TOP FLITE BEECHCRAFT BONANZA ADDENDUM

BON9ADD1

Before beginning construction of your Bonanza you should **make** these following corrections:

Fuselage Plan - The correct site of the rudder/fintip block **(BON9S08)** is: 5/8" x 7/8' x 6-1/4'
Page 57, step 7 - Change F2 to F1A
Page 57, step 9 - Change F2 to F1A
Page 58, step 17 - Change "..along the cut lines .." to "..about 1/16" inside the cut lines."
Page 58, step 2 - Change ".. Phillips head .." to ". . Socket Head Cap Screw. ."
Page 60, step 4 - Change 1" x 1-3/4"X2" -3/8'x 1-3/8' x 1-1/2'
Page 62, step 15 - Change Fuselage to "cowl"
Page 64, step (wing)l - Add " as" after the word "such"
Page 68, step 10 -Add sure" after the word "make"
Page 69, control throw chart – Trim mixing section change references to "Down" to "Up"

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

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

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

Top Flite Models
P.O. Box 788
Urbana, IL 61803

Technical Assistance - Call (217) 398-8970

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

TABLE OF CONTENTS

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

Your Beechcraft Bonanza is not a toy, but a sophisticated working model that functions very much like an actual airplane.

Because of its realistic performance, if you do not assemble and operate your Bonanza correctly, you could possibly injure yourself or spectators and damage property.

To make your R/C modeling experience totally enjoyable, get assistance with assembly and your first flights from an experienced, knowledgeable modeler. 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 Academy of Model Aeronautics (AMA), which has more than 2,300 chartered clubs across the United States. We recommend you join the AMA which will insure you at AMA club sites and events. AMA Membership is required at chartered club fields where qualified flight instructors are available.

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

AMA
SINCE 1936

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN 47302
(800) 435-9262
Fax (765) 741-0057

Your Top Flite Gold Edition Beechcraft Bonanza is intended for scale and general sport flying including **mild** aerobatics such as loops, stall turns, rolls, etc. Its structure is designed to withstand such stresses. If you intend to use your Bonanza for more abusive types of flying such as racing, aggressive aerobatics, or flying from rough fields, it is your responsibility to reinforce areas of the model that will be subjected to the resulting unusually high stresses.

INTRODUCTION

Thank you for purchasing the **Top Flite Gold Edition Beechcraft Bonanza.**

From this kit you can build either the V35B V-tail (1970, 1971) or the F33A straight tail (1970, 1971). If you like the looks of the V-tail best, don't be intimidated. Actually, the V-tail is a little easier to build than the straight tail because it has fewer parts! See page 7 for more comments on the differences between the V-tail and the straight tail.

Since this is a scale model with lots of detail, you'll find it takes a little longer to complete than the sport models you've built before. But since this is a Top Flite Gold Edition kit, it isn't more difficult to build than those sport models. The Top Flite Bonanza uses the same materials and standard construction techniques you've already become accustomed to. You won't have to learn anything new to end up with a first class scale model! Not only that, nearly all of the trim schemes you'll find on full size Bonanzas are quite simple and should be easy to duplicate with Top Flite MonoKote film! The Top Flite Beechcraft Bonanza is an excellent Sportsman or Expert Scale subject. Its large size and accurate scale outline afford you the opportunity to go all out with as many extra details as you like. And with the abundance of Bonanzas at airports around the country, finding a full scale plane to model shouldn't be a problem. The option of building either a V-tail or conventional tail opens up the possibilities even more!

Anyone who has mastered a low wing sport model should be able to fly the Bonanza without difficulty. It handles very much like a full size Bonanza–smooth and predictable.

Because of its 81" wingspan, the Top Flite Beechcraft Bonanza is eligible for IMAA* events. In order to be IMAA legal some of the control components and hardware may need to be replaced to conform to Giant Scale rules even though this model does not require heavy duty hookups.

Several scale accessories specially designed for the Top Flite Bonanza are available separately including a full cabin interior, in-cowl exhaust system, and a complete lighting kit. See the Scale Accessories section on page 5 for more information.

*IMAA (International Miniature Aircraft Association) is an organization that promotes non-competitive flying of giant scale models.

IMAA
International Miniature Aircraft Association
205 S. Hilldale Road
Salina, KS 67401

Please inspect all parts carefully before starting to build! If any parts are missing, broken or defective, or if you have any questions about building or flying this model, please call us at (217) 398-8970 and we'll be glad to help. If you are calling for replacement parts, please look up the part numbers and the kit identification number (stamped on the end of the carton) and have them ready when calling.

PRECAUTIONS

1. You must build the plane **according to the plans and instructions.** Do not alter or modify the model, as doing so may result in an unsafe or unflyable model. **In a few cases the plans and instructions may differ slightly from the photos. In those instances you should assume the plans and written instructions are correct.**

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

3. You must use a proper RIC **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 every flight to insure that all equipment is operating, and you must make certain that the model has remained structurally sound. Be sure to check external nylon clevises often and replace them if they show signs of wear.

6. If you are not already an experienced R/C pilot you must **fly** the model **only with the help** of a competent, experienced R/C pilot.

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

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

DECISIONS YOU MUST MAKE

TAIL CONFIGURATION

You may build your Bonanza as a *straight tail* or a *V-tail.* Complete instructions are provided for both. The main differences in construction are building the tail surfaces themselves, the way they mount to the fuse, and the turtle deck sheeting. If you wish to utilize the elevators as *ruddewators* (elevators and rudder) on the V-tail, you will need a computer radio with V-tail mixing or a servo mixer such as the Ace MixMaster (ACEM2510). However, the Bonanza will fly just fine with elevators only and no rudder input. Do not be intimidated by the V-Tail configuration. It flies beautifully and is as easy to handle as the straight tail.

ENGINE SELECTION

Recommended engine size:

.60 to .91 cu. in. **2-stroke** -or- .90 *to* ,120 cu. in. **4-stroke**

The Bonanza will fly **well** with any of the recommended engines. The 4-stroke engines and most *.75* 2-stroke engines will turn a larger prop at lower RPM's. This is often desirable for scale realism. Many .60 2-stroke engines produce about as much horsepower as the popular *.75* or .90 2-stroke engines and will fly the Bonanza well. If you use a .60 2-stroke, a ball bearing, Schnuerle-ported engine is highly recommended. Our prototype Bonanza weighed 13 pounds with all of the options, including flaps, scale cockpit interior and operational lighting, and was flown with a SuperTigre *G-75.* It turned a Top Flite Power Point 12x8 prop at 9,600 RPM. **This engine provided excellent performance and more than enough power, even in gusty winds.** Although larger engines can be used to power this model, the extra horsepower is **not** needed.

The included adjustable engine mount will hold a range of engines from .60 2-stroke through 1.20 4-stroke.

EXHAUST SYSTEM

A Top Flite header and muffler are available that will fit inside your cowl. They are designed for 2-stroke engines mounted horizontally, as used on the model and shown in the instructions.

For part numbers see the accessory list on page 6.

RETRACTABLE LANDING GEAR

You may build the Bonanza either with fixed or retractable landing gear. Of course, fixed gear will be much easier to install than retracts; but we provide detailed instructions on retract installation so you should have no trouble. We chose the Robart #BZA80 retracts because they are specially designed for this model. This landing gear is a special adaptation of the Robart #640 mains and the #631 nose gear. Other systems may work as well but it is up to you to make modifications to fit them into the model.

FLAPS

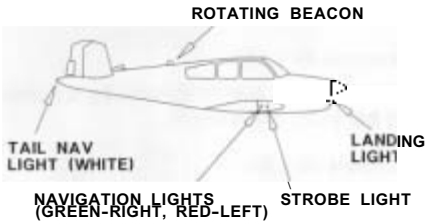
This model was designed to incorporate scale **flaps; however,flaps are optional are not necessary** for an excellent flying experience. Without flaps, the takeoff roll is longer and the landing speed is faster.

The flaps are not difficult to build, but they do require good craftsmanship to fit well. Flaps add nicely to the model's flight characteristics and scale appearance while causing no bad effects. Only slight trim correction is needed when they are used with the recommended throws. They are a highly recommended *fun option* for those who wish to install them. More information on the use of the flaps may be found in the "Flying" section.

For part numbers see the accessory list on page 5.

TOP FLITE SCALE ACCESSORIES

Operational lighting



An operational lighting system (TOPQ7912) has been developed specially for the Top Flite Bonanza and was installed in our prototypes. Guidelines are provided in this manual for building the wiring into the wing and building brackets to hold the wing tip and tail navigation lights. You can install the lights in the fuse at any time. The instructions included with the lighting kit provide information on how to hook everything up. The lighting kit includes one rotating beacon for the top of the fuselage, one landing light for the front of the cowl, and three navigation or *position* lights for the wing tips and tail cone (green in the right wing tip, red in the left wing tip, and white in the tail cone). If you would like to add the strobe lights in the wing tips, order RAM #RAM01 (RAMQ2301) and purchase additional clear lenses directly from RAM.

Scale cockpit interior

Your model won't be complete without the Top Flite Beechcraft Bonanza Scale Cabin Interior (TOPQ8402). It includes the floor, side panels, full instrument panel and six seats! You can install the Cabin Interior at any time because the cabin top is removable but it's easiest to build the cockpit into the model while it's under construction. The servos and pushrods are located so the Cabin Interior can be installed without any modification.

NOTES FOR COMPETITION MINDED MODELERS

We designed our model from Beechcraft's own 1969 3-view drawings and from measurements taken from a V35B at a local airport. The model scale is 15.

If you plan to enter your Bonanza in scale competition (it's lots of fun, and the runways are almost always paved!), this kit qualifies for **Fun Scale** and the *Sportsman* and *Expert* classes in **Sport Scale.** Fun Scale and Sport Scale have the same flight requirements where you must perform ten maneuvers of which five are mandatory. If you have never competed in a scale contest, you could start out in Fun Scale. In Fun Scale, the only documentation you need for static judging is any proof that a full size aircraft of this type, in the painffmarkings scheme on your model, did exist. **A** single photo, kit box cover, even a painting is sufficient proof! If you're interested, contact the AMA for a rule book which will tell you everything you need to know. Look in the back of the AMA magazine *Model Aviation* for a schedule of events.

The trim scheme of the Bonanza on your kit box was *inspired* by several trim schemes and is not taken from one particular plane. If you are not too concerned with an exact scale trim scheme you can duplicate the one on the kit box, make a variation of the one on the box, or design your own trim scheme. If you are going to compete in scale competition use the photos in your documentation package as a guide for your trim scheme.

DOCUMENTATION

three view drawings and photo packs of full size Beechcraft Bonanzas are available from:

Scale Model Research,
3114 Yukon Ave, Costa Mesa, CA 92626
(714) 979-8058

OTHER ITEMS REQUIRED

Accessories

These are additional items you will need to complete your Bonanza that are *not included* with your kit. Order numbers are in parentheses (GPMQ4130). Our exclusive brand is listed where possible: **TOP** is the Top Flite brand, **GPM** is the Great Planes brand, and **HCA** is the Hobbico brand.

- ❑ 4- to 6-channel radio with 6 to 9 servos
- ❑ (2) 24" extension for ailerons
- ❑ (2) 12" extension for elevator and rudder servo
- ❑ (1) " Y Harness for ailerons
- ❑ 3-1/2" Main Wheels (ROBQI516)
- ❑ 2-3" Nose Wheel (ROBQI513)
- ❑ (6) 3/16 Wheel Collars (GPMQ4309)
- ❑ 14 oz. Fuel Tank (GPMQ4106)
- ❑ 2-3/4" White Spinner (GPMQ4525)
- ❑ 36" Medium Silicone Fuel Tubing (GPMQ4131)
- ❑ 1/2 R/C Foam Rubber Padding (HCAQ1050)
- ❑ 1/5 Scale Pilot Figures (WBRQ2485)
- ❑ Fuel Filler Valve (GPMQ4160)
- ❑ Exhaust Deflector (HCAP2175)
- ❑ 3-4 rolls Top Flite Super MonoKote covering, see *Finishing* on page 64
- ❑ Paint, see *Finishing* on page 64
- ❑ Propellers, *see* the engine instructions

Items for V-tail with elevator only:

- ❑ (1) " Y Harness for elevator servos (if building V-tail with elevator only)

For Flaps, the following additional items will be required:

- ❑ (1) " Y Harness

OR

- ❑ (2) 9" Servo Extensions
- ❑ (1) Dual Servo Extension

- ❑ Robart #309 Super Hinge Points (ROBQ2509)
- ❑ Two standard servos

For an In Cowl Muffler setup, the following items will be required:

- ❑ O.S.61SF & FX Top Flite Header (TOPQ7920)
- ❑ SuperTigre .61-.90K Top Flite Header (TOPQ7925)
- ❑ SuperTigre .75-.90G Top Flite Header (TOPQ7926)
- ❑ **.61-.75 Bonanza In Cowl Muffler** (TOPQ7917)

BUILDING SUPPLIES

Here's a checklist of supplies you should have on hand while you're building. *We recommend* ***Great Planes Pro CA*** *and Epoxy.*

Glue/Filler

- ❑ 4 oz. Thin CA (GPMR6003)
- ❑ 4 oz. Medium CA+ (GPMR6009)
- ❑ 2 oz. Thick CA- (GPMR6015)
- ❑ CA Accelerator (GPMR6035)
- ❑ CA Debonder (GMPR6039)
- ❑ CA Applicator Tips (HCAR3780)
- ❑ 30-minute epoxy (GPMR6047)
- ❑ 6-minute epoxy (GPMR6045)
- ❑ Pro Wood Glue (GPMR6161)
- ❑ J & Z Products *Z RC/56* canopy glue (JOZR5007)
- ❑ Microballoons (TOPR1090)
- ❑ Milled Fiberglass (GPMR6165)
- ❑ Lightweight Hobby Filler (Balsa Color, HCAR3401)
- ❑ Auto body filler (Bondo@r similar)
- ❑ 3M #75 Spray Adhesive (MMMR1900)
- ❑ Denatured or Isopropyl Alcohol

Tools

- ❑ #11 Blades (HCAR0311, 100 qty.)
- ❑ Single Edge Razor Blades (HCARO312, 100 qty.)
- ❑ Razor Plane (MASRI510)
- ❑ X-Acto@Building Square (XACR7726)
- ❑ X-Act0 Building Triangle (XACR7725)
- ❑ T-Pins (HCAR5100 - small, HCAR5150 - medium, HCAR5200 - large)

Drill Bits:

- ❑ 1/16"
- ❑ 3/32"
- ❑ 1/8
- ❑ 5/32"
- ❑ 3/16"
- ❑ 1/4
- ❑ 17/64"
- ❑ 9/32"
- ❑ 5/16"
- ❑ 9/64" or #29
- ❑ 11/64" or #10
- ❑ 13/64" or #7

Tools (Cont.)

- ❑ 1/4-20 Tap and drill set (GPMR8105)

8-32 Tap and drill set (GPMR8103)

- ❑ Kyosho" *LexarP* Curved Scissors (KYORI010)
- ❑ Long handle 9/64 ball driver (GPMR8004)
- ❑ Long handle 3/32" ball driver (GPMR8002)
- ❑ Silver Solder (GPMR8070 w/flux)
- ❑ Masking Tape
- ❑ Wax Paper
- ❑ Easy-Touch'" Bar Sanders*
- ❑ Heat Gun (TOPR2000)
- ❑ Trim Seal Tool (TOPR2200)
- ❑ Hot Sock (TOPR2175)
- ❑ Sealing Iron (TOPR2100)

EASY-TOUCH™ HAND SANDER

*A flat, durable, easy to handle sanding tool is a necessity for building a well finished model. Great Planes makes a complete range of **Easy-Touch Bar Sanders** (patent pending) and replaceable **Easy-Touch adhesive-backed sandpaper.** While building the Bonanza we used two 5-1/2" Bar Sanders and two 11" Bar Sanders equipped with 80-grit and 150-grit adhesive-backed sandpaper.

Here's the complete list of Easy-Touch Bar Sanders and adhesive backed sandpaper:

5-1/2 Bar Sander	(GPMR6169)
11" Bar Sander	(GPMR6170)
22" Bar Sander	(GPMR6172)

12' roll of Adhesive-backed sandpaper

80-grit	(GPMR6180)
150-grit	(GPMR6183)
220-grit	(GPMR6185)

Assortment pack of 5-1/2 strips (GPMR6189)

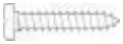
We also use 3M 320-grit or 400-grit wet-or-dry sandpaper for finish sanding.

IMPORTANT BUILDING NOTES

There are two types of screws used i\n this kit:

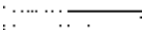
Sheet metal screws are designated by a number and a length.

For example #4 x 5/8":



Machine screws are designated by a number, **threads per inch,** and a length.

For example 4-40 x 3/4":



- When you see the term *test fit* in the instructions, it means that you should first position the part on the assembly **without using any glue,** then slightly modify or *custom fit* the part as necessary for the best fit.
- Whenever the term ***glue*** is used this means you should rely upon your experience to decide what type of glue to use. When a specific type of adhesive works best for that step we will tell you what type of glue to use.
- Whenever just ***epoxy*** is specified you may use ***either*** 30-minute epoxy ***or*** 6-minute epoxy. When 30-minute epoxy is **specified** it is **highly recommended** that you use only 30-minute epoxy because you will need the working time and/or the additional strength.
- Occasionally we refer to the *top* or *bottom* of the model or *up* or *down.* To avoid confusion, the *top* or *bottom* of the model is as it would be when the airplane is right side up and will be referred to as the top even if the model is upside down during that step, *i.e.* the top main spar is always the top main spar even if the wing is upside down when you are working on it. Similarly, *move the former up* means move the former toward the top of the fuselage even if the fuselage is upside down when you are working on it.
- **Incidence and Thrust Angles:** The incidence angles and down thrust angles shown on the fuselage side view are in reference to the stepped main fuselage stringer (the 1/4" x 3/8" x 36" stepped stringer), which is set at 0". The right thrust shown on the bottom view is in reference to the centerline of the fuselage. Remember, this is

the **bottom view** so right thrust is viewed as an offset to the left from the bottom.

- When you get to each step, read that step **completely through to the end** before you begin. Frequently there is important information or a note at the end of the step that you need to know before you start.
- **Photos** and **sketches** are placed **ahead** of the step they refer to. Frequently you can study photos in following steps to get another view of the same parts.

COMMON ABBREVIATIONS USED IN THIS BOOK AND ON THE PLANS:

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

TYPES OF WOOD:

Balsa **Basswood** **Plywood**

INCHES X 25.4 = MM (CONVERSION FACTOR)

1/64" = .4mm	3/4" = 19.0 mm
1/32" = .8 mm	1" = 25.4 mm
1/16 = 1.6rnm	2" = 50.8 mm
3/32" = 2.4 mm	3" = 76.2 mm
118" = 3.2 mm	6 = 152.4 mm
5/32" = 4.0 mm	12" = 304.8 mm
3/16 = 4.8 mm	1 8 = 457.2 mm
114" = 6.4 mm	21" = 533.4 mm
3/8 = 9.5rnm	24" = 609.6 mm
1/2" = 12.7rnm	30" = 762.0 mm
5/8 = 15.9 mm	36" = 914.4 mm

NOTES FROM THE DESIGNER

Scale Accuracy: The Bonanza was designed using three view drawings from Beechcraft dated 1969. In addition, measurements of all aircraft components were taken from a V35B Bonanza at a local airport.

Wing Design: The TF Bonanza was designed with an "I-Beam" type of wing spar rather than the more traditional "D-Tube" type construction. Actually, the design could be called an "I-Tube". This simplifies construction and is approximately 50% stronger than D-Tube designs. The wing was designed with an absolute minimum number of seams that must be sanded on the finished wing. The result is a very smooth wing.

Flaps: Flaps on the full scale aircraft allow steeper approaches and slower landing speeds. They do exactly the same on this model. The improvement in performance is well worth the effort.

Landing Gear: If you are installing fixed gear you will note that the strut extends out from the center of the groved rail instead of the end. This allows landing stresses to be distributed across three ply reinforced ribs, rather than being concentrated at the end of the rail. If you plan to install retractable landing gear, I highly recommend the Robart units especially designed for the Bonanza. They are very robust and include shock absorbing struts. One of our prototype models was built with Robart #606HD mains and a #607 nose unit. Though adequate, they required a lot of maintenance and occasional repair. Gear doors would look great on this model but you will have to do some modifications if you want to install then. The mounting rails are designed to minimize damage in the event of hard landings or contact with obstacles.

Fuselage Design: The fuselage design is fairly conventional. The cabin top is a LARGE ABS piece and it drove many of the other design elements - such as how to get it into the box! But it does simplify construction and looks great. It is designed to be removable but if you are not concerned with access to the fuel tank and cabin interior it can be permanently glued in place, allowing the seams to be filled in. We found that if you choose your trim design carefully, the seams are pretty well hidden.

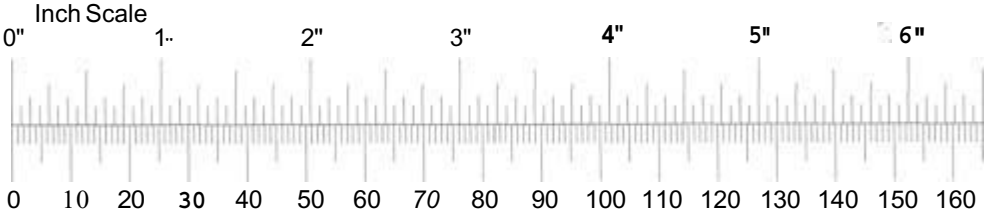
The cabin area is reinforced with 1/8 lite ply. While it is more than strong enough, I would recommend that you reinforce the area with some basswood rails along the bottom of formers F2, F4 and F6 across the width of the fuselage. We have included ample extra 1/4" x 3/8" basswood material for this purpose.

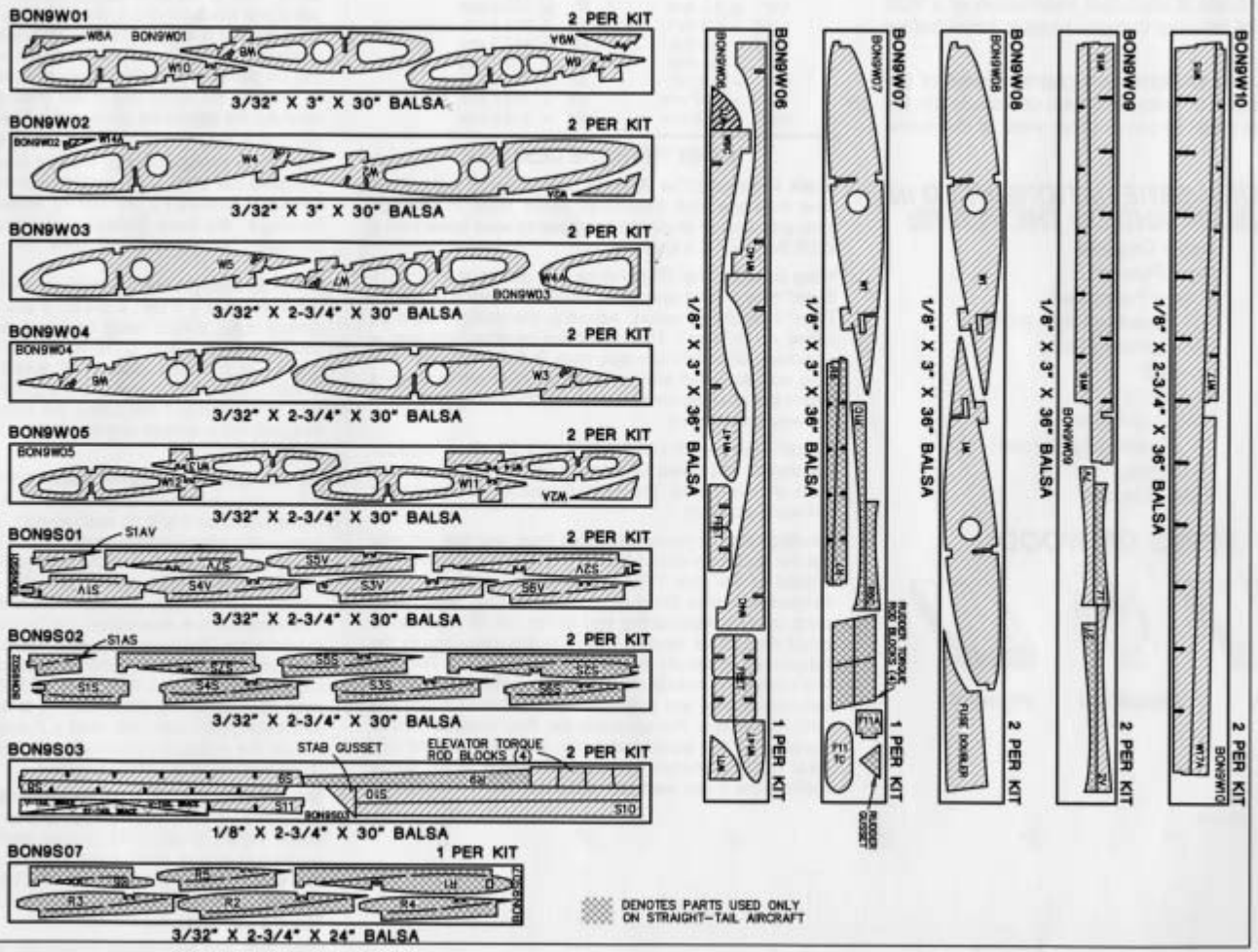
V-Tail vs straight tail: I personally feel that a Bonanza is not a Bonanza if it isn't a V-Tail. If you are intimidated by rumors about V-Tails being hard to build or difficult to fly, you shouldn't be. The V-Tail is easier to build and just as easy to fly. I, **on the other hand, was intimidated by the V-Tail!** Just kidding. It was designing the model to be either a V-Tail or straight tail, using the same basic mounting structure and pushrods and showing it all on the plans that I found intimidating.

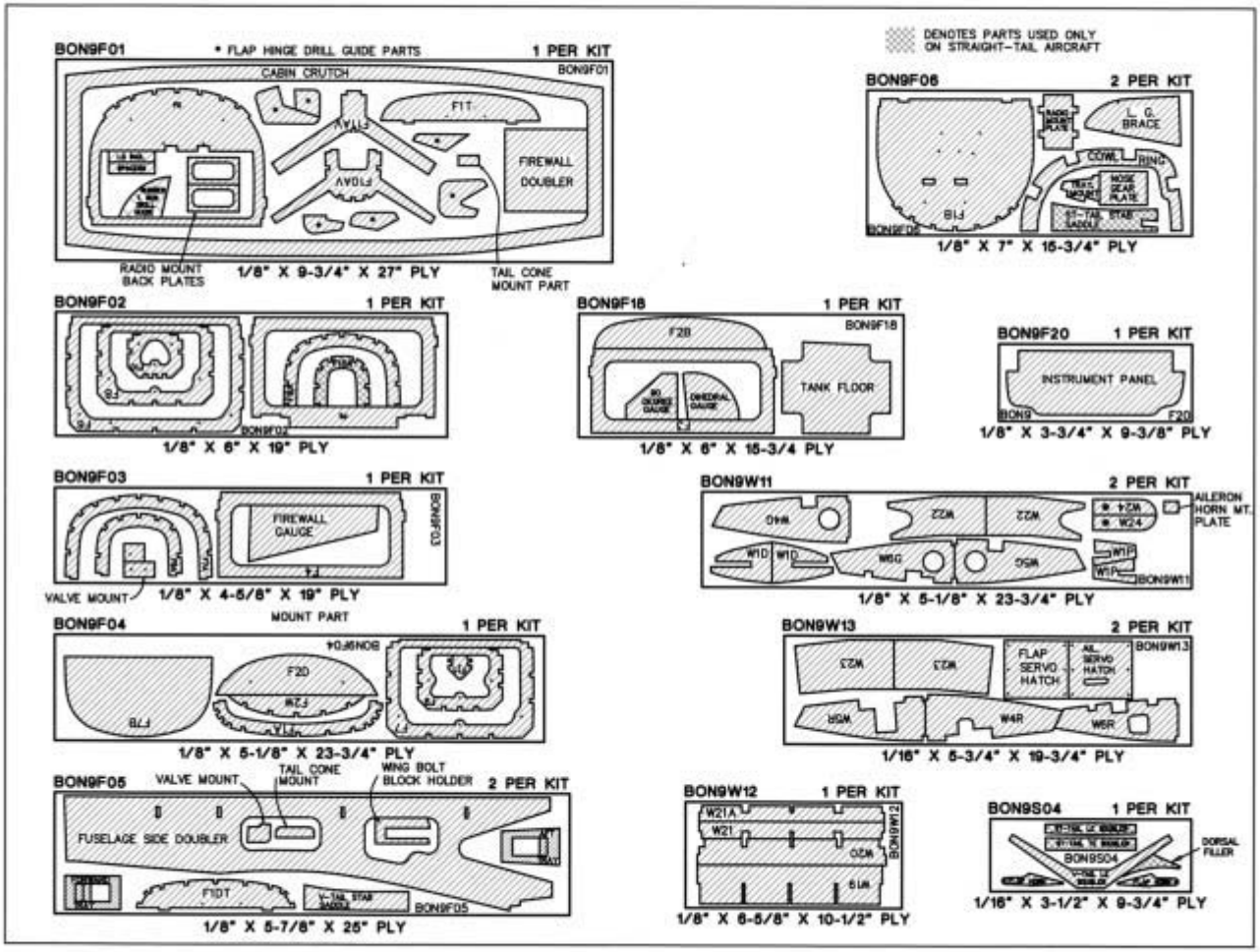
Do You Need a Computer Radio? NO!! A computer radio will simplify radio installation and allow full utilization of the ruddervators but it is in no way required. Simply connect the ruddervator servos together with a Y-cable and use them as elevators. Or use one of the many mixers available to obtain V-Tail mixing. Incidentally, this model duplicates virtually all of the flight characteristics of the full size aircraft. The rudders are somewhat ineffective and it has the characteristic Bonanza tail wiggle. The full size aircraft has differential throw when rudder is applied - the ruddervator having more up throw than down. This compensates for a nose down tendency otherwise. Try to duplicate this if you use a computer radio. We used a Futaba radio and did get the required compensation as you will note in the recommended control throws section.

Will It Really Fly On a .60 Size Engine? YES!! And very scale like as well. Our test flying was done with a new Super Tigre .75 with a TF in-cowl muffler. It was during winter and it was cold so we weren't able to dial in the engine very well. It was turning a TF 12-8 Power Point prop at 9,600 RPM and we never felt a need for more power. It flew in a very scale like manner.

Good luck and good flying. I hope you enjoy building and flying your Bonanza as much as I did designing it.




BON9W01
2 PER KIT
3/32" X 3" X 30" BALSA
BON9W02
2 PER KIT
3/32" X 3" X 30" BALSA
BON9W03
2 PER KIT
3/32" X 2-3/4" X 30" BALSA
BON9W04
2 PER KIT
3/32" X 2-3/4" X 30" BALSA
BON9W05
2 PER KIT
3/32" X 2-3/4" X 30" BALSA
BON9S01
S1AV
2 PER KIT
3/32" X 2-3/4" X 30" BALSA
BON9S02
S1AS
2 PER KIT
3/32" X 2-3/4" X 30" BALSA
BON9S03
STAB GUSSET
ELEVATOR TORQUE ROD BLOCKS (4)
2 PER KIT
1/8" X 2-3/4" X 30" BALSA
BON9S07
1 PER KIT
3/32" X 2-3/4" X 24" BALSA
BON9W06
1 PER KIT
1/8" X 3" X 36" BALSA
BON9W07
1 PER KIT
1/8" X 3" X 36" BALSA
RUDDER TORQUE ROD BLOCKS (4)
RUDDER GUSSET
BON9W08
2 PER KIT
1/8" X 3" X 36" BALSA
FUSE DOUBLER
BON9W09
2 PER KIT
1/8" X 3" X 36" BALSA
BON9W10
2 PER KIT
1/8" X 2-3/4" X 36" BALSA
DENOTES PARTS USED ONLY ON STRAIGHT-TAIL AIRCRAFT

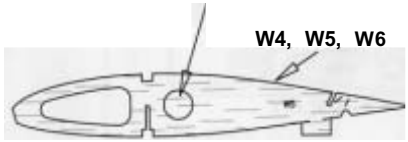

BON9F01
* FLAP HINGE DRILL GUIDE PARTS
1 PER KIT
CABIN CRUTCH
BON9F01
F1T
F1AV
F1OAV
FIREWALL DOUBLER
RADIO MOUNT BACK PLATES
1/8" X 9-3/4" X 27" PLY
TAIL CONE MOUNT PART
DENOTES PARTS USED ONLY ON STRAIGHT-TAIL AIRCRAFT
BON9F06
2 PER KIT
L.G. BRACE
COWL RING
NOSE GEAR PLATE
F1B
1/8" X 7" X 15-3/4" PLY
BON9F02
1 PER KIT
F2B
F2T
1/8" X 6" X 19" PLY
BON9F18
1 PER KIT
F2B
BON9F18
TANK FLOOR
1/8" X 6" X 15-3/4 PLY
BON9F20
1 PER KIT
INSTRUMENT PANEL
BON9
F20
1/8" X 3-3/4" X 9-3/8" PLY
BON9F03
1 PER KIT
FIREWALL GAUGE
BON9F03
VALVE MOUNT
1/8" X 4-5/8" X 19" PLY
BON9W11
2 PER KIT
AILERON HORN MT. PLATE
W4O
W2Z
W1D
W5G
W5O
W1P
BON9W11
1/8" X 5-1/8" X 23-3/4" PLY
BON9F04
MOUNT PART
1 PER KIT
BON9F04
F2D
F2M
F1B
1/8" X 5-1/8" X 23-3/4" PLY
BON9W13
2 PER KIT
W2J
FLAP SERVO HATCH
AIL. SERVO HATCH
BON9W13
W5R
W4R
1/16" X 5-3/4" X 19-3/4" PLY
BON9F05
VALVE MOUNT
TAIL CONE MOUNT
WING BOLT BLOCK HOLDER
2 PER KIT
FUSELAGE SIDE DOUBLER
F1DT
BON9F05
1/8" X 5-7/8" X 25" PLY
BON9W12
1 PER KIT
W21A
W21
W2O
W1S
BON9W12
1/8" X 6-5/8" X 10-1/2" PLY
BON9S04
1 PER KIT
BON9S04
DORSAL FILLER
1/16" X 3-1/2" X 9-3/4" PLY

GET READY TO BUILD

❑ 1. Unroll the plan sheets, then roll them inside out so they lie flat.

❑ 2. Remove all the parts from the box. Use a ballpoint pen (not a felt-tip pen) to lightly write the **name** or **size** on each piece so you can identify it later. Use the ***die-cut patterns*** on pages ***8*** & 9 to identify and mark the die-cut parts **before** you remove them from their die-cut sheets. Many of the parts already have numbers stamped on them, but in some cases the number is located alongside the parts. You may remove all the die-cut parts from their die sheets now or wait until you need them. If a part is difficult to remove, don't force it out but cut around it with a #11 blade. After you remove the parts from their die sheets, lightly sand the edges to remove slivers or die-cutting irregularities. **Save some of the larger scraps of wood.**

DO NOT PUNCH OUT THE ROUND LIGHTENING HOLE



Note: If you are going to install retracts, don't punch out the round *lightening hole* in the die-cut 3/32" balsa **wing ribs W4, W5 and W6.** Instead, apply thin CA around the lightening hole to glue it in place.

❑ 3. Separate the parts into groups such as **stab, fin, wing** and **fuse.**

HOT TIP

Store smaller parts in zipper-top food storage bags.

BUILD THE TAIL SURFACES

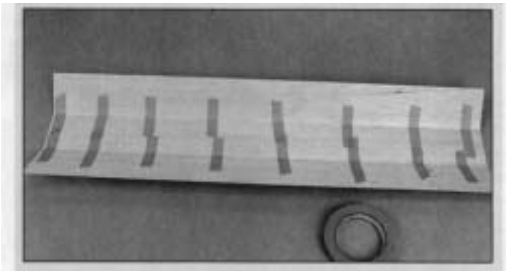
Make the skins for the tail surfaces

❑ 1. See the **Hot Tip** that follows and use six 1/16" x 3" x 30" balsa sheets to make two 1/16" x 9" x 30" **stab skin *planks.*** If you're building the straight-tail, make a third *plank* for the **finlrudder skin** from three more 1/16" x 3" x 30" balsa sheets. *Hey, if you're building the V-tail it looks as if you are going to have three sheets of 1/16" balsa leftover!*

HOT TIP

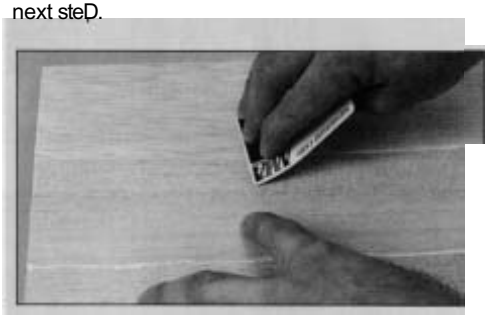
HOW TO MAKE THE SKINS

A. Use a straightedge and a sharp #11 blade to true the joining edges of the sheets. When you trim them, do not cut all the way through the first time but make *several passes* so you ***slice*** the wood instead of splitting it.

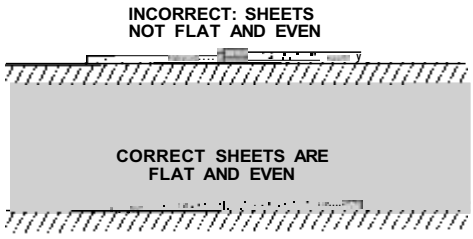


B. Tightly tape the sheets together with masking tape placed about every **4"** along the seams. The sheets will not lay flat because they are tightly taped together.

C. Place wax paper on your workbench. Flip the sheets over and apply a bead of aliphatic resin *(wood workers glue* such as Great Planes Pro™) between the seams. Immediately proceed to the next steD.



D. Use a credit card or thin peice of plywood to squeegee the excess glue from the seam. Wipe the glue off your squeegee with a paper towel or a stick of wood. Immediately proceed to the next step.



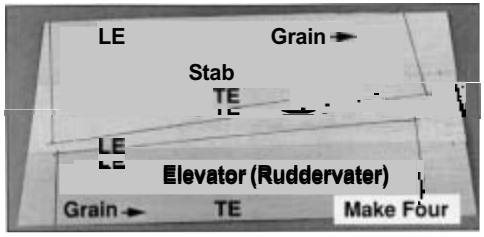
E. Press the joining edges of the sheets down with your fingers so they are flat and even. Place weights on top of the sheets to hold them flat.

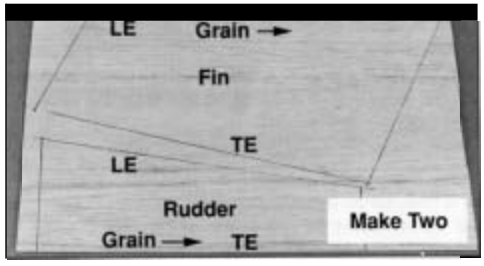
F. Squeegee the glue, press the seams flat, and place weights along the other glue joint. Let the glue dry.

G. Use the same procedure to make the wing skins when you build the wing.

❑ 2. After the glue is dry, peel off the masking tape and decide which side of the planks will be the outside. Use a bar sander or a large, flat sanding block and 150-grit sandpaper to sand the planks so they are flat, even and smooth. The idea is to do the sanding ***before*** you glue the skins to the structure.

❑ 3. Cut the 9" x 30" sheets in half, making four (or six for the straight tail) 9" x 15" planks.





❑ 4. Cut the **stab and elevator skin templates** from the plan. Use a straightedge and a ballpoint pen to mark their outline onto the 9" x 15" planks (do not use a felt-tip pen). The templates are slightly oversize to allow for slight variances in construction. Note the **grain direction.** Cut the **stab and elevator skins** from the planks. If you're building the straight tail do the same for the fin and rudder skin. **Note:** The template shown on the plans for the elevator (ruddervator) is larger than needed. You will need to trim this to the correct size when you fit the skin into place.

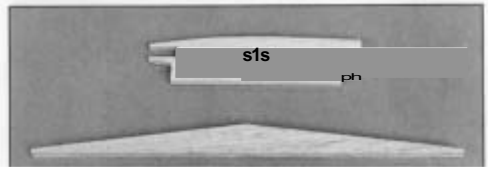
Beech Fact: Let's get it straight. All Bonanza 35's (that's A through V including the very first Bonanza–the ***35*** are V-tails. Models 33 through 33C are *Debonairs* (more on the *Debonair* in a later ***Beech Fact).*** Models 33E through G are straight tail Bonanzas, as well as the very last Bonanzas produced: the 36 and A36. But **it's** not that simple. The designations didn't necessarily proceed from A, to B, to C, etc. There were variations of some of the models such as the V35, V35TC. V35A, V35A-TC and so on. Or, the F33, F33A and F33C. But, the *number designation rule* still applies. Now you can really impress your friends!

If you're building the V-tail, skip to *"Build the stabilizer and ruddervators"* on page 17.

BUILD THE STABILIZER AND ELEVATORS

Build the right and left stab halves simultaneously. The left half of the stab plan shows the straight tail stab with dashed lines indicating the V-tail stab. The right half of the stab plan shows the V-tail stab with dotted lines indicating the straight tail stab.

❑ STI. Position the plan so the stab is over your flat building board (or cut the stab from the wing plan) and tape it down and cover it with wax paper.



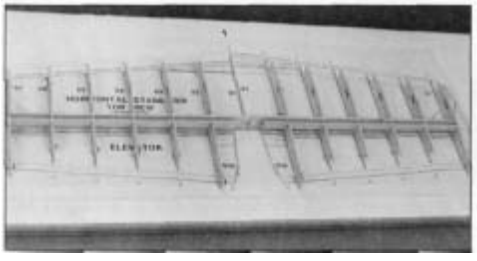
❑ ST2. Glue both die-cut *118"* balsa **straight tail LE braces** together and both die-cut 3/32" balsa **S1S ribs** together.

❑ ST3. Test fit the die-cut 3/32" balsa **stab ribs S2S** through **S7S** in the notches of both die-cut 1/8" balsa **stab TE spars** Place both assemblies over the plan and add the LE brace. See the photo at step ST4.

❑ ST4. Use a small square to align the stab TE spar at rib S2S over the plan. Pin rib S2S over its location on the plan with a T-pin about 1/4" in front of the TE spar.

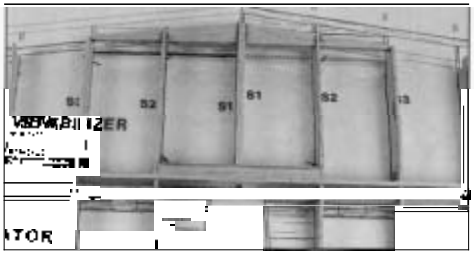
❑ ST5. Use the same method to align the TE spar and pin the rest of the ribs on both sides of the stab to your building board over the plan.

❑ ST6. Pin the fronts of the ribs to your building board over the plan.



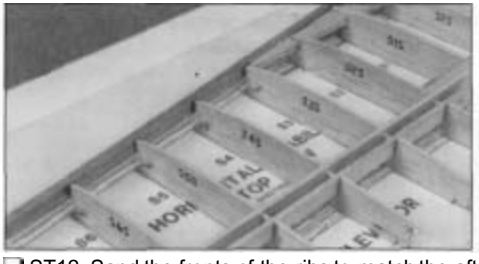
❑ ST7 Add botn d e-cut 1 8" balsa **elevator LE spars (S8)** to the assembly.

❑ ST8. Make sure all the jig tabs of all the ribs are contacting your building board. Glue the stab TE spar and elevator LE spar to the ribs with medium CA. Don't use large amounts of CA or build up fillets of glue. Later we will instruct you to reinforce glue joints that don't look strong.

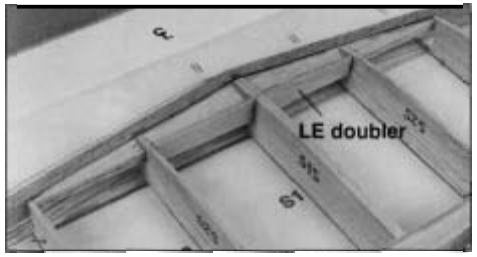


❑ ST10. Glue the die-cut 1/16 plywood **straight tail TE doubler** to **the front** of the TE brace (it's the one with straight edges).

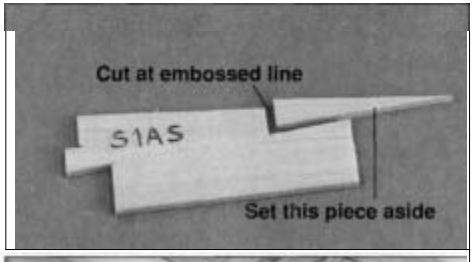
❑ STI1. Add the center rib S1S and glue it into position.

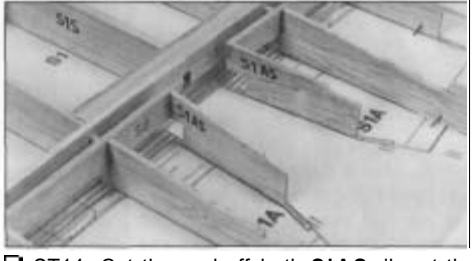


❑ ST12. Sand the fronts of the ribs to match the aft sweep of the leading edge. Cut two shaped 5/16" x 15" balsa **stab/fin leading edges** to a length of 13-314" and bevel the joining ends to match the plan. Glue them to the ribs and the LE joiner so the **top** is **even** with the **top** of the ribs. The bottom will extend below the ribs but will be sanded flush later.



❑ ST13. Cut a 1/16 notch in center rib S1S behind the LE brace. Test fit the die-cut 1/16" plywood **straight tail LE doubler** in the notch. Deepen the notch as necessary so the top of the doubler is even with the top of rib **SIS.** Glue the doubler to the LE brace and glue rib S1S to the doubler.





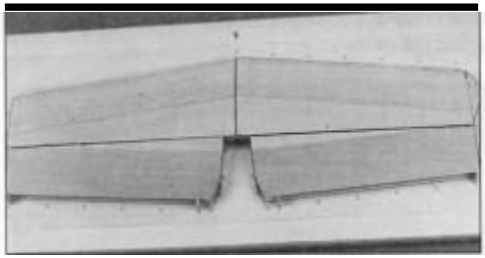
❑ ST14. Cut the end off both **SIAS** ribs at the embossed line and set those little pieces aside. They will be used later to glue the aft end of S1AS into position. Fit the to the elevator LE spars, pin them to the plan, and then glue them to the elevator LE spars.

❑ ST15. Sand the top of the leading edges, stab and elevator spars, and the TE brace so they match the contour of the ribs. Do not change the shape of the airfoil by sanding too much.

❑ ST16. **THIS STEP IS VERY IMPORTANT!** Arrange the T-pins so **every other rib** is held down with one pin near the front and one pin near the rear and make sure all the pins go into the jig tabs **at the same angle.** This will allow you to *finagle* the stab off your building board by lifting it up and to one side after the top sheeting is glued in place (the T-pins are concealed).

❑ ST17. Use your favorite method to glue the stab skin to the stab. We recommend using aliphatic resin to glue the skin to the ribs and TE spar, and CA for only the leading edge. Apply glue to the stab structure. Working quickly, position the stab skin and hold the leading edge down until the CA hardens. When the CA is hardened, wet the front of the skin with a 50/50 mix of alcohol and water and press it to the rest of the frame, holding it down with weights until the glue dries.

Note: If you choose to use CA for the entire job, be aware that residual accelerator you may have used earlier can make the CA you use for this step cure quickly. You'll have to work rapidly.

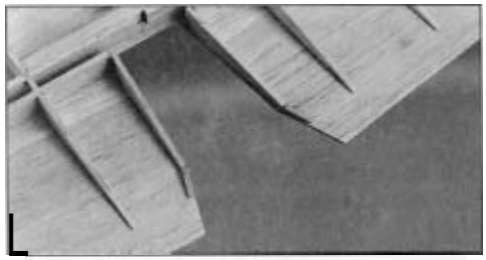


❑ ST18. Glue the elevator skin to the elevator. You can use CA for this step since the skin is small and easy to position. Make sure the trailing edge contacts the *stoppers* on the top of the jig tabs on ribs S7S and S2S.

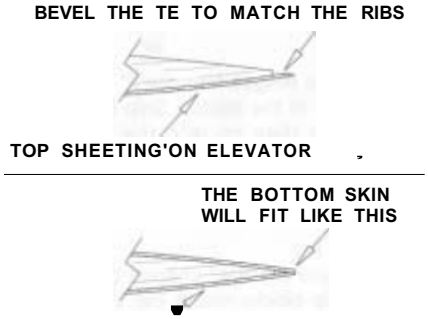
❑ ST19. After the glue has thoroughly dried, remove all the T-pins you can reach. **Carefully** lift the stab (with the elevators) from your building board. Trim the jig tabs from the ribs and take out the rest of the T-pins.

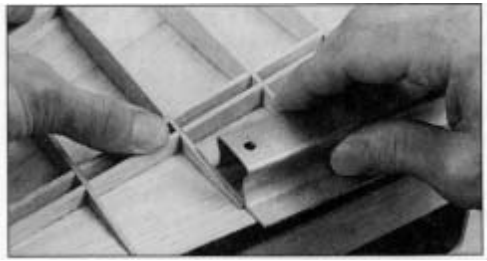
❑ ST20. Use a razor plane or a #1 1 blade to trim the **bottom** of the LE so it is the same size as the front of the ribs and matches the airfoil shape.

❑ ST21. Sand the bottoms of the ribs, leading edges, stab spars, elevator spars and the TE brace so they smoothly blend.



❑ ST22. Glue the little tips you cut off the end of the S1AS ribs to the sheeting and S1AS.





❑ ST23. Use a bar sander and 150-grit sandpaper to bevel the trailing edge of the top elevator skin so it will accommodate the bottom skin. While you sand, apply pressure only to the sheeting and use the ribs to set your sander at the correct angle. Do not bevel the trailing edge to a *sharp edge* but leave about 1/32" *squared off.* **Hint:** Support the TE with the edge of your workbench or a platform while you sand.

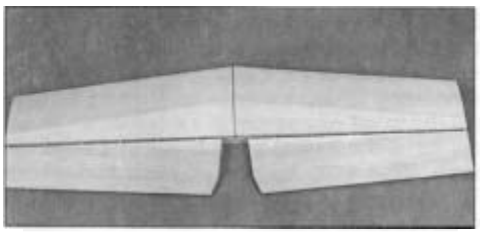
ST24. Glue four die-cut *1/8"* balsa **elevator torque rod blocks** between both sets of ribs S1AS and S2AS.

❑ ST25. Cut twelve 1-7/8" long **hinge blocks** from the 1/4 x 3/8" x 3 6 balsa stick. Glue them evenly spaced to the stab TE spar and the elevator LE spar where shown on the plan. Glue the die-cut 1/8" balsa **stab gusset** to the hinge block and rib S7S as shown on the plan. Position the gusset so it is even with the bottom of the hinge block so you do not break it when you cut the hinge slot. Align the grain as shown on the plan.

❑ ST26. Trim the elevator torque rod blocks and any protruding hinge blocks so they are even with the bottoms of the ribs.

❑ ST27. Reinforce any glue joints that do not look strong.

❑ ST28. Glue the elevator skins to the bottom of the elevators so the trailing edges align.



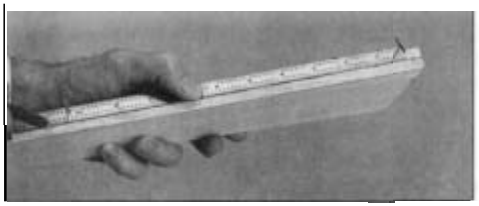
ST29. Glue the stab skins to the bottom of the stab. If you have not used any accelerator on the stab you may glue the skins on with thick or medium CA. Otherwise, use aliphatic resin. Work over a flat work surface and be careful not to add any twist into the stab as you press the skins to the stab frame. **Optional:** Use the die-cut 1/8" balsa **straight tail stab cradles S2T** and **S7T** to hold the stab flat on your workbench while you glue the bottom skins on. Use the stab cradles the same as the wing cradles shown in steps 1-5 on page 30.

❑ ST30. After the glue dries, use a bar sander with 150-grit sandpaper to sand the sheeting even with the ends of the stab and elevators.

❑ ST31. Cut the ribs and separate the elevator from the stab. Sand the excess sheeting and rib stubs from the TE of the stab and the LE of the elevator. Sand the elevator sheeting even with rib SIAS.

❑ ST32. Glue a die-cut 1/8" balsa **stab TE (S10)** to the TE of both stab halves. Glue a die-cut 1/8" balsa **elevator LE (also S10)** to the LE of both elevators.

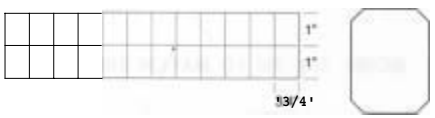
❑ ST33. Sand the stab TE's and the elevator LE's so they are even with the ends of the stab and elevators. Sand the stab TE and elevator LE's so they blend with the tips and skins.



❑ ST34. Use two T-pins, placed in the **center** of the leading edge of one of the elevators near the ends, to align a straightedge and draw a centerline with a ballpoint pen.

❑ ST35. Mark the other elevator and the TE of the stab the same way.

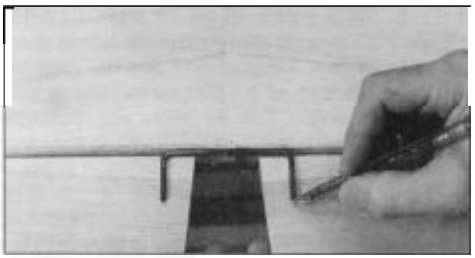
❑ ST36. Cut the hinge slots on the centerlines of the elevators and the stab where shown on the plan.



❑ ST37. Cut six **hinges** from the 2" x 9" **CA hinge strip** as shown in the sketch. Snip the corners off the hinges so they go into the slots easier. Temporarily join both elevators to the stab with the hinges. If necessary, adjust the hinge slots so the elevators and stab align.

❑ ST38. Locate the 3/4" shaped balsa **stab tip blocks.** The tip blocks match the **V-tail** stab tips, so use the plan to reshape them to fit your straight tail stab.

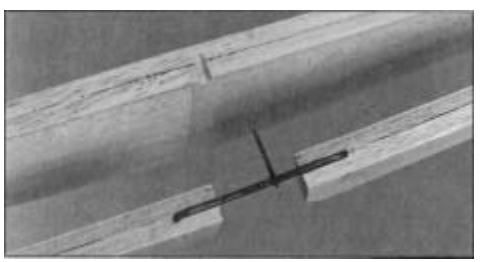
❑ ST39. Skip ahead to ***Make the stab tips*** on page 20 to make the tip blocks (the straight tail and V-tail tips are shaped the same way). When you're done, return to step ST40.



❑ ST40. Using the plan, accurately mark the location of the 1/8" **elevator joiner wire and horn** (from now on referred to as just the ***elevator joiner)*** on the elevators.

❑ ST41. Drill a 9/64" hole and cut a groove in the center of both LE's for the joiner. Test fit the elevator joiner in the elevators.

Hint: Use a 1/8" brass tube sharpened at one end to cut the grooves.



❑ Cut a small groove in the TE of the stab so the ***horn*** on the elevator joiner will not bind

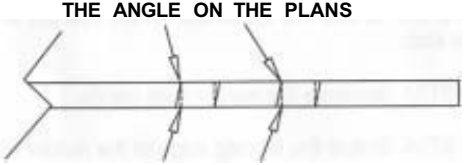
against the stab when the elevator deflects downward. Test fit the elevators to the stab, with the elevator joiner in place, and make adjustments if necessary.

Beech Fact: The Bonanza was (and still is) a remarkable airplane and held many world records. In 1949 it held the world record non-stop distance for all light planes flying 4,957 miles in 36 hours, 2 minutes from Honolulu to New Jersey piloted by Capt. Bill Odon. In 1958 it held the same record flying 7090 miles in 45 hours, 43 minutes from Manila to Pendleton, Oregon flown by Capt. Pat Boling.

BUILD THE FIN AND RUDDER

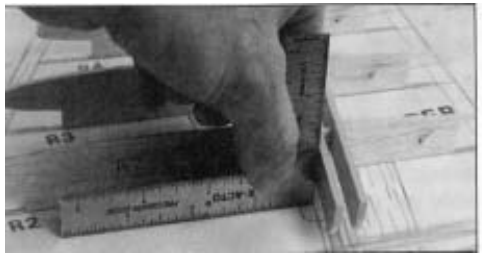
❑ ST1. Place the fin plan over your building board and cover it with wax paper.

BEVEL THE NOTCHES IN THE FIN RIBS AND SPARS TO MATCH THE ANGLE ON THE PLANS



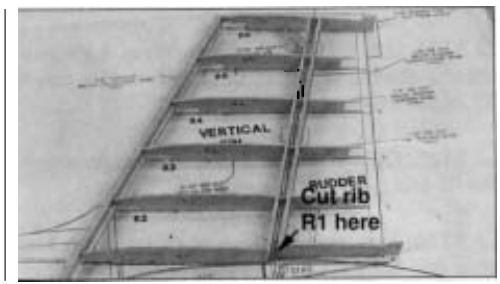
ORIGINAL NOTCHES

❑ ST2. Test fit the die-cut 3/32" balsa **fin ribs R2 through R6** in the notches of the die-cut 1/8" balsa **fin TE spar (R7)** and **rudder LE spar (R8).** Place the assembly over the plan. If the ribs fit tightly into the notches of the fin TE spar and the rudder LE spar, remove the ribs and bevel the notches in the spars and the ribs as shown in the sketch.



ST3. Use a small square to position the fin TE spar over the plan near rib R2. Align rib R2 over the plan and pin it to your building board. Use one pin near the front of the jig tab and one T-pin !ar the rear of the jig tab.

❑ ST4. Use the same method to align the fin TE spar over the plan at each rib. Pin the rib to your building board. Glue the ribs to the spars with medium CA. Use small drops of CA and do not build up fillets. Later, we will remind you to reinforce the glue joints.



Refer to this photo for the next three steps

❑ ST5. Cut rib R1 apart between the spar notches. Add fin rib **R1** and rudder rib **R1A** to the spars. Pin them to the plan and glue them in position.

❑ ST6. Sand the fronts of the ribs to match the aft sweep of the leading edge. Cut a shaped 5/16" x 15" balsa **stab/fin leading edge** to a length of 12-1/2". Glue it to the front of the ribs so the **top** of the LE is **even** with the **top** of the ribs. The bottom of the LE will extend below the bottom of the ribs but will be sanded flush later.

❑ ST7. Sand the upward facing edges of the leading edge and the sub spars so they match the contour of the ribs. Do not change the shape of the airfoil by sanding too much.

❑ ST8. Arrange the T-pins so they all go into the jig tabs at the same angle. This will allow you to *finagle* the fin and rudder off your building board by lifting it up and to one side after the top sheeting is glued in place (the T-pins are concealed).

❑ ST9. Glue the fin and rudder skin to the structure. The bottom of the fin skin should extend below rib R1 by approximately 1/4"-1/2" so you can trim it later. Make sure the trailing edge of the rudder meets the *stoppers* on the top of the jig tabs on ribs R6 and R1A. **Note:** The rudder skin was cut wider than needed, to allow enough material to trim it to size now.

❑ ST10. After the glue has thoroughly dried, remove all the T-pins you can reach. Carefully lift the fin (with the rudder) from your building board. Trim the jig tabs from the ribs and take out the rest of the T-pins.

❑ ST11. Use a razor plane or a #11 blade to trim the right side of the LE so it is the same size as the front of the ribs and matches the airfoil shape.

❑ ST12. Sand the bottoms of the ribs, leading edges, fin spar, rudder spar and trailing edges so that they blend.

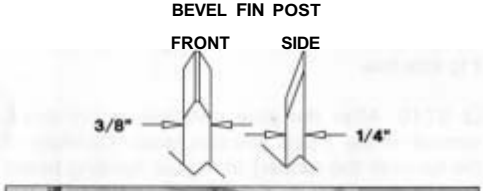
❑ ST13. Bevel the trailing edge of the left rudder skin the same way you did the stab.

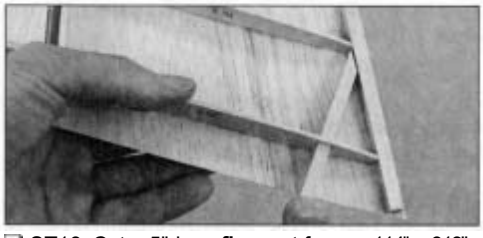
ST14. Glue the four die-cut1/8" balsa **rudder torque rod blocks** betweenR1A and R2 in the rudder.

❑ ST15. Cut six 1-718" long **hinge blocks** from the 1/4" x 3/8 x 36" balsa stick. Test fit, then glue the hinge blocks, evenly spaced, to the fin TE spar and the rudder LE spar where shown on the plan.

❑ ST16. Glue the die-cut 1/8" balsa **fin gusset** to the hinge block and rib R6. The gusset should be raised so it is even with the left side of the fin TE and rib R6 (so it does not interfere with the hinge slot).

❑ ST17. Trim the elevator torque rod blocks and any hinge blocks so they are even with the ribs.





❑ ST18. Cut a 5" long **fin post** from a 114" x 318" x 36" basswood stick. Bevel one end so it matches the plan. Bevel the sides to accommodate the sheeting. Set the fin post aside for now.

❑ ST19. Reinforce glue joints that don't look strong.

❑ ST20. Glue the other rudder and fin skin to the right side of the rudder and fin. **Optional:** Use the die-cut 1/8" balsa **finlstab cradles R1C** and **R6C** to hold the fin and rudder flat on your workbench while you glue the right skins on.

❑ ST21. Sand the tip of the fin and rudder sheeting flush with rib R6.

❑ ST22. Cut the ribs and separate the rudder from the fin. Sand the excess sheeting and rib *stubs* from the TE of the fin and the LE of the rudder. Sand the bottom of the rudder even with rib R1A.

❑ ST23. Glue a die-cut 118" balsa **fin trailing edge (R9)** to the fin TE spar and a die-cut 1/8" balsa **rudder leading edge (R9)** to the rudder LE spar. Sand the fin TE and rudder LE so they blend with the tips and skins.

❑ ST24. Use the *straightedge and pin* technique to draw a centerline on the LE of the rudder and the TE of the fin.

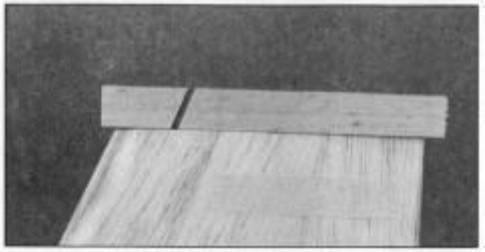
❑ ST25. Cut the **hinge slots** on the centerline of the fin and rudder where shown on the plan.

❑ ST26. Cut three more hinges from the hinge strip and temporarily join the rudder to the fin. If necessary, adjust the hinge slots so the fin and rudder align.

❑ ST27. Securely tape the rudder to the fin with masking tape on both sides. Sand the ends of the fin and rudder so they are even.

❑ ST28. Draw a centerline on the top and bottom of the 518" x 718" x 6-1/4" balsa **fin tip block.** Cut the block into two pieces as shown on the plan. Sand the edges you just cut so they are smooth and match the angle on the plan.

❑ ST29. Use thick or medium CA to glue the rudder tip block **only to the rudder.** Use the centerline on the rudder tip block as a guide to make sure it is centered on the rudder and fin.



❑ ST30. Glue the fin tip to the fin, making sure there is a 1/16" gap between the fin tip and the rudder tip.

❑ ST31. Use a razor plane or a hobby carving knife followed by sanding to carefully shape the fin and rudder tip blocks. Inspect your progress frequently and use the centerlines as a guide.

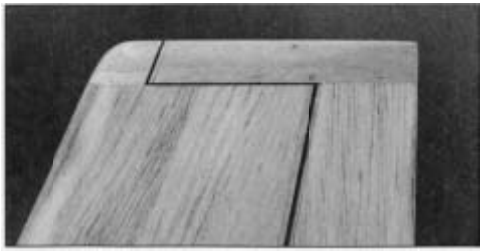
Hint: Stick a T-pin through the top of the rudder tip into the fin. This will hold the rudder tip while you shape it.

❑ ST32. Shape the LE of the fin as you did with the stab.

❑ ST33. Separate the rudder from the fin.

❑ ST34. Shape the leading edge of the rudder to a "V" as you did with the elevators. Use the centerline on the leading edge as a guide. Make sure the angle of the "V" will allow the throws indicated in the back of this manual.

❑ ST35. Rejoin the rudder to the fin with the hinges. Shift the rudder upward so there is approximately a 1/32" gap between the rudder tip and the fin.



❑ ST36. Sand the top of the rudder tip so it matches the fin tip (since you raised the rudder slightly).

What a nice piece of workmanship! Put the stab and fin in a safe place, clean off your workbench, vacuum the floor, read the following ***Beech Fact,*** *then skip to page 21 and build the wing.*

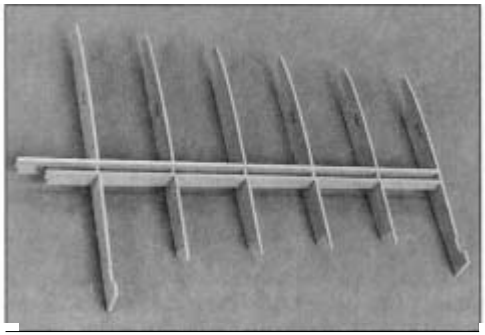
Beech Fact: At first, the *Bonanza* model existed only in the V-tail configuration. The original straight tail Beech, introduced in 1959, was named the *Debonair.* It was intended to be a less expensive, *bare essentials* model in the Beechcraft lineup to compete with Piper's Comanche and Cessna's soon-to-be-released 210. However, after many upgrades and changes, the Debonair evolved into what was basically a straight tail Bonanza. So in 1968 Beech decided to drop the Debonair name and called both the *33* and the *35*, the *Bonanza. Neat-O!*

V-TAIL INSTRUCTIONS

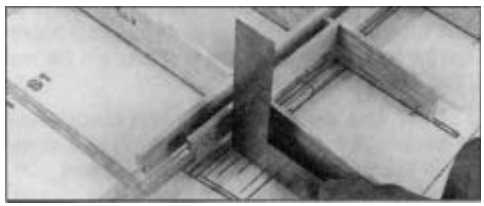
BUILD THE STABILIZER AND RUDDERVATORS

The right half of the stab plan shows the V-tail stab with a dashed line indicating the straight tail stab. The left half of the stab plan shows the straight tail stab with dashed lines indicating the V-tail stab. Build the ***right*** *side of the stab first so your progress matches the photos.*

❑ V1. Position the plan so the stab is over your flat building board (or cut the stab from the wing plan) and tape it down and cover it with wax paper.



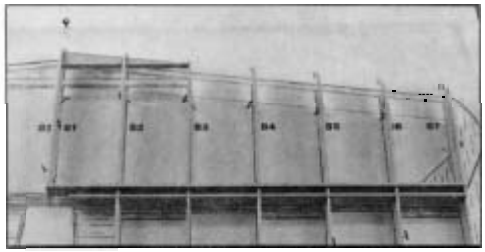
❑ ❑ V2. Test fit.the die-cut 3/32" balsa **stab ribs S2V** through **S7V** in the notches of the die-cut 1/8" balsa **stab TE spar (S9)** and the ***ruddervator*** **LE spar (S8).** Place the assembly over the plan.



❑ ❑ V3. Use a small square to help align the ruddervator LE spar S8 over the plan at rib S2V. Pin the rear of the jig tab on S2V to the plan. Use the same procedure to pin the rear of the jig tabs on the rest of the ribs to the plan.

❑ ❑ V4. One at a time, align the fronts of the ribs over the plan and pin the jig tabs down to your building board.

❑ ❑ V5. Still without using glue, join **rib S1V** to the assembly and pin it to your building board.



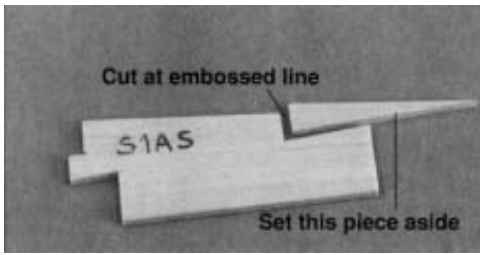
❑ ❑ V6. Glue two die-cut 1/8" balsa **V-tail LE braces** together. Place them in the notches of ribs S1V and S2V as shown on the plan.

❑ ❑ V7. Make sure all the jig tabs of all the ribs are contacting your building board, then glue the stab TE spar, ruddervator LE spar and the V-tail LE brace to the ribs with medium CA. Don't use large amounts of CA or build up fillets of glue. Later we will instruct you to reinforce glue joints that don't look strong.

❑ ❑ V8. Bevel the fronts of the ribs to match the aft sweep of the leading edge. Cut a shaped 5/16" x 15" balsa **stab/fin leading edge** to a length of
Glue it to the fronts of the ribs so the **top** is **even** with the **top** of the ribs. The bottom of the LE will extend below the ribs but will be sanded flush later.

❑ ❑ V9. Check the fit of the **sub spar (S11)** in the die-cut notches of the ribs SIV, S2V and S3V. Make any adjustments needed.

❑ ❑ VIO. Test fit, then glue the sub spar in position. Use a 90" triangle to insure that the sub spar is vertical.



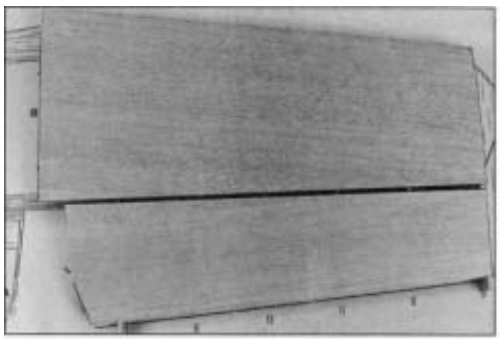
❑ ❑ V11. Cut the end off rib SIAV at the embossed line and set that little piece aside. Glue SIAV to the ruddervator LE spar over its location on the plan.

❑ ❑ V12. Sand the top of the leading edge, sub spar, elevator TE spar and the ruddervator LE spar so they match the contour of the ribs. Don't change the shape of the airfoil by sanding too much.

❑ ❑ V13. **THIS** STEP **IS VERY** IMPORTANT! Arrange the T-pins so **every other rib** is held down with one pin near the front and one pin near the rear and make sure all the pins go into the jig tabs **at the same angle.** This will allow you to *finagle* the stab off your building board by lifting it up and to one side after the top sheeting is glued in place (the T-pins are concealed).

❑ ❑ V14. Use your favorite method to glue the stab skin to the stab. We recommend using aliphatic resin to glue the skin to the ribs and TE spar, and CA for only the leading edge. Apply the glue. Working quickly, position the stab skin and hold the leading edge down until the CA cures. When the CA is cured, wet the front of the skin with a 50/50 mix of alcohol and water and press it to the rest of the frame, holding it down with weights until the glue dries.

Note: If you choose to use CA for the entire job, be aware that residual accelerator you may have used earlier can make the CA you use for this step cure quickly. You'll have to work rapidly.



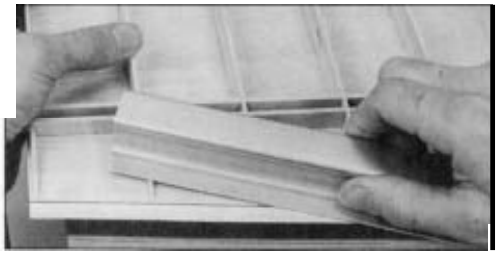
❑ ❑ V15. Glue the ruddervator skin to the ruddervator. You can use CA for this step since the skin is small and easy to posidon. Make sure the trailing edge contacts the *stoppers* on the top of the jig tabs on ribs S7V and S2V.

❑ ❑ V16. After all the glue has dried, remove all the T-pins you can reach. Carefully lift the stab (with the ruddervator) from your building board. Trim the jig tabs from the ribs and take out the rest of the T-pins.

❑ ❑ V17. Use a razor plane or a #I 1 blade to trim the **bottom** of the LE so it is the same size as the front of the ribs and matches the airfoil shape.

❑ ❑ V18. Sand the bottoms of the ribs, leading edges, stab, ruddervator spars and trailing edges so they blend together.

❑ ❑ V19. Glue the little tip you cut off the end of rib SIAV to the sheeting and SIAV.

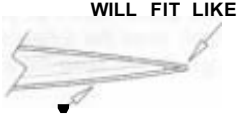


For clarity we've drawn a line indlcating the bevel

BEVEL THE TE TO MATCH THE RIBS

TOP SHEETING' ON ELEVATOR

THE BOTTOM SKIN WILL FIT LIKE THIS



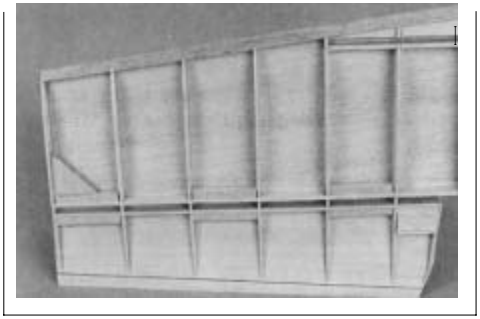
TOP SHEETING

❑ ❑ V20. Use a bar sander and 150-grit sandpaper to bevel the trailing edge of the top ruddervator skin so it will accommodate the bottom skin. While you sand, apply pressure only to the sheeting and use the ribs to set your sander at the correct angle. Do not bevel the trailing edge to a *sharp edge* but leave about 1/64 *squared off.*

Hint: Support the TE with the edge of your workbench or a platform while you sand.

❑ ❑ V21. Glue four die-cut 1/8" balsa **ruddervator torque rod blocks** between ribs SIAV and SS2AV You can see the torque rod blocks in the following photo.

❑❑ V22. Remove a small section of rib S2v between the LE brace and the sub spar. Now you should have a slot in rib S2V like the one in the photo below. **DO NOT** cut the slot shown in rib S1V until instructed to do so later.



❑❑ V23. Cut six 2-118" long hinge blocks from the 1/4" x 3/8" x 36" balsa stick. Glue the hinge blocks evenly spaced to the stab TE spar and the ruddervator LE spar where shown on the plan. Glue the die-cut 1/8" balsa stab gusset to the hinge block and rib S7V as shown on the plan. Position the gusset so it is not on the centerline of the hinge so you do not break it when you cut the hinge slot. Align the grain as shown on the plan.

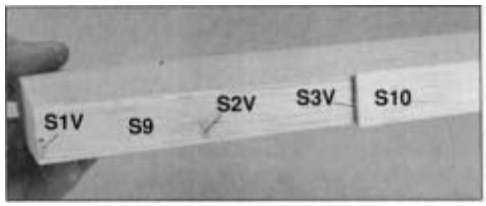
❑❑ V24. Trim the ruddervator torque rod block and any protruding hinge blocks so they are even with the bottoms of the ribs.

❑❑ V25. Reinforce glue joints that don't look strong.

❑❑ V26. Glue the bottom stab and ruddervator skins to the bottom of the stab and ruddervator. Work over a flat surface and be careful not to add any twist into the stab as you press the skins onto the stab frame. Make sure the TE of the ruddervator skins align. Optional: Use the die-cut 1/8" balsa V-tail stab cradles S2V and S7V to hold the stab flat on your workbench while you glue the bottom skins on. Use the stab saddles the same as the wing saddles shown in stepsl-5 on pages 30.

❑❑ V27. Use a bar sander with 80-grit sandpaper to sand the sheeting even with rib S7V.

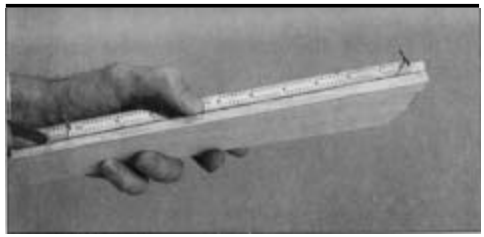
❑❑ V28. Cut the ribs and separate the ruddervator from the stab. Sand the excess sheeting and rib *stubs* from the TE of the stab and the LE of the ruddervator. Sand the root of the ruddervator sheeting flush with rib SIAV.



❑❑ V29. Cut 4-3/8" off the *small end* of the die-cut 1/8" balsa stab **TE (S10).** Glue the stab TE to the stab so the root end aligns with the inner edge of rib S3V as shown on the plan.

❑❑ V30. Shape the stab TE so it blends with the stab and tip.

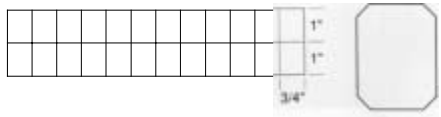
❑❑ V31. Glue a ruddervator **LE** (also **S10)** to the LE of the ruddervator and sand it so it blends with the skins and tips.



❑❑ V32. Use two large T-pins, placed in the center of the leading edge of the ruddervator near the ends, to align a straightedge and draw a centerline with a ballpoint pen.

❑❑ V33. Mark the trailing edge of the stab the same way.

❑❑ V34. Cut the hinge slots on the centerline of the ruddervator and the stab where shown on the plan. Do not cut the hinge slot in the stab nearest the root until instructed to do so.



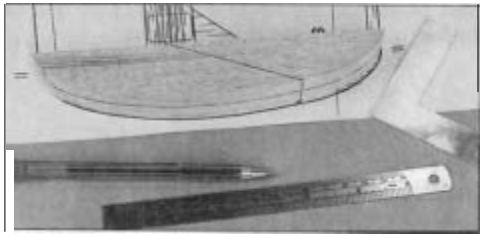
❑❑ V35. Cut three hinges as shown in the sketch from the 2" x 9" **CA** hinge strip. Snip the corners off the hinges so they go into the slots easier.

❑❑ V36. Temporarily join the ruddervator to the stab with two hinges. If necessary, adjust the hinge slots so the ruddervator and stab align.

MAKE THE STAB TIPS

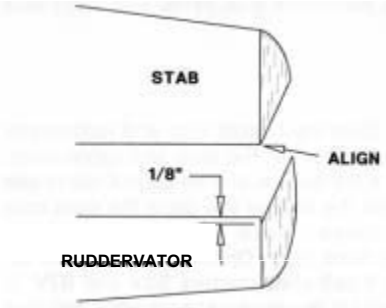
❑❑ 1. Securely tape the ruddervator (or elevator if you're building the straight tail) to the stab with masking tape on both sides. Sand the ends of the stab and ruddervator so they are even.

❑❑ 2. Draw a centerline all the way around a 3/4" shaped balsa **stab tip block.**

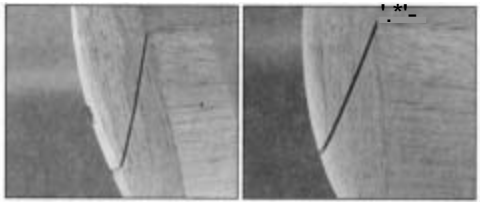


❑❑ 3. Place the stab tip block over its location on the plan. Mark where the ruddervator tip meets the stab tip on both sides of the block.

❑❑ 4. Cut the stab tip from the ruddervator tip. True the edges you just cut with a bar sander.



❑❑ 5. Glue the **stab tip** to the stab. The sharp *point* of the stab tip should align with the TE of the stab. Glue the **ruddervator tip** to the ruddervator so it is 1/8" aft of the LE and aligns with the stab tip (as shown in the sketch).



❑❑ 6. Use a razor plane or a hobby carving knife, followed by sanding to **carefully** shape the ruddervator and stab tip. Inspect your progress frequently. Use the centerlines as a guide and the plan as a reference so you know what the curve of the tip should look like.

Hint: Stick a T-pin through the ruddervator tip into the stab. This will hold the ruddervator tip while you shape it.

Note: When you shape the left stab tip, in addition to the plan, use the finished tip on the right stab as a guide to shape the left stab tip. This way you can make sure both of the stab tips are identical.

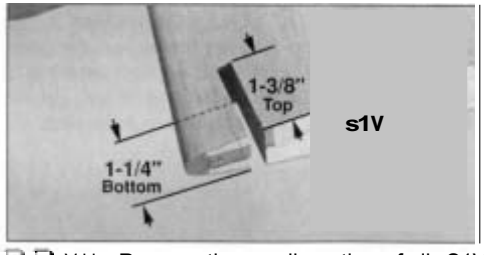
❑❑ 7. Shape the stab LE as shown on the plan.

❑❑ 8. Separate the ruddervator from the stab.

❑❑ 9. Shape the leading edge of the ruddervator to a "V" as shown on the plan. Use the centerline on the leading edge as a guide. Make sure that the angle of the "V" will allow the throws indicated in the back of the manual.

Straight tail builders, make the other stab tip the same way; then, return to step ST40 on page 14.

❑❑ V10. Starting at rib S1V, remove a 1-3/8" strip of **top** sheeting between the V-tail LE brace and the sub spar. Remove a 1-1/4" strip of **bottom** sheeting between the V-tail LE brace and the sub spar. See the following photo.

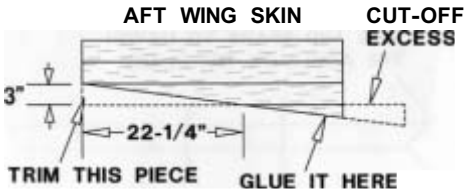


❑❑ V11. Remove the small section of rib S1V between the LE brace and the sub spar. Now you should have a slot in the stab like the one in the photo.

*What a nice piece of workmanship! Put the right stab in a safe place. Clean off your workbench, vacuum the floor, and build the **left** stab the same way.*

BUILD THE WING

MAKE THE WING SKINS



❑ 1. Glue **three** 3/32" x 3" x 36" balsa sheets together to make an **aft wing skin.** Trim a wedge from the aft wing skin. Glue it back onto the skin as shown in the sketch.

❑ 2. Glue **two** 3/32" x 3" x 30" ***(not 36")*** balsa sheets together to make the **forward outer wing skin.**

Note: You will need a total of four **aft wing skins** and five **forward wing skins** (one of the forward wing skins will be cut into four pieces to make the forward ***inner*** skins). You can make all the wing skins now in an assembly line fashion or make them as needed.

❑ 3. After the glue dries, remove the masking tape and mark the best side of each skin as the top. Sand the bottoms of both wing skins so they are flat (or almost flat). Sand the tops of the skins so they are flat andsmooth.

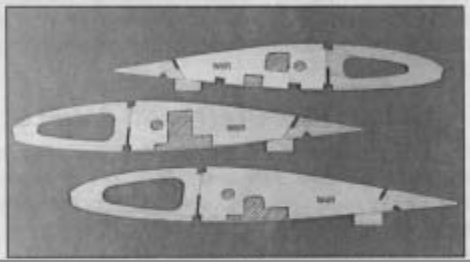
PREPARATIONS

❑ 1. Unroll the wing plan. Roll it inside out so it will lie flat. Cut the **right** wing panel with the center section from the wing plan. Position it on your **flat** building board and cover the plan with wax paper.

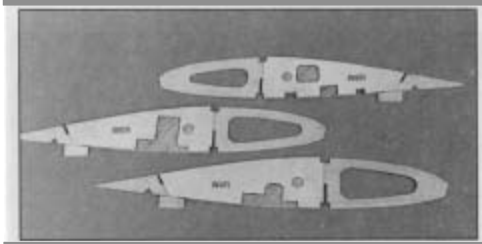
Perform steps 2 through 6 if you are installing retractable landing gear.

HOT TIP

Have you purchased your retracts yet? If you have (or as soon as you do), take the neoprene air lines out of the package and hang them from a hook somewhere in your shop letting them dangle under their own weight. This will get all the kinks out and make them easier to work with when it's time to install them.

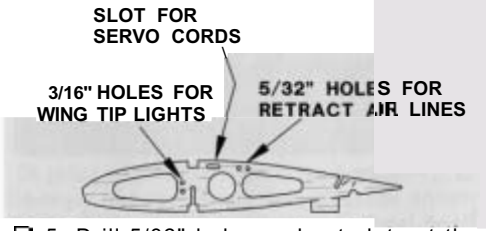


❑ 2. Prepare a set of **right** wing ribs by using 30-minute epoxy to glue the die-cut 1/16" plywood **retract landing gear rib doublers W4R, W5R and W6R** to the die-cut 3/32" balsa **ribs W4, W5 and W6 exactly** as shown in the photo. Make sure the doublers are on the side of the ribs as shown in the photo and on the right wing plan.

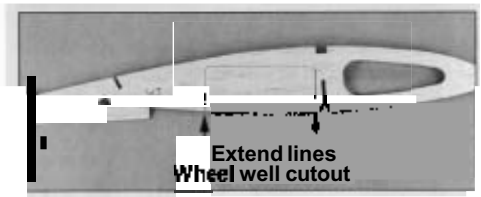


❑ 3. Prepare a set of **left** wing ribs the same way but **use the photo above** to make sure you glue the doublers to the correct side of the ribs.

❑ 4. Remove the shaded area of balsa shown in the previous two photos after the epoxy is fully cured.



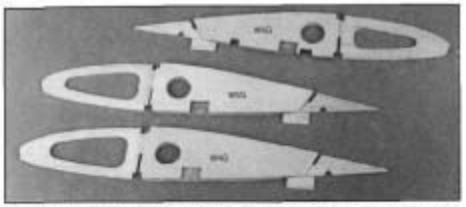
❑ 5. Drill 5/32" holes and cut slots at the locations suggested in the sketch in both sets of ribs W2, W3 and W4 for the retract air lines and servo cords. Make the slots large enough so the connectors on the ends of your servo cords will pass through. If you will be installing lights in the wing, drill 3/16" holes through wing ribs W3 through W14 in the approximate location shown in the sketch. **Hint:** An appropriate size brass tube sharpened at one end cuts very clean holes.



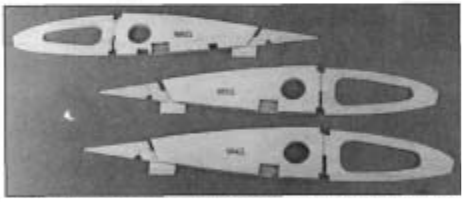
❑ 6. Use a ballpoint pen to extend the die-cut wheel well cutout in both W3 ribs. Cut partway through the rib along the line so the cutout will be easier to remove later.

Beech Fact: In 1946 Walter H. Beech announced his all new, revolutionary, single engine entry in the postwar market. He named it the Bonanza, descriptive of an extra value offered in the way of economy, performance and pleasure to the owner.

Perform steps 7 through 9 only if you are installing fixed landing gear,



❑ 7. Prepare a set of **right** wing ribs by using 30-minute epoxy to glue the die-cut 1/8" plywood **fixed landing gear rib doublers W4G, W5G and W6G** to the die-cut 3/32" balsa **ribs W4, W5 and W6 exactly** as shown in the photo. Make sure the doublers are on the side of the ribs as shown in the photo.

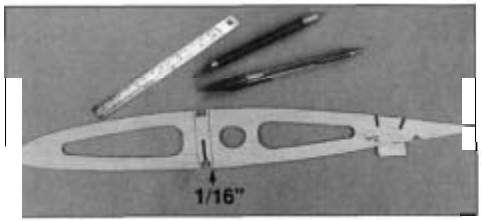


❑ 8. Prepare a set of **left** wing ribs the same way but **use the photo above** to make sure you glue the doublers to the correct side of the ribs.

❑ 9. Remove the shaded area of balsa shown in the previous two photos after the epoxy is fully cured.

Note: Details for fixed landing gear are shown on the **left** wing plan.

❑ 10. If you will be installing lights in the wing, drill 3/16" holes through wing ribs W3 through W14 in the approximate location shown in the sketch on step 5 page 21.



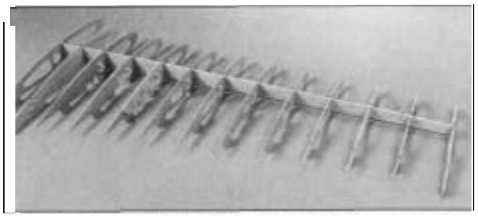
❑ 11. Use a straightedge and a ballpoint pen to mark a vertical line 1/16" from the front and back of the spar notches in both **W2 ribs.** Use a sharp hobby knife to **lightly** cut halfway through the balsa along the lines. You will remove this section of balsa to accommodate the spar joiners when it is time to join the wing.

BUILD THE OUTER WING PANELS

For clarity, some of the photos show the wing off the building board without the plan, but of course you should build your wing over the plan the same as we do.

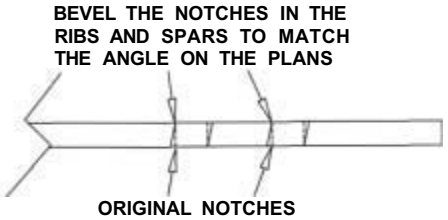
*Build the **right** wing panel first so your progress matches the photos.*

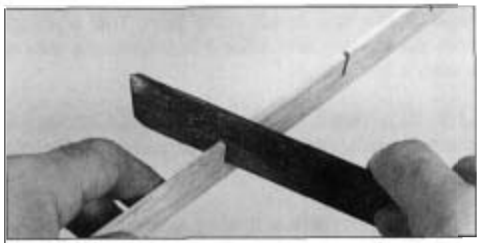
❑❑ 1. **Do not use any glue until step 8.** Pin a 1/4" x 3/8" x 36" balsa **bottom spar** over its location on the plan so the root end extends past the dashed line by about 1/8". Stick the pins through the spar at an angle so they will not interfere with the spar web when you position it in the next step.



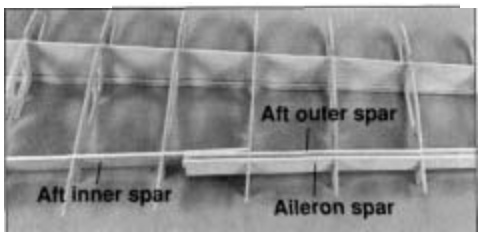
❑❑ 2. Test fit ribs W2 through W14 to the die-cut 1/8" balsa **spar web (W15).** If necessary, deepen the notches (in the ribs or in the spar web) so the ribs fit all the way into the spar web.

❑❑ 3. Fit the ribs and spar web to the bottom spar so the ribs accurately align with the plan.





❑❑ 4. Test fit the die-cut 1/8" balsa **aft inner spar**



❑❑ 5. Test fit the die-cut 118" balsa **aft outer spar (W16)** and the die-cut 1/8" balsa **aileron spar (W17)** into the notches of ribs through W14. If necessary, bevel the notches in the spars and ribs the same way you did in the previous step.

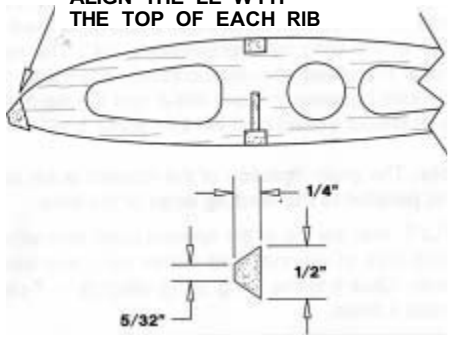
❑ ❑ 6. Temporarily remove rib W2 from the assembly.

❑ ❑ 7. One at a time, accurately align the jig tabs of all the ribs with the plan and pin them to your building board. In addition to T-pins, place weights on top of the ribs and the aft spars to insure that **all the jig tabs are contacting your building board.** Inspect all joints and make sure everything aligns with the plan. The spar web must fully contact the bottom spar. A die-cut 1/8" plywood **90 degree *gauge*** is supplied in the kit to help you keep the ribs vertical as you glue them.

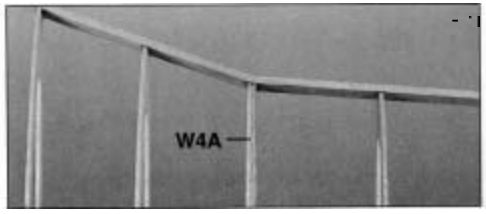
❑ ❑ 8. Use medium or thin CA to glue all the joints. Use the CA sparingly at this stage of construction and do not build up fillets. This will allow you to realign parts if necessary and keep you from gluing the jig tabs to the ribs. We will remind you to reinforce all glue joints later.

❑ ❑ 9. Place rib W2 back onto the assembly. Align W2 with the dashed line depicting where it contacts the plan. Use the die-cut 1/8" plywood **dihedral gauge** to set W2 at the correct angle. Glue it to the bottom spar and the spar web. Glue W2 to the aft inner spar using the dihedral gauge to set it at the correct angle.

❑ ❑ 10. Test fit a 1/4" x 3/8" x 36" balsa upper spar in the notches of the ribs so the end of the spar aligns with rib W2. Glue the spar to the ribs and the spar web with thick or medium CA. Remember, don't use too much glue.



❑ ❑ 11. Cut a 1/4" x 36" shaped balsa **leading edge** to a length of 29-1/2". Glue the LE to ribs W4 through W14 so the top aligns with the tops of the ribs (the same as on the stab).



❑ ❑ 12. Bevel the end of the remaining piece of 6-1/2" leading edge so it matches the LE on the wing when you position it on ribs W4, 3 and 2. Glue it in position. Glue **rib W4A** to the side of rib W4. **Hint:** Glue the LE to rib W2 *last* so you can use the dihedral gauge to make sure W2 is at the correct angle.

NOTE: Use a long straightedge along the length of W2 to insure that it is flat along it's length (from the LE to the TE).

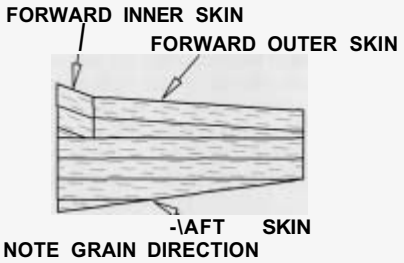
Beech Fact: Among other famous Beechcraft models, some include variations of the stagger-wing biplane; several versions of the 18A which is a twin engine, low wing mono-plane (distinguishable by its twin rudders); a light, single engine model named the Musketeer; a sort of *bare-bones* straight tail Bonanza called the *Debonaic* the T-34 (which is a US. Navy trainer); and of course, several versions of the ever-popular twin engine *Baron.*

SHEET THE TOP OF THE WING PANELS

❑ ❑ 1. Use a large sanding block or a bar sander with 150-grit sandpaper to sand the tops of the top spar, aft spars, LE and ribs so they all smoothly blend together. Make sure the tops of the aft spars match the tapering angle of the ribs but sand the ribs lightly so you maintain the designed airfoil shape.

❑ ❑ 2. Remove the T-pins from the bottom spar and replace them so they are all sticking in from the front. This way you will be able to remove them when the aft top sheet is in position. Remove the T-pins from the aft jig tabs and replace them in every other jig tab so they all go into the building board at the same angle *(you know the drill).* Remove the weights from the top of the wing (if you used them).

Note: If you observe that the wing panel remains flat and all the jig tabs are contacting your building board when you remove the T-pins, you may leave the T-pins out of the jig tabs. In this case the weights that will be used to hold the sheeting to the ribs will be enough to hold the wing flat to your building board.



Use this photo and the sketch for the next few steps

This photo shows a few weights on top of the wing, but in actuality we used enough weights to fully cover the skins. You can use magazines for weights too. T-pins in the front ensure that the skins are securely bonded to the top spar.

❑❑ 3. Trim the aft wing skin so it fits the wing. The **TE** should be straight and true and contact the *stopper* portion of the jig tabs on ribs W14 and W3. The **front** of the sheet should *end* in the center of the top spar. The ends should extend past W2 and W14 equally.

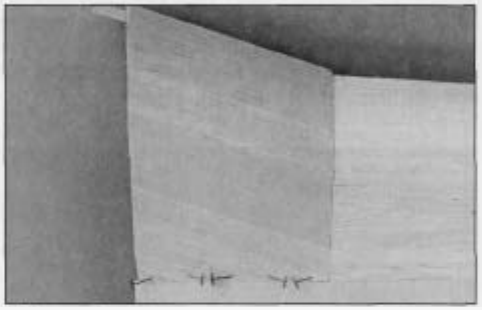
❑❑ 4. Use your favorite method to glue the **aft** wing skin to the wing. We recommend using aliphatic resin because it gives you plenty of time to align the skin and position your weights or T-pins. Hold the wing skin in position with magazines or weights made from plastic bags filled with lead shot or BBs. If you choose to use T-pins to hold the skin to the wing, **lightly** mark lines on the top of the wing skin indicating the location of the ribs underneath. **Do not disturb the wing until the glue fully cures.**

❑❑ 5. Remove the T-pins from the bottom spar. The weights on the aft sheeting will hold your wing flat.

❑❑ 6. Trim the forward **outer** wing skin so it fits the wing. The **aft** edge of the skin should contact the aft skin (in the center of the spar) and the **front** edge of the skin should extend past the leading edge of the wing by approximately 1/4". The **root** end of the sheet should accurately align with the glue joint between W4 and W4-A and the **tip** of the sheet should extend past W14 by about 1/16.

Note: The grain direction of the forward outer skin runs **parallel to the leading edge** of the wing.

❑❑ 7. Wet the top of the forward outer skin with a 50/50 mix of alcohol and water so it will bend easier. Glue it to the wing using weights or T-pins to hold it down.



❑❑ 8. If you haven't already done so, glue two more 3/32 x 3 x 30" balsa sheets together for the **forward inner skin.** From that sheet, cut a piece that fits between ribs W2 and W4 and glue on a third piece cut from leftover 3/32" balsa to fill up the rest of the space. Note that the grain direction is parallel to the leading edge between ribs W2 and W4. Trim the sheet to fit the wing. Glue it in position.

❑❑ 9. After the glue on all the sheeting is dry, remove the T-pins you can reach and lift the wing off your building board.

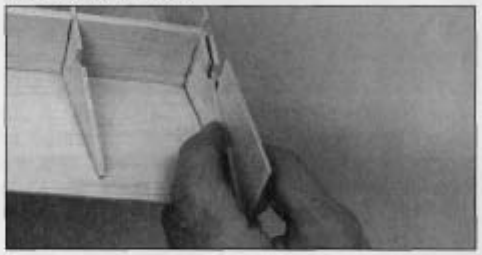
❑❑ 10. Clean the glue blobs and wood chips off your workbench so they won't leave dents in your beautiful wing sheeting. Turn the wing over and carefully cut the jig tabs off the ribs.

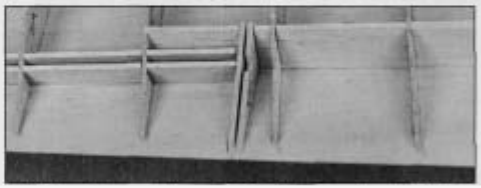
❑ 11. Reinforce all glue joints that don't look strong. It is particularly important that the joint between the spar web and both spars are securely glued.

❑ 12. Position the **left wing plan** on your building board and cover it with wax paper. Return to step 1 on page 22, and repeat the steps to build the left wing panel.

FINISH THE OUTER WING PANELS

*Start with the **right** wing panel so your progress matches the photos.*

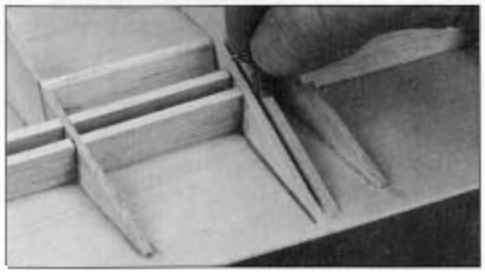




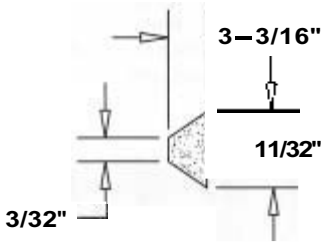
❑❑ 1. Glue a die-cut 3/32" balsa sub-rib **W2A** to rib **W2** where shown on the plan. The sub rib provides additional gluing area when the sheeting is installled. Use the W2A that does not have a notch cut in it for the flap spar.

❑❑ 2. Glue the die-cut 3/32" balsa **flap ribs W2A** and **W8A** and **aileron ribs W9A** and **W14A** to the wing where shown on the plan. Note that W8A and W9A are perpendicular to the aileron spar W17.

Hint: Temporarily place a *shim* made from 1/16" leftover plywood between the ribs for perfect alignment.

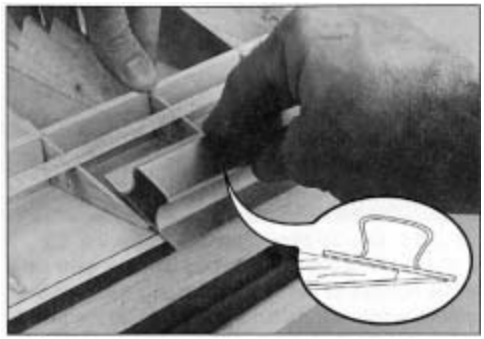


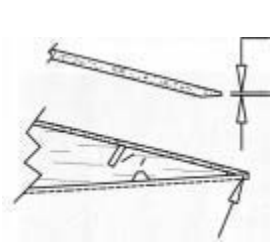
❑ ❑ 3. Stick a pin through the wing sheeting in a few places along the space between W8A and W9A, along the space between W2A and W2A, and along the space between W14A and W14. These pin points will indicate where to cut the sheeting to separate the ends of the flap and aileron from each other and the wing.



❑ ❑ 4. Cut a shaped 18" balsa **flap spar** to fit between flap ribs W2A and W8A. Test fit, then glue the flap spar in the notches of the flap ribs.

❑ ❑ 5. Starting with 80-grit sandpaper on a large sanding block or your bar sander, sand the remainder of the jig tabs from the ribs and blend the bottoms of the aft spars and the aileron spar to the contour of the ribs.





❑ ❑ 6. Use a bar sander and 150-grit sandpaper to bevel the trailing edge of the top wing skin so it will accommodate the bottom skin. While you sand, apply pressure only to the sheeting and use the ribs to set your sander at the correct angle. Do not bevel the trailing edge to a *sharp edge* but leave about 1/32" *squared off.* **Hint:** Support the TE with the edge of your workbench or a platform while you sand.

Perform steps 7-13 if you are installing retractable landing gear.

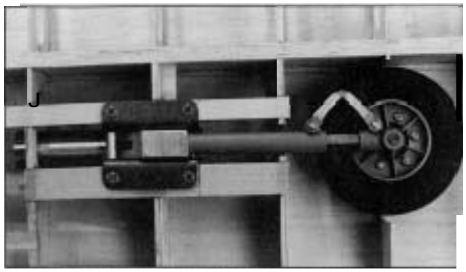
❑ ❑ 7. Cut the 1/2" x 3/4" x 6-3/4" grooved basswood **aft landing gear rail** to a length of 6-1/8". Test fit and glue the rail in position with 30-minute epoxy **(with the groove facing the top sheeting).** Test fit, then glue the 1/4" x 1/2" x 9" plywood **forward landing gear rail** in position with 30- minute epoxy. Immediately proceed to the next step before the epoxy cures.

❑ ❑ 8. From a 1/4" x 3/8" x 24" basswood stick, cut a piece that is 1-1/2" long. Glue this **landing gear rail brace** to rib doubler W5R and the bottom of the forward landing gear rail with 30-minute epoxy.

❑ ❑ 9. Test fit your retract unit with only the strut but not the wheel. If necessary, enlarge the clearance holes in the ribs and doublers so the air cylinder and the strut do not interfere with the ribs.

❑ ❑ 10. Cut along the line you started earlier on rib W3 for the wheel cutout and remove the section of balsa for the wheel.

❑ ❑ 11. Mount a wheel to your landing gear strut. Place your retract unit on the landing gear rails in the location shown on the plan (by the way, the *oleo scissors* face **forward).** Retract the wheel by hand to check the operation and make sure your retract is mounted in the correct location. *Now is the time to plan your installation and make sure everything fits. It will be more difficult to make corrections after the bottom sheeting is in place.*



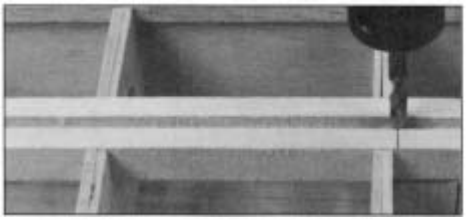
❑❑ 12. Drill holes in the rails and mount your landing gear. Use the screws included with your landing gear. **Hint:** Countersink the holes in the landing gear for #6 x 1/2" flat head screws.

❑❑ 13. Now is a convenient time to plan your air line routing. If you haven't already done so, drill or cut holes in the ribs to guide the air lines. **A** 5/32" brass tube sharpened at one end makes a great drillto cut holes through the ribs.

Perform steps 14-16 if you are installing fixed landing gear.

❑❑ 14. Use 30-minute epoxy to glue the 1/2" x 314" x 6-3/4" grooved hardwood **landing gear rail** in the notches of the ribs and rib doublers with the groove visible, as shown in the photo. At the same time, glue the 3/4" x 3/4" x 1" maple **torque block** to rib doubler W4G and the top of the landing gear rail. The fixed landing gear rail and rib doublers are shown on the **left** wing plan.

❑❑ 15. Cut the 1/4 x 1/2" x 9" plywood **flap servo hatch forward rail** to a length of 3-1/16". Glue it into the notches of ribs W6 and W7.



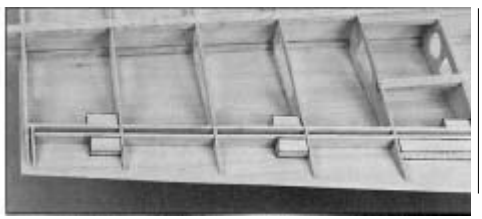
❑❑ 16. After the epoxy on the landing gear has fully cured, drill a 31/6" hole through the landing gear rail and the torque block. The center of the hole should be 3/32" from the plywood rib doubler W4G. Make sure you hold the drill perpendicular to the bottom of the landing gear rail.

❑❑ 17. **Optional:** From the right side of the plan cut off the two paper tube strips along the dashed lines. Roll these strips and cut them to the lengths needed. They are used to allow easy routing of the servo wires and their extensions. For fixed gear the tubes go from R2 to R9. For retracts they go from R7 to R9. For retract installation, the wires can easily be fished through the small holes in R4, R5 and R6.

❑❑ 18. Cut three 3-1/16" long **servo hatch cover rails** from the 1/4" x 3/8" x 24" basswood stick (the same stick you used for the landing gear rail support if you are building retracts). Glue the rails in the notches of the ribs where shown on the plan.

❑❑ 19. Cut three 1-1/2" long **flap hinge blocks** from the shaped 5/8" x 9" balsa stock. Bevel the ends of the hinge blocks so they fit the ribs, then glue them in the location shown on the plan. **See the cross section** on the wing plan to be sure you know the position of the blocks.

❑❑ 20. Cut five 1" long **aileron hinge blocks** from a 1/2" x 1/2" x 6" balsa stick. Cut one 2-7/8" long hinge block from the 5/8" x 1/2" x 6" balsa stick. The long hinge block is the one closest to the root end of the aileron and is the *base* for the aileron control horn.



❑❑ 21. Bevel the ends of all the aileron hinge blocks so they fit against the ribs as shown on the plan. Bevel the **tops** of the hinge blocks that fit in the aileron so they match the angle of the ribs. Glue the hinge blocks in the wing and aileron.

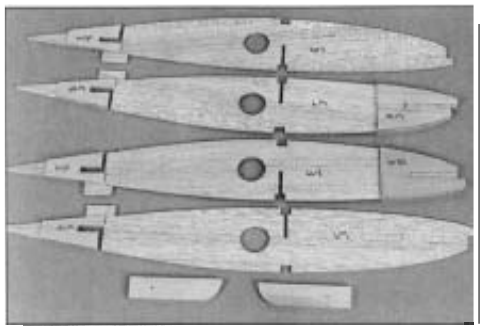
❑ ❑ 22. Use a bar sander and 80-grit sandpaper to sand the sheeting, spars and LE so they are flush with root rib W2 and tip rib W14.

❑ ❑ 23. Mark the locations of the aileron hinge slots on the outer wing TE and the aileron LE, so you will know where to cut the hinge slots after the wing and aileron are sheeted. Mark the location of the flap hinge blocks the same way.

❑ 24. Return to step 1 on page 24 and finish the left wing panel.

BUILD THE CENTER SECTION

❑ 1. Position the center section wing plan (which is attached to the right wing plan) over your building board and cover the plan with wax paper.



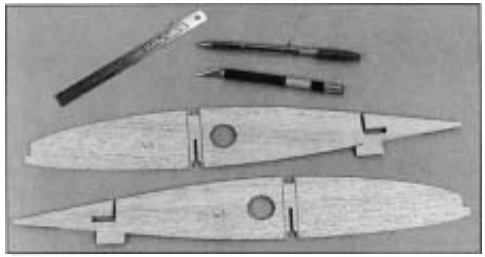
❑ 2. Use thick or medium **CA** to glue two die-cut 118" plywood **dowel rib doublers W1D** and one **bolt plate rib doubler W1P** to the sides of the die-cut 118" balsa ribs **W1** as shown on the plan. Pay careful attention to which sides of the ribs the doublers are glued.

❑ 3. Glue two sets of 1/8" die-cut plywood **wing bolt plates** together to make two 114" plates.

❑ 4. Glue the 1/8" die-cut plywood **leading edge doubler (W21)** to the die-cut 1/8" plywood **center leading edge (W21A)** so the **bottoms** of the **notches** align. W21A is narrower than W21 so the top and bottom edges will be offset 1/16".

❑ 5. Test fit the wing bolt plate in the notches of the ribs where shown on the plans. Adjust the notches if necessary so the bolt plates fit.

❑ 6. Remove the balsa from both W1 ribs between the notches of the dowel doublers.



❑ 7. With a straightedge and a ballpoint pen mark two vertical lines 1/16" ahead of and behind the spar notches on the ***outside*** of both of the W1 ribs, that have only the W1P doublers glued to them. Use a sharp hobby knife to cut halfway through the balsa along the lines. This section of balsa will be removed to accommodate the spar joiners when it is time to join the wing.

❑ 8. Cut one 11" long piece for the **bottom center spar** and one 9-1/4" long piece for the **top center spar** from a 1/4 x 3/8" x 24" basswood stick. Pin **only the ends** of the 11" bottom center spar to your building board over its location on the plan. Do not stick the T-pins through the basswood spar but insert them in a crossed fashion over the spar to hold it to your building board.

*Now for the **fun** part. . .*

❑ 9. Fit the ribs onto the die-cut 1/8" plywood **center spar web W19.** Make sure the ribs go all the way down in the center spar web. Deepen the notches (in the ribs or the spar web) if necessary. Fit the assembly onto the bottom spar.

❑ 10. Join the die-cut 1/8" plywood **aft center spar W20,** the center leading edge assembly (W21 and W21A), the 9" top spar, and the wing bolt plates to the ribs. Make sure the ribs align with the plan.

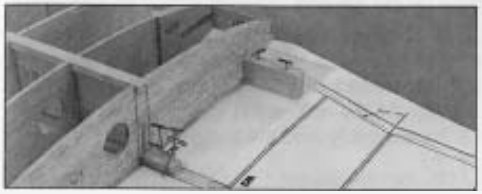
❑ 11. Pin small blocks of leftover balsa to the plan next to the W1 ribs, aligning them over the plan, and place weights on top of the ribs and spars to hold the jig tabs to the building board. Use a small square to make sure the W1 ribs are vertical.

❑ 12. Use medium or thin CA to glue all joints **excepting the top spar.** Do not use large amounts of **CA** and do not build up large fillets. This will make it easier to join other parts to the assembly. You will be reminded to reinforce all glue joints later.

❑ 13. Remove the top spar. Glue it back in place.

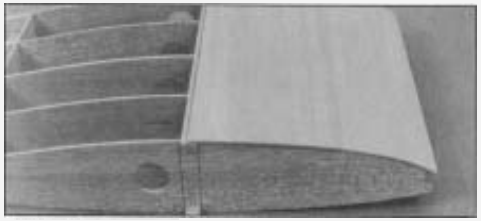
SHEET THE TOP CENTER SECTION

❑ 1. Sand the top of the leading edge, spars and ribs so they blend together. You may remove the center section from your building board if necessary, but pin it back down after you're done sanding.



❑ 2. Make sure the center section accurately aligns with the plan. If necessary, pin two more balsa blocks to the building board near the fronts of the ribs.

❑ 3. Use two 3/32" x 3" x 30" balsa sheets to make one 7" x 9" forward top center section wing skin and one 11" x 9" aft top center section wing skin.



❑ 4. Sand the sheets so they are flat and smooth. Trim the forward skin so the aft edge aligns with the center of the top spar and the front extends past the LE by approximately 1/8". If you find it necessary, wet the top of the forward top skin first, before gluing it to the center section of the wing. *You're an expert at sheeting now, so this should be easy.*

❑ 5. Trim the aft skin so the front edge joins the forward skin and the aft edge extends past the ends of the ribs 1/2". Trim the ends of the aft top skin so it extends past the W1 ribs by approximately 1/16" to allow for sanding later.

❑ 6. Glue the aft skin to the center section.

❑ 7. After the glue dries, remove the center section from the plan. Trim, then sand the bottom spar and the top sheeting flush with the end ribs. **Do not** sand off the tabs on the ends of the aft spar W20. They will key into ribs W2 and align the outer panels with the center section.

❑ 8. Remove the jig tabs and sand the bottoms of the ribs and spars so they all blend together. Bevel the trailing edge of the top sheeting the same way you did for the outer panels.

1/8"

1/4" HOLES

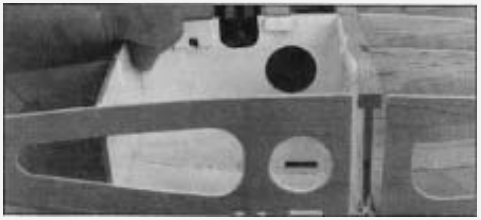
❑ 9. Drill 1/4" holes through the LE of the center section **(W21A)** where shown on the sketch. Slightly round one end of both 1/4" x 2-1/2" **wing dowels.** Test fit, then glue the wing dowels into the center section with 30-minute epoxy.

❑ 10. Reinforce all glue joints that don't look strong. **Do** not build up any glue fillets where the dihedral braces will be fitted.

Beech Fact: The T-34 evolved from the Beech designated Model 45 which began as a converted A35 Bonanza. Although Walter Beech did experiment with the V-tail for military purposes, he thought that the conservative military would prefer the conventional straight tail which is what emerged for the final design. It is named the ***Mentor.***

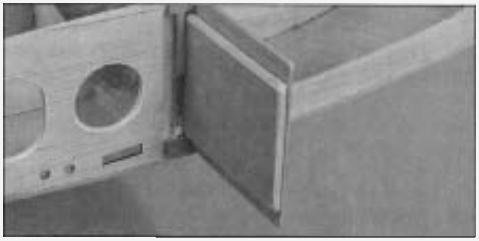
PREPARE THE BOTTOM OF THE WING FOR SHEETING

❑ 1. If you are installing retracts, build a *partition* on both wing panels from leftover 3/32" balsa to seal the wing aft of the wheel well compartment. Fuelproof the *nooks and crannies* of the wheel well inside the wing that you will not be able to reach after the bottom sheeting is in place. You can see the partitions in the following photo.



❑ ❑ 2. Remember where you cut **partway** through ribs W2 on both wing panels 1/16" ahead of and behind the spar notches? Use a hobby knife or a fine razor saw to cut the rest of the way through rib W2 on the right wing panel and remove the balsa within the area you cut.

❑ ❑ 3. Cut away the portion of balsa on rib W1 between the spars on the right side of the **center section** the same way.



❑ ❑ 4. Test fit the die-cut 1/16" plywood **dihedral braces W23** and the die-cut 1/8" plywood **dihedral braces W22** in the outer wing panel. If necessary chamfer the corners of the braces to accommodate small glue fillets in the wing. **Note:** Make certain you fit the braces *right side up* the same as the dihedral of wing.

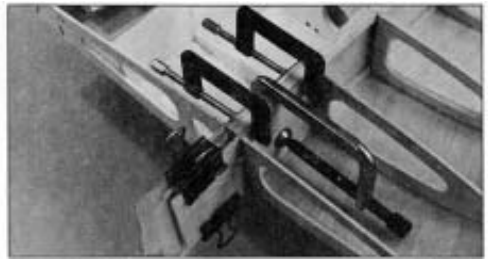
❑ ❑ 5. Temporarily join the center section to the right wing panel with the dihedral braces to make sure everything fits. Make adjustments where needed so the center section fully contacts the right panel. Separate the wing sections and remove the dihedral braces.

Read the following five steps before you actually use any glue so you understand the procedure and can gather the items you will need.

❑ ❑ 6. Mix a batch of 45- or 30-minute epoxy. Spread a film of epoxy in the outer wing panel everywhere it contacts the dihedral braces. Spread a film of epoxy on the 1/8" and 1/16" ply dihedral braces **except where they will contact the center section** wing panel. Fit the dihedral braces into the right wing panel. **Make certain you fit the braces *rjght side up.***

❑ ❑ 7. Remove excess epoxy from the parts of the dihedral braces that will contact the **center section.**

❑ ❑ 8. *Set* the dihedral braces by **temporarily** joining the center section to the right wing panel. Clamp the dihedral braces **to the right wing panel only.** Carefully remove the center section and wipe away excess epoxy with a paper towel.

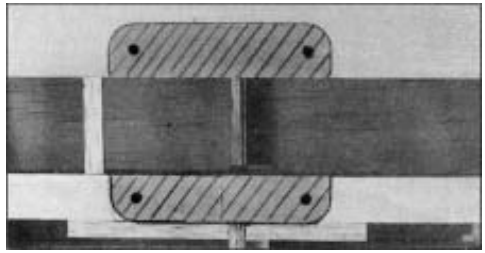


❑ ❑ 9. Insert two approximately 2" x 2" pieces of wax paper between the dihedral braces where they protrude from the right panel, then insert a piece of 1/8" balsa between the two pieces of wax paper. Clamp the outer 1/16" ply dihedral braces to the inner 1 / 8 ply dihedral braces.

❑ ❑ 10. Use small balsa sticks and small pieces of paper towel to wipe away all excess epoxy so it will not interfere with the center section when it is time to join it to the right wing panel.

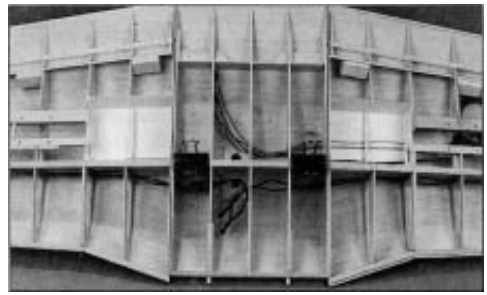
❑ ❑ 11. After the epoxy cures, glue W2 to the 1/16" dihedral braces.

❑ 12. Return to step 2 and glue the dihedral braces in the left wing panel.

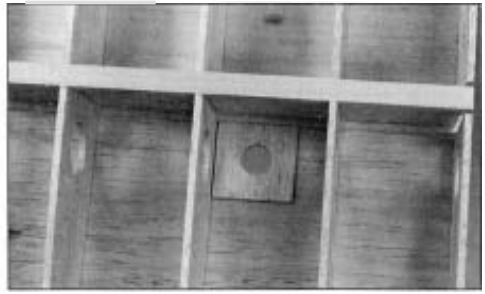


❑ 13. If you're installing retracts, glue leftover 3/16" or 1/4" balsa to the front of the forward landing gear rail and between the rails to support the sheeting. Use a ballpoint pen or a pencil (not a felt-tip pen) to trace the outline of the landing gear onto the rails so you know where **not** to apply glue when you glue on the bottom sheeting. Later, the sheeting over this area will be removed to accommodate the landing gear mounts.

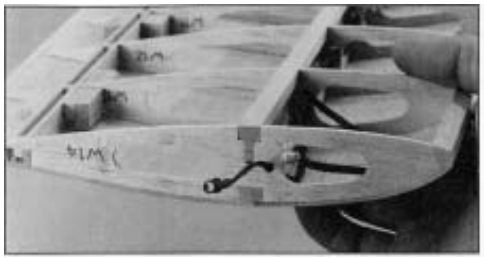
❑ 14. Cut holes and slots in the W1's on the ends of the center section to match the holes for the servo cords and retract air lines in the W2's of the outer panels. Cut the holes slightly oversize just in case they don't align perfectly.



We've temporarily joined the wing panels and installed the air lines and servo cords in the right wing panel to mock-up the installation to give you an idea of how to route them later. If you wish, you could test your installation now to make sure your setup will work.



❑ 15. Glue a piece of leftover 3/32" balsa to the center section sheeting aft of the spar (note the grain direction). Cut a 3/4" hole through the sheeting at this location for the servo cords and air lines to exit the wing into the fuse.



❑ 16. If you will be adding the optional lighting kit, route the wiring through the holes you drilled in the ribs. The red *light cover* goes in the left tip, and the green *light cover* goes in the right tip. If you have purchased the strobe lights in addition to the Top Flite Lighting Kit, route those wires too. Cut a hole in the center section sheeting ahead of the main spar for the wires and connectors to exit the wing.

❑ 17. Separate the wing panels and remove the servo cords and air lines but leave the tip light wires in both outer wing panels.

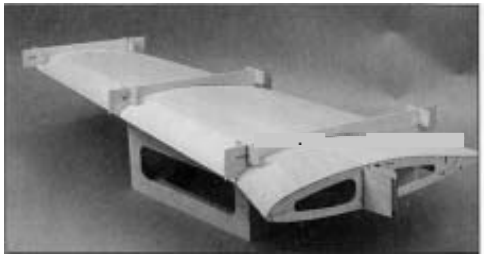
❑ 18. Sand the bottom of the outer wing panels with a bar sander and 150-grit sandpaper so the spars, landing gear and servo rails blend to the shape of the ribs.

Sheet the bottom of the wing panels

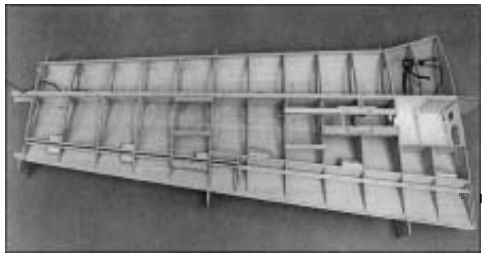
❑ 1. If you have not already done so, make the forward and aft bottom wing skins the same way you made the top wing skins on page 21.

❑ ❑ 2. Use a ballpoint pen to mark the top sheeting over ribs W14, W9 and W4 at the leading and trailing edges.

❑ ❑ 3. Test fit the die-cut 1/8" balsa **wing cradles W14C, W9C and W4C** on the top of the wing, aligning them with the marks you made. Sand away any slivers or slight die-cutting irregularities until the cradles match the contour of the wing.



❑ ❑ 4. Glue the die-cut 1/8" balsa ***feet*** to the cradles. Apply one drop of thick or medium CA near the front and rear of each cradle and tack glue them to the top wing sheeting in their proper locations. You only need enough glue to hold the cradles to the wing so they won't fall off when you turn it upside down.



❑ ❑ 5. Place the wing on your workbench so it is resting on the cradles. Trim the *stoppers* on the cradles so the trailing edge of the bottom sheeting aligns with the trailing edge of the top sheeting and the front edge of the sheeting *ends* at the center of the spar (the same way as the top sheeting).

❑ ❑ 6. Glue the aft bottom skin to the wing. Use T-pins or weights to hold the skin in place until the glue dries. **Caution:** Do not add too much weight because this may bow the wing.

❑ ❑ 7. Test fit, trim, then glue the forward **outer** skin to the wing panel. Just the same as the top forward outer skin, the wood grain should be parallel to the **leading edge** of the wing panel.

❑ ❑ 8. Use the remainder of the 3/32" x 6" x 30" balsa sheet you used for the forward **inner** top skin to make a forward inner bottom skin. Test fit, then glue the skin to the wing panel.

❑ ❑ 9. After the glue dries remove any T-pins you may have used and take the weights off the wing panel. Trim all the sheeting so it is even with the tip and root ribs and the leading and trailing edges of the wing.

❑ ❑ 10. If you are installing fixed landing gear, use the plans as a guide to poke holes through the wing skin with a pin until you locate the groove in the landing gear rail. Remove a strip of balsa from the groove just long enough to accept the landing gear wire. Use the **nylon straps** as a template to mark holes in the sheeting for the #2 x 3/8" screws. Drill 1/16" holes at the marks and Test fit the landing gear to the wing with the straps and screws as shown on the plan. Remove the landing gear.

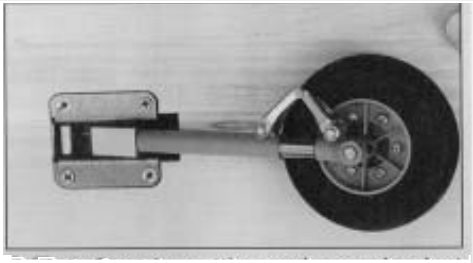
Note: The nylon straps should be inset into the balsa skin so that they are secured to the basswood landing rail.

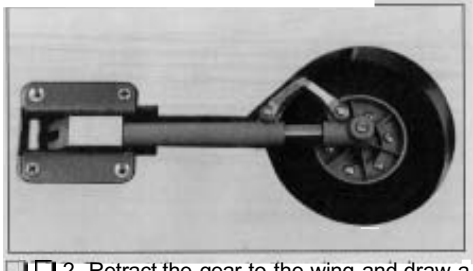
❑ 11. Set the right wing panel aside and sheet the bottom of the left wing panel the same way.

Beech Fact: Beech also manufactures jet aircraft including the 400A/400T *Beechjet* (their only production turbo fan, purchased from Mitsubishi in 1986 and fitted with a new Beech interior and larger fuel capacity); and a few turboprops including the Model 1300 Airliner, Model 1900D and the Model 1900C; and of course, the Model 2000/2000A *Starship* featuring a canard front wing, pusher turboprop engines and composite construction.

Perform these steps only if you are installing retracts.

CUT OUT THE WHEEL WELLS

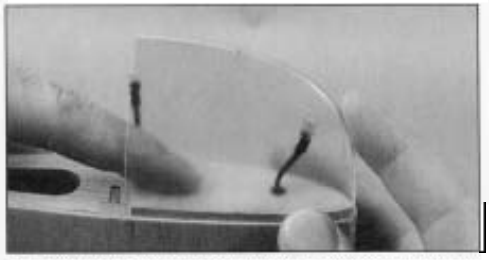




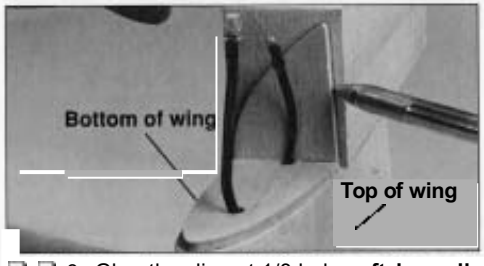
❑❑ 2. Retract the gear to the wing and draw a rough outline of the wheel onto the sheeting. Cut the sheeting within the outline. Retract the wheel again and draw a more accurate outline. Cut the sheeting until the wheel fully retracts into the wheel well, leaving at least 1/8" clearance between the wheel and the sheeting (in case you *tweak* your landing gear on one of those bumpy landings).

BUILD THE WING TIPS

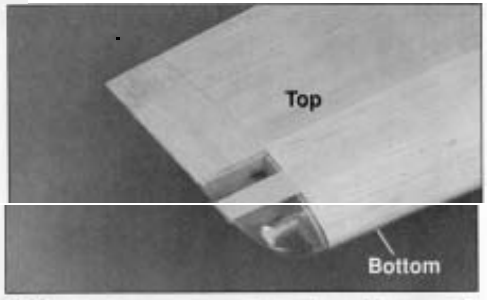
❑❑ 1. Cut the molded clear plastic **right wing tip lens** along the cutlines. If you are installing the optional lighting kit, drill holes in the die-cut 1/8" balsa **tip lens rib W14T** for the lighting wires to pass through.



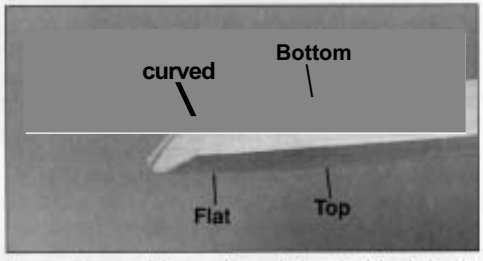
❑❑ 2. Align W14T with W14 so the edges of the lens are flush with the wing sheeting. Glue W14T to W14 in this position.



❑❑ 3. Glue the die-cut 1/8 balsa **aft lens rib** WT1 to the aft edge of WT14 Position the 1 1/2" x 2 1 / 8 x 6" balsa wing tip block on the wing tip and trace the outline of the wing onto the block.



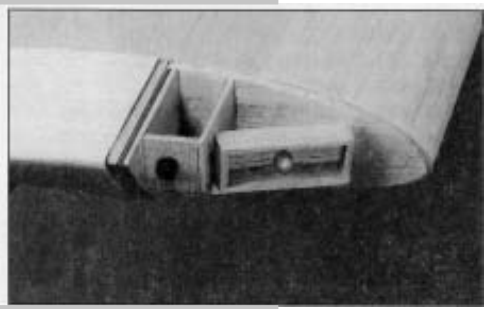
❑❑ 4. Read the note below and roughly carve the wing tip block to fit the wing tip. Glue it to the wing tip and sand it to the final shape. When you near the final shape of the tip block, tape the tip lens to the wing tip and shape the tip block to match the lens. To avoid scratching the lens with your sandpaper, cover it with masking tape.



Note: The **trailing edge** of the tip block is the same width as the trailing edge of the wing and does not taper. This means that the shape of the tip block *changes* from the TE where it is **flat** to WT1 where it is **curved.** This gives the wing tip a concave appearance. **Proceed slowly** and inspect your work frequently as you *zero-in* on the final shape.

❑❑ *5.* Shape the leading edge of the wing as shown on the cross section on the wing plan and blend it to the wing tip lens.

Perform this step only if you are installing wing tip lighting.



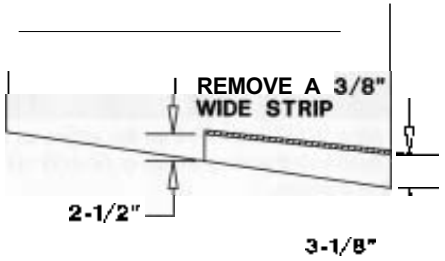
❑ 6. Use the templates on the wing plan to make the **reflector bracket** from leftover 1/16 balsa. Drill a small hole through the part of the braces that hold the lenses in your lighting kit so they ***snap*** in. Do not fit the lenses until after you paint the pieces. Glue the ***brackets*** to the wing tip as shown on the plan. Paint everything inside the wing tip lens to match the color scheme you have chosen. On our prototype we painted the insides white. Tape the wing tip lens to the wing to protect the lights while you work on the rest of the wing.

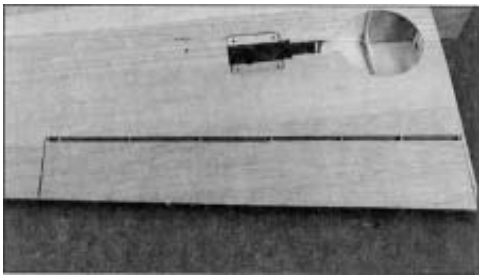
❑ 7. Return to step 1 on page 31 and build the wing tip on the left wing panel plan.

BUILD THE FLAPS

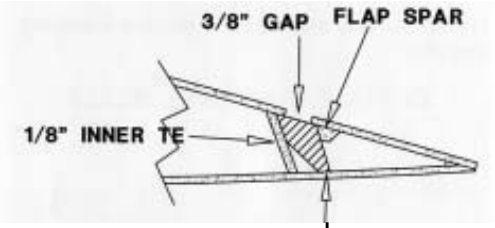
Skip this section if you are not building flaps.

❑❑ 1. Use a fine razor saw to cut only the **ends** of the flap from the wing along the holes you poked in the top sheeting.



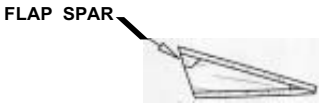


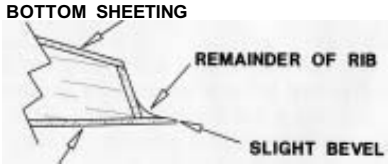
❑❑ 2. Use a ballpoint pen to lightly mark the flap on the bottom of the wing as shown in the sketch. Remove the 3/8 strip of sheeting from the bottom. This will expose the ribs so you know where to cut them to separate the flap from the wing.



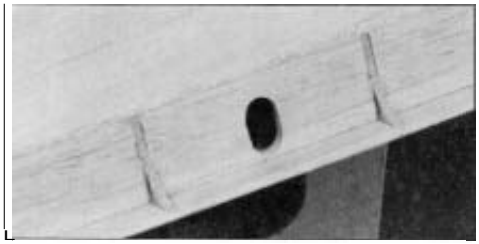
CUT THE TOP SHEETING IN THIS AREA

❑❑ 3. Use a razor saw to cut through the ribs and top sheeting as shown in the sketch.



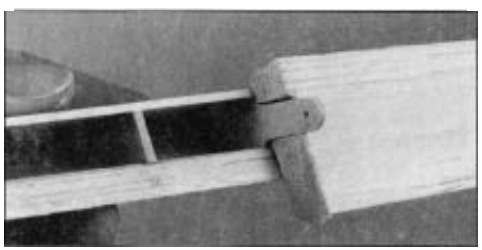


❑ D 4 . Trim the TE of the wing in the flap area and the LE of the flap as shown in the sketch. A 3/4" dowel wrapped with 150-grit sandpaper can be used to round out the rib stubs.



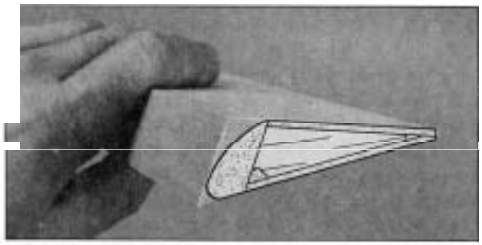
❑ ❑ 5. Cut a hole in the inner wing TE for the flap horn at the location shown on the plan. The hole should be **biased** toward the top of the wing.

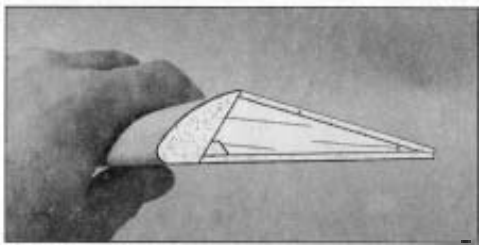
❑ ❑ 6. Place the flap over the plan and mark the location of the die-cut 1/16" ply **flap horn.** Fit but do not glue the flap horn into the flap. **Note:** Each flap has a different location for the flap horn so make sure you use the correct wing plan for the flap you are working on.



❑ ❑ 7. Cut the 5/8" x 1-318" x 18" balsa **flap LE** into two pieces that fit on both sides of the flap horn. Cut a 1/16" notch in the longer LE to accommodate the flap horn. Glue the LE to the flap so the top edge is flush with the top of the flap.

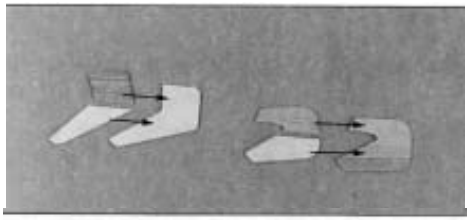
❑ ❑ 8. Remove the flap horn. **Temporarily tack glue** the short flap LE to the flap with **a few drops** of thick or medium CA. Sand the ends of the flap LE so they are even with the ends of the flap. Sand the top and bottom of the flap LE flush with the top and bottom of the flap.

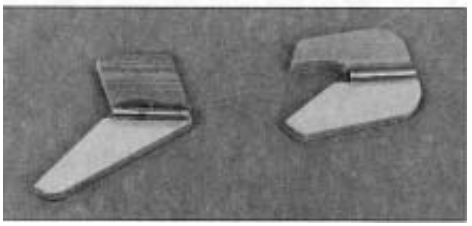




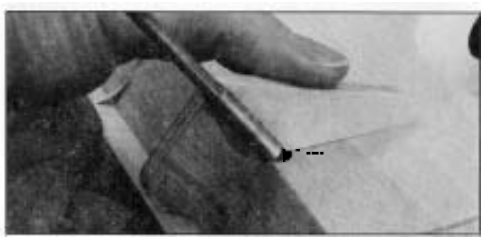
❑ ❑ 9. Cut the flap **root and tip end templates** from the plan. Glue them to the ends of the flap with rubber cement or spray adhesive. Use the templates as a guide to shape the flap LE with a razor plane or a hobby carving knife followed by a bar sander.

❑ ❑ 10. Drill a 1/16" hole through the punch mark in the front of the flap horn for the clevis. Add a few drops of thin CA to the hole. After the CA hardens redrill the hole. Remove the flap LE you tack glued on. Insert the flap horn into the flap and securely glue it in place. Permanently glue the flap LE to the flap.





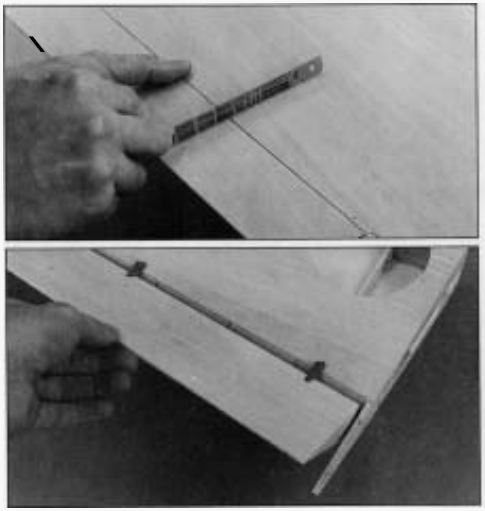
❑ ❑ 11. Assemble the die-cut 1/8" plywood **flap hinge drill guides** by gluing the pieces together as shown. **Optional:** Glue a piece of 7/32" brass tubing (3/16" I.D.) to the hinge drill guides to guide your drill even better.



❑ ❑ 12. Position the **wing** flap hinge drill guide on the wing over each hinge block (you marked them before you sheeted the bottom of the wing) and drill 3/16" holes for the Hinge Points. **Hint:** Instead of using a drill bit, use a piece of 3/16" brass tube sharpened at one end to drill holes with clean edges.

❑ ❑ 13. Insert three #309 Robart Super Hinge Points into the holes in the wing but do not glue them in. Fit the flap to the wing and mark the locations of the hinge points on the flap.

❑❑ 14. Use the **flap** hinge drill guide to drill holes in the flap the same way you did for the wing.

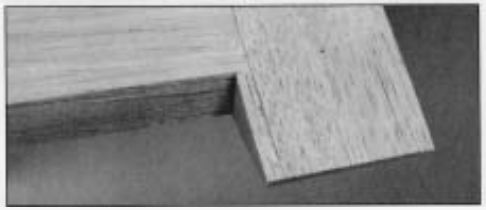


❑❑ 15. Cut 1/4" off the end of the outermost hinge point that fits into the flap. Test fit the flaps to the wing with the hinge points. Adjust the position (depth) of the hinges until the flap aligns with the wing the same way it was before you cut it loose. Make adjustments until the flap fits the wing and freely moves about its range of motion. Strive for a good fit where the top of the flap meets the top of the wing.

❑ 16. Return to step 1 page 32 and mount the other flap to the wing the same way.

BUILD THE AILERONS

❑❑ 1. If you have built flaps remove them from the right wing panel. Use a razor saw to separate the aileron from the wing by cutting between the LE of the aileron and the TE of the wing. Refer to the plans to find the location of this gap and poke a pin through the sheeting to verify you have found the gap. Use the razor saw to cut the ends of the aileron from the wing along the holes you poked in the top sheeting.

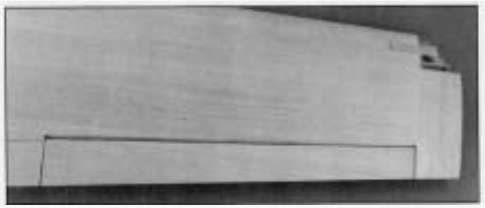


❑❑ 2. Sand the sheeting and the *rib stubs* on the wing even with the TE. Glue a piece of leftover 3/32" balsa to the wing tip rib. Sand it to the shape of the wing.

❑❑ 3. Sand the sheeting and the *rib stubs* on the aileron even with the LE and the tips. Glue the die-cut 1/8" balsa **aileron leading edge (W17A)** to the front of the aileron. Sand the leading edge flush with the ends and top and bottom of the aileron sheeting.

❑❑ 4. Use the *Straightedge and T-pin technique* to mark a centerline on the wing TE and the aileron LE. Cut the hinge slots where shown on the plan. Test fit the aileron to the wing with the hinges. Adjust any hinge slots if necessary so the aileron and wing align. Sand the tip of the aileron so there is about a 1/16" gap between the end of the aileron and the wing tip.

❑❑ 5. Bevel the leading edge of the aileron to a " V using the centerline as a guide. The bevel must permit the full amount of aileron throw as specified on page 68, plus a bit extra to prevent servo binding.



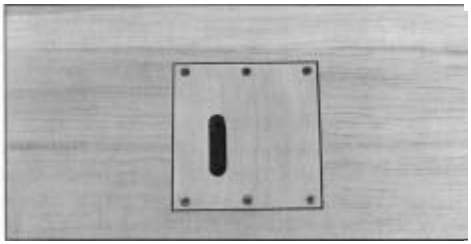
❑❑ 6. Replace the flap onto the wing. Adjust the root of the aileron and the tip of the flap so there is approximately a 3/32" gap between them.

❑ 7. Return to the first step and build the aileron on the left wing panel the same way.

MOUNT THE FLAP AND AILERON SERVOS

❑❑ 1. Cut the openings in the bottom of the wing sheeting for the die-cut 1/16" plywood **aileron and flap servo hatch covers** (if you're building flaps). Start by cutting a smaller opening at the location indicated on the plan. Carefully enlarge the hatch openings using a fresh #11 blade and a straightedge until the hatch covers fit. **Hint: As** you *zero-in* on the final shape of the hatch openings, use the hatch covers themselves as a template to cut the openings.

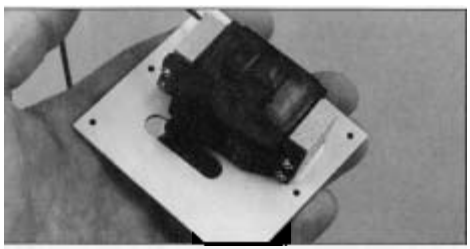
❑❑ 2. Drill 1/16" holes through the punch marks in the servo hatch covers. Place the hatch covers on the rails in the hatches and drill 1/16" holes through the hatch covers into the rails.



❑ ❑ 3. Enlarge the holes in the hatch covers only with a 3/32" drill bit. *Countersink* the holes for the #2 x 3/8 flat head screws with a countersink or other pointed tool. Test fit the hatch covers to the rails with the screws. If necessary, remove the hatch covers and sand the sides of the hatch covers so they align with the edges of the hatch. Note: Though the hatch covers are 1/16 thick and the wing sheeting is 3/32" thick, by the time you sand the wing sheeting smooth it will be the same height as the hatch covers. If not, you can raise the hatch covers by placing thin shims made from 1/64 plywood or thin cardstock on top of the rails.

❑ ❑ 4. Use 30-minute epoxy to glue the 5/16" x 3/4" x 7/8" servo mount blocks to the servo hatch covers as shown on the plan.

Note: You can increase the strength of this joint by drilling a few shallow 1/16" holes into the servo mount blocks. This will create epoxy pins that extend into the blocks.



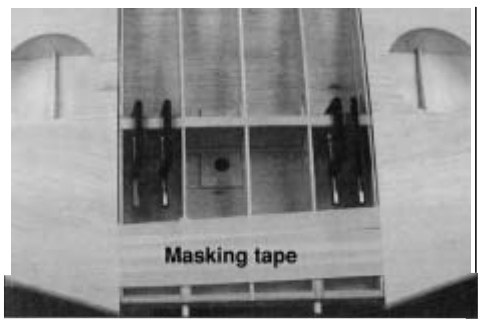
❑ ❑ 5. Mount your servos to the blocks with the screws included with your servos. Test fit the servo hatches in the wing and screw them down with the hatch cover screws.

❑ 6. Return to the first step and mount the flap and aileron servos in the other wing panel.

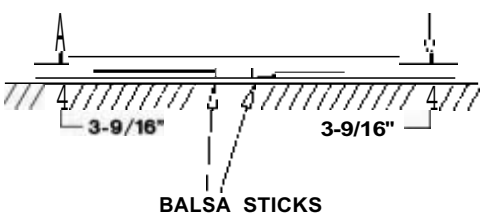
❑ 7. Glue leftover 1/16" balsa sheeting to the inside of the bottom sheeting around the wheel well cutout with the grain direction opposite that of the wing sheeting. This will reinforce the sheeting around the wheel well cutout.

❑ 8. Brush another coat of fuelproof paint inside the wheel wells while they are still easy to reach with a paint brush.

JOIN THE WING PANELS



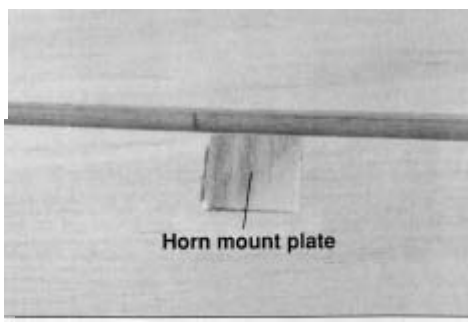
❑ 1. Remove the flaps. Test fit both outer panels to the center section. Make small adjustments if necessary to minimize any gaps you see. *Test fit* your clamps to make sure you have enough of them and to make sure you know where you are going to place the clamps when you actually glue the wing together.



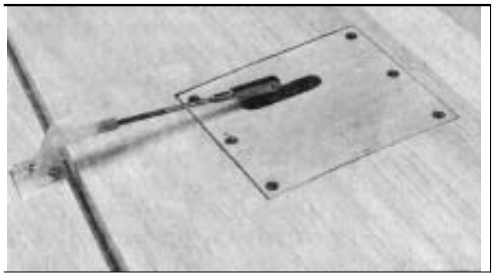
❑ 2. Optional: The dihedral braces and the *preset* angle of the root ribs on the outer panels will determine the dihedral in the wing. But if you wish to check the dihedral before you permanently glue the wings together, clamp the wing together, raise the center section off your workbench with balsa sticks of equal size (so the wing is not resting on the clamps) and measure the height of both wing tips. The height of both tips (measured under the bottom of the spar at tip rib W14) should be 3-9/16" (not including the balsa sticks). If the measured dihedral of both wing tips is within a range of 3-3/8" to 3-3/4", the dihedral is okay.

❑ 3. Mix a batch of 45 or 30-minute epoxy to join the wing panels to the center section. Apply epoxy to all the mating surfaces of the end ribs, spars and dihedral braces. If you have installed the wires for the wing tip lighting, pull the wires through the root ribs so you can route them into the center section. Join the outer panels to the center section and position your clamps. Wipe away excess epoxy with a paper towel before it cures and do not disturb the wing until the epoxy cures.

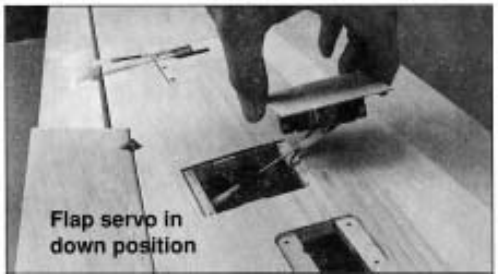
MAKE THE FLAP AND AILERON PUSHRODS



❑ ❑ 1. Cut a 1/8" deep notch in the aileron for the die-cut 1/8" plywood aileron horn mounting plate where shown on the plan. Glue the horn mounting plate to the aileron and sand it to match the leading edge.



❑ 2. Make the aileron pushrods from a .074" x 4 **threaded end rod** with a **nylon clevis** and a **solder clevis.** We recommend silver solder for the solder clevis. Drill 1/16" holes in the aileron horn mounting plate and add a few drops of thin CA to the holes and allow to harden. Mount a **control horn** to the aileron with two #2 x 3/8" screws and hook up the servo with the pushrod.



❑ ❑ 3. Thread another nylon clevis onto the end of another *.074* x 4" threaded end rod. Bend and cut the wire to the length shown on the wing plan for the **right** flap pushrod. Enlarge the holes in your flap servo arms with a hobby knife (or a #48 drill for perfection) and connect the flap pushrod to the servo arm using a nylon **FasLink".** Rotate the flap servo arm to the *down* position and set the flap hatch cover (with the flap servo and pushrod connected) over the flap hatch and guide the pushrod out of the hole in the TE.

❑ ❑ 4. Temporarily connect the clevis to the flap horn to see if the pushrod is approximately the correct length.

❑ 5. Connect the other aileron and flap pushrod the same way. Make final adjustments to the lengths of the pushrods when you set up your radio.

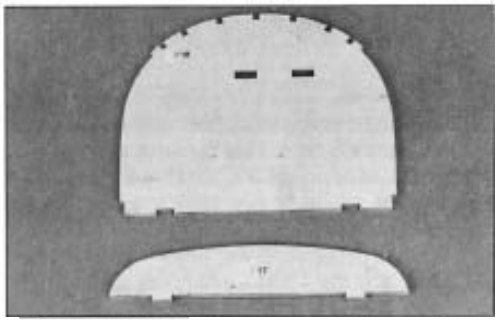
This is as far as we can go with the wing until it is fitted to the fuse. But first, we need a fuse, so.. *.build the fuse!*

BUILD THE FUSELAGE

PREPARATION

Note: The die-cut 1/8" plywood formers are stamped with only the necessaly portion of their name. For example, **F-2B** is stamped **28.** All die-cut parts are 1/8" plywood unless they are otherwise noted.

❑ 1. Position the bottom view of the fuselage plan over your flat building board. Cover it with wax paper. You may cut the bottom view from the rest of the plan.



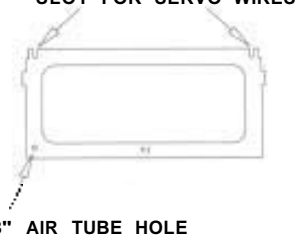
❑ 2. Use 30-minute epoxy to glue two die-cut 1/8" plywood **FIB's** together and **F1T** to the front of **F1DT** (there are two F1DT's included in the kit but only one is used). Clamp the assemblies to a flat table or board or lay weights on them with wax paper underneath. Inspect the parts closely before the epoxy cures to make sure they remain aligned. Wipe away excess epoxy before it cures. From now on the F1B assembly will be referred to as the ***firewall.***

❑ 3. Drill 1/16" holes through the punch marks in **F2D** and **F2** that are closest to the bottom of the formers. Glue F2D to the front of F2 with the holes aligned. After the glue dries, drill 5/16" holes through the punch marks. If you do not have a 5/16" drill bit you can start with a 1/4" hole and enlarge it to approximately 5/16" with a hobby knife or a round wood file. These holes do not have to be *exactly* 5/16" or perfectly round.

❑ 4. If you're installing retracts, drill 1/8" holes through the punch marks in the bottom of F6 for the air tank dowels and through the punch marks in F2 for the pull/pull nose steering cable guide tubes.

❑ 5. Drill 3/16" holes through the punch marks in the die-cut 1/8" plywood formers **F6** through **FII.** When you drill the holes press down on each former to prevent the wood from splitting when the drill bit goes through.

TYPICAL HOLES AND SLOTS FOR AIR TUBES AND WIRES



❑ 6. If you plan to install the Top Flite Beechcraft Bonanza Scale Interior Kit drill holes and cut slots in the formers for routing the air lines and servo wires between the fuse sides and the cockpit interior in formers F3, F4 and F5.