2. If needed, sand the leading edge sheeting even with the front edge of W-1.



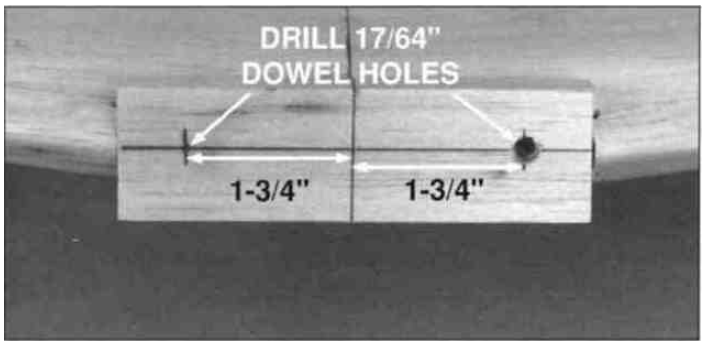


D 3 Before using any glue,trial fit the wings together using the die-cut plywood **dihedral brace (DB).** The wing roots (W-1) should fit together smoothly, and the dihedral brace should contact both spars and also locks into both W-2s. The dihedral brace is mounted perpendicular to W-1, **not** parallel to the spars (see plan for exact position) Be sure the "V" shaped edge of the dihedral brace is **toward the bottom** of the wing. Apply 30-minute epoxy to the mating surfaces of the W-1 ribs, dihedral brace and inner edges of the center TE. Clamp or pin the wings together while the epoxy cures.

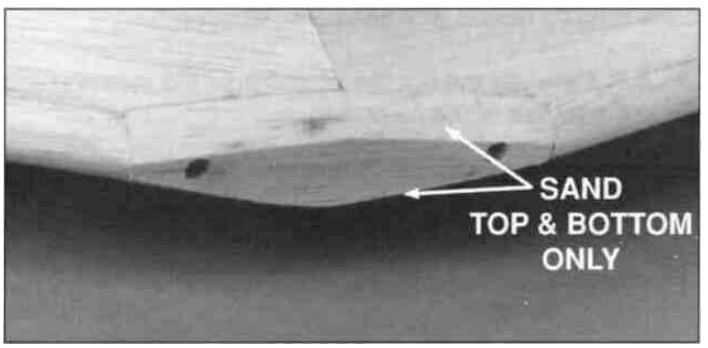
NOTE: When the epoxy has cured, look at (DB) from the leading edge and add additional epoxy to fill any visible gaps.



D 4. Fit and install the 1/2" x 1-7/16" x 5" balsa **center leading edge** block. We suggest using a liberal amount of thick CA when you glue it in position.

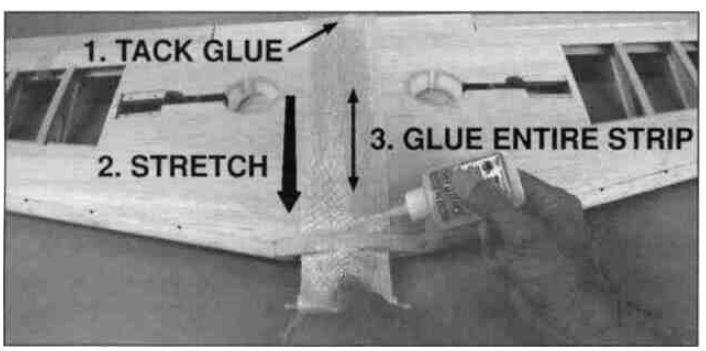


D 5. Draw a horizontal line across the front of the center leading edge block. Mark the centerline of the wing on the front of the block. Make a mark 1-3/4" on each side of the centerline. These marks show the position of the 1/4" wing dowels. Drill a **17/64"** hole through the block at each of the marks.



D 6. Carve and sand the **top** and **bottom edges** of the block to follow the airfoil contour but **leave the front surface flat.**

D 7. Round one end of each 1/4" **x** 4" **wing dowel** and chamfer the other end (to make it easier to insert). Test fit the dowels into the wing to be sure that they pass easily through the leading edge block and the dihedral brace. Glue them in place with 30-minute epoxy.



D 8. Apply 3" **wide fiberglass cloth** to the center joint on the top and bottom of the wing. We prefer to adhere the cloth with thin CA to save weight, but resin or thinned epoxy will work just as well. *Read the Expert Tip that follows before performing step #8.*

Applying Fiberglass Cloth

A. Center one end of the fiberglass cloth on the trailing edge of the wing, then apply several drops of thin CA to hold it in position. Roll the loose end of the fiberglass cloth onto a pencil, then use the pencil as a handle to stretch the cloth over the wing toward the leading edge. Apply a few more drops of thin CA to the LE to hold the cloth in its "stretched tight" position.

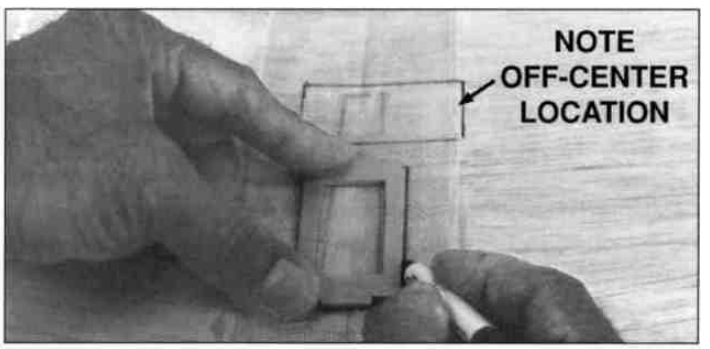
B. Make a squeegee by wrapping a 2" wide piece of stiff cardboard with a plastic sandwich bag or similar material.

Perform the following operation in a well ventilated area with a fan directing air flow away from you.

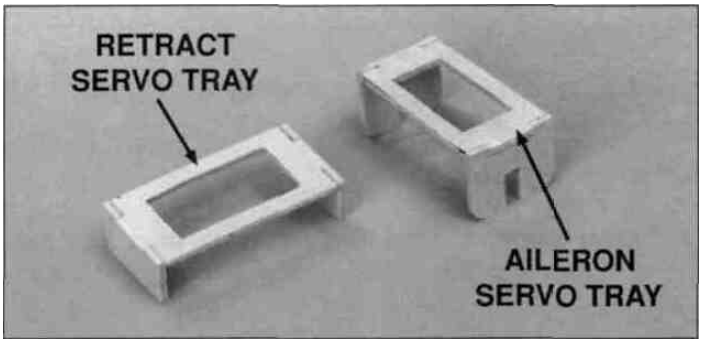
C. Starting at the trailing edge, **flow** thin CA into the cloth. Smooth the cloth down with the squeegee as you work toward the leading edge. Avoid standing directly over the work as the CA fumes can be quite irritating to your eyes and nose.

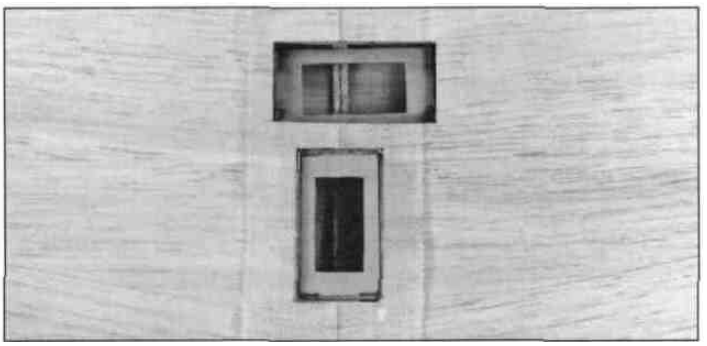
D. Allow the CA to cure naturally **without using any accelerator.** When thoroughly cured, lightly sand the edges with 150-grit sandpaper to remove any ridges.

E. Just before you cover your model, fill the weave and blend the edges with the wing using balsa filler. Sand the dried filler with 220-grit sandpaper and recoat if necessary.

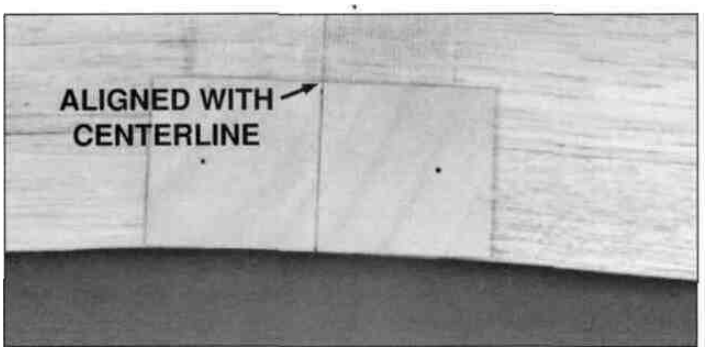


D 9. NOTE: The aileron and retract servo trays are slightly different in size - the aileron servo tray is the smaller one. Center the die-cut plywood aileron servo tray on top of the wing at the marks you made in siep 5 of the previous section (Completing the wing panels). Mark the outside perimeter of the tray, then cut the wing sheeting from inside the lines. Refer to the wing plan to locate the retract servo tray opening. Mark and cut the sheeting for the retract servo tray.





D 10. Insert the die-cut 1/8" plywood **aileron servo tray supports** into the opening on the top of the wing, then fit the servo tray onto the supports. Glue the assembly to the inside of the wing with thin CA followed by a fillet of thick CA. If installing retracts, repeat this operation for the die-cut 1/8" ply retract servo tray.

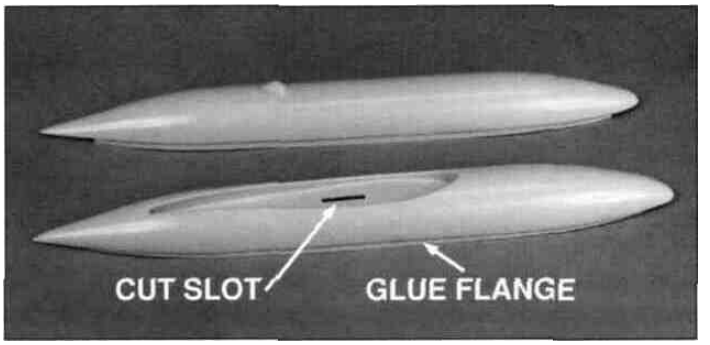


D 11. Draw a center line on the die-cut 1/16" plywood trailing edge reinforcing plate across the narrow dimension. Glue the plate to the bottom of the wing, with the centerlines on the wing and plate in alignment. Be sure the punch marks are on the side that shows. You will need to see them later.

Sand the Leading Edge

1. Use the die-cut plywood leading edge **gauge** to check the curvature of the LE along its length. The wide end of the gauge is used at the root and the narrow end is used at the tip. If necessary, touch up the LE with a sanding block to conform to the gauge.

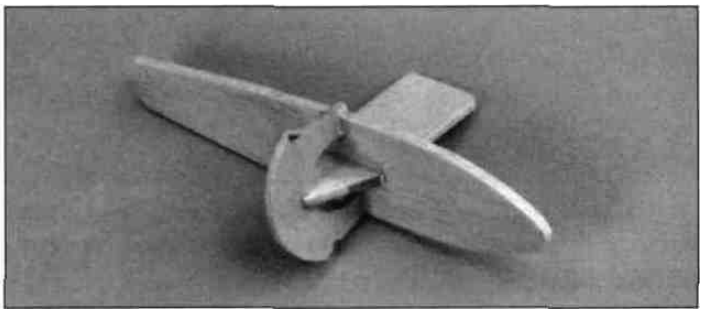
Assemble & Install the Tip Tanks



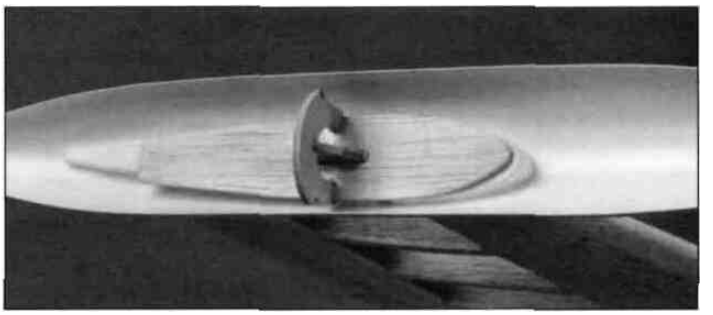
D 1. Trim the four plastic **tip tank** halves to the embossed cut lines.
NOTE: Each piece has one half of a lap joint.

D 2. Sand the edges smooth. Roughen the **inside** surface of the wing tip recess with coarse sandpaper.

D D 3. Carefully cut out the plastic from the inside of the slot in the middle of the rib recess.

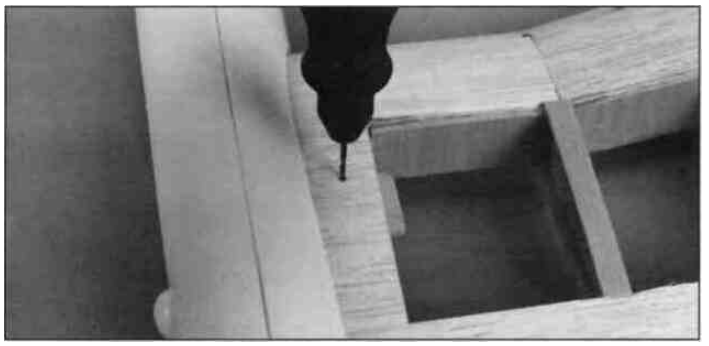


D D 4. Insert a die-cut ply tip tank **former** into the notches of the tank rib. Insert the die-cut **tip tank tongue** (tapered end first) through the rib slot into the notch of the former. Align all parts "straight and true," then securely glue them together.



D D 5. Insert the **tip tank tongue** through the slot in the tank and test fit the assembly on the wing tip. Be sure to **match the right tank with the right wing tip** and the left tank with the left wing tip.

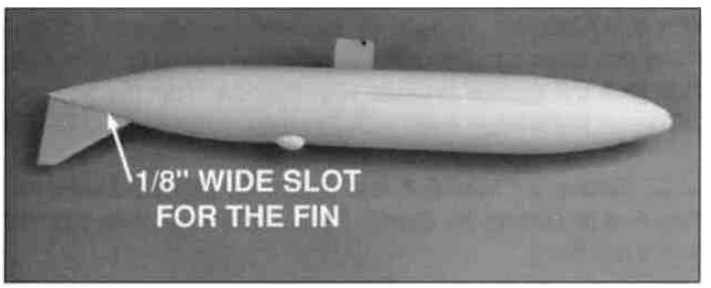
D D 6. Remove the wooden support assembly, then apply 6-minute epoxy to only the rib. Slide the tongue back into position through the tank (while on the wing) and allow the epoxy to cure. Do not get any epoxy onto the tongue as the tank must be removable.



D D 7. Hold the tank in position while you carefully drill a 3/32" hole through the center of the mounting blocks and tank tongue from the bottom of the wing. Try not to drill through the top of the wing.

D D 8. Enlarge the opening of the entrance hole to 3/16" diameter x 1/8" deep. This will hide the head of the cap screw when it's installed.

D D 9. Glue the outside of the tip tank to the assembled inner half.



D D 10. Cut a 1/8" wide slot in the "outside" aft end of the tip tank centered between the top and bottom edge of the tank. Test fit the die-cut plywood tip tank **fin** into the slot. Round off the LE and TE of the fin with sandpaper.

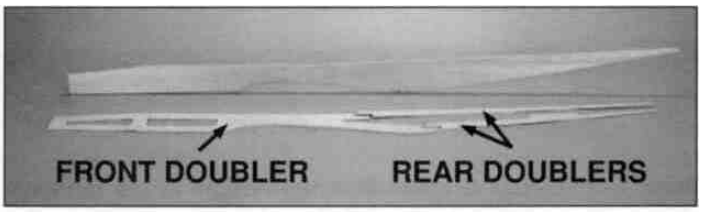
D 11. Glue the fin into the slot at the aft end of the tank, then repeat steps 2 thru 9 for the other tip tank.

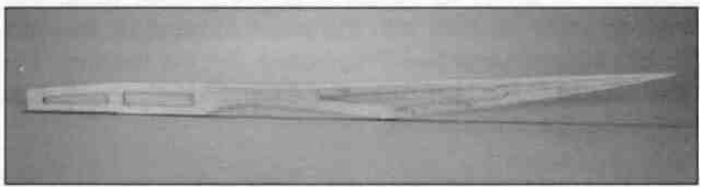
D 12. If you will be painting the tip tanks, fill the joints with automotive body filler (Bondo®). When the filler has cured, wet sand the seam smooth.

This completes the assembly of the wing for the time being. Looks like a jet wing, eh? Clean off your workbench, take a break, then let's get on with the fuselage. You can sleep later.

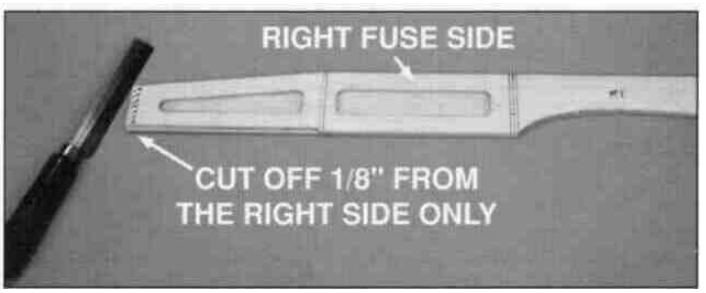
BUILD THE FUSELAGE

Preparation



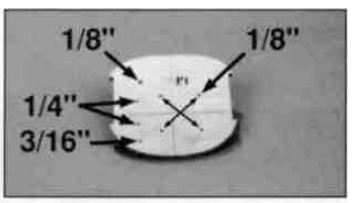


D 1. Pin the side view fuselage plan to your building board and cover it with waxed paper. Assemble the die-cut 1/8" balsa **front** and **rear fuselage sides** over the plan, then add the die-cut 1/8" balsa **front** and **rear doublers.**



D 2. Turn the fuselage side upside-down, cover it with waxed paper, then assemble the fuselage side and its doublers **over** it. Remove both sides from the board and sand them so they match exactly. Cut 1/8" off the front of the **right side only.** This will set the proper amount of **right thrust** in the firewall.

D 3. Mark the former positions on the **inside** of both fuselage sides, then remove the side view plan from the board.



D 4. Assemble the three piece firewall (with the punch marks forward) using 6-minute epoxy. Glue **the** two **F-1s** together and also **F-1D** to the aft side of the F-1s. Using the **plan and punch marks as guides,** carefully drill holes for the engine mount, fuel lines, throttle cable and, if using fixed gear, the nosegear steering cable. Mark the **top front** of the firewall now, so you won't make a mistake later. Install four 4-40 blind nuts on the back of the firewall assembly.

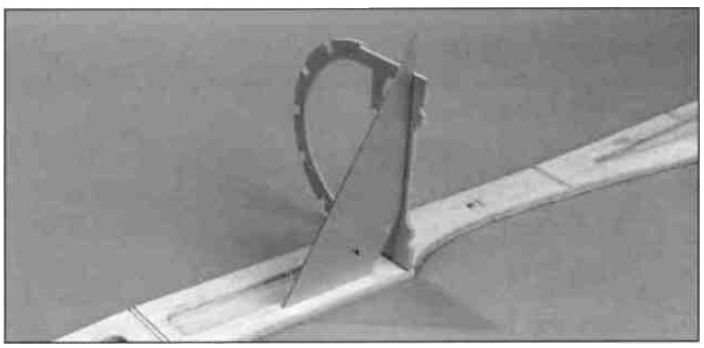
d 5. After referring to the fuselage plan, drill the pushrod guide tube holes at each of the punch marks on **all** of the formers. Use a 1/8" drill bit for the nosewheel steering guide tube and a **3/16"** bit for the outer throttle guide tube.
NOTE: Do **not** drill any holes in **F-7** at this time.

Frame the Fuselage

(Assembles right side-up over the plan)

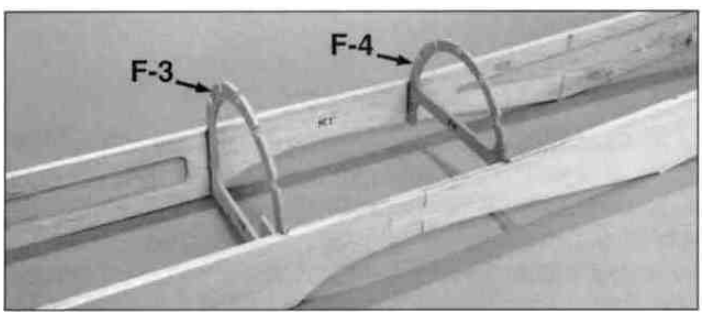
Note: The firewall is lower than the bottom of the fuselage sides, so in order to install it at the proper time, the fuselage must be built with the **nose extending beyond the left side of your building board.** Pin the fuselage top view plan to the board, with F-1 extending about an inch **past** the edge of the board.

Important: Unless specified differently, all fuselage formers are made from die-cut 1/8" plywood. Be sure that the **die stamped numbers on each former face the nose of the model** or the pushrod routing holes will not line up.

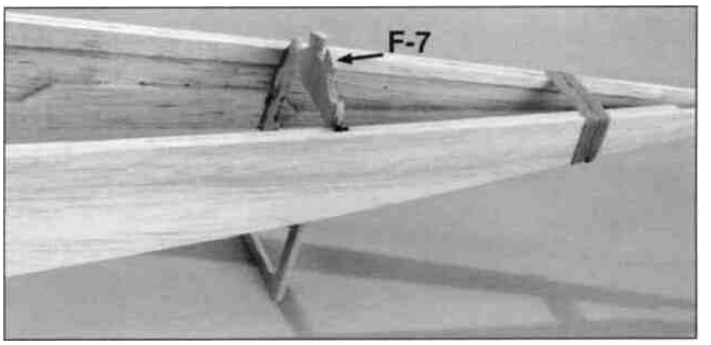


D 1. With the **right fuselage side** held flat on your building board, glue **F-3** in place, perpendicular to the fuselage side. Be careful, when installing all of the fuselage formers, that you position them correctly (see plan).

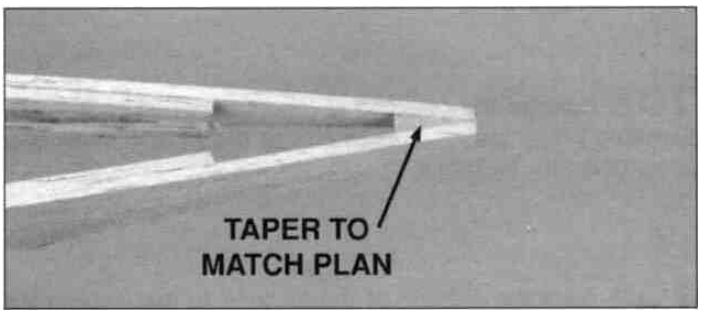
D 2. Turn this assembly upright and pin F-3 in its proper location over the plan, then **glue the left fuselage side to F-3. NOTE:** All formers have a centerline embossed on the bottom end. Use these marks to align the formers over the fuse plan.



D 3. Glue **F-4** in place between the fuselage sides. Be sure to seat **F-4** all the way to the top of the "long" notch.



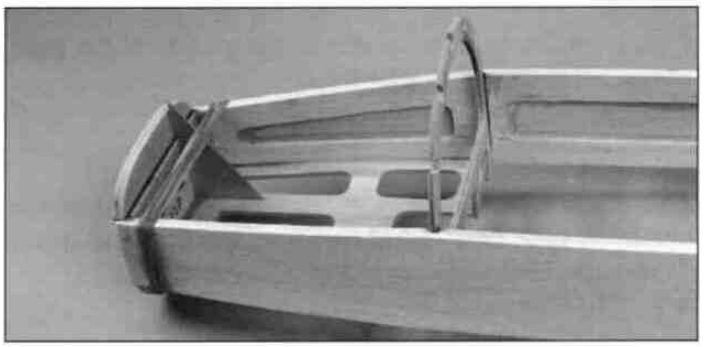
D 4. Pull the rear of the fuselage sides together and hold them with rubber bands. Glue **F-7** into place and pin the support leg on the bottom of F-7 to the board, again making sure that the former is centered over the plan.



D 5. Cut a 1" length from the 1/4" x 3/4" balsa left over from the fin frame. Taper it to a wedge shape to fit between the fuse sides at the aft end of the fuse. Remove the rubber bands holding the rear of the fuselage sides together and place the wedge between the sides. **Measure carefully** with a 90 degree triangle to be sure the aft ends of the sides are **directly** above the centerline shown on the plan, then glue the wedge in place with thin CA. Trim the top and bottom of the wedge flush with the fuse.

D 6. Glue in formers **F-6** and then **F-5,** centered over the plan and pinned to the board. Pin the fuselage **sides** to the board at F-5.

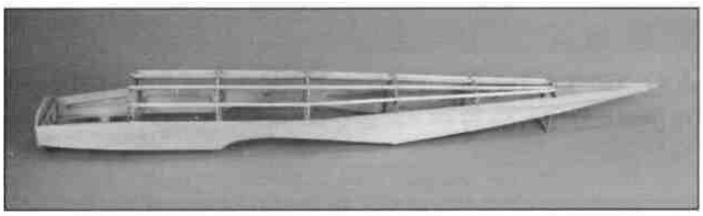
D 7. Hold the front of the fuselage sides together with rubber bands while you glue **F-2** in place. Slide the die-cut 1/8" ply **tank floor** into position with the embossed letters pointing toward the top of the fuse. Glue the tank floor to F-2 only - **not** to the fuse sides. (See next photo.)

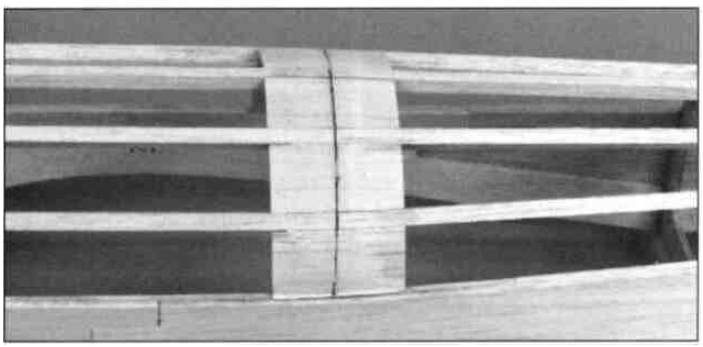


D 8. Fit the **firewall assembly** between the front of the fuselage sides. Sand an angle on the edges of the firewall to match the angle of the fuselage sides when they are

pulled in to meet it Wet the fuselage sides from F-2 forward, but keep the water away from the gluing surfaces. Glue the firewall in place with 30-minute epoxy, then run a bead of thick CA along the top edges of the tank floor Use rubber bands or clamps to hold the sides together until the epoxy cures Pin the fuselage sides to the board as close to the firewall as you can to help keep the firewall centered

D 9 Without gluing, fit the 1/4" x 1/4" x 36" balsa **top stringers** in the notches from F-2 to F-7 Mark the position of F-4 on each stringer Cut halfway through the stringers from the bottom so that they will make a clean bend at F-4 **Glue** all five stringers in place





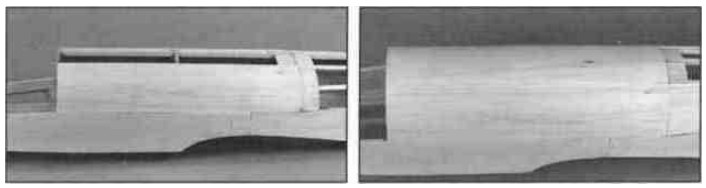
D 10 Center, then glue the 3/32" x 1-1/16" x 2" balsa **fillers** between the stringers on both sides of F-4 Sand the front and rear portions of the fillers and the tops of the stringers so that the sheeting will lie flat on top of them

Sheeting a rounded surface.

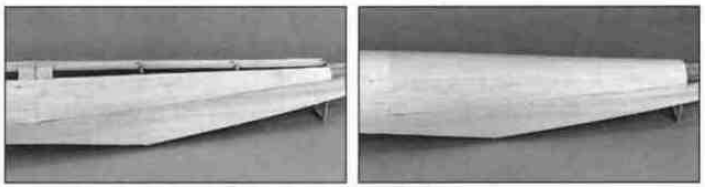
Wet the outside of a balsa sheet, then **flex it with the grain** for a minute or two to soften it up and start a curve Align the sheet with the fuse side, then temporarily hold it in place with clothespins

Mark the sheet for cutting Always trim the sheet to the **center** of the appropriate stringer to allow for a gluing surface for the next piece of sheeting

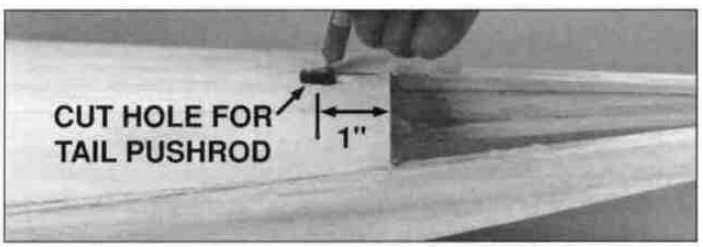
Apply medium or thick CA to all frame parts that the sheet will contact. **Roll** the sheet into position, starting along the lower edge Hold it in position by hand and with clothespins until the CA cures **Wick** thin CA along the top seam, wiping off the excess before it cures Repeat for the other side of the fuse It's best to sheet alternate sides to avoid building in a twist.



D 11 Install the 3/32" x 3" x 13-1/8" forward top sheeting from F-2 to F-4 Glue the **first** sheet to the top of the fuselage side doubler and then trim it so that it extends to the **middle of the second** stringer Wet the balsa if necessary, then glue this sheet down Sheet the **other side.** Fit and install the **top** sheet between them.

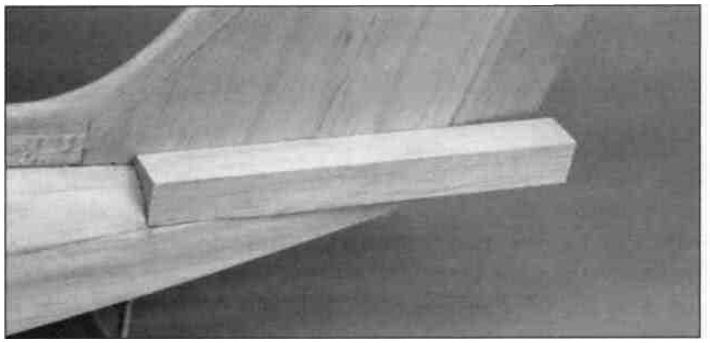


D 12 Install the 3/32" x 3" x 19-1/8" **aft top sheeting** the same way as the forward sheeting, except that you may find it easier to trim the side sheets roughly to shape before gluing them to the top of the fuse doubler.

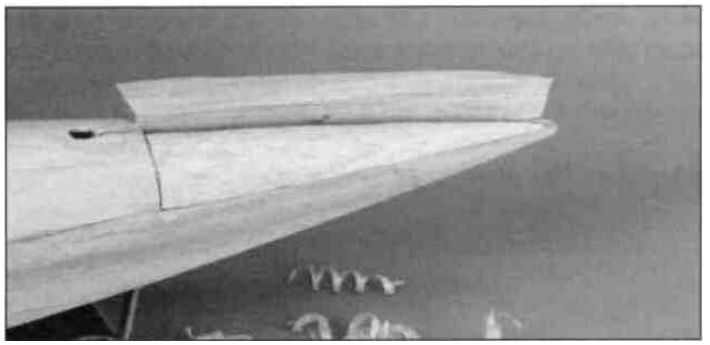


D 13 Trim and sand the top sheeting flush with F-2 and F-7, then remove the fuse from the building board Cut a 3/8" diameter hole through the top sheeting **and** center stringer **1**" **in front of F-7** for the tail surface pushrod tubes **NOTE:** Before performing the following step, lightly draw a centerline along the top of the fuse using the top center stringer locations at F-2 and F-7 for reference.

D 14 Insert the completed vertical fin into the rear of the fuselage Shim the rear of the fin so that it is **centered** between the fuselage sides **IMPORTANT: Carefully check that the fin is lined up fore and aft with the centerline of the fuselage** Hold a 36" straightedge along one side of the fin, then adjust the fin so that the straightedge is parallel to the centerline on top of the fuse. Be sure that the fin is perpendicular to the building board. Mark the fin's position on the back of F-7, then pin it firmly in place.

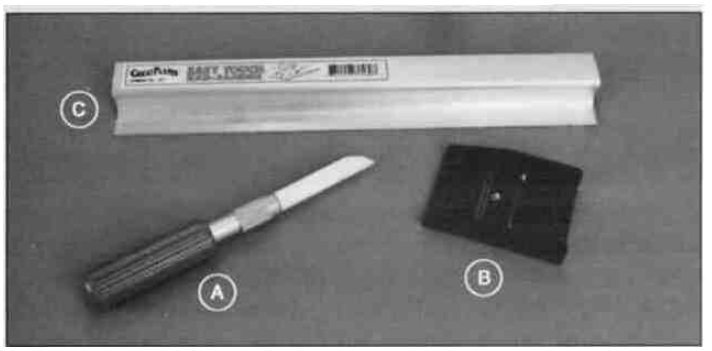


D 15. Fit the 1" x 1" x 9-1/2" balsa **top aft fuse fairing blocks** in place on both sides of the fin. Mark and sand the forward ends of the blocks so they fit flush with F-7. Glue the blocks to the rear of F-7 and the top of the fuselage sides, but **not to the fin.** Use glue carefully so that you **don't** accidentally glue the fin in place. Remove the fin immediately after this step.

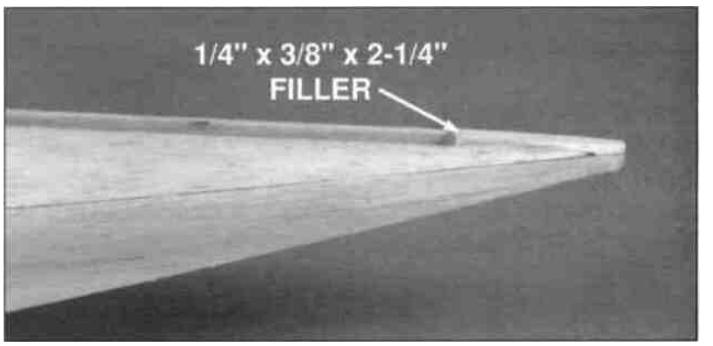


D 16. Carve and sand the fuselage and fairing blocks to shape (see Expert Tip that follows). Use the cross sections on the plan as a guide and make sure there are no flat surfaces left. This is the key to a fuselage that will appear round, even if it isn't.

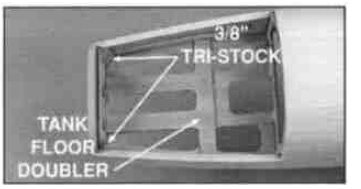
SHAPING BALSA BLOCKS



A long carving blade in a heavy duty handle (A) is the best tool to create the rough shape as a large amount of wood can be easily removed. Once the blocks are "roughed in," use a razor plane (B) to fine tune the shape. Finally, coarse, medium, and fine sandpaper on an Easy-Touch" Bar-Sander will smooth out the lines and flat spots. Don't try to shave too much wood at one time and check your work regularly. You can always remove wood, but it's difficult to put it back.



D 17. Glue a the 1/4" x 3/8" x 2-1/4" balsa filler between the rear top blocks to fill the gap behind the fin.

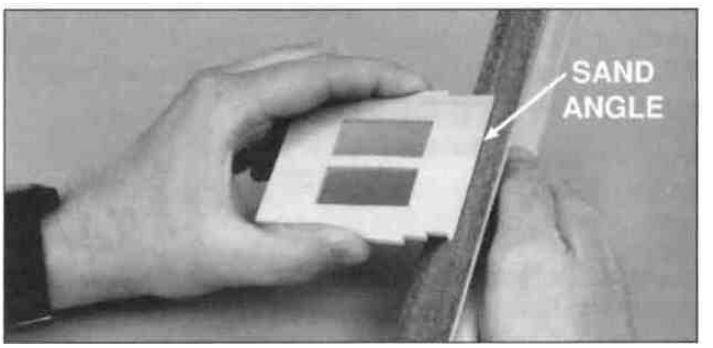


D 18. If you will be using retracts, cut out the **scored** part in the front of the tank floor and install the die-cut 1/8" ply **tank floor doubler (TFD)** on the top side.

D 19. Trim and sand 3/8" balsa **tri-stock reinforcements** to fit behind the firewall and both sides of the fuse. Glue them in place.

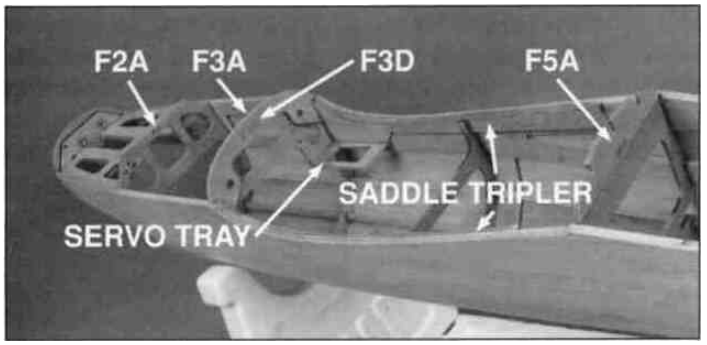
D 20. Put the fuselage upside-down in a **Styrofoam" cradle*** so that you can work on it without marring the top surfaces. **Cut off the support crutch from the bottom of F-7.**

***HINT:A** Styrofoam ice chest is cheap and can be cut to fit, or you can purchase a Robart Super Stand which is specifically made for this purpose.*



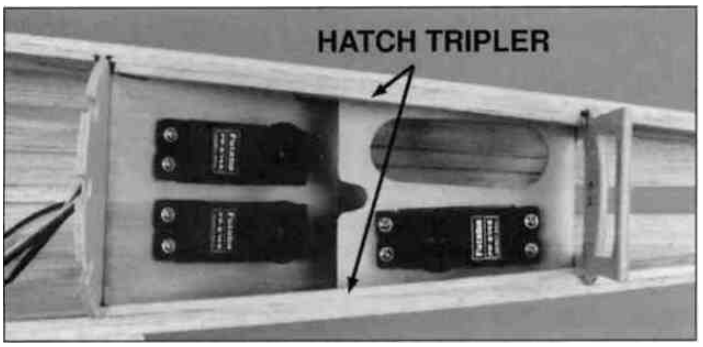
D 21. Sand a bevel on the wide end of the die-cut 1/8" ply **forward servo tray** that corresponds to the angle at F-6 (see side view of fuse plan). Using the bottom view plan as a guide, glue the forward and the die-cut 1/8" plywood **rear**

servo tray in place between F-6 and F-7. **NOTE:** Don't block the pushrod holes in F-6 with the servo tray. The **rear** servo tray must be glued to the **top** edge of the aft doubler and not to the stringers.



D 22. Glue the die-cut 1/8" balsa **wing saddle triplers in** place. If you are using retracts, install the die-cut 1/8" plywood **nose retract servo tray.**

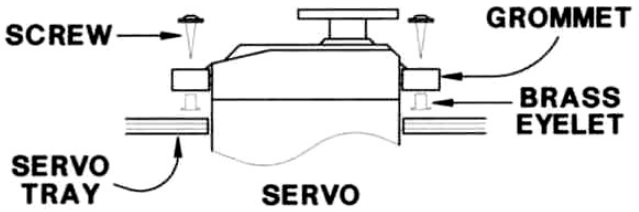
D 23. Glue **F-2A** to the bottom of F-2. Be sure the control cable tube holes are on the **right** side. Glue **F-3A** to the bottom of F-3 and then glue **F-3D** to rear of F-3 and F-3A. Glue **F-5A** to the bottom of F-5.



D 24. Cut and fit the 1/8 x 1/4 x 6-1/4" balsa hatch triplers to the fuselage sides along the hatch opening. With reference to the plan, install all of the fuselage servos and the forward control pushrods. (See Expert Tip that follows.)

EXPERT TIP

MOUNTING SERVOS



The proper way to mount a servo is as follows:

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

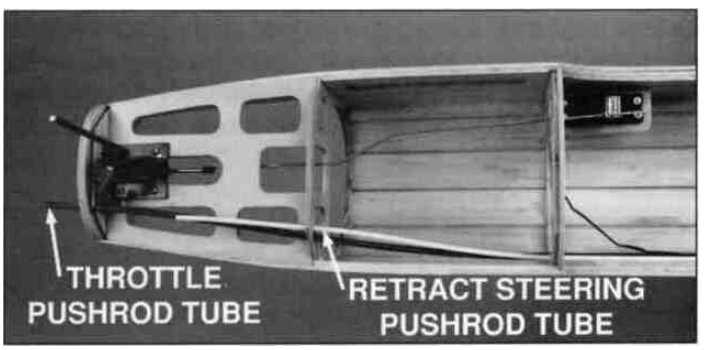
B. Insert a metal eyelet from the **bottom** side of the rubber grommet. This way the wide portion of the eyelet will be in contact with the servo tray when mounted.

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

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

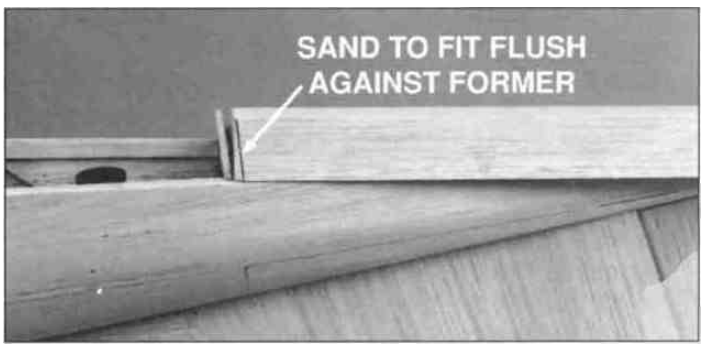
E. Use the servo screws supplied with your radio to mount the servo(s) in the servo tray. Tighten the screws until they **just touch** the top of the metal eyelet.

D 25. Install the retractable nose gear if you will be using one. Follow the routing on the plan to install the **3/16 OD throttle and 1/8" OD nosewheel steering guide tubes.** Insert the **cable** and **flexible pushrod,** then check to see that there is no binding. When everything is working smoothly, glue the tubes in place at **each** former.



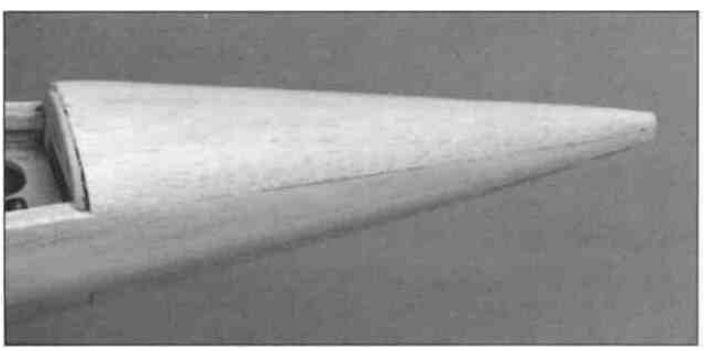
D 26. If you are using retracts, make the retract pushrod from 2-56 threaded pushrod wire (not included, GPMQ3716) and a nylon clevis. Install an adjustable 5/32" axle on the gear strut as shown on the plan and install the nosewheel with two 5/32" wheel collars (not included, GPMQ4150). Hook up the steering cable and the retract pushrod, then install the retract servo and cycle the retract to be sure everything is working properly. Remove the gear strut but leave the retract mechanism in place.

D 27 If you would like to use a larger capacity fuel tank than the recommended 8 ounce size, run two 1/8" aluminum tubes along the right side of the fuselage from just behind the nose retract servo tray to the middle of the fuselage
NOTE: In order to obtain reliable engine performance you will need to install an auxiliary fuel pump to deliver fuel to the engine The larger tank should be mounted on cross members (not supplied) in the fuse, **centered on the CG** During final assembly connect the tank and engine to the aluminum tubes with standard fuel tubing

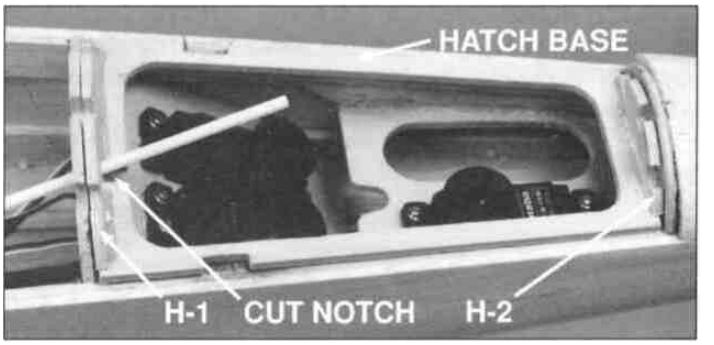


D 28. Insert the vertical fin into its slot in the fuselage. Carefully check its alignment and pin it in place Fit the rear **bottom blocks** in place on either side of the fin and glue them to the rear of F-7 and the top of the fuselage sides, but **not** to the fin.

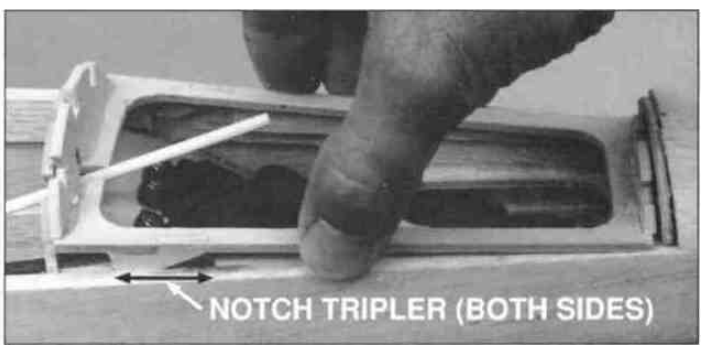
D 29 Glue a 1/4" x 3/8" x 9-1/2" balsa **filler strip** between **the** rear blocks to fill the gap The filler strip should be flush with the edge of F-7 and touch the side sheeting at the aft end of the fuse Remove the fin immediately after this step **to** be sure it isn't accidentally glued in place.



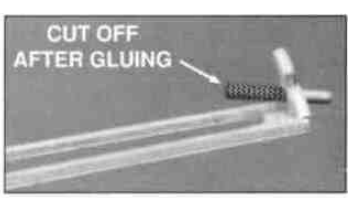
D 30 Carve and sand the rear bottom blocks to shape Use the bottom of F-7 and the plan as a guide to the correct shape (See Expert Tip on page 22)



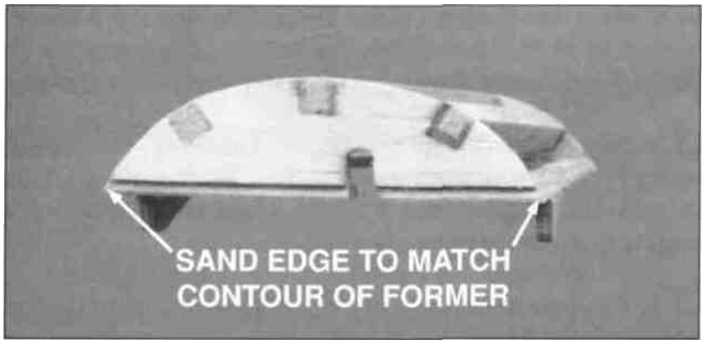
D 31 Put the die-cut 1/8" ply **hatch base** in place between F-6 and F-7 Glue the die-cut 1/8 ply **hatch formers H-1** and **H-2** (make sure punch mark faces forward) to the hatch base using F-6 and F-7 to set the correct angles Be careful not to glue the hatch into the fuselage Cut out the section of the hatch base which corresponds with the notch in H-1 to allow for the nose wheel pushrod guide tube.



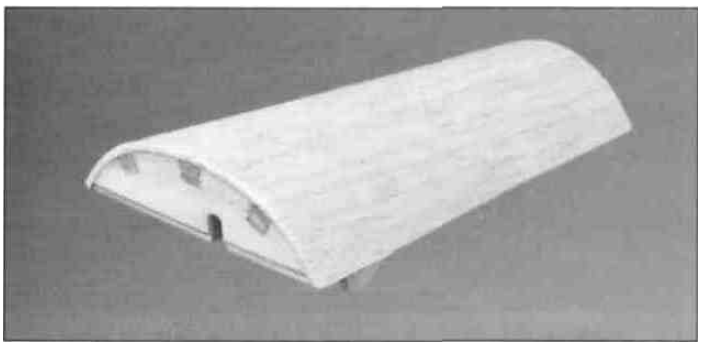
D 32 Glue the two die-cut 1/8" ply **locking tabs** to the bottom of the hatch with the wide end toward the front Notch the forward end of the servo compartment **tripler** to match the locking tabs, allowing the hatch to seat properly Drill 1/16" pilot holes through the fuse sides into the locking tabs. Before flying, secure the hatch with two #2 x 3/8" screws.



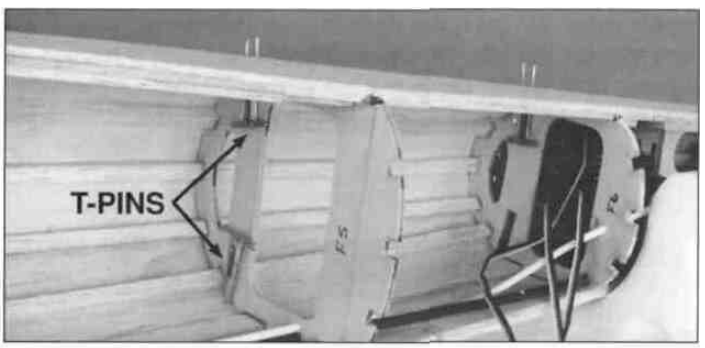
D 33 Drill through the punch mark in H-2 into F-7 with a 1/8" bit angled downward at about a 5 degree angle. Remove the hatch Round one end of the 1/8" x 1" hatch dowel Insert the dowel into H-2 so that it extends 3/16" from the rear, then mark it on the inside of H-2 Install the hatch, then glue the dowel in position to the inside of H-2 using your mark to obtain the correct depth After the CA has cured, cut off the excess dowel on the inside of the hatch.

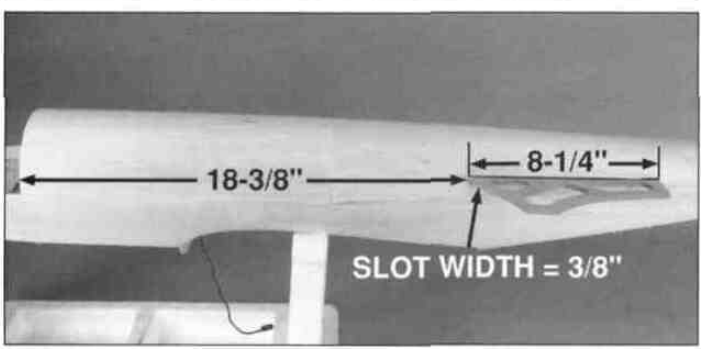


D 34. Remove the hatch from the fuselage and sand the sides of the hatch base to an angle that matches the contour of H-1 and H-2. Install three 1/4" x 1/4" x 6-3/4" balsa **stringers,** and sand off any rough edges.

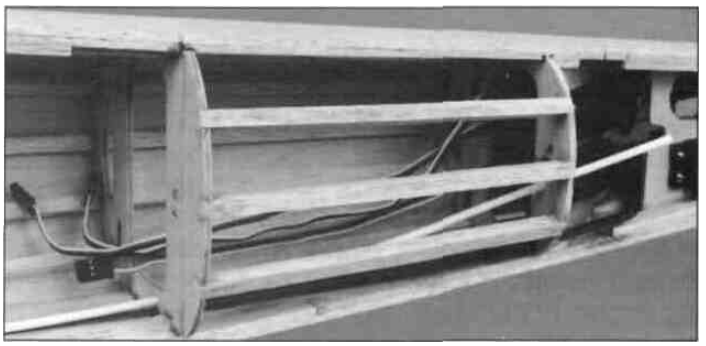


D 35. Glue a 3/32" balsa sheet to the outside edge of the hatch base. Wet the outside of the sheet, bend it around and trim it to end at the middle of the center stringer. Glue it in place. Repeat for the other side, then when the sheeting has dried completely, sand the front and back ends flush with the hatch formers.

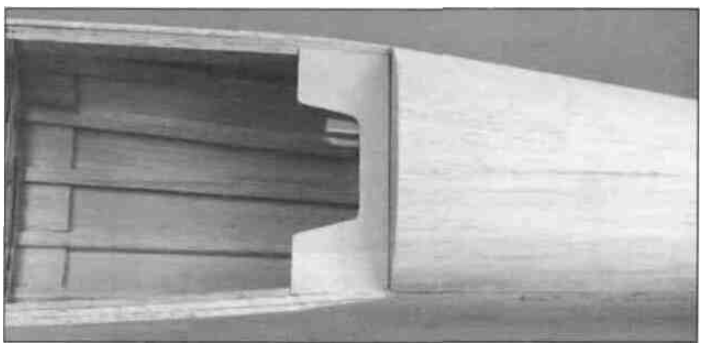




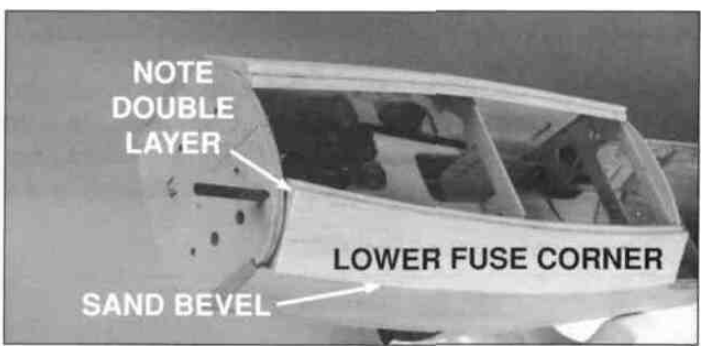
D 36. Locate the *dummy engine* **nacelle pylon** positions by inserting pins through the sheeting from the inside of the fuse at the notched sections of formers F-5 and F-6. Remove the pins, then use a straightedge and knife to cut out the sheeting between the pin marks. Extend the slots on both sides of the two formers so that the forward edge is 18-3/8" from F-2 and the overall length of the slot is 8-1/4". Test fit the die-cut ply **pylons** into the slots and make adjustments as necessary. **IMPORTANT:** Both pylons must be the same distance from F-2. *Don't worry about the thickness of the pylons as we still have to sheet them.*



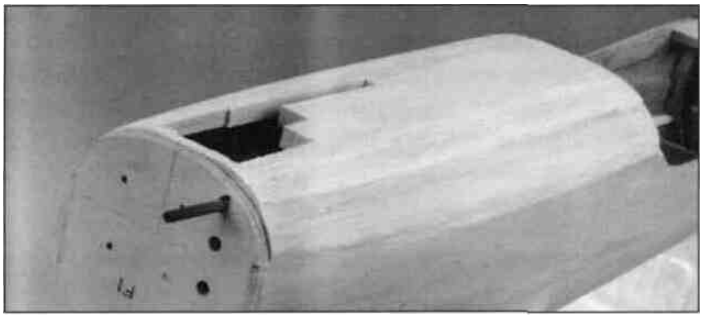
D 37. Glue three 1/4" x 1/4" x 6-3/4" stringers between F-5 and F-6 and sheet this area with moistened 3/32" x 3" x 6-3/4" balsa. After the sheeting has dried thoroughly, install the hatch and sand the entire rear portion of the fuselage bottom to shape.



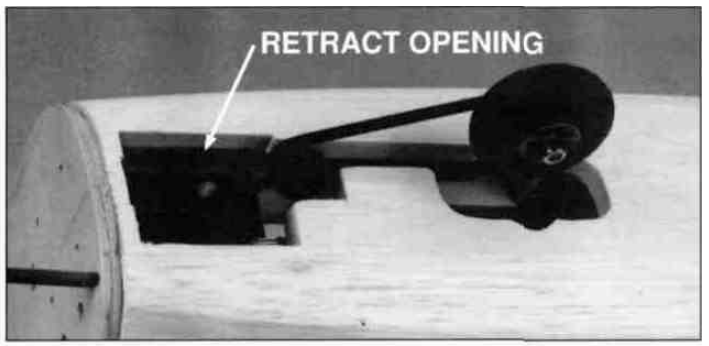
D 38. Fit the 1/4" plywood **wing bolt plate** in the notches in the wing saddle triplers, up against F-5. Use **30-minute epoxy** to glue this part in position. Add 1/4" balsa **triangle reinforcements** between the wing saddle triplers and the **top** of the plate at both ends.



D 39. Fit one die-cut 3/16" balsa **lower fuse corner** to each side of the fuselage between F-3 and F-1. Sand an angle on the convex (curving outward) side so that it will fit flush on the bottom edge of the fuselage side doubler. Glue these pieces in place, then fit and glue a **second pair of fuse comers** on top of the first. Using four pieces here instead of two makes the required twist much easier to achieve.



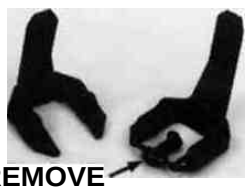
D 40. Remove the retract mechanism. Trim and sand the tops of the F-8s flush with the top of F-1 D, F-2A and F-3A, then glue the 1/2" x 4" x 13" balsa front **bottom block** in place. If you are using retracts, cut a clearance hole for the retract mechanism in the block. **HINT:** *To locate the position of the retract mechanism, push a sharpened piece of wire through the retract screw holes in the tank floor out through the bottom of the block. Align the retract mechanism over the holes, then mark its shape.* Carve off the overhanging portions of the fuse bottom and **roughly** create the rounded shape.



D 41. If you are using retracts, reinstall the retract unit, axle and wheel. Slowly retract the gear while you cut away the portions of the bottom block which interfere. A template has been provided on the fuse plan for reference. Cycle the retract a few times to be sure that everything works correctly, then remove the retract assembly.

Mount the Engine

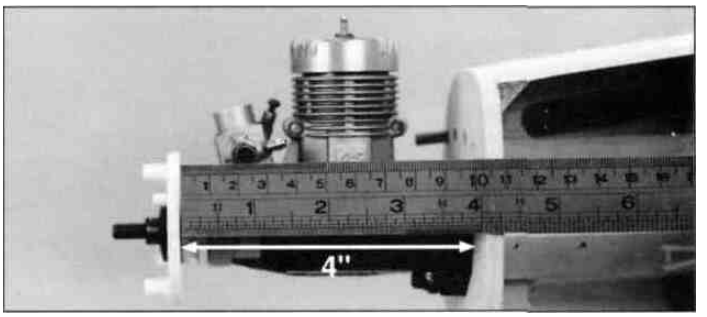
The Great Planes **adjustable engine mount** is simple and convenient to use. It may be used to mount most .20 - .40 two-stroke and .26 - .48 four-stroke engines. Nose gear bearings for 5/32" diameter wire are incorporated in the mount.



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

D 2. Temporarily install the engine mount on the firewall using four #4 **flat washers** and four **4-40 x 1"** machine screws. Don't tighten the screws completely until after the engine has been positioned.

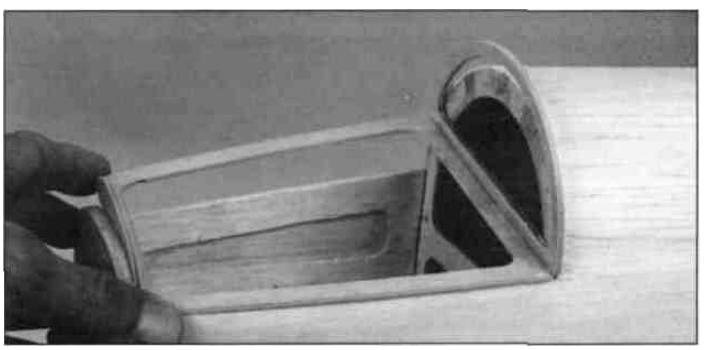
D 3. Position the engine on the engine mount. Slide the engine mount halves apart until the **engine mounting lugs** will sit flat on the rails. Adjust the mount up and down until the tic marks on the mount are centered on the horizontal reference line on the firewall. After adjusting the mount, tighten the 4-40 screws to hold it firmly in position.



D 4. Position the engine so that the backplate of a spinner will be 4" (102mm) in front of the firewall. **Carefully mark the engine mounting holes** on the rails with a sharpened piece of wire or a pencil lead.

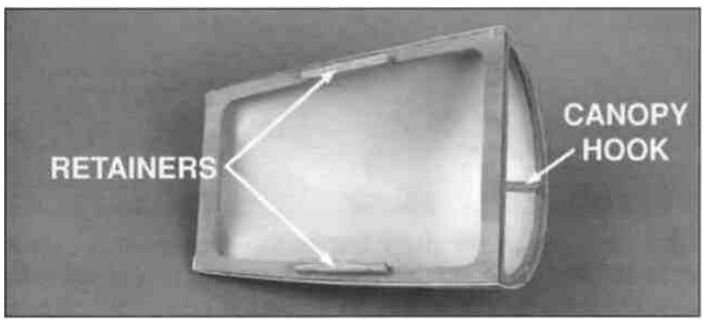
D 5. Remove the engine and engine mount from the fuse. Use a centerpunch or sharpened nail to "dimple" the marks on the rails, then drill a 7/64" hole through the rails at each punch mark. If you have access to a drill press, this is the best tool for the job. However, if you are using a hand held electric drill, try to keep the bit perpendicular to the rails. Test fit the engine but don't screw it permanently in position **just yet.**

Install the Canopy & Cowl

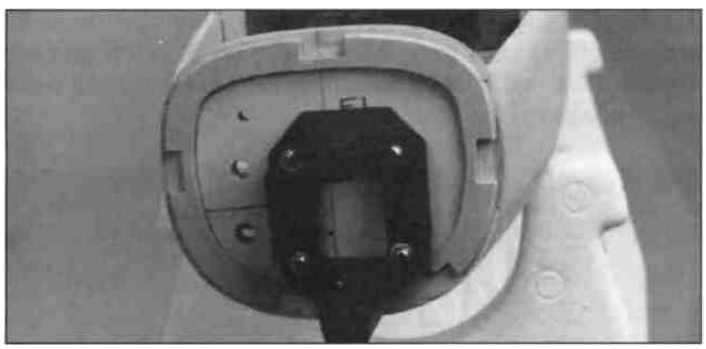


D 1. Protect the edges of the fuse and formers with waxed paper, then fit the die-cut 1/8" ply **canopy base** between F-1 and F-2. Glue the die-cut 1/8" ply **C-1** and **C-2** to the canopy base using F-1 and F-2 to set the proper angles. Be careful not to glue the canopy base to the fuselage.

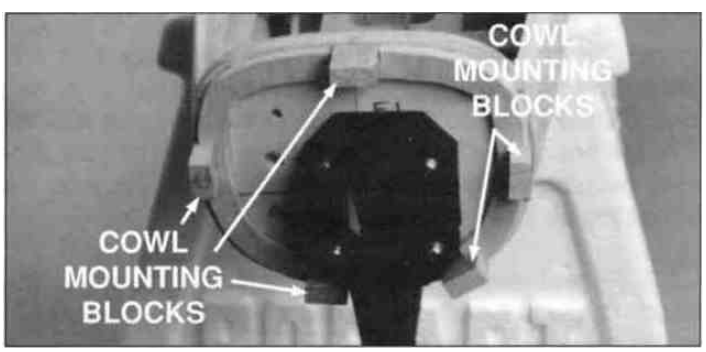
D 2 Sand the sides of the canopy base to an angle to match the shape of C-1 and C-2 Tack glue the canopy frame into the fuselage, then trim the canopy (starting **outside** the cut lines) to fit When satisfied, remove the canopy and frame from the fuselage, then glue the canopy and frame together.



D 3 Glue the die-cut plywood **canopy hook** inside of the canopy frame at the notched location in C-2 Fit and glue two 1/4" x 3" balsa sticks (cut from 6" piece) to the bottom of the canopy frame to prevent the canopy from moving sideways The canopy is held in position by a rubber band (not included) looped around the cross piece on former F-2 and then attached to the plywood hook.

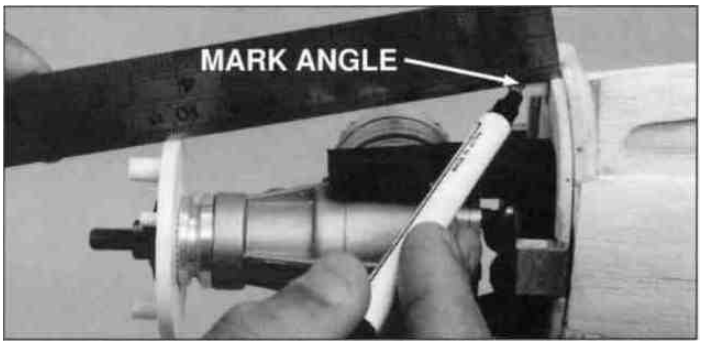


D 4 After referring to the plan, glue the die-cut plywood **firewall cowl ring** to the front of F-1 **NOTE:** The cowl ring is **"inside"** the perimeter of F-1 by about 1/16" to allow for the thickness of the cowl material

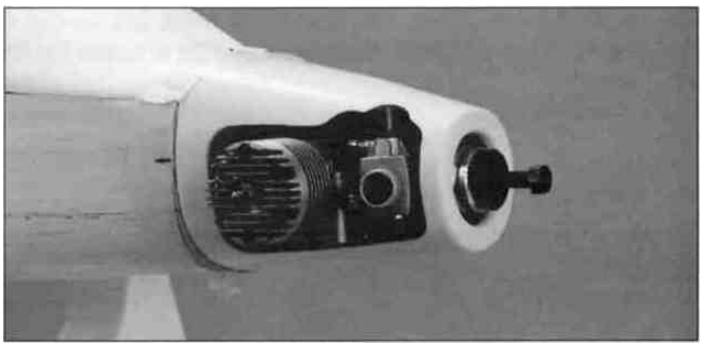


D 5 Use 6-minute epoxy to glue the five 1/2" x 1/2" x 1/4" hardwood **cowl mounting blocks** into the notches of the cowl ring

D 6 Install the engine with four #6 x 3/4" **sheet metal screws** that have been provided with this kit Install a **Learjet** 2-1/4" **spinner** (not included, GPMQ4542) on the prop shaft.



D 7 Position a straightedge between F-1 and the spinner, then draw the angle of the cowl on the edge of each mounting block Remove the spinner Sand the tops of the blocks to the lines you drew Mark the centerline of **each** block on a piece of tape wrapped around the fuse

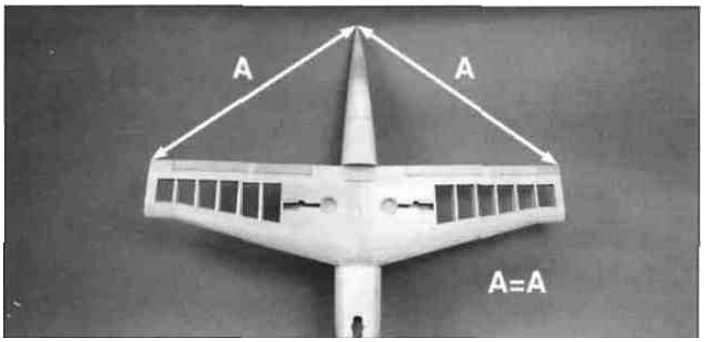


D 8 Cut the opening at the front of the cowl and trim the rear edge to along the "cut line " Cut out the engine access hole on the side of the cowl following the cut lines Position the cowl on the fuse and make adjustments to the engine opening as required Sand the edges of the mounting blocks if needed for a good fit.

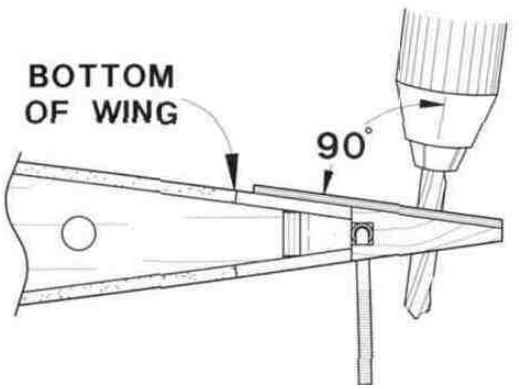
D 9 Reinstall the spinner and prop then adjust the cowl to clear the back of the spinner by 1/16" Securely tape the cowl in position, then drill 1/16" (1 6mm) holes through the cowl into the mounting blocks (using the centerlines you drew in step 7) for the #2 x 3/8" cowl mounting screws
NOTE: A 1/16" plywood spinner ring has been included to shim the front of the cowl if needed.

D 10 Cut the cowl as necessary to allow clearance for the muffler, then remove the cowl and engine in preparation for final sanding.

Mount the Wing

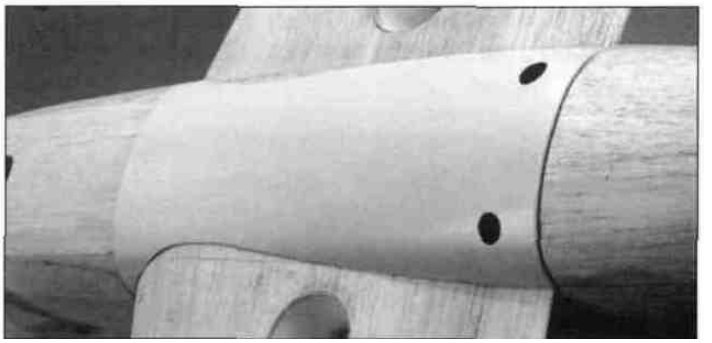


D 1. With the fuselage upside-down in the foam cradle, fit the wing in the wing saddle. The wing dowels should slide easily into the holes in F-3D, and there should be no gaps between the wing and the saddle at the front or the rear. Check that the wing tips measure the same distance from the tip of the tail. When the fit is right, mark the center of the trailing edge on the bottom sheeting as a guide for the next step.



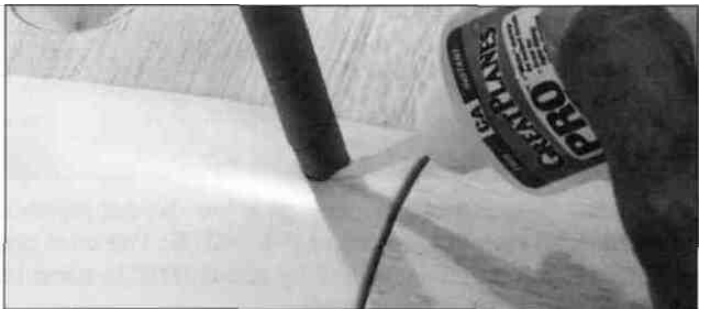
D 2. Drill through the punch marks in the trailing edge reinforcing plate with a 13/64" bit. These holes must extend all the way through the wing and the wing bolt plate and must be perpendicular to the surface of the wing. Do not allow the wing to move out of alignment while you are drilling these holes. Now run a 1/4-20 tap through the holes. Remove the wing and drill out the holes in the wing to 1/4". Apply a few drops of thin CA to the threads in the wing bolt plate, and after the CA has completely cured, run the tap through them again.

D 3. Bolt the wing to the fuselage using the supplied 1/4" **x** 2" **nylon bolts.**



D 4. Trim the plastic **belly pan** to the embossed perimeter cut line. Test the belly pan on the wing, then carefully make adjustments to the edges to obtain a good fit*. Sand a bevel on the inside of the edges that will contact the surface of the wing.
* Fill any gap between the fuse formers and belly pan with left over balsa.

D 5. With the wing mounted on the fuse, glue the belly pan in position using a mixture of 30-minute epoxy and Top Flite Microballoon filler (TOPR1090). Use 4 parts of the filler to 1 part of epoxy. Apply a bead of the mixture to the inside surface of the belly pan, then quickly position the part and secure it with tape while the epoxy cures. Be careful not to glue the wing to the fuse.



D 6. Cut out the wing bolt holes on the plastic belly pan using the cut lines as a guide. Enlarge the holes in the wing fairing to 1/2" diameter. Insert the supplied 1/2" x 6" cardboard tube into one of the holes centered on a wing bolt. Glue the tube to the **outside** of the belly pan with thin CA. **Do not** allow CA to contact the wing bolt or your wing may become permanently attached. Cut off the tube just above the surface of the belly pan.

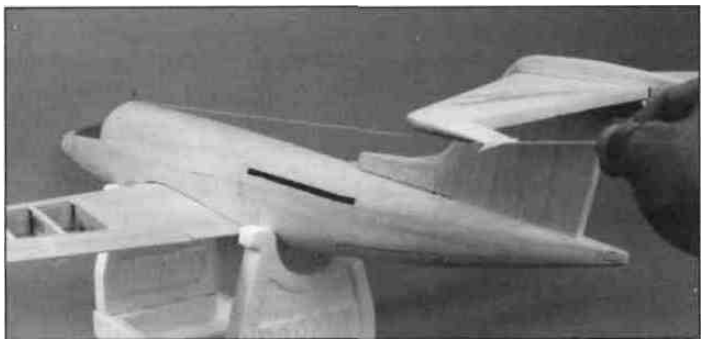
D 7. Repeat step 6 for the other bolt hole. Turn the tube over to provide a squared off end at the bolt's location. Cut off the excess tube material.

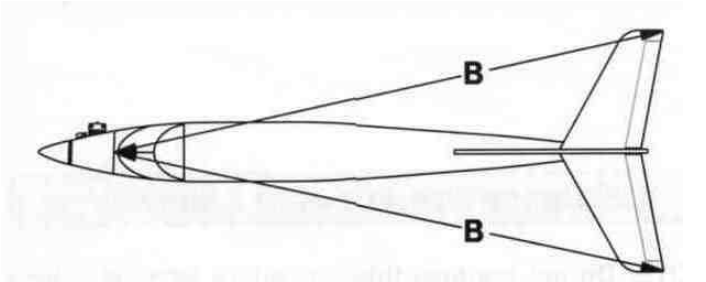
D 8. Remove the wing bolts, then drip a few drops of thin CA down the inside of the tubes to attach them to the inside of the wing. **Do not** reinstall the wing bolts until you are sure the CA is fully cured!

D 9. Sand the top edges of the tubes flush with the contour of the belly pan.

FINAL ASSEMBLY

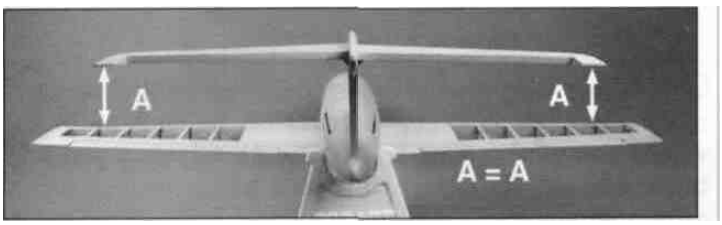
Install the Tail Group





D 1. Mount the wing, then **without gluing,** insert the fin into the tail slot. Slide the stab into position, centering it visually on both sides of the fin. Use string to measure the distance from each stab tip to a pin centered on top of F-2. The distance to the pin must be equal from each stab tip.

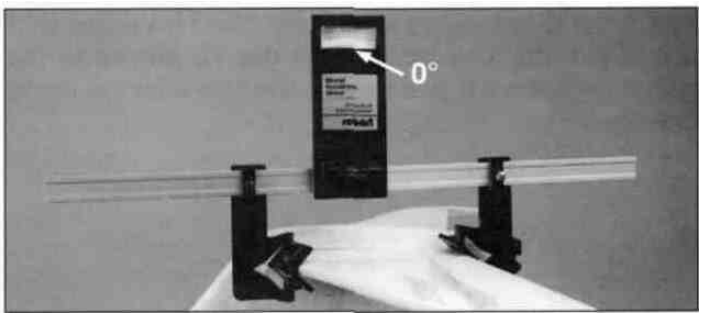
D 2. Mark the top of the stab **with reference lines** on both sides of the fin.



D 3. Position the model so that you can "sight" it several feet from the front and rear. Look at the relationship between the stab tips and the top of the wing - the distance must be equal. If not, sand the high side of the slot in the fin to correct the situation. When satisfied, remove the stab, then use 6-minute epoxy to glue it in position using your reference marks for alignment. Before the epoxy cures, recheck your alignment from all points of reference.

The following 3 steps are critical to the way your Learjet flies, so take your time and work carefully.

D 4. Block up your model so that the wing root is level and has 0 degrees of incidence. We recommend the use of an incidence meter for this important step. If you can't obtain an incidence meter, you can accomplish the same objective if you insert a pin in the **center** of the leading and trailing edges, **then exactly equalize the distance from the workbench to the pins.**

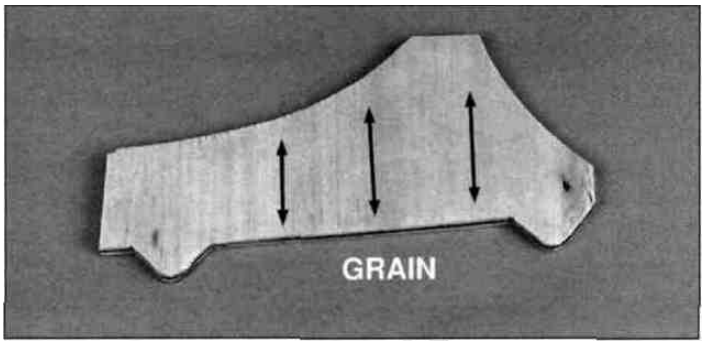


D 5. Once the wing angle is set, check the incidence of the stab - it must be 0 degrees as well. Once again use an incidence meter or the pin measurement technique. If the stab does not measure 0 degrees, adjust the angle of the **fin** up or down in its slot to remedy the problem. **NOTE:** The base of the fin may need to be sanded slightly to allow enough movement. Sand (or shim) the bottom of the dorsal fin, if needed, to obtain a good fit with the top of the fuse. Draw reference lines on the fin (along the top of the fuse) once the correct angle is established.

D 6. Use 30-minute epoxy to glue the fin into the fin slot at the marked angle. Be sure to check the incidence angle once again before the epoxy cures

D 7. Center and glue the shaped 1/4" balsa **ventral fin** to the bottom of the fuse flush with the aft end as shown on the fuse plan.

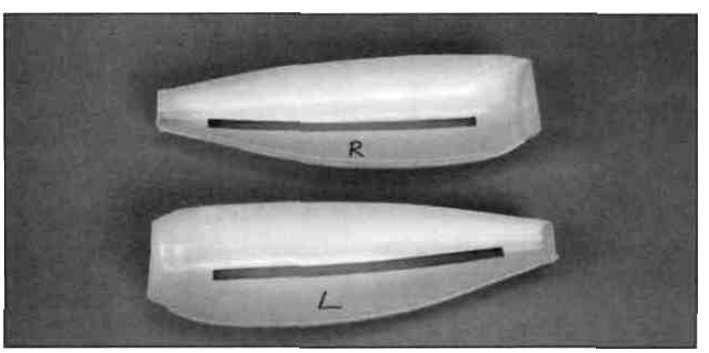
Assemble the Engine Nacelles



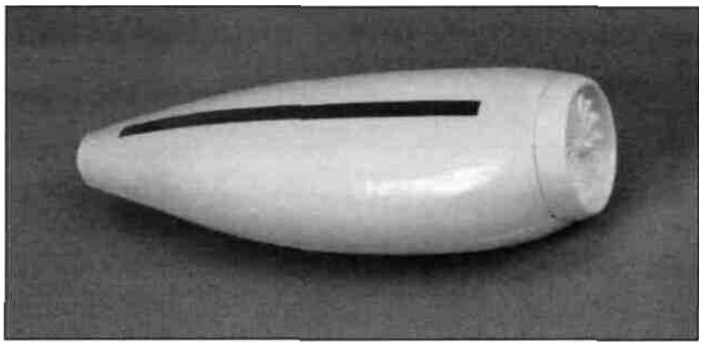
D 1. Sheet both die-cut 1/8" plywood **nacelle pylons** on both sides with 3/32" x 3" balsa. Be sure the grain direction runs from the inboard edge to the tip. Trim and sand the sheeting to the shape of the die-cut pylons.

D 2. Insert the pylons into the slots in the fuse, then cut two pylon trailing edge pieces from the remaining balsa rudder stock to the shape shown on the plan. Sand the edges for a nice fit with the fuse sides. **Glue the TE pieces to the pylons only.** We will glue them to the fuse **after** the model is covered.

D 3. Trim the six pieces that comprise the dummy engine nacelles to the embossed cut lines. Sand the edges smooth. Without gluing, fit the parts together, then designate the left and right nacelles. Open the two nacelles.



D 4. Cut a pylon access slot in **only the two pieces** that will be **closest** to the fuselage following the embossed cut lines on the inside surface of the nacelles. **Do not cut the slots in all four pieces** or you will have slots showing on the outside of the nacelle.



D 5. Roughen the mating surfaces with coarse sandpaper then glue the left, right and front pieces together with thin CA.

D 6. If you will be painting the nacelles, now would be a good time to fill the joints with automotive body filler (Bondo). Wet sand the seams smooth before priming and painting.

Balance the Airplane Laterally

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

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

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

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

D 3. If one wing always drops when you lift the model, it means that side is heavy. Balance the airplane by gluing weight to the other wing tip. **NOTE: An airplane that has been laterally balanced will track better in loops and other maneuvers.**

There. The assembly is done! If you have followed the instructions and Expert Tips you should be looking at a pretty spiffy Learjet airframe. From here on you should work over a soft pad of foam or bathroom towels to prevent creating new dings in the structure. Clean off your workbench and vacuum up any balsa dust and wood chips as they have a way of causing scratches on the covering as you apply it.

FINISHING

Fuelproofing

Fuelproofing may be done after covering but it is an important step that must not be omitted.

D 1. Fuelproof the firewall and fuel tank compartment paying special attention to the inside of the wheel well. K&B epoxy paint or 30-minute epoxy is recommended.

D 2. Fuelproof any exposed wood.

Final Sanding Before Covering

D 1. Fill any open joints or dings (see expert tip that follows) with HobbyLite" balsa filler, then when dry, go over the entire airframe with progressively finer grades of sandpaper to obtain a glass-smooth finish. *We use 400-gnt as our final grade.*

Repairing Dings

Many small dings in balsa can be repaired without having to use filler Simply moisten the area with water or rubbing alcohol, then apply a hot sealing iron to the area. The heat and moisture will cause the wood to swell back to its original shape. Lightly sand off the spot to finish the repair. Look over your work carefully with an eye to any surface blemish that will cause problems during covering Fix the problems before proceeding.

NOTE:The Learjet does not require much painting to obtain the scheme shown on the box, as most of the finish is done with Top Flite MonoKote film. The only painting that is required are the plastic parts such as the cowl, tip tanks, engine nacelles and canopy, but as these are molded in white plastic they may be left unpainted if you desire There are many other schemes used on Learjets and two colorful ones are shown on the side of the box.

The technique we will describe here is how the model pictured on the top of the box was finished. In general, it involves covering most of the model with MonoKote film, then priming and painting the cowl and surface details Remove all dust from the structure with a Top Flite Tack Cloth (TOPR2185) so the MonoKote film will stick well.

Make sure the MonoKote film is thoroughly stuck down to the structure and all of the edges are sealed. Use a **Top Flite MonoKote Hot Sock'"** (TOPR2175) on your covering iron to avoid scratching the MonoKote film.

Applying MonoKote Covering

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

D 1. Cover your sealing iron with a **Top Flite Hot Sock** and turn the heat about 3/4 of the way to the high setting.

D 2. Cut a piece of MonoKote film about 2" larger all around than the surface you are going to cover Strip off the backing and position the film. Tack the film down **smack dab in the middle of the surface.**

D 3. Pull (as in stretch) the film toward the longest end, sealing it to the balsa from **the center outward.** Work out any **wrinkles and air pockets** as you proceed with a combination of circular and back and forth motion.

D 4. Perform the same procedure working the **opposite direction** from the center.

D 5 Pull and seal **diagonally toward the four corners,** always starting from the center. The trick is to shrink out any wrinkles before you seal the film to the surface.

D 6. Use a heat gun to heat and stretch the film around curved surfaces like the stab and rudder tips, while pulling on the excess material. You may need to pull hard to get out all of the wrinkles, so wear a glove to protect your hand from the heat Follow-up the heat gun with your sealing iron to secure the bond.

The idea behind this approach (which can be applied to any part of the model) is to **preshrink the MonoKote film** as it's applied, and remove the air pockets that can expand later and cause the sags and wrinkles.

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

Covering Sequence

D 1.Tail and nacelle junction strips as described in the previous note
D 2.Rudder ends
D 3. Rudder right and left sides
D 4. Ends of both elevators
D 5. Bottom of elevators
D 6. Top of elevators
D 7. Stab bottoms
D 8. Stab top
D 9 Fin right and left sides
D 10. Fuse bottom
D 11. Fuse sides
D 12. Fuse top
D 13 Ends of ailerons
D 14. Bottoms of ailerons
D 15. Tops of ailerons
D 16 TE surfaces of wing at ailerons
D 17. Bottom of left wing panel (overlap covering 1/4" at belly pan)
D 18. Bottom of right wing panel (overlap covering 1/4" at belly pan)
D 19. Top of left wing panel (overlap covering 1/4" at wing LE and center)
D 20. Top of right wing panel (overlap covering 1/4" at the LE and center)
D 21. Nacelle pylons, bottom and top
D 22. MonoKote trim stripes and accents.

Painting

We recommend *Top Flite LustreKote"* primer and color coat for all plastic parts.

Surface preparation
Spray the **cowl, nacelles, canopy** and **tip tanks** with a **thin** coat of primer. Add a second coat of primer to areas that need it It's best to allow the primer to dry overnight before sanding Wet sand the primer with 320 and 400 grit sandpaper Most of the primer should be sanded off.

Apply the colors
Spray the parts with several light coats of Top Flite LustreKote, allowing each coat to dry before applying the next.

Apply the Decals

NOTE: The decal sheet gives you everything you need to completely trim your model, except for the red stripes.

D 1. Study the photos on the box to decide where to place the decals.

D 2. Thoroughly clean your airplane before applying decals.

D 3. Trim the decals as close as practical. Carefully apply the decals to the model. You can float the decals into position by first applying soapy water (two or three drops of dish detergent to a quart of water) to the model's surface, then smoothing on the decal Squeegee out excess water using a credit card wrapped with a tissue Blot the surface dry and let the decals cure for at least 12 hours before running the engine.

D 4. Most of the panel lines and access hatches are included on your decal sheet. The two straight black lines at the bottom of the sheet may be used to create an outline of the door.

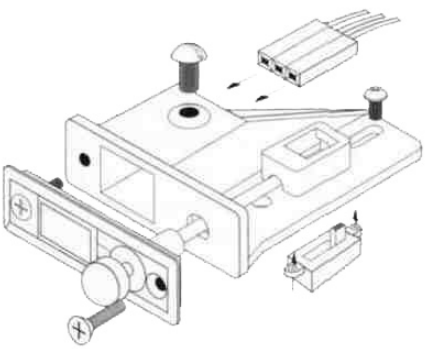
D 5 An identification label is also provided for your convenience and complies with AMA guidelines. Be sure to cover the label with the clear protective frame.

NOTE: Certain text decals are provided and may be used at your discretion.

INSTALL THE RADIO AND CONTROL SURFACES

Install the Receiver & Switch

D 1. Plug the required servo extension leads and all servos into the receiver, following the manufacturers' instructions If using retracts, you need to install a "Y" cord in the retract position as you will be using two servos Wrap the receiver in a layer of 1/4" foam rubber (HCAQ1000), then secure in place with scrap balsa and a couple of rubber bands.



D 2. Install the receiver switch wherever you choose between F-5 and F-6

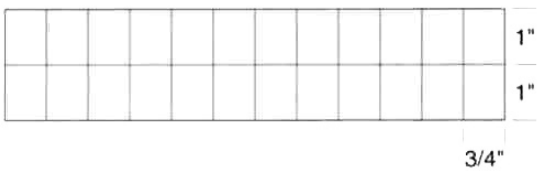
Hint: The most inconspicuous location is below the nacelle pylons. We used a Great Planes Switch/Charging Jack (GPMM1000) as it offers both functions in one small unit. Connect the switch to the receiver.

D 3 Wrap the battery in 1/4" foam, then install it in the opening in the servo compartment. Connect the battery to the switch.

D 4 Center all of the trim levers on your transmitter, then turn on the transmitter and the receiver. Manually center all of the servo horns.

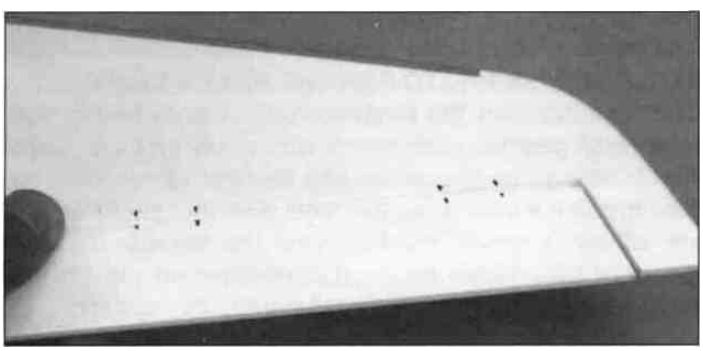
D 5. Use some scrap balsa to make a tray to support and secure the receiver.

Hinge & Hook Up the Controls



D 1. With reference to the above sketch, cut **18 hinges** from the supplied 2" x 9" composite hinge material You will need six hinges for the elevators and two for the rudder. Each aileron gets four hinges

D 2 Draw a centerline on the TE of the stab and the LE of the elevators. Do the same for the fin and rudder.



D 3 Use the plan as a guide to mark the locations of the hinges on all tail components - fin, rudder, stab, elevator, the wings' TE and the ailerons Refer to the Expert Tip that follows, then cut matching hinge slits in all parts **Do not use any glue until step 4.**

EXPERT TIP

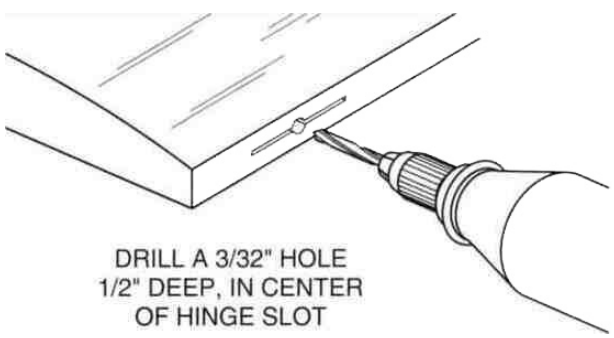
INSTALLING CA HINGES

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

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

CUT HINGE SLOT
WITH HOBBY KNIFE
AND #11 BLADE

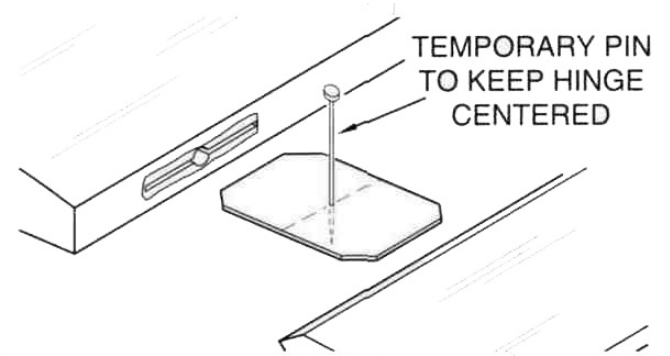
A. Cut the hinge slot using a #11 blade in a standard #1 knife handle The CA hinges provided have a thickness that fits this type of slot very well Trial fit the hinge into the slot If the hinge does not slide in easily, work the knife blade back and forth in the slot a few times to provide more clearance (it is really the **back edge** of the blade that does the work here in widening the slot)



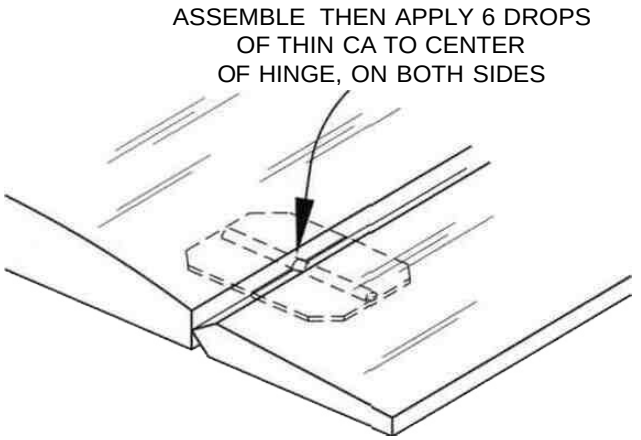
DRILL A 3/32" HOLE
1/2" DEEP, IN CENTER
OF HINGE SLOT

B. Drill a 3/32" hole, 1/2" deep, in the center of the hinge slot. If you use a Dremel Moto-Tool® for this task, it

will result in a cleaner hole than if you use a slower speed power or hand drill Drilling the hole will twist some of the wood fibers into the slot, making it difficult to insert the hinge, so you should reinsert the knife blade, working it back and forth a few times to clean out the slot.

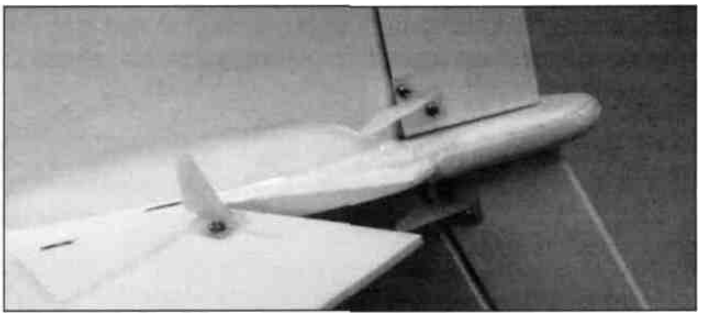


C Insert the hinges and install the control surface Verify the left-right positioning of the control surface, and close up the hinge gap to 1/32" or less It is best to leave a very slight hinge gap, rather than closing it up tight, to help prevent the CA from wicking along the hinge line Make sure the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

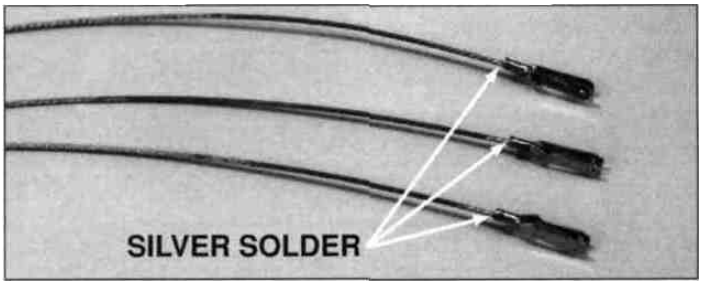


D 4 Apply **6 drops** of thin CA adhesive to **both sides of each hinge on the elevators and rudder only - not the ailerons yet.** Allow a few seconds between drops for the CA to wick into the slot Note that the small "tunnels" you created by drilling the 3/32" holes allow the CA to freely travel in to the entire surface of the hinge, producing an extremely secure bond.

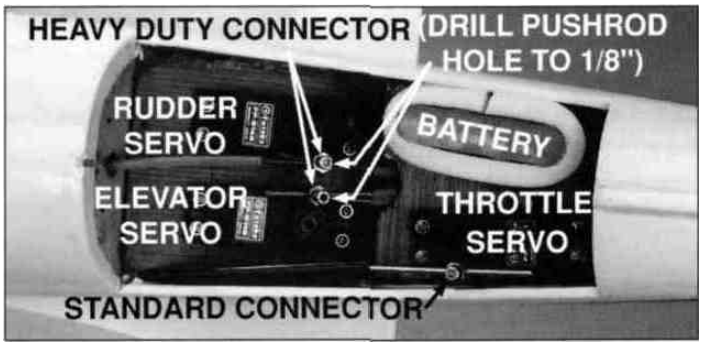
D 5. Pack each of the torque rod holes in the ailerons with 30-minute epoxy (a toothpick works well for this), then install the ailerons with their hinges Repeat the gluing technique described in step 9 and allow the epoxy to cure



D 6 Install the control horns on both elevators and rudder in the location shown on the fuse plan Mark the mounting holes, then drill through the control surface with a 3/32" bit at each mark Apply a couple of drops of thin CA into each hole to strengthen them When the CA has cured, mount all of the horns using 2-56 x 1/2" machine screws



D 7 Cut three pieces of braided cable to 18" long Use silver solder (GPMR8070) to solder a metal clevis to one end of each cable **If installing retracts,** solder an additional metal clevis (not included, GPMQ3810) to one end of a 36" cable This cable will be used for the nose wheel steering. **NOTE:** Because of the acidic nature of the flux, you must thoroughly clean each joint after soldering to avoid destructive corrosion Lightly oil the cable after cleaning



REFER TO THIS PHOTO FOR THE NEXT 6 STEPS

D 8 Drill through the pushrod hole of both heavy **duty** screw lock pushrod connectors with a 1/8" drill bit Install the connectors on the rudder and elevator servo horns but don't install the locking washer until after the control throws are adjusted Install the horns on the servos Install a standard screw-lock pushrod connector on the throttle servo horn. Once again, don't use the locking washer

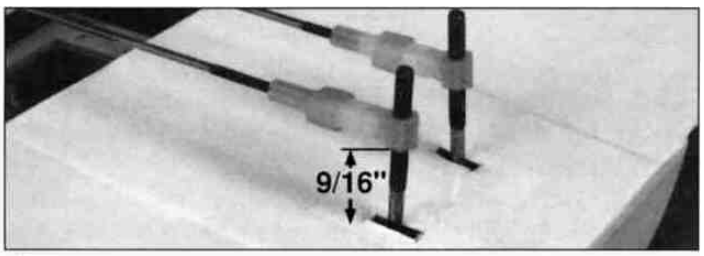
D 9 Slide a silicone clevis retainer onto each clevis, then insert the rudder and elevator cables into their guide tubes from the control surface end Thread them into the connectors on the servos. Both of the elevator cables fit into one hole.

D 10 Insert the nose wheel steering cable into the guide tube from the nose of the model, all the way into the rudder servo connector.

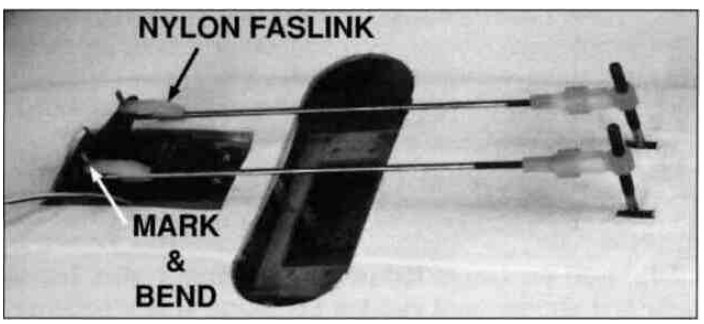
D 11. Screw a 1" threaded insert into one end of the plastic throttle pushrod, then attach a nylon clevis and silicone retainer to the threaded insert Each part must be screwed into position with at least 14 revolutions

D 12. Permanently install the engine mount and engine.

D 13 Insert the throttle pushrod into its guide tube (from the firewall), then connect the clevis to the throttle arm on the engine Cut off the excess pushrod 1" past the exit from the guide tube Screw a 4" threaded wire pushrod into the plastic pushrod 14 turns Pull the pushrod all the way to the rear, then cut off the excess 1/2" short of F-7 Disconnect the clevis at the throttle, then slide the wire pushrod into the connector on the servo horn Reattach the pushrod to the throttle.



D 14 Screw a 12" threaded wire pushrod 14 revolutions into a nylon clevis Snap the clevis into a nylon torque rod horn. Screw the horn onto an aileron torque rod until the bottom of the horn is 9/16" above the surface of the wing Repeat the process for the other pushrod Install a silicone retainer on each clevis after the servo and throws are adjusted.



Refer to this photo for the next three steps.

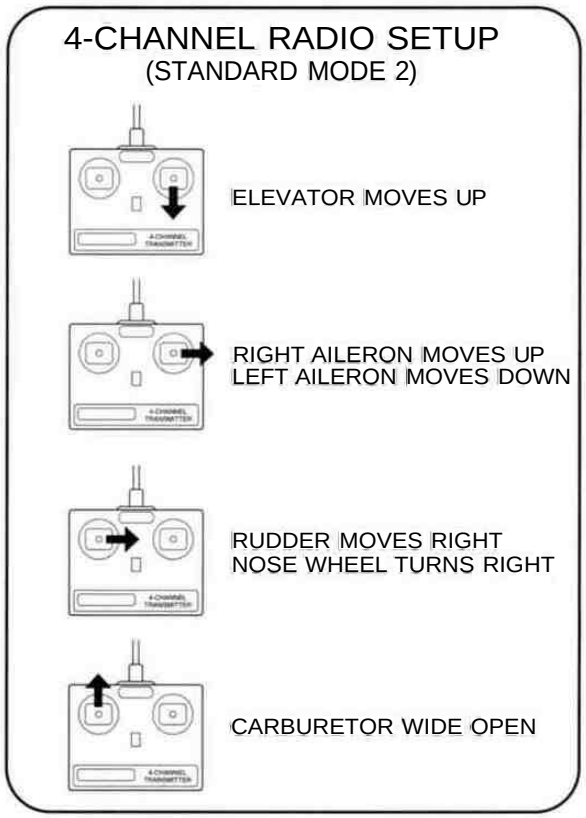
D 15 Install the aileron servo as shown on the plan, using a straight servo horn Center the servo, then with the ailerons set in a neutral position, mark the pushrod wires where they intersect the servo horn holes.

D 16 Enlarge the servo horn holes with a 5/64" drill bit

D 17 Make a 90 degree bend in both pushrod wires where you marked them Cut off the excess wire 3/8" above the bend Insert the pushrod wires into the servo horn, then secure them with nylon Faslinks.

Recommended Control Surface Throws

NOTE: Throws are measured at the **widest part** of the elevator and rudder Make sure the control surfaces move in the proper direction as illustrated below



	High Rates	Low Rates
ELEVATOR:	5/16" up 5/16" **down**	1/4" up 1/4" down
RUDDER:	1" right 1" left	3/4" right 3/4" left
AILERONS:	1/4" up 1/4" down	3/16" up 3/16" down

These control surface "throws" are approximate and provide a good starting point for the first flights with your Learjet You may wish to change the throws slightly to provide the smoothness or quickness that you prefer
NOTE: If your radio does not have 'dual rates," then set up the control surfaces to move at **between** the **high rate and low rate** throws.

IMPORTANT: The balance and surface throws for this aircraft have been extensively tested. We are confident that they represent the settings at which the Learjet flies best. Please set up your aircraft to the specifications listed above. If, after a few flights, you would like to adjust the throws to suit your tastes, that's fine. Too much throw can force the plane into a stall or unexpected maneuver, so remember... "More is not better."

COMPLETE THE MODEL

Install the Fuel Tank

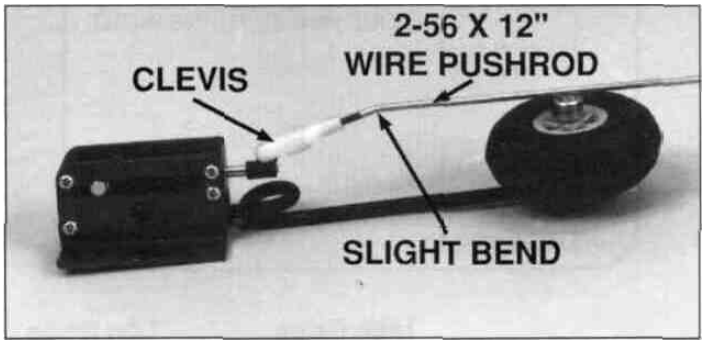
D 1 Assemble and install an **eight ounce** fuel tank according to the manufacturer's instructions.

D 2 Install the tank by placing it on a piece of 1/4" foam rubber on the tank floor, then securing it in position with rubber bands.

D 3 Route the supply and pressure tubes to the engine and muffler pressure tap Be sure there are no kinks in the tubes

Install Retractable Landing Gear

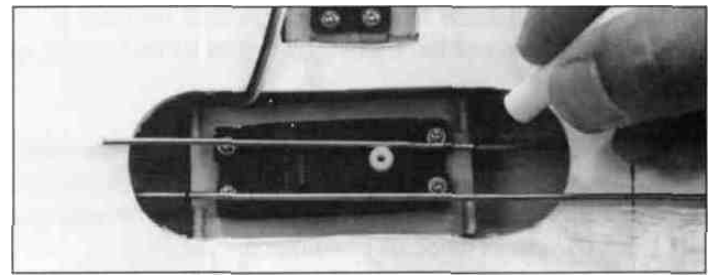
Perform steps 1 thru 7 if installing retracts. Skip this section if installing fixed gear.



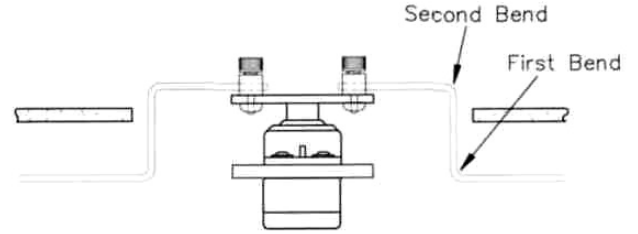
D 1 Assemble the retract pushrods with the materials specified at the front of this manual Temporarily install your retract servo (Futaba 135G low profile servo recommended)

D 2. A large round servo horn with holes drilled 12 5mm from the center is suitable for most retract actuation Install screw-lock pushrod connectors (not included, GPMQ3870 recommended) onto the horn as shown Install the servo horn on the servo, then mount the servo in the wing

D 3 Connect the pushrods to the retracts, then insert the pushrods through the clearance holes toward the servo. Mount the retracts with #4 x 1/2" sheet metal screws (not included).



D 4. Pull the retract pushrods to the stops This will lock the gear in the down position Mark the pushrod about 1/8" **short** of the servo case Make a 90 degree bend in the pushrods, out and away from the surface of the wing.



D 5 Make another bend in each pushrod about 5/16" **above** the first, to point the pushrod ends toward the pushrod connectors on the servo

D 6 Hook up and cycle the retracts a few times to make sure that there is no interference or binding in the linkage Make minor adjustments as required Trim off the excess pushrod wire at the servo once satisfied with the retracts operation **NOTE:** 4-40 set screws should be substituted for the socket head cap screws supplied with the screw-lock pushrod connector.

D 7 Install and hook up the nose wheel retract as you did during construction, then connect the steering cable to the steering arm with a metal clevis.

Install Fixed Landing Gear

D 1 Insert the torque rod portion of the main wire landing gear (the shorter end) into the LG blocks in the bottom of the wings Use the straps and plan as guides, then drill 1/16" pilot holes for the screws Attach the gear legs with two nylon **landing gear straps** and four #2 x 3/8" sheet metal screws per gear.

D 2 Refer to the cross section of the firewall on the plan, then install the nose gear using the supplied 5/32' **wheel collar** and **set screw** and the **nylon steering arm/wheel collar** assembly Install a screw-lock pushrod connector upside down in the last hole of the steering arm securing it with a locking washer Connect the steering arm to the braided wire steering cable and secure it with a 4-40 x 1/8" cap screw

Install the Nacelles & Tip Tanks

D 1. Use 6-minute epoxy to glue the assembled and covered nacelle pylons into the slots you cut earlier. Double check the forward edge distance from F-2 before the epoxy cures - it should be 18-3/8".

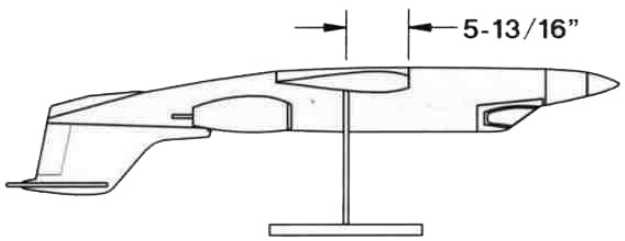
D 2. Use 6-minute epoxy and a #2 x 3/8" sheet metal screw to fasten each nacelle to its pylon. Make sure both nacelles are at the same height.

D 3. Attach the two tip tanks to the wing tips with a 4-40 x 3/4" cap screw.

Balance the Aircraft Fore to Aft

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

D 1. Before balancing, the model must be in "ready to fly" condition with the tip tanks, nacelles, empty fuel tank, wheels, propeller and spinner installed If you haven't already done so, install these components now.



BALANCE YOUR MODEL

D 2. Accurately mark the balance point on the **top** of the wing on both sides of the fuselage The balance point is shown on the plan (CG), and is located **5-13/16" back from the leading edge.** This is the balance point at which your model should balance level for your first flights. Later, you may wish to experiment by shifting the balance up to **3/16" forward or back** to change the flying characteristics Moving the balance **forward** may improve the smoothness and arrow-like tracking, but it may then require more speed for takeoff and make it more difficult to slow down for landing. Moving the balance **aft** makes the model more agile with a lighter and snappier "feel" and often improves knife-edge capabilities In any case, **please start at the location we recommend and do not at any time balance your model outside the recommended range.**

D 3. With the wing attached to the fuselage, all parts of the model installed (ready to fly) and an **empty** fuel tank, hold the model upside down with the stabilizer level.

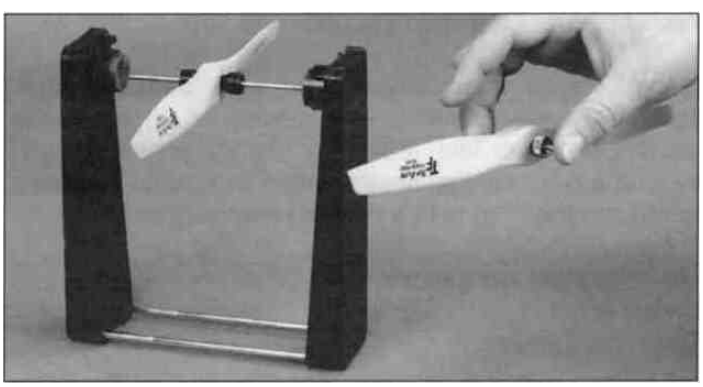
D 4. Lift the model at the balance point. If the tail drops when you lift, the model is "tail heavy" and you must add weight* to the nose to balance If the nose drops, it is "nose heavy" and you must add weight* to the tail to balance. **NOTE:** Nose weight may be easily installed by using a Heavy Spinner Hub or gluing lead weights into the fuel compartment Tail weight may be added by using Great Planes (GPMQ4485) "stick-on" lead weights applied inside the servo compartment.

*If possible, first attempt to balance the model by changing the position of the receiver battery and receiver 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.

THE MAIDEN VOYAGE

Balance the Propeller

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



We use a Power Point Precision **Magnetic Balancer** (TOPQ5700) in the workshop and keep a **Great Planes Fingertip Balancer** (GPMQ5000) in our flight box.

Preflight

D 1 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

D 2 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 are snug, that the hinges are secure, and the prop-nut is on tight

Range Check Your Radio

D 1 Wherever you fly, you need to range check the operation of the radio before the first flight of the day This means with the transmitter antenna collapsed and the receiver and transmitter on, you should be able to walk at least 100 feet away from the model and still have control. Have someone help you Have them stand by your model and, while you work the controls, tell you what the various control surfaces are doing.

D 2 Repeat this test **with the engine running** at various speeds with an assistant holding the model If the control surfaces are not acting correctly at all times, **do not fly!** Find and correct the problem first

Engine Safety Precautions

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

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

Get help from an experienced pilot when learning to operate engines

Use safety glasses when starting or running engines.

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

Keep your face and body (and 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, cigarette lighters, screw drivers) that may fall out of shirt or jacket pockets into the prop.

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

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

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

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

AMA Safety Code

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

General

1 I will not fly my model aircraft in sanctioned events, air shows, or model flying demonstrations until it has been proven to be airworthy by having been previously successfully flight tested

2 I will not fly my model aircraft higher than approximately 400 feet within 3 miles of an airport without notifying the airport operator I will give right of way to, and avoid flying in the proximity of, full scale aircraft Where necessary an observer shall be used to supervise flying to avoid having models fly in the proximity of full scale aircraft.

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

7 I will not fly my model unless it is identified with my name and address or AMA number, on or in the model

9 I will not operate models with pyrotechnics (any device that explodes, burns, or propels a projectile of any kind)

Radio Control

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

2. I will not fly my model aircraft in the presence of spectators until I become a qualified flier, unless assisted by an experienced helper

3. I will perform my initial turn after takeoff away from the pit or spectator areas and I will not thereafter fly over pit or spectator areas, unless beyond my control.

4 I will operate my model using only radio control frequencies currently allowed by the Federal Communications Commission.

FLYING

Find a Safe Place to Fly

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

If a club and its flying site are not available, you need to find a large area with at least 300' of smooth surface for a runway (because of its small wheels the Learjet is not suited for rough grass runways) The flying site should be 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.

The **Learjet** is a great looking semi-scale airplane **and** a great flying sport model Like its full-size counterpart, the Great Planes Learjet is capable of graceful aerobatics It does **not** have the self-recovery characteristics of a primary trainer Therefore, you must either have mastered the basics of R/C flying or obtained the assistance of a competent R/C pilot to help you with your first flights.

Takeoff

Do a low speed taxi test before your first takeoff If the plane does not track straight, adjust the steering linkage **to** correct the problem **Don't adjust the ground steering with the rudder trim!** Although the **Learjet** has good low speed flight characteristics, you should not lift the model into the air until it has built up sufficient air speed, as this will give you a safety margin in case of a "flame-out" As the model rolls down the runway, continue to build up speed and gently apply up elevator Climb out gradually and let it gain some airspeed before hunting for the clouds For safety's sake, always remember to make your first turn **away** from the pit area If you are using retracts, it's wise to leave them extended for your first few laps around the field on a maiden voyage in case of engine failure Once your confidence in the model is satisfied, the gear may be retracted when the model is safely airborne

Flight

We recommend that you take it easy with your **Learjet** for the first several flights and gradually "get acquainted" with its flying characteristics while your engine gets fully broken-in Work on trimming the airplane for straight and level flight with the transmitter trims at neutral, adjusting the clevises or pushrod cables after each flight Also, take note of the responsiveness of the elevator, ailerons and rudder, and adjust their throws to your preference Add and practice one maneuver at a time, learning how it behaves in each one The Learjet is a surprisingly lively model — especially with a "hot" 45 or 46 engine As with any model, high speed dives and abrupt movements that can lead to flutter and structural failure should be avoided

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

Landing is straightforward with no tricky tendencies. Just cut the power to a reliable idle, raise the nose slightly, and the Learjet will naturally bleed off airspeed. Once the Learjet has slowed down, lower the landing gear (if using retracts), then control your descent with power. Upon the final approach, if you find that you must add power, do so **gradually.** Just before touchdown, gradually feed in up elevator to flare the model a few inches above the runway. Plan to land slightly faster than stall speed on the main wheels first, as this is the smoothest way to land your Learjet.

In the event of a "dead stick" landing where you may not make it to the runway, leave the gear retracted (if so equipped) until the last possible moment to help stretch your glide. If you definitely won't make the runway, and no other smooth surface is within range, leave the gear retracted and make a belly landing on the softest surface you can find. It's easier to patch scuffed MonoKote than having to repair damaged landing gear mounts and retract mechanisms.

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

GOOD LUCK AND GREAT FLYING!

SEE THE *FULL LINE OF GREAT PLANES AIRPLANE KITS AND ACCESSORIES AT YOUR HOBBY DEALER.*

2-VIEW DRAWING

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