## *BUILDING NOTES*

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

**PLANS**

1. Fuselage Plan - The correct size of the rudder/fin tip block (BON9S08) is: 5/8" x 7/8" x 6-1/4"
2. Wing Plan - On the stab plan - change “S11AV” to F11AV”.

**MANUAL**

**1. Page 5, Operational lighting.** If you want to add wing tip strobe lights, use the RAM #1 (RAMQ2301) navigation light kit. It has three bulbs, flashing circuit board and a 9V battery connector. Use two of the bulbs for the strobe lights. Do not use the RAM #2 strobe light kit. It has only one bulb and you would need two of the kits.

**2. Page 56, step 4.** Add before the NOTE “When satisfied with the fit glue the tank floor into position.”

**3. Page 57, step 1.** Change “F3" to “F2.” Also note that the photo shows the forward blocks glued to F3, which is incorrect.

**4. Page 57, step 7**. Change F2A to F1A.

**5. Page 57, step 9.** Change F2A to F1A.

**6. Page 58, step 2.** Change “Phillips Head” to “Socket Head Cap Screw.” Also add the following note: **NOTE:** The photo above shows a hole being drilled Into the block glued to “F3.” The block is actually glued to “F2.”

**7. Page 58, step 17.** Change “along the cut lines” to “about 1/16" inside the cut lines.”

**8. Page 60, step 4.** Change “1" x 1-3/4" x 2"” to “1-3/8" x 1-3/8" x 1-1/2"”


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**9. Page 62, step 15.** Change “fuselage” to “cowl”
**10. Page 64, step (wing)1.** Add “as” after the word “such.”
**11. Page 68, step 10.** Add “sure” after the word “make.”
**12. Page 69, Control Throw Chart–Trim Mixing Section.** Change references to “Down” to “Up”

**IMPORTANT**
**Page 66 - BALANCE YOUR MODEL.**
The recommended initial balance point is 6-3/8" aft of the leading edge of the wing center section. Some modelers have reported that with larger more powerful engines, such as a .90 2-stroke or 1.20 4-stroke engine, that the model was overly sensitive in pitch. You should initially balance your model at 6" (5-3/4" with retractable landing gear) - even if you are using a smaller engine. Then, adjust the balance aft to obtain the handling characteristics you desire. Also - **DO NOT EXCEED THE RECOMMENDED CONTROL THROWS UNTIL YOU HAVE ADJUSTED THE BALANCE.**

**RETRACTABLE LANDING GEAR.**
The recommended retractable landing gear, Robart #630BNZ (ROBQ1620), have struts that can be adjusted for length. This is accomplished by loosening the bolt clamping the strut into the gear unit. The strut can then be adjusted to a longer length if needed. By adjusting the amount that the nose gear strut and main gear struts extend from the retract units, you may adjust the stance of the model as it sits on the gear (nose high attitude). You may then need to slightly move the main gear units on the mounting rails so that the wheels will fit in the retracted location shown on the plans.

# 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.

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### *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

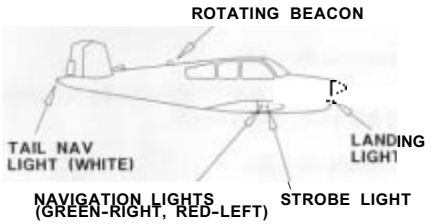
This model was designed to incorporate scale **flaps; however,flaps are optional are not necessary** for an excellent flying experience. Without flaps, the takeoff roll is longer and the landing speed is faster.

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)

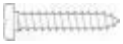
We also use 3M 320-grit or 400-grit wet-or-dry sandpaper for finish sanding.

# IMPORTANT BUILDING NOTES

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

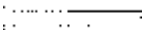
**Sheet metal screws** are designated by a number and a length.

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.

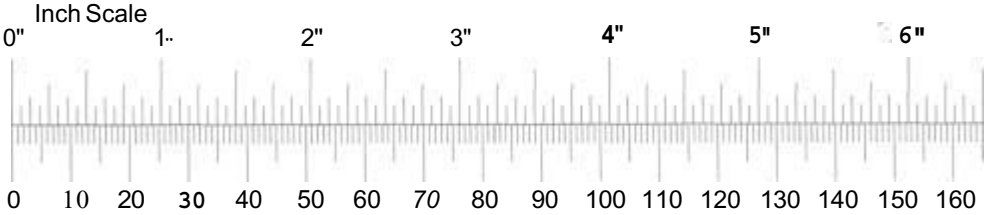
The cabin area is reinforced with 1/8 lite ply. While it is more than strong enough, I would recommend that you reinforce the area with some basswood rails along the bottom of formers F2, F4 and F6 across the width of the fuselage. We have included ample extra 1/4" x 3/8" basswood material for this purpose.

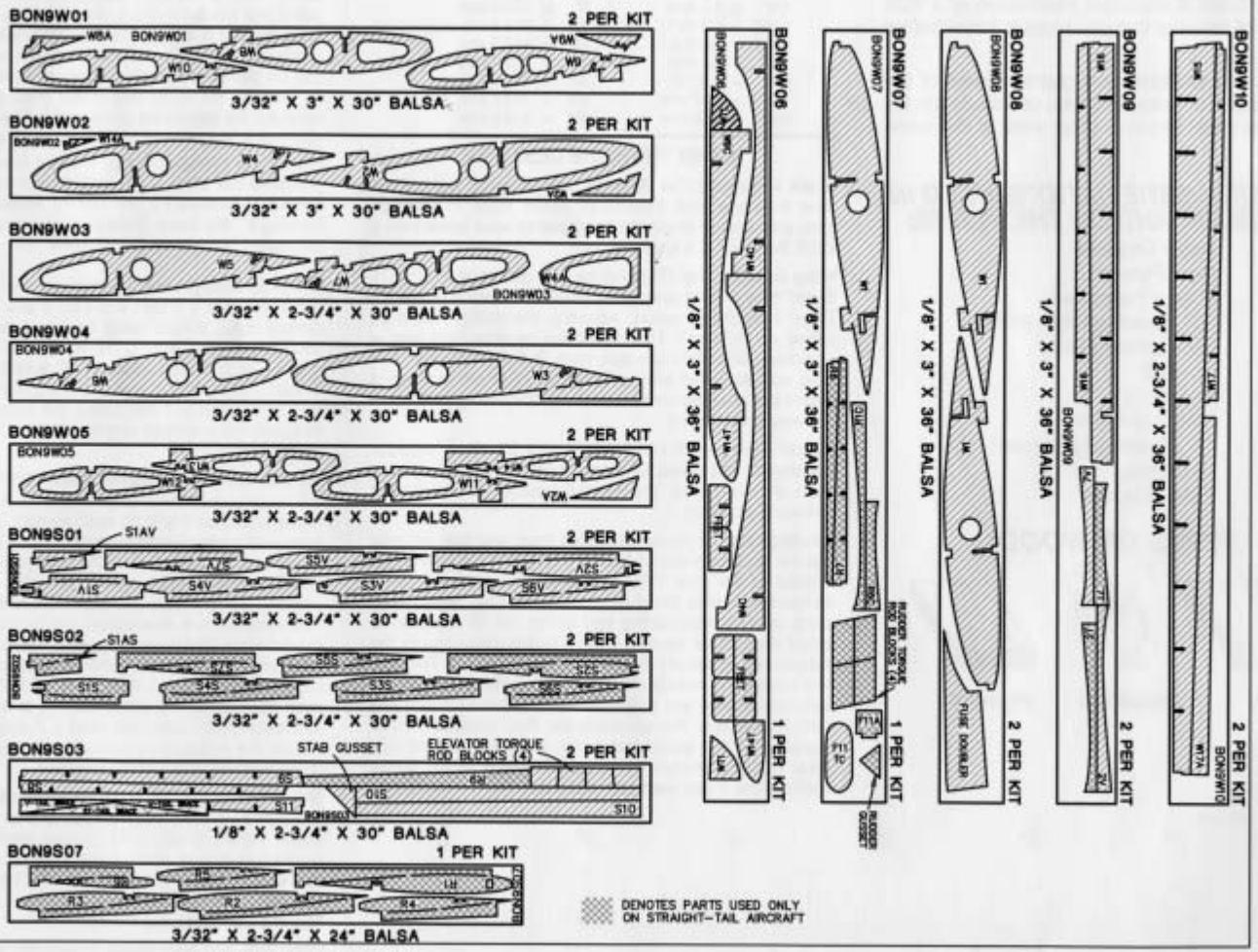
**V-Tail vs straight tail:** I personally feel that a Bonanza is not a Bonanza if it isn't a V-Tail. If you are intimidated by rumors about V-Tails being hard to build or difficult to fly, you shouldn't be. The V-Tail is easier to build and just as easy to fly. I, **on the other hand, was intimidated 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.

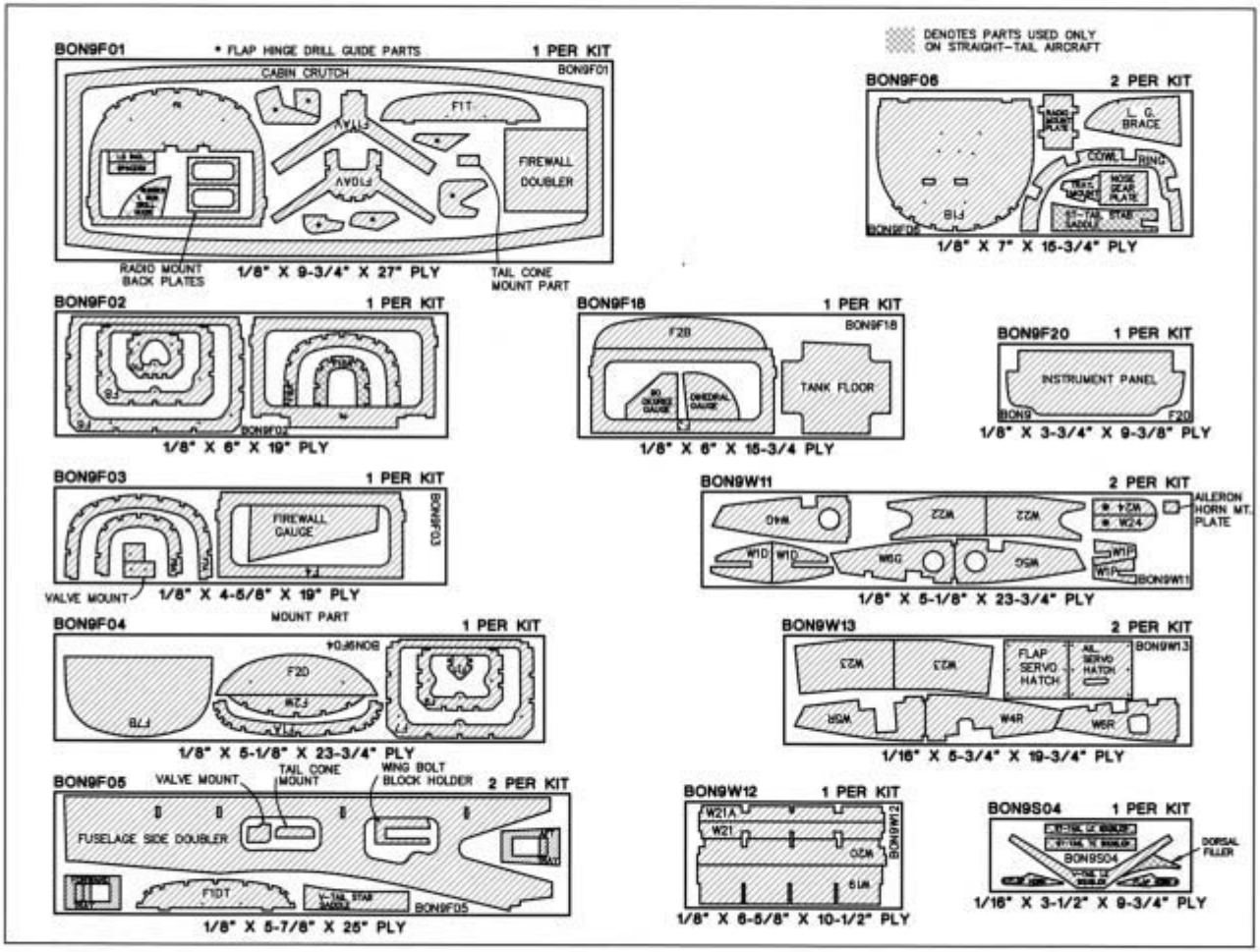
**Do You Need a Computer Radio?** NO!! A computer radio will simplify radio installation and allow full utilization of the ruddervators but it is in no way required. Simply connect the ruddervator servos together with a Y-cable and use them as elevators. Or use one of the many mixers available to obtain 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

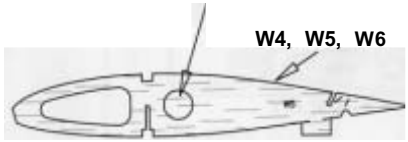

BON9F01
* FLAP HINGE DRILL GUIDE PARTS
1 PER KIT
CABIN CRUTCH
BON9F01
F1T
F1AV
F1OAV
FIREWALL DOUBLER
RADIO MOUNT BACK PLATES
1/8" X 9-3/4" X 27" PLY
TAIL CONE MOUNT PART
DENOTES PARTS USED ONLY ON STRAIGHT-TAIL AIRCRAFT
BON9F06
2 PER KIT
L.G. BRACE
COWL RING
NOSE GEAR PLATE
F1B
1/8" X 7" X 15-3/4" PLY
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

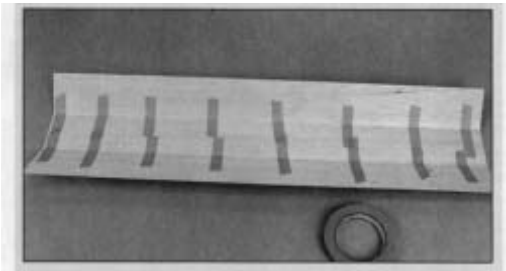
### *Make the skins for the tail surfaces*

❑ 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

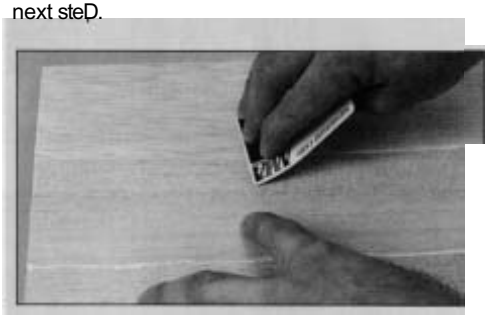
**HOW TO MAKE THE SKINS**

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.

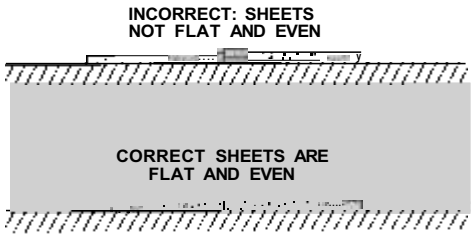


B. Tightly tape the sheets together with masking tape placed about every **4"** along the seams. The sheets will not lay flat because they are tightly taped together.

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.



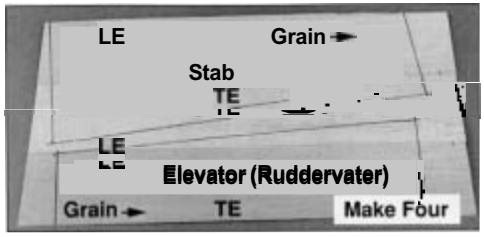

E. Press the joining edges of the sheets down with your fingers so they are flat and even. Place weights on top of the sheets to hold them flat.

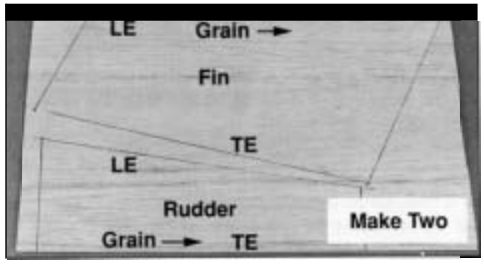
F. Squeegee the glue, press the seams flat, and place weights along the other glue joint. Let the glue dry.

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.

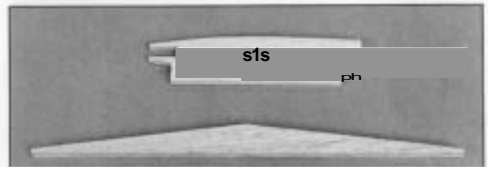
**Beech Fact:** Let's get it straight. All Bonanza 35's (that's A through V including the very first Bonanza–the ***35*** are V-tails. Models 33 through 33C are *Debonairs* (more on the *Debonair* in a later ***Beech Fact).*** Models 33E through G are straight tail Bonanzas, as well as the very last 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.



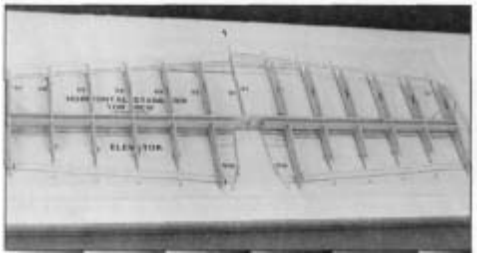

❑ ST2. Glue both die-cut *118"* balsa **straight tail LE braces** together and both die-cut 3/32" balsa **S1S ribs** together.

❑ 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.

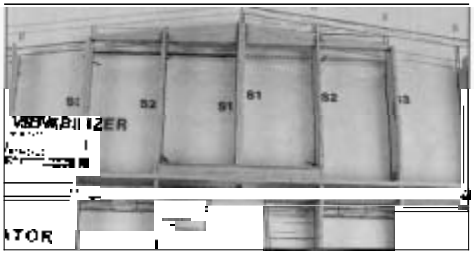
❑ ST5. Use the same method to align the TE spar and pin the rest of the ribs on both sides of the stab to your building board over the plan.

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



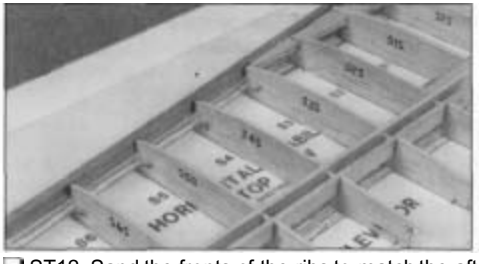
❑ ST7 Add botn d e-cut 1 8" balsa **elevator LE spars (S8)** to the assembly.

❑ 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.

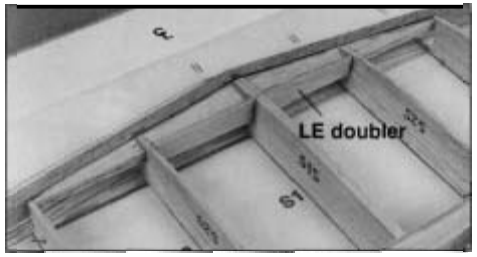


❑ ST10. Glue the die-cut 1/16 plywood **straight tail TE doubler** to **the front** of the TE brace (it's the one with straight edges).

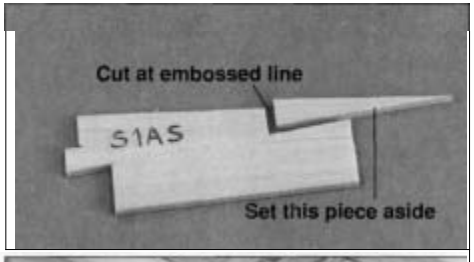
❑ STI1. Add the center rib S1S and glue it into position.

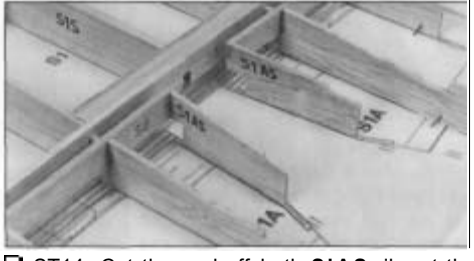


❑ ST12. Sand the fronts of the ribs to match the aft sweep of the leading edge. Cut two shaped 5/16" x 15" balsa **stab/fin leading edges** to a length of 13-314" and bevel the joining ends to match the plan. Glue them to the ribs and the LE joiner so the **top** is **even** with the **top** of the ribs.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



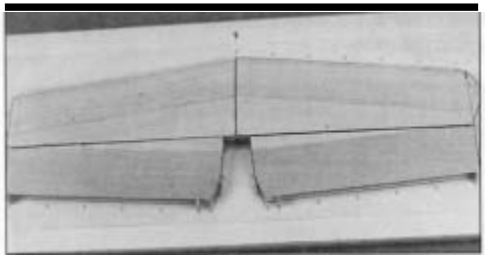
❑ ST14. Cut the end off both **SIAS** ribs at the embossed line and set those little pieces aside. They will be used later to glue the aft end of S1AS into position. Fit the to the elevator LE spars, pin them to the plan, and then glue them to the elevator LE spars.

❑ 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.

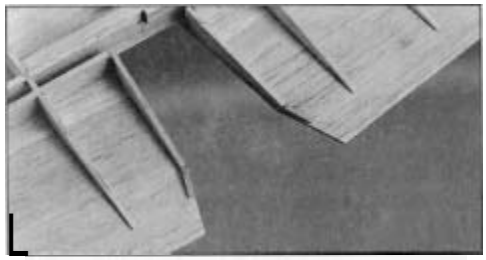


❑ ST18. Glue the elevator skin to the elevator. You can use CA for this step since the skin is small and easy to position. Make sure the trailing edge contacts the *stoppers* on the top of the jig tabs on ribs S7S and S2S.

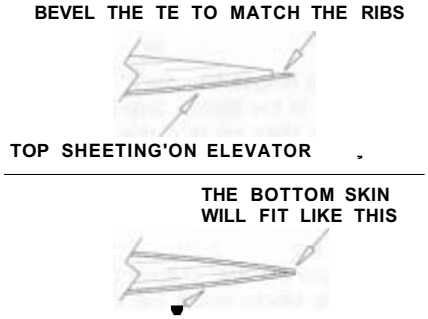
❑ ST19. After the glue has thoroughly dried, remove all the T-pins you can reach. **Carefully** lift the stab (with the elevators) from your building board. Trim the jig tabs from the ribs and take out the rest of the T-pins.

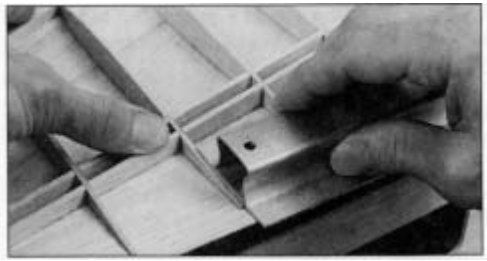
❑ ST20. Use a razor plane or a #1 1 blade to trim the **bottom** of the LE so it is the same size as the front of the ribs and matches the airfoil shape.

❑ 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.

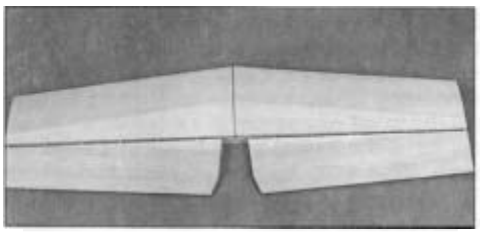
ST24. Glue four die-cut *1/8"* balsa **elevator torque rod blocks** between both sets of ribs S1AS and S2AS.

❑ 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.



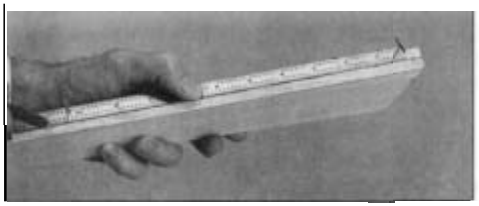
ST29. Glue the stab skins to the bottom of the stab. If you have not used any accelerator on the stab you may glue the skins on with thick or medium CA. Otherwise, use aliphatic resin. Work over a flat work surface and be careful not to add any twist into the stab as you press the skins to the stab frame. **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.

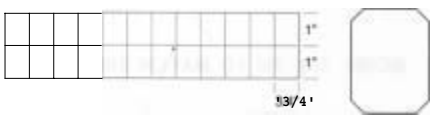
❑ ST33. Sand the stab TE's and the elevator LE's so they are even with the ends of the stab and elevators. Sand the stab TE and elevator LE's so they blend with the tips and skins.



❑ 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.

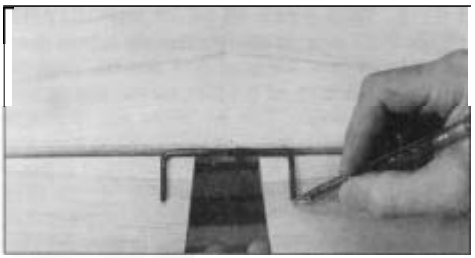
❑ ST36. Cut the hinge slots on the centerlines of the elevators and the stab where shown on the plan.




❑ 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.

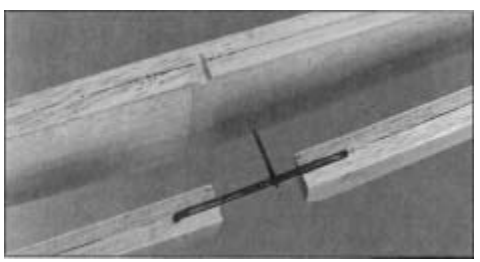
❑ ST39. Skip ahead to ***Make the stab tips*** on page 20 to make the tip blocks (the straight tail and V-tail tips are shaped the same way). When you're done, return to step ST40.



❑ 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

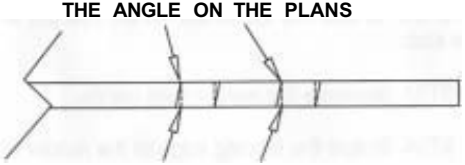
against the stab when the elevator deflects downward. Test fit the elevators to the stab, with the elevator joiner in place, and make adjustments if necessary.

**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*

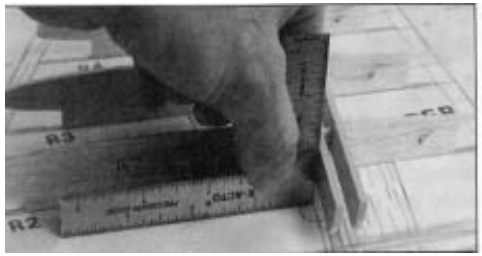
❑ ST1. Place the fin plan over your building board and cover it with wax paper.

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



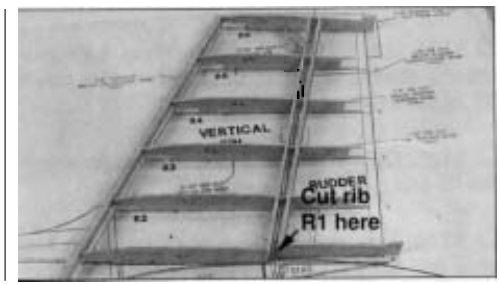
**ORIGINAL NOTCHES**

❑ 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.

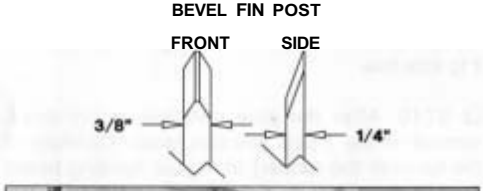
❑ ST13. Bevel the trailing edge of the left rudder skin the same way you did the stab.

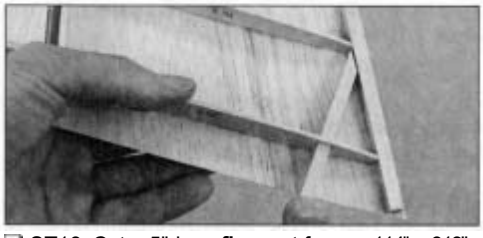
ST14. Glue the four die-cut1/8" balsa **rudder torque rod blocks** betweenR1A and R2 in the rudder.

❑ 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.

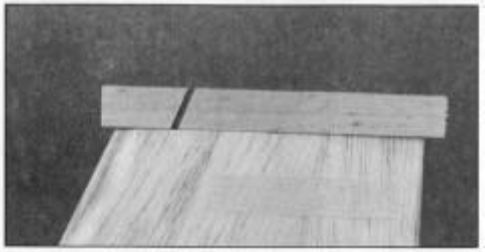
❑ ST25. Cut the **hinge slots** on the centerline of the fin and rudder where shown on the plan.

❑ 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.

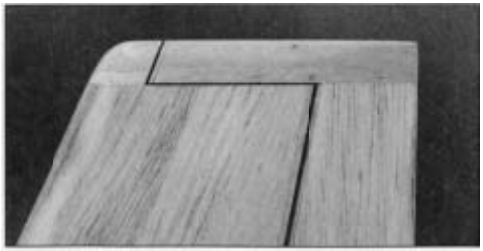
**Hint:** Stick a T-pin through the top of the rudder tip into the fin. This will hold the rudder tip while you shape it.

❑ 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.*

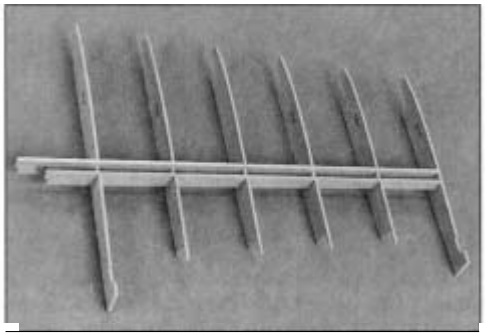
**Beech Fact:** At first, the *Bonanza* model existed only in the V-tail configuration. The original straight tail Beech, introduced in 1959, was named the *Debonair.* It was intended to be a less expensive, *bare essentials* model in the Beechcraft lineup to compete with Piper's Comanche and Cessna's 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

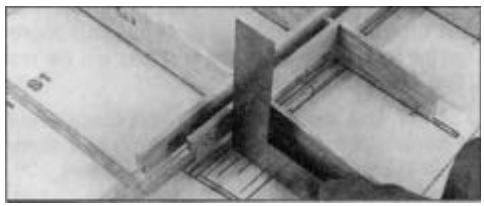
### *BUILD THE STABILIZER AND RUDDERVATORS*

*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.



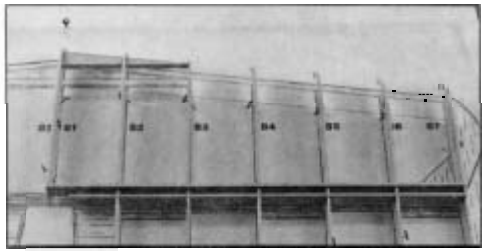
❑ ❑ V2. Test fit.the die-cut 3/32" balsa **stab ribs S2V** through **S7V** in the notches of the die-cut 1/8" balsa **stab TE spar (S9)** and the ***ruddervator*** **LE spar (S8).** Place the assembly over the plan.



❑ ❑ 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.



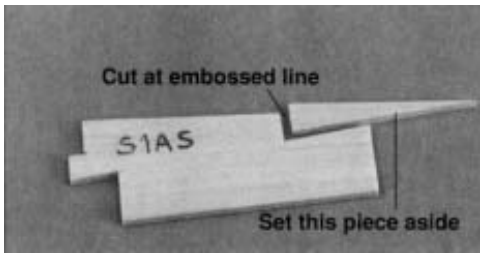
❑ ❑ V6. Glue two die-cut 1/8" balsa **V-tail LE braces** together. Place them in the notches of ribs S1V and S2V as shown on the plan.

❑ ❑ 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.



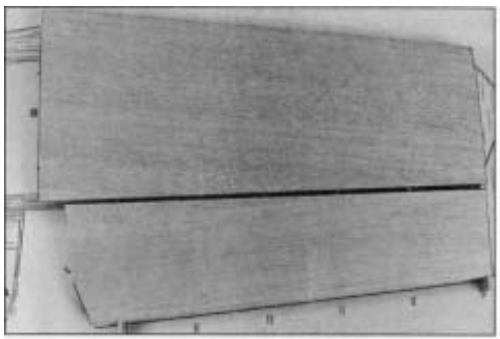

❑ ❑ V11. Cut the end off rib SIAV at the embossed line and set that little piece aside. Glue SIAV to the ruddervator LE spar over its location on the plan.

❑ ❑ 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.



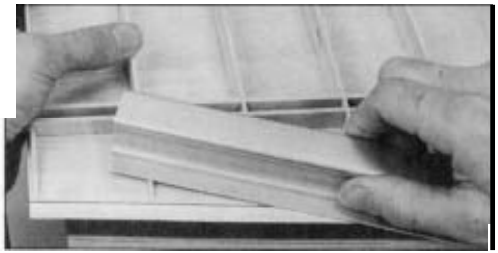
❑ ❑ V15. Glue the ruddervator skin to the ruddervator. You can use CA for this step since the skin is small and easy to posidon. Make sure the trailing edge contacts the *stoppers* on the top of the jig tabs on ribs S7V and S2V.

❑ ❑ 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.

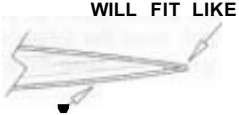


*For clarity we've drawn a line indlcating the bevel*

**BEVEL THE TE TO MATCH THE RIBS**

**TOP SHEETING' ON ELEVATOR**

**THE BOTTOM SKIN WILL FIT LIKE THIS**



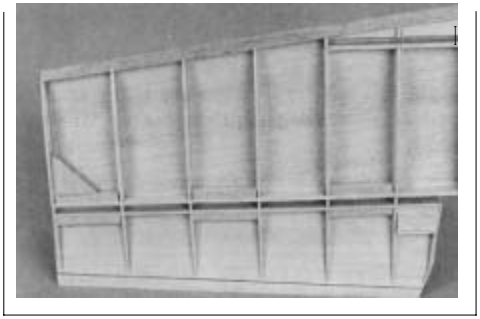
**TOP SHEETING**

❑ ❑ 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.

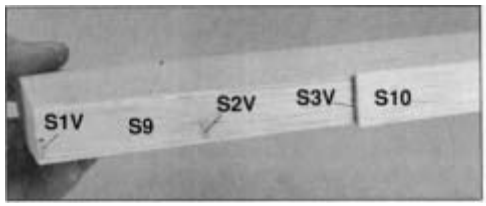
❑❑ V24. Trim the ruddervator torque rod block and any protruding hinge blocks so they are even with the bottoms of the ribs.

❑❑ 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.

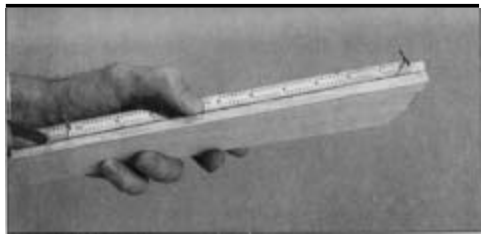
❑❑ V28. Cut the ribs and separate the ruddervator from the stab. Sand the excess sheeting and rib *stubs* from the TE of the stab and the LE of the ruddervator. Sand the root of the ruddervator sheeting flush with rib SIAV.




❑❑ 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.

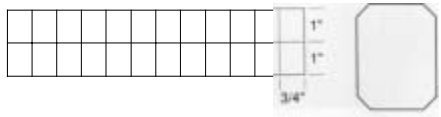
❑❑ V31. Glue a ruddervator **LE** (also **S10)** to the LE of the ruddervator and sand it so it blends with the skins and tips.



❑❑ 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.



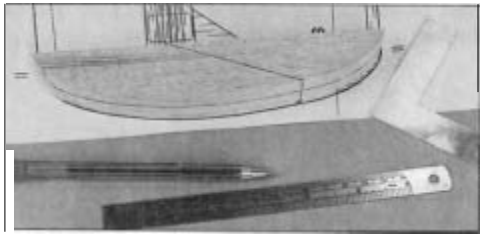

❑❑ V35. Cut three hinges as shown in the sketch from the 2" x 9" **CA** hinge strip. Snip the corners off the hinges so they go into the slots easier.

❑❑ 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*

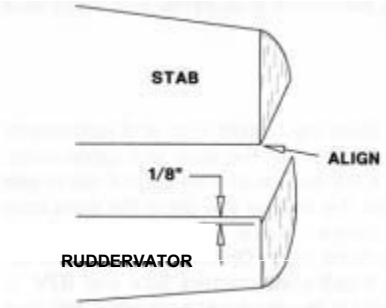
❑❑ 1. Securely tape the ruddervator (or elevator if you're building the straight tail) to the stab with masking tape on both sides. Sand the ends of the stab and ruddervator so they are even.

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

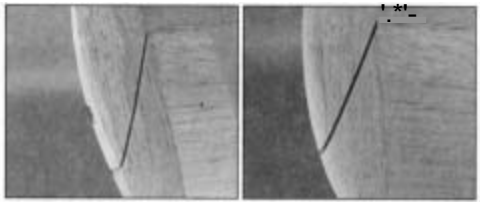


❑❑ 3. Place the stab tip block over its location on the plan. Mark where the ruddervator tip meets the stab tip on both sides of the block.

❑❑ 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.

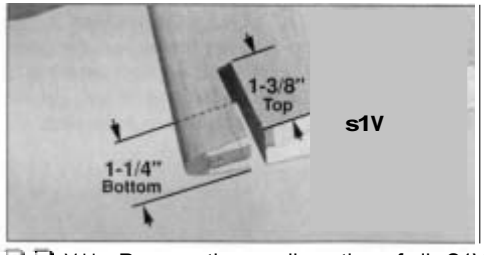
❑❑ 7. Shape the stab LE as shown on the plan.

❑❑ 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.

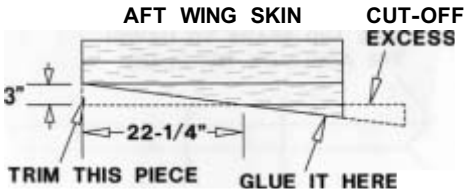



❑❑ V11. Remove the small section of rib S1V between the LE brace and the sub spar. Now you should have a slot in the stab like the one in the photo.

*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.

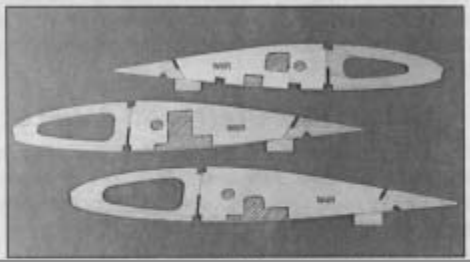
## *PREPARATIONS*

❑ 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.

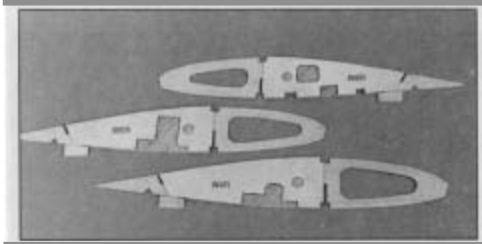
***Perform steps 2 through 6 if you are installing retractable landing gear.***

**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.

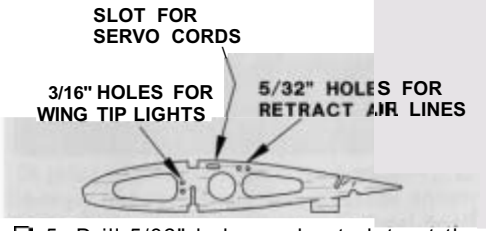


❑ 2. Prepare a set of **right** wing ribs by using 30-minute epoxy to glue the die-cut 1/16" plywood **retract landing gear rib doublers W4R, W5R and W6R** to the die-cut 3/32" balsa **ribs W4, W5 and W6 exactly** as shown in the photo. Make sure the doublers are on the side of the ribs as shown in the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

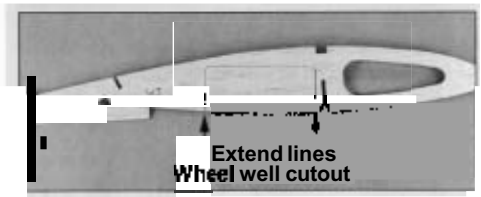


❑ 3. Prepare a set of **left** wing ribs the same way but **use the photo above** to make sure you glue the doublers to the correct side of the ribs.

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



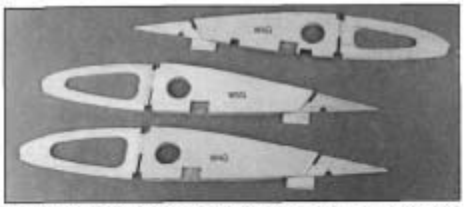

❑ 5. Drill 5/32" holes and cut slots at the locations suggested in the sketch in both sets of ribs W2, W3 and W4 for the retract air lines and servo cords. Make the slots large enough so the connectors on the ends of your servo cords will pass through. If you will be installing lights in the wing, drill 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.



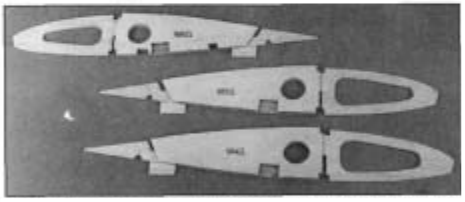

❑ 6. Use a ballpoint pen to extend the die-cut wheel well cutout in both W3 ribs. Cut partway through the rib along the line so the cutout will be easier to remove later.

**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.

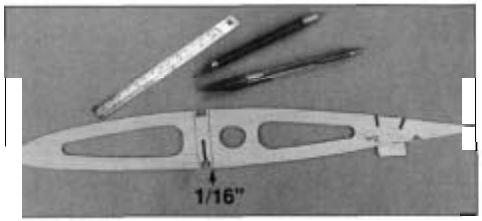


❑ 8. Prepare a set of **left** wing ribs the same way but **use the photo above** to make sure you glue the doublers to the correct side of the ribs.

❑ 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.



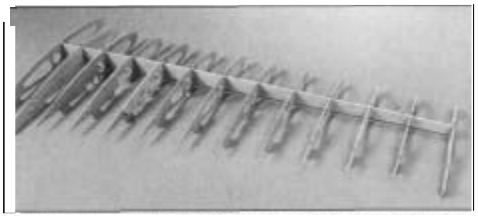

❑ 11. Use a straightedge and a ballpoint pen to mark a vertical line 1/16" from the front and back of the spar notches in both **W2 ribs.** Use a sharp hobby knife to **lightly** cut halfway through the balsa along the lines. You will remove this section of balsa to accommodate the spar joiners when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

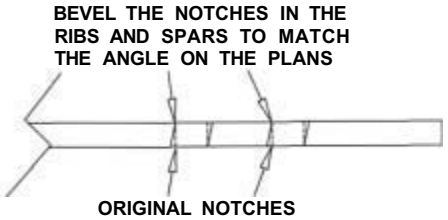
*Build the **right** wing panel first so your progress matches the photos.*

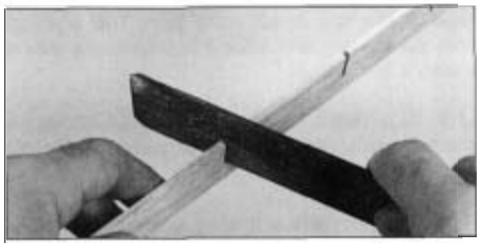
❑❑ 1. **Do not use any glue until step 8.** Pin a 1/4" x 3/8" x 36" balsa **bottom spar** over its location on the plan so the root end extends past the dashed line by about 1/8". Stick the pins through the spar at an angle so they will not interfere with the spar web when you position it in the next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



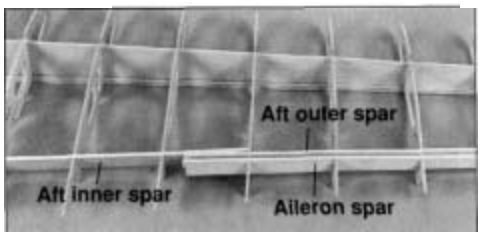
❑❑ 2. Test fit ribs W2 through W14 to the die-cut 1/8" balsa **spar web (W15).** If necessary, deepen the notches (in the ribs or in the spar web) so the ribs fit all the way into the spar web.

❑❑ 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.

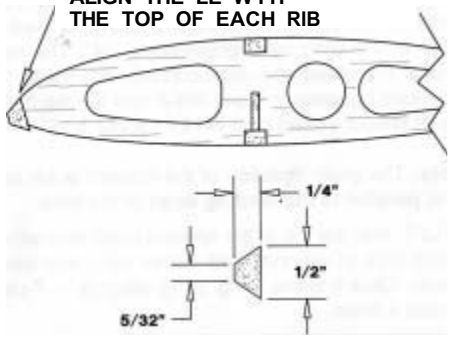
❑ ❑ 6. Temporarily remove rib W2 from the assembly.

❑ ❑ 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.

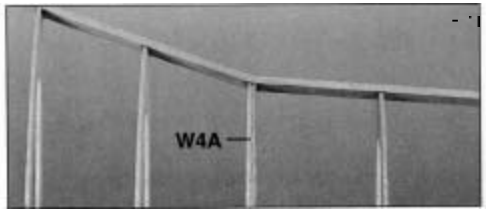
❑ ❑ 8. Use medium or thin CA to glue all the joints. Use the CA sparingly at this stage of construction and do not build up fillets. This will allow you to realign parts if necessary and keep you from gluing the jig tabs to the ribs. We will remind you to reinforce all glue joints later.

❑ ❑ 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).

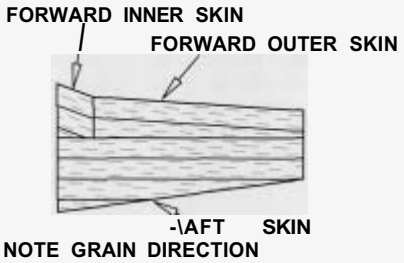
**Beech Fact:** Among other famous Beechcraft models, some include variations of the stagger-wing biplane; several versions of the 18A which is a twin engine, low wing mono-plane (distinguishable by its twin rudders); a light, single engine model named the Musketeer; a sort of *bare-bones* straight tail 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.

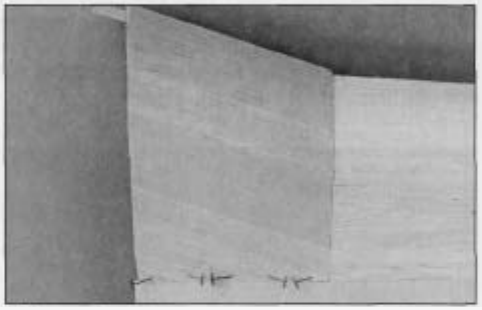
❑❑ 4. Use your favorite method to glue the **aft** wing skin to the wing. We recommend using aliphatic resin because it gives you plenty of time to align the skin and position your weights or T-pins. Hold the wing skin in position with magazines or weights made from plastic bags filled with lead shot 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.

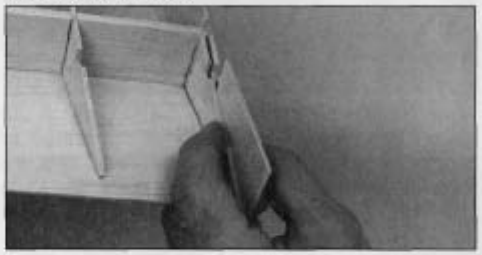
❑❑ 10. Clean the glue blobs and wood chips off your workbench so they won't leave dents in your beautiful wing sheeting. Turn the wing over and carefully cut the jig tabs off the ribs.

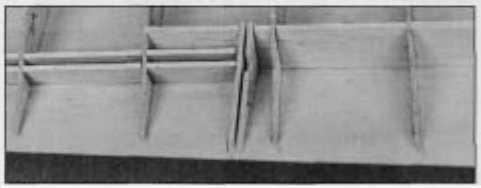
❑ 11. Reinforce all glue joints that don't look strong. It is particularly important that the joint between the spar web and both spars are securely glued.

❑ 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.*

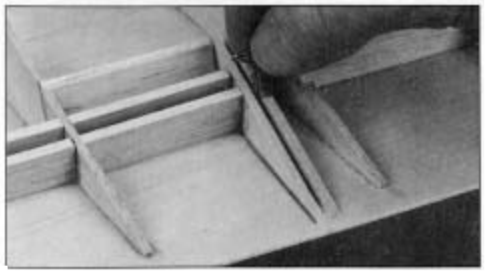




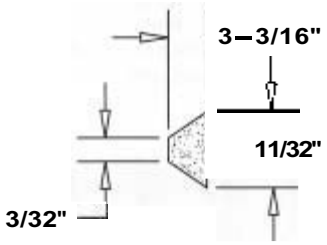
❑❑ 1. Glue a die-cut 3/32" balsa sub-rib **W2A** to rib **W2** where shown on the plan. The sub rib provides additional gluing area when the sheeting is installled. Use the W2A that does not have a notch cut in it for the flap spar.

❑❑ 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.

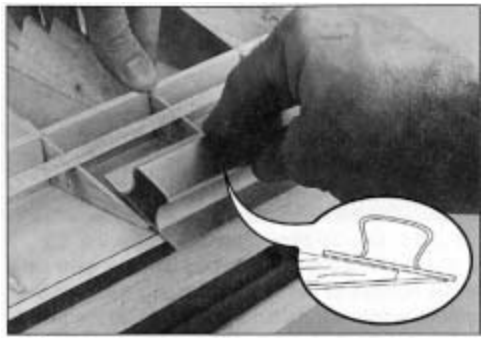


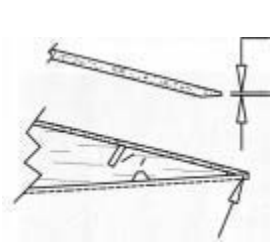
❑ ❑ 3. Stick a pin through the wing sheeting in a few places along the space between W8A and W9A, along the space between W2A and W2A, and along the space between W14A and W14. These pin points will indicate where to cut the sheeting to separate the ends of the flap and aileron from each other and the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

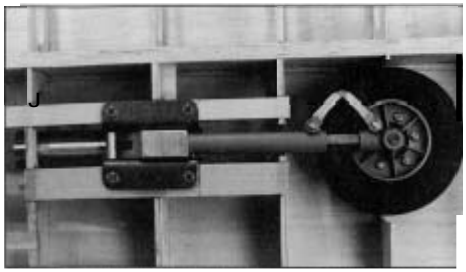
❑ ❑ 7. Cut the 1/2" x 3/4" x 6-3/4" grooved basswood **aft landing gear rail** to a length of 6-1/8". Test fit and glue the rail in position with 30-minute epoxy **(with the groove facing the top sheeting).** Test fit, then glue the 1/4" x 1/2" x 9" plywood **forward landing gear rail** in position with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



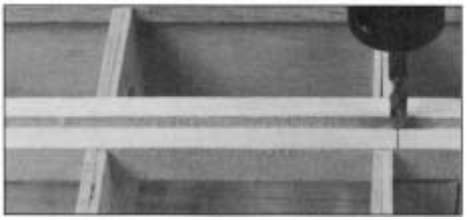
❑❑ 12. Drill holes in the rails and mount your landing gear. Use the screws included with your landing gear. **Hint:** Countersink the holes in the landing gear for #6 x 1/2" flat head screws.

❑❑ 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.



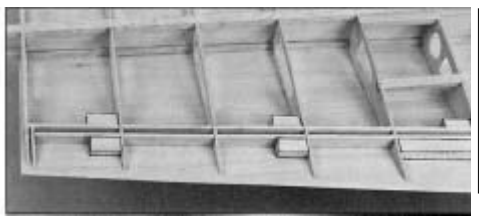
❑❑ 16. After the epoxy on the landing gear has fully cured, drill a 31/6" hole through the landing gear rail and the torque block. The center of the hole should be 3/32" from the plywood rib doubler W4G. Make sure you hold the drill perpendicular to the bottom of the landing gear rail.

❑❑ 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.

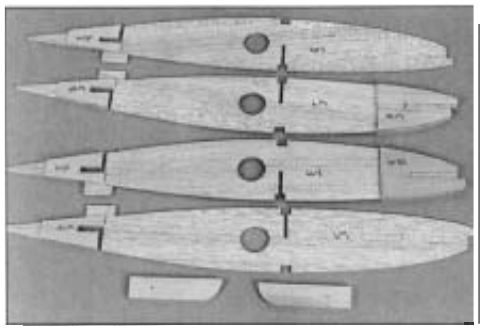
❑ ❑ 22. Use a bar sander and 80-grit sandpaper to sand the sheeting, spars and LE so they are flush with root rib W2 and tip rib W14.

❑ ❑ 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.



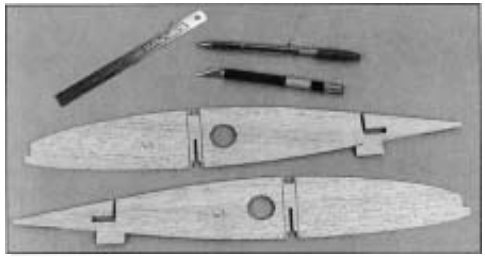
❑ 2. Use thick or medium **CA** to glue two die-cut 118" plywood **dowel rib doublers W1D** and one **bolt plate rib doubler W1P** to the sides of the die-cut 118" balsa ribs **W1** as shown on the plan. Pay careful attention to which sides of the ribs the doublers are glued.

❑ 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.

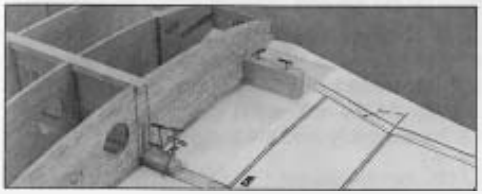
❑ 11. Pin small blocks of leftover balsa to the plan next to the W1 ribs, aligning them over the plan, and place weights on top of the ribs and spars to hold the jig tabs to the building board. Use a small square to make sure the W1 ribs are vertical.

❑ 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.

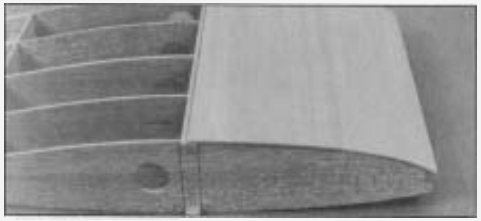
## *SHEET THE TOP CENTER SECTION*

❑ 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**

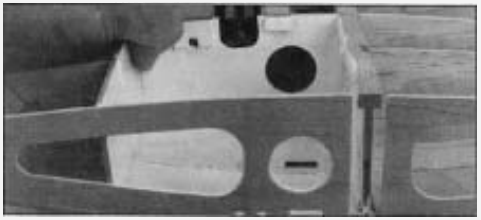
❑ 9. Drill 1/4" holes through the LE of the center section **(W21A)** where shown on the sketch. Slightly round one end of both 1/4" x 2-1/2" **wing dowels.** Test fit, then glue the wing dowels into the center section with 30-minute epoxy.

❑ 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.***

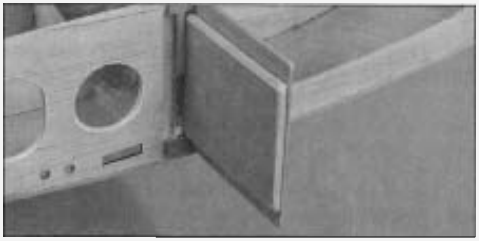
## *PREPARE THE BOTTOM OF THE WING FOR SHEETING*

❑ 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.

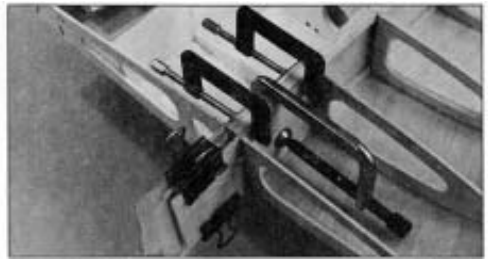
❑ ❑ 5. Temporarily join the center section to the right wing panel with the dihedral braces to make sure everything fits. Make adjustments where needed so the center section fully contacts the right panel. Separate the wing sections and remove the dihedral braces.

*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.

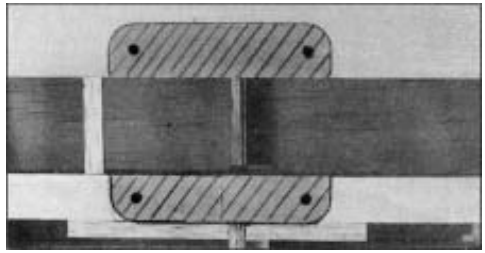


❑ ❑ 9. Insert two approximately 2" x 2" pieces of wax paper between the dihedral braces where they protrude from the right panel, then insert a piece of 1/8" balsa between the two pieces of wax paper. Clamp the outer 1/16" ply dihedral braces to the inner 1 / 8 ply dihedral braces.

❑ ❑ 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.

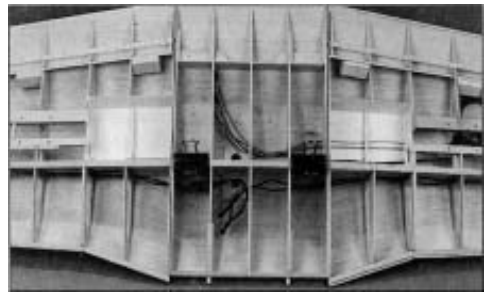
❑ ❑ 11. After the epoxy cures, glue W2 to the 1/16" dihedral braces.

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

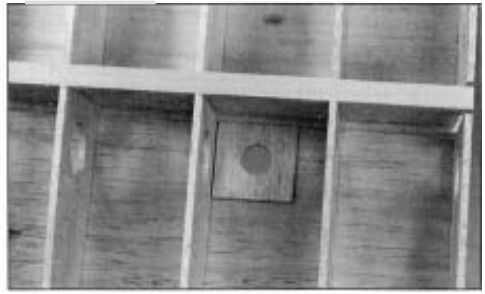


❑ 13. If you're installing retracts, glue leftover 3/16" or 1/4" balsa to the front of the forward landing gear rail and between the rails to support the sheeting. Use a ballpoint pen or a pencil (not a felt-tip pen) to trace the outline of the landing gear onto the rails so you know where **not** to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

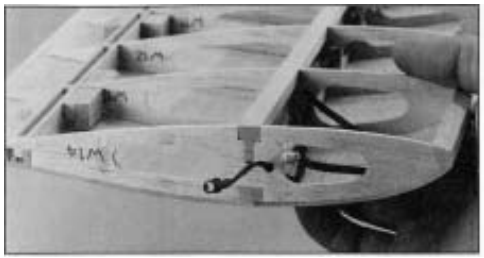
❑ 14. Cut holes and slots in the W1's on the ends of the center section to match the holes for the servo cords and retract air lines in the W2's of the outer panels. Cut the holes slightly oversize just in case they don't align perfectly.



*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.

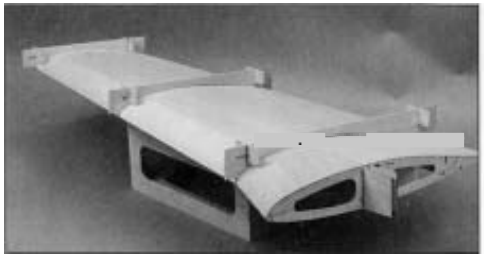
❑ 18. Sand the bottom of the outer wing panels with a bar sander and 150-grit sandpaper so the spars, landing gear and servo rails blend to the shape of the ribs.

### *Sheet the bottom of the wing panels*

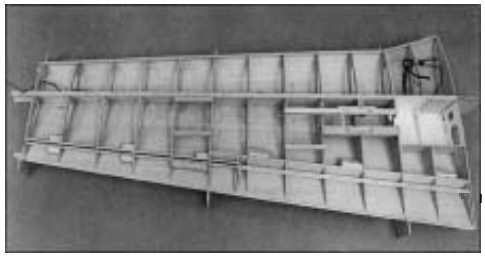
❑ 1. If you have not already done so, make the forward and aft bottom wing skins the same way you made the top wing skins on page 21.

❑ ❑ 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.

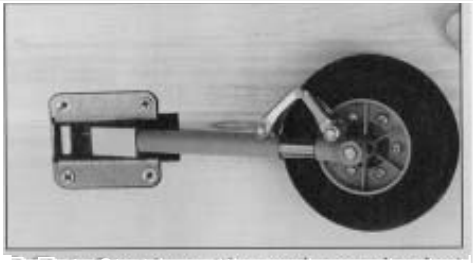
**Note:** The nylon straps should be inset into the balsa skin so that they are secured to the basswood landing rail.

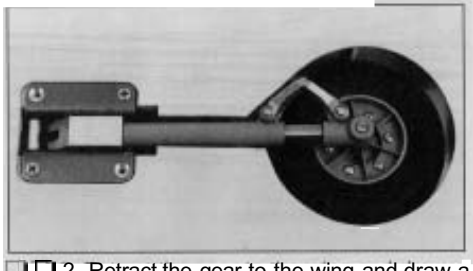
❑ 11. Set the right wing panel aside and sheet the bottom of the left wing panel the same way.

**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*

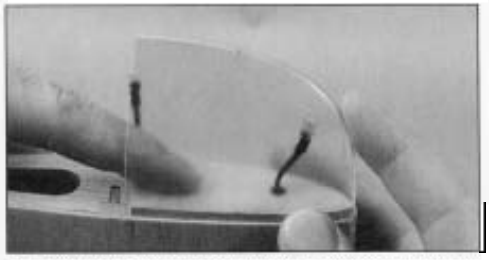




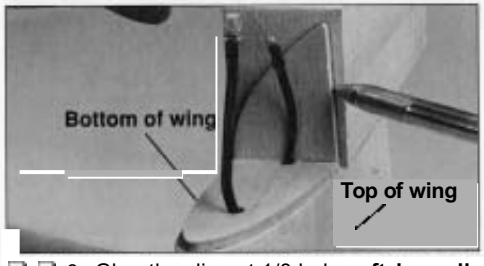
❑❑ 2. Retract the gear to the wing and draw a rough outline of the wheel onto the sheeting. Cut the sheeting within the outline. Retract the wheel again and draw a more accurate outline. Cut the sheeting until the wheel fully retracts into the wheel well, leaving at least 1/8" clearance between the wheel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

## *BUILD THE WING TIPS*

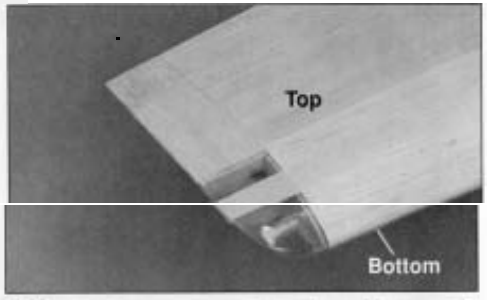
❑❑ 1. Cut the molded clear plastic **right wing tip lens** along the cutlines. If you are installing the optional lighting kit, drill holes in the die-cut 1/8" balsa **tip lens rib W14T** for the lighting wires to pass through.



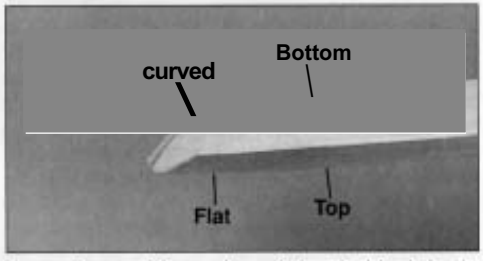
❑❑ 2. Align W14T with W14 so the edges of the lens are flush with the wing sheeting. Glue W14T to W14 in this position.




❑❑ 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.



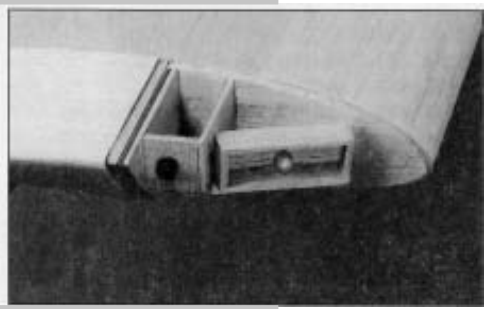

❑❑ 4. Read the note below and roughly carve the wing tip block to fit the wing tip. Glue it to the wing tip and sand it to the final shape. When you near the final shape of the tip block, tape the tip lens to the wing tip and shape the tip block to match the lens. To avoid scratching the lens with your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



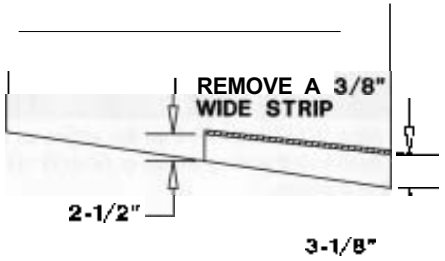
❑ 6. Use the templates on the wing plan to make the **reflector bracket** from leftover 1/16 balsa. Drill a small hole through the part of the braces that hold the lenses in your lighting kit so they ***snap*** in. Do not fit the lenses until after you paint the pieces. Glue the ***brackets*** to the 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.

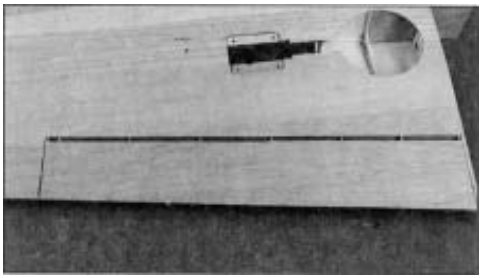
❑ 7. Return to step 1 on page 31 and build the wing tip on the left wing panel plan.

## *BUILD THE FLAPS*

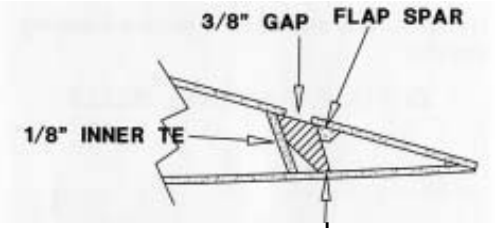
**Skip this section if you are not building flaps.**

❑❑ 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.



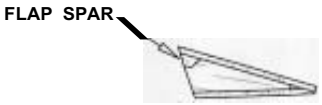



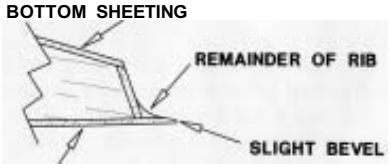
❑❑ 2. Use a ballpoint pen to lightly mark the flap on the bottom of the wing as shown in the sketch. Remove the 3/8 strip of sheeting from the bottom. This will expose the ribs so you know where to cut them to separate the flap from the wing.



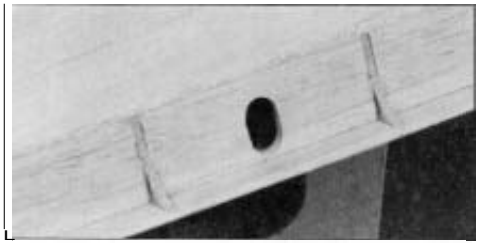

**CUT THE TOP SHEETING IN THIS AREA**

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



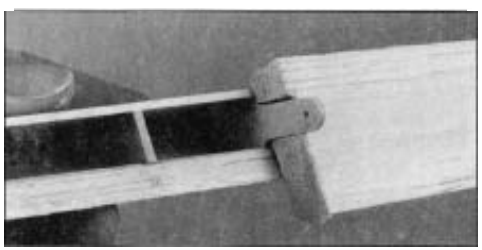




❑ D 4 . Trim the TE of the wing in the flap area and the LE of the flap as shown in the sketch. A 3/4" dowel wrapped with 150-grit sandpaper can be used to round out the rib stubs.



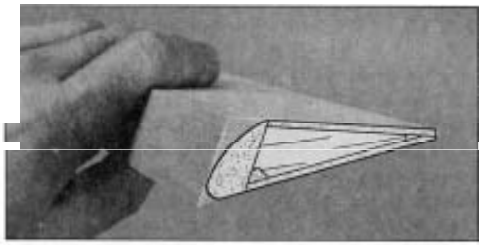
❑ ❑ 5. Cut a hole in the inner wing TE for the flap horn at the location shown on the plan. The hole should be **biased** toward the top of the wing.

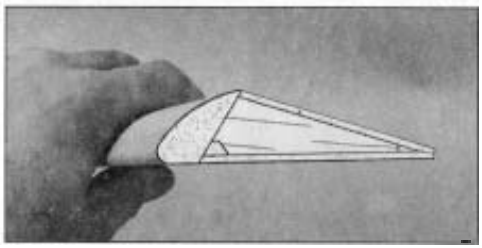
❑ ❑ 6. Place the flap over the plan and mark the location of the die-cut 1/16" ply **flap horn.** Fit but do not glue the flap horn into the flap. **Note:** Each flap has a different location for the flap horn so make sure you use the correct wing plan for the flap you are working on.



❑ ❑ 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.

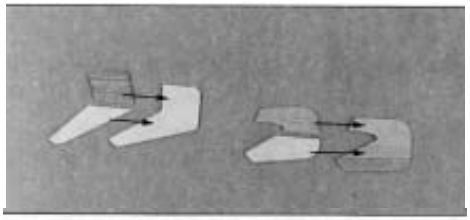
❑ ❑ 8. Remove the flap horn. **Temporarily tack glue** the short flap LE to the flap with **a few drops** of thick or medium CA. Sand the ends of the flap LE so they are even with the ends of the flap. Sand the top and bottom of the flap LE flush with the top and bottom of the flap.

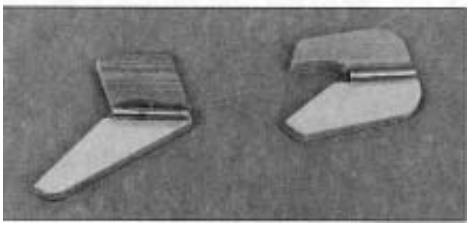




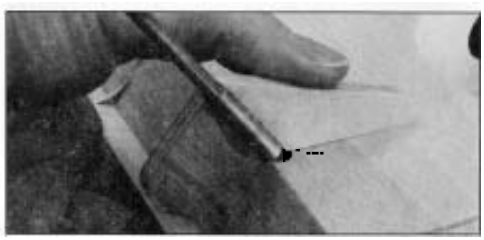
❑ ❑ 9. Cut the flap **root and tip end templates** from the plan. Glue them to the ends of the flap with rubber cement or spray adhesive. Use the templates as a guide to shape the flap LE with a razor plane or a hobby carving knife followed by a bar sander.

❑ ❑ 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.





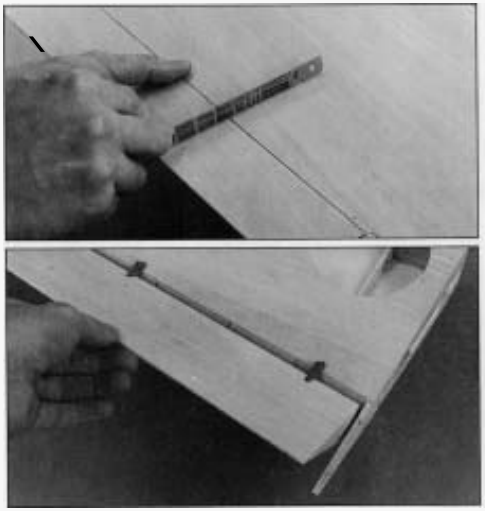
❑ ❑ 11. Assemble the die-cut 1/8" plywood **flap hinge drill guides** by gluing the pieces together as shown. **Optional:** Glue a piece of 7/32" brass tubing (3/16" I.D.) to the hinge drill guides to guide your drill even better.



❑ ❑ 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.

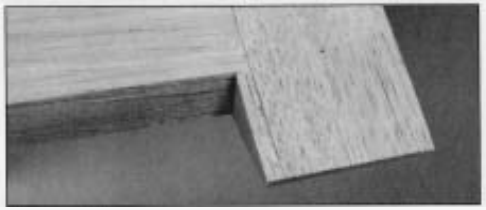


❑❑ 15. Cut 1/4" off the end of the outermost hinge point that fits into the flap. Test fit the flaps to the wing with the hinge points. Adjust the position (depth) of the hinges until the flap aligns with the wing the same way it was before you cut it loose. Make adjustments until the flap fits the wing 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.

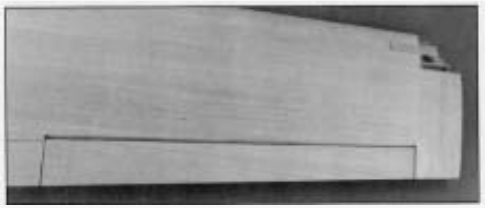


❑❑ 2. Sand the sheeting and the *rib stubs* on the wing even with the TE. Glue a piece of leftover 3/32" balsa to the wing tip rib. Sand it to the shape of the wing.

❑❑ 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.



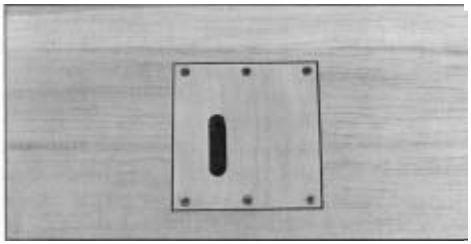
❑❑ 6. Replace the flap onto the wing. Adjust the root of the aileron and the tip of the flap so there is approximately a 3/32" gap between them.

❑ 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.

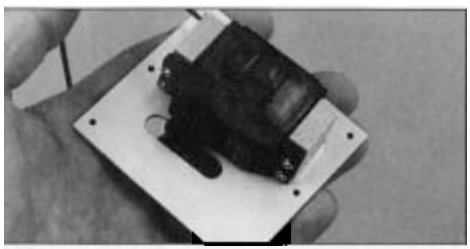
❑❑ 2. Drill 1/16" holes through the punch marks in the servo hatch covers. Place the hatch covers on the rails in the hatches and drill 1/16" holes through the hatch covers into the rails.



❑ ❑ 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.



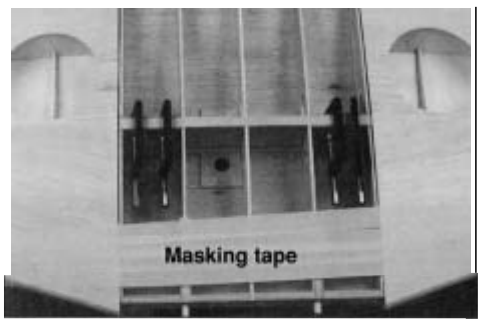
❑ ❑ 5. Mount your servos to the blocks with the screws included with your servos. Test fit the servo hatches in the wing and screw them down with the hatch cover screws.

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

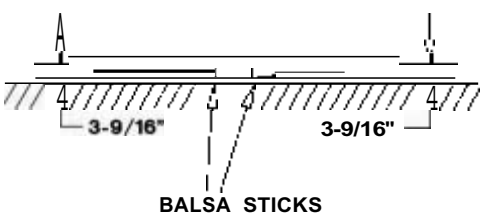
❑ 7. Glue leftover 1/16" balsa sheeting to the inside of the bottom sheeting around the wheel well cutout with the grain direction opposite that of the wing sheeting. This will reinforce the sheeting around the wheel well cutout.

❑ 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*



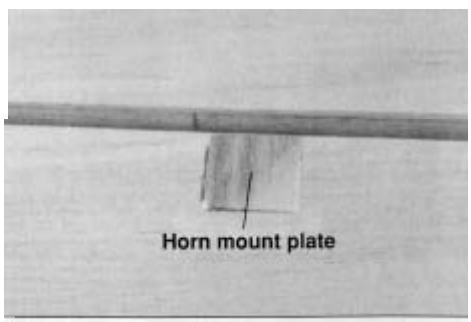

❑ 1. Remove the flaps. Test fit both outer panels to the center section. Make small adjustments if necessary to minimize any gaps you see. *Test fit* your clamps to make sure you have enough of them and to make sure you know where you are going to place the clamps when you actually glue the wing together.



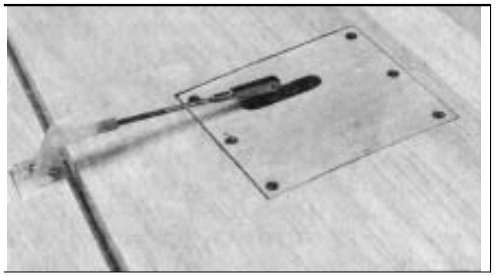

❑ 2. Optional: The dihedral braces and the *preset* angle of the root ribs on the outer panels will determine the dihedral in the wing. But if you wish to check the dihedral before you permanently glue the wings together, clamp the wing together, raise the center section off your workbench with balsa 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.

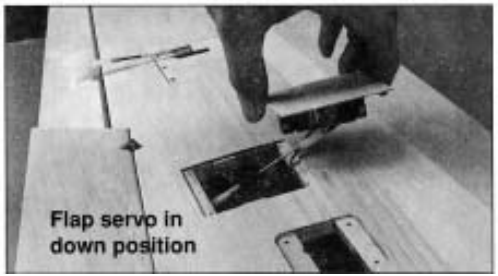
## *MAKE THE FLAP AND AILERON PUSHRODS*




❑ ❑ 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.

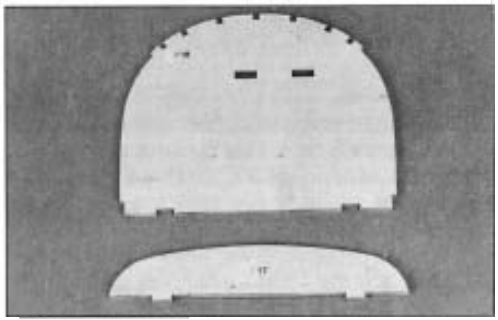
*This is as far as we can go with the wing until it is fitted to the fuse. But first, we need a fuse,* so.. *.build the fuse!*

## 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.



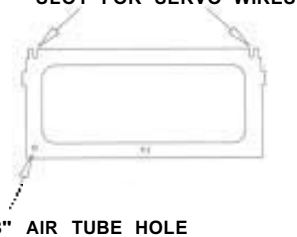
❑ 2. Use 30-minute epoxy to glue two die-cut 1/8" plywood **FIB's** together and **F1T** to the front of **F1DT** (there are two F1DT's included in the kit but only one is used). Clamp the assemblies to a flat table or board or lay weights on them with wax paper underneath. Inspect the parts closely 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.

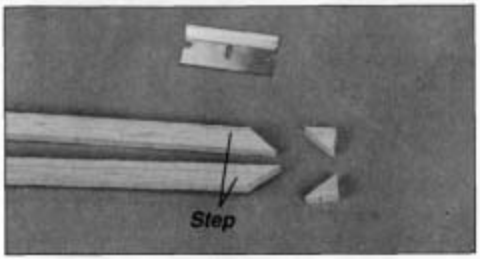
❑ 5. Drill 3/16" holes through the punch marks in the die-cut 1/8" plywood formers **F6** through **FII.** When you drill the holes press down on each former to prevent the wood from splitting when the drill bit goes through.

**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.

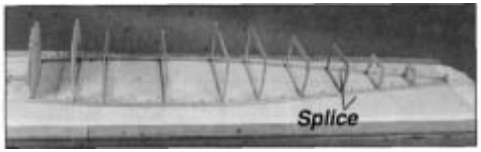
## *BUILD THE BOTTOM OF THE FUSELAGE*




❑ 1. Cut a 45 degree angle at the aft end of two 1/4" x 3/8" x 36" stepped balsa **side stringers** so you can *splice* them onto another stringer later.

❑ 2. Pin the stringers over their location on the plan so the ***step*** is on the bottom and faces the outside of the fuselage. The front end of the stringers should align with the **dashed lines** near the front and extend past the firewall by 1/8". Use plenty of T-pins to hold the stringers down so they conform to the curvature of the plan.

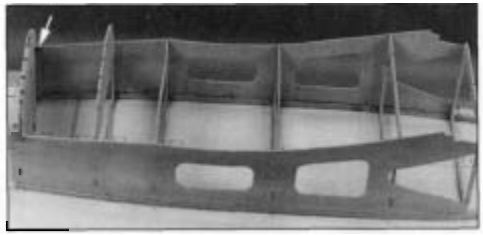
❑ 3. Cut another 1/4" x 3/8" x 36" stepped balsa side stringer in half. Bevel one end of both stringers **to match the angles you cut on the stringers already pinned to the plan.** Pin the stringers to the plan and glue them to the front stringers with thin CA. Trim the ends so they extend past former F11 by approximately 1/8". You can see the *splice* in the following photo.




❑ 4. Position but do not glue formers **F1** through **F11** on the side stringers so the embossed names on the formers face forward. *Are your* 3/76" *pushrod holes drilled?*

❑ 5. Glue formers F2 through F11 to the side stringers, holding them vertical with a 90 degree triangle. Don't be concerned about formers that are slightly warped or twisted–that is normal. You will be able to straighten these formers when you glue the 3/16" stringers to them.

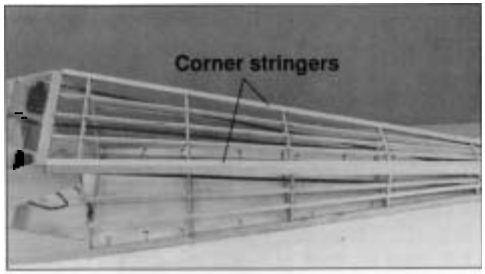
❑ 6. Glue the firewall to the side stringers using the die-cut 1/8" plywood **firewall angle gauge** to hold the firewall at the correct angle.

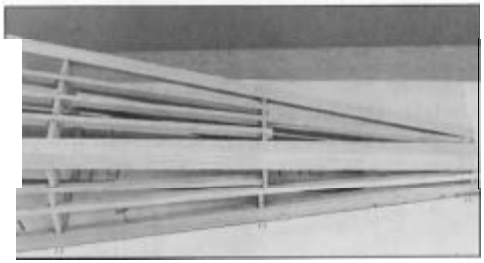


❑ 7. Test fit, then glue the die-cut 1/8" plywood **fuse side doublers** to formers F2 through F6 only and to the side stringers. **Do not** glue the doublers to the firewall until the next step. You may have to reposition some of your T-pins so they do not interfere with the side doublers. Use your 90" triangle to hold the formers vertical while you glue the doublers to them.

❑ ***8.*** Glue the fuse side doublers to the firewall with 30-minute epoxy using the firewall angle gauge to make sure the firewall is set at the correct angle. Use a large C-clamp or masking tape to securely hold the doublers to the firewall until the epoxy fully cures. Cut one 3" long piece from each of the (2) 1/2" x 36" balsa tri stock pieces. Shape the pieces so they fit between the firewall and the fuse sides on both the left and right sides behind the firewall. Glue them in place with 30-minute epoxy.

❑ 9. Locate two of the 24" pushrod tubes. Sand the outside of the tubes so glue will stick. Slide them through the holes in formers F6 through F10 so they extend forward of former F6 by Do not glue the pushrod tubes in place until instructed to do so.



*Refer to these photos for the next four steps. Disregard the servos.*

10. Glue the 3/16" x 1/2" x 9-7/8" balsa bottom **fuse sheeting support** in position. Sand the ends even with the fuse side doublers. Cut and fit, but **do not glue,** the aft bottom fuse stringers from seven 3/16" x 3/16" x 36" balsa sticks to fit in the notches of the formers as shown on the plan and in the photo. Save the leftover pieces. The three bottom stringers extend to the sheeting support. You can see the stringers in the photo at step 5 page 38.

11. Glue the fronts of the three bottom stringers to the sheeting support, then use your 90 degree triangle to hold each former at the correct angle and glue the bottom stringers to the formers.

❑ 12. Glue the 3/16" x 3/16" side stringers and pushrod guide tubes to the formers.

❑ 13. Cut the bottom **corner stringers** to fit on the formers where shown on the plan from two 1/2" x 36" balsa triangle sticks. Glue the corner stringers in place.

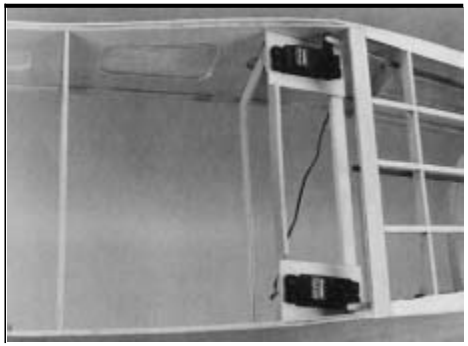
## *MOUNT THE SERVOS*

❑ 1. **Optional:** For routing your receiver antenna out the back of the fuselage, cut a third 3/16" outer pushrod guide tube (not included) to a length of 21". Roughen the outside of the tube with coarse sandpaper (so glue will stick) and slide the tube through the holes in the bottom of the formers until the front extends past former F7 by approximately 1/2". Glue the tube to the formers (this tube is visible in the photo at step 5).

❑ 2. Test fit your servos in the **aft servo trays** (or **ruddervator/elevator** servo trays) to make sure they fit. Glue a servo tray **doubler** to the bottom of the **front** of both trays.

❑ 3. Cut an **aft servo tray rail** from a 1/4" x 3/8" x 36" basswood stick to fit between the fuse sides approximately 1-7/8" aft of former F5 where shown on the plan. It will be helpful if you cut the rail to a length that will provide a *friction fit* between the fuse side doublers so it will temporarily stay in position without using glue. Position the aft servo tray rail between the fuse sides.

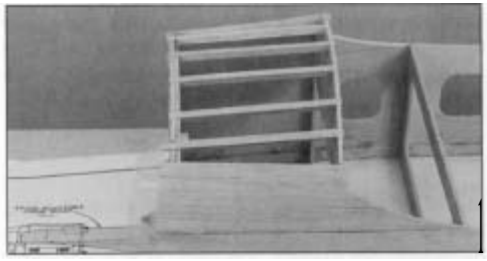
❑ 4. Position your servos into the servo trays and place the trays on the rail and former F5. Temporarily thread two nylon clevises just a few turns onto two 36" one-end threaded pushrods. Install the pushrods into the pushrod guide tubes and connect the clevises to servo arms on your servos.



❑ 5. Position the rail and the servo trays so the servo arms align with the pushrods. Glue the rail and servo trays to former F5 and the fuse sides in this position. Drill 1/16" holes in the servo trays and mount the servos with the screws that came with your radio.

## *FINISH FRAMING THE FUSE*

❑ 1. Refer to the photo in the following step and test fit a die-cut 1/8" balsa **forward fuse doubler** on the right side of the fuse. The front edge of the forward fuse doubler should align with the front edge of the fuse side doubler. Wet the outer surface of the doubler and glue it in place. Be sure that former F2 remains square and flat.



2. Glue the other forward fuse doubler to the left side of the fuselage. Use 3/16" x 3/16" balsa sticks leftover from the aft bottom stringers to make the **forward bottom stringers** that fit in the notches of the firewall and F2. Glue the stringers in place.

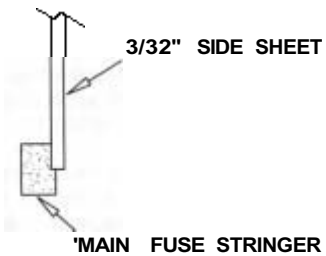
❑ 3. Sand the stringers even with the formers. Sand the fronts of the triangle corner stringers so they blend to the ply side doublers and the bottom sheeting support.

❑ 4. One at a time, remove the T-pins in the main side stringers aft of former F6. Replace them at an angle from the outside so they will not interfere with the side sheeting.

**Beech Fact:** Walter H. Beech died of a heart attack late in 1950 at the age of 53. During this time the military was evaluating the **YT-34** prototypes for use as a trainer.

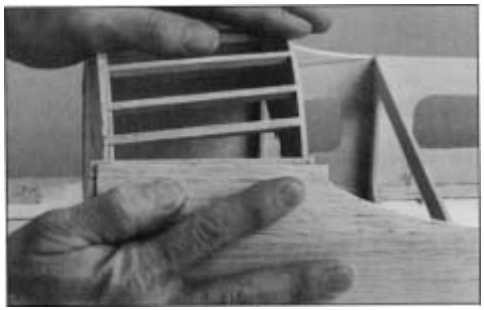
## *SHEET THE FUSELAGE SIDES*

❑ ❑ 1. Glue two 3/32" x 3" x 48" balsa sheets together to make a 6" x 48" **fuse side sheet.** After the glue is dry, sand the sheets so they are flat, even and smooth.




❑ ❑ 2. True one edge of the fuse side sheet. Hold the side sheet on the right fuse side and mark the wing saddle and corner stringer on the sheet. Trim the sheet about 3/16" outside of the lines.

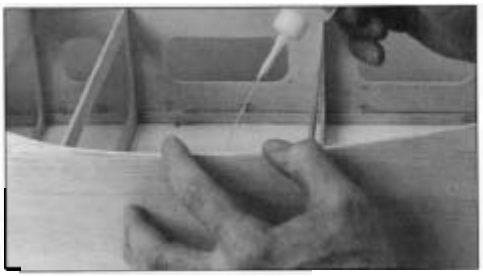
**Note:** The side sheet will not reach all the way back to the end of the fuselage. We will instruct you to add a piece of leftover 3/32" balsa to the rear later.



❑ ❑ 3. Reposition the side sheet on the fuse. Mark and trim the front bottom of the side sheet 1/8" above the bottom of the balsa front fuse doubler.

❑ ❑ 4 . Test fit the side sheet and make any further adjustments necessary for a good fit.

❑ ❑ 5. Apply a bead of medium CA to the *ledge* portion of the side stringer from the firewall to former F6. Working quickly, position the side sheet on the ledge of the side stringer and press it into position where you have applied the glue. After the CA dries apply thin CA to the side stringer and side sheet aft of former F6 from inside the fuse. A long CA applicator tip, such as the Pacer Z-Ends" with a Teflon@tube, helps you apply the CA just where you need it.



❑ ❑ 6. A little section at a time, carefully pry the fuse side from the fuse side doubler and apply thin or medium CA between the two. Quickly press them together. Do this until the fuse side is thoroughly glued to the side doubler.

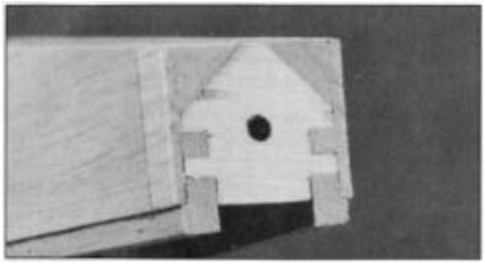
❑ ❑ 7. Glue the fuse side to the side stringers with thin CA and hold them together until the CA cures.

*You can really see how the bottom half of the fuse will remain straight, true and flat **(as** flat as your building board) when you remove it from your building board!*

❑ 8. Return to step 1 and glue another side sheet to the left fuse side the same way.

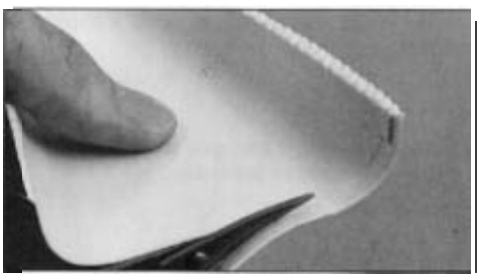
❑ 9. Add pieces of leftover 3/32" balsa to extend the side sheets to the end of the fuselage. See the photo at step 11.

❑ 10. Remove the T-pins and lift the fuselage from your building board. Reinforce glue joints you couldn't reach earlier or those that don't look strong.



❑ 11. Trim, then sand the fuselage side sheeting and stringers that extend aft of former F11 so they are flush.

## *GLUE THE TAIL CONE TOGETHER*



❑ 1. Cut both formed ABS **tail cone halves** along the cutlines. The cutlines can be most easily seen from the inside. We highly recommend a pair of curved Kyosho Lexan Scissors because you can cut straight lines or small tight curves easily and accurately. You could also use a small pair of regular scissors or *score* the plastic along the cutlines with a hobby knife and flex the plastic until the excess breaks free.

❑ 2. True the edges of both tail cone halves with coarse sandpaper and a bar sander. Thoroughly sand the mating surfaces so glue will stick. Carefully glue the tail cone halves together with thin CA. Use just a few drops at a time.

**Note:** Do not use CA accelerator on any of the ABS plastic. Accelerator may cause the plastic to develop cracks over time and prevent some types of paint from sticking.

❑ 3. Trim the clear plastic **tail lens** to fit on the end of the tail cone. Do not glue the tail lens in place until after you paint the tail cone.

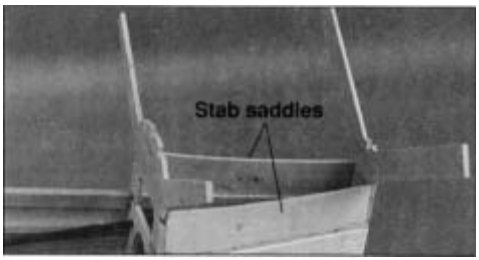
❑ 4. If you are installing a tail navigation light, make an **aft tail cone former** from a piece of leftover ABS plastic and glue it to the rear of the tail cone. Drill a 5/32" hole in the rear of the tail cone for the tail light lens included with the lighting kit. Test fit the tail light.

## V-TAIL INSTRUCTIONS

**If you are building the straight tail, Skip to *Mount the Sfraight Tail Stab and Fin* on page 45.**

## *MOUNT THE V-TAIL STAB*

**Note:** Build accurately during the next few steps. The stab saddle and the aft formers align the stab and set the incidence, which will greatly affect the way your model flies.



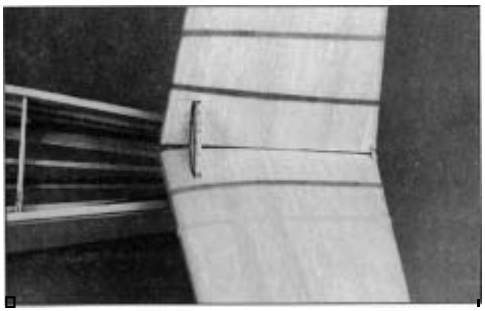

*Refer to this photo for the following three steps.*

❑ V1. Glue the die-cut 1/8" plywood **aft upper former F11AV** to the aft bottom former F11. Make sure F11AV **accurately** aligns with F11.

❑ V2. Glue the die-cut 1/8" plywood **V-tail stab saddles** to the top of the main side stringers and F11AV. The angle of the aft edge of the stab saddle sets the angle of F11AV (which is 90').

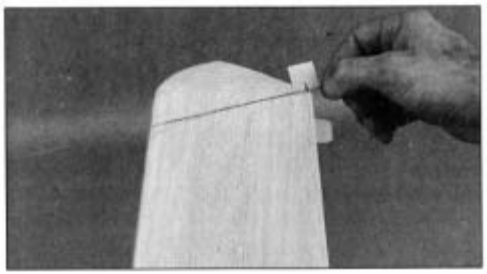
❑ V3. Glue the die-cut 1/8" plywood former **FIOAV** to the top of F10 and the front edge of the stab saddles. F1OAV may be slightly aft of F10.

❑ V4. Test fit the stab halves on the fuse by sliding them onto the *joiner* portion of former FIOAV. Bevel the ends of the stabs as necessary so they fit all the way onto former F1OAV. Bevel the top, inner edge of the stab saddles to match the angle of the stabs but **do not change the incidence angle.** The ends of former F11AV should contact the inboard ends of the stab

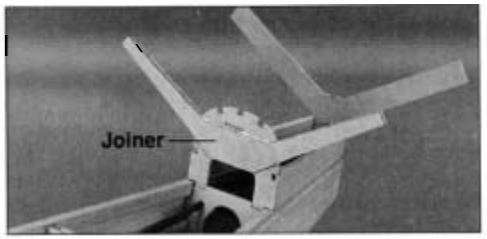


❑ V5. Remove the stab halves. Temporarily position the die-cut 1/16" plywood **V-tail LE doubler** on the front of former FlOAV and test fit the stab again. Make adjustments if necessary so the stab aligns the same as it did in the previous step. Use **#64** rubber bands to temporarily hold the stabs to F11AV.

❑ V6. Insert a T-pin in the **center** of the top of the firewall.

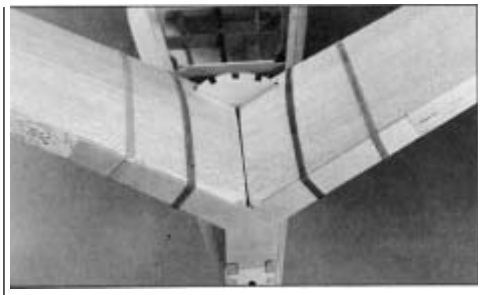


❑ V7. Tie a loop on one end of a 54" piece of string and connect it to the T-pin in the top of the firewall. Put a piece of masking tape with an arrow on it near the other end of the string. Slide the tape along the string and align the arrow with the corner of one of the stab halves. Swing the tape over to other corner on the other stab half. Shift the stab halves and slide the tape along the string until the arrow aligns with the corners on both stab halves. Once you have confirmed that the stabs will align, remove them from the fuselage.




❑ V8. Glue the 1/16" plywood V-tail LE doubler to the front of former F1OAV with 30-minute epoxy. *Study the next three steps before you proceed. Then work quickly and carefully.*

❑ V9. Mix enough 30-minute epoxy to thoroughly coat both sides of the *joiners* on former F1OAV and the insides of the stab halves where they contact the *joiners.* You may add some Great Planes Milled Fiberglass to the epoxy to thicken it and add strength.



❑ V10. Coat both sides of the forward V-tail LE doublers, the front of the rear joiners, the tops of the saddles, the insides of the stab halves where they contact the joiners and the TE of the stabs where they contact the joiners with epoxy. Slide the stab halves into position and use rubber bands to hold them in place. Use the pin and string to align the stab halves and, if necessary, use T-pins or masking tape to hold them in position. Apply a fillet of epoxy where both stab halves meet. Wipe away excess epoxy before it cures and do not disturb the model until the epoxy is fully cured.

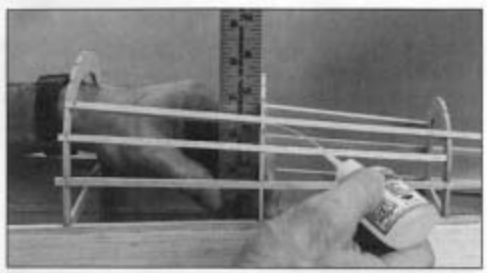
❑ V11. Turn the fuselage over and inspect the glue joints that hold the stab in place. If necessary, add 30-minute epoxy to joints that may not have received enough.

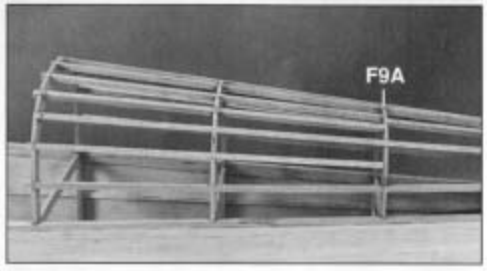
❑ V12. After the epoxy fully cures, sand the joiner portion of flush with the top and bottom of the stabs. Add balsa filler if needed. Sand the filler so it is smooth and matches the contour of the stab sheeting.

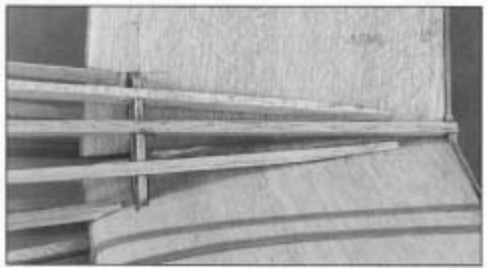
**Beech Fact:** In the April, 1959 issue of *Fortune Magazine,* the Beechcraft Bonanza was included in the *100 best designs list.* The only other aircraft included in the list was another world famous airplane the Douglas DC-3.

## *BUILD THE TURTLE DECK*

❑ V1. Glue formers **F7A, F8A** and **F9A** to the tops of their respective formers.





❑ V2. Cut the **turtle deck stringers** from six 3/16"x 3/16"x 36" balsa sticks. Trim the aft edge of the stringers that contact the stab so they fit the sheeting. Glue the stringers into the notches of the formers as shown on the fuselage plan and in the photo. Note the arrangement of the stringers at F9A. **Important:** Align the formers with a straightedge as you glue them to the stringers.

❑ V3. Sand the stringers and formers so that they will blend.

❑ ❑ V4. The turtle deck is sheeted with four 1/16" balsa sheets-one sheet on the *bottom* of each side of the turtle deck and one sheet on the *fop* of each side of the turtle deck. Examine the four 1/16 x 3" x *24"* balsa sheets and set the two softest sheets aside to be used for the tops.

❑ ❑ V5. Follow the **Hot Tip** that follows and make the skin for the bottom of the left turtle deck side from one of the 1/16"balsa sheets you selected for the bottom. Use the **bottom turtle deck sheet pattern** on the plan to cut the sheet to the approximate shape.

**HOT TIP**

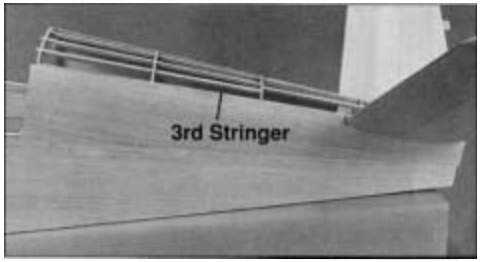
**How to use the patterns to make the turtle deck skins**

Cut the pattern from the plan. Spray the back of the pattern and **one** of the sheets with 3M 75 Repositionable Spray Adhesive. Press the sheets together and press the pattern onto one of the sheets. Cut the skins along the lines with a sharp #11 blade.

❑ ❑ V6. Test fit the bottom turtle deck sheet and trim where needed. The top edge of the sheet *ends* in the center of the third stringer. If necessary, wet the sheet with a 50/50 solution of alcohol and water so it will bend easier.

**Hint:** The best way to accurately cut the sheet to fit your model is with careful test fitting, close observation, and removing only **small amounts** of material at a time. When done this way, you will be rewarded with a great looking model even *before* you cover it. Then, sheeting will be your favorite part!

❑ ❑ V7. Glue the bottom turtle deck sheet to the stringers, formers and stab.



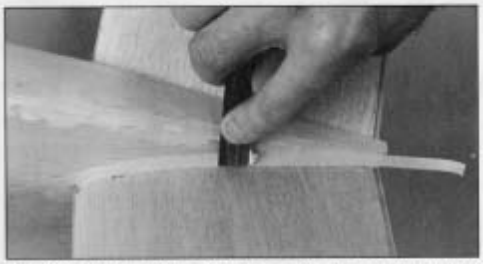

❑ ❑ V8. Fill in the small *wedge* between the bottom turtle deck sheet and the fuse side with a leftover piece of 1/16"balsa.

❑ V9. Sheet the bottom of the turtle deck on the other side the same way.

❑ ❑ V10. Make a **top turtle deck sheet** for the left side of the turtle deck with the **top turtle deck pattern** on the plan and one of the soft 1/16"x 3" x 24" balsa sheets you set aside. Test fit the sheet to the turtle deck and trim where needed.

❑ ❑ V11. Glue the top turtle deck sheet to the turtle deck. Use a paint brush to **liberally** apply a 50/50 mixture of alcohol and water to the sheet (especially from the leading edge of the stab to the end of the sheet). Be patient, bend the sheet a little at a time, and keep applying water and alcohol.

❑ ❑ V12. Sheet the other side of the turtle deck the same way. Fill in the space between the two turtle deck sheets on top near former F7A with a leftover piece of 1/16 balsa.



❑ ❑ V13. Apply hobby filler where needed. Use masking tape to keep filler off the sheeting where it isn't needed. Do not build up a fillet.

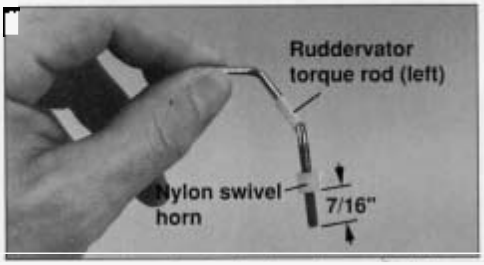
❑ ❑ V14. Trim, then sand the turtle deck sheeting so it is flush with former F7A and F11A. The sheeting at the front should be even with F7A where it meets the *step* on the side stringer.

**IMPORTANT NOTE:** Some modelers prefer to *sand as they build* instead of waiting until the very end. If you prefer to do a little sanding now to even the turtle deck sheeting with the fuse sides, you may do so but **do not excessively thin** the 1/16" turtle deck sheeting because the ABS **tail cone** and ABS **cabin** have yet to be fitted and must match the sheeting.

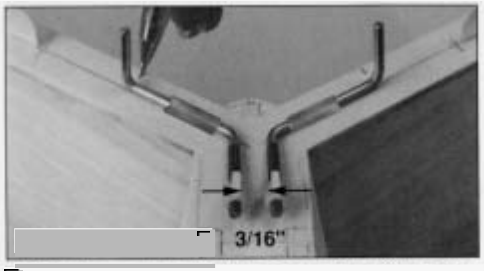
*It's beginning to look like a Bonanza, isn't it!*

## *HOOK UP THE RUDDERVATORS*

❑ **V1.** Cut the remaining two hinge slots on the TE of the stabilizers. Test fit the ruddervators to the stab with the hinges.

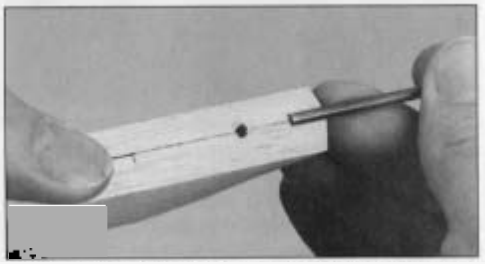



❑ V2. Tap threads into both nylon **swivel** horns with a 6-32 tap. Thread one of the swivel horns onto one of the **ruddervator torque rods** so the bottom of the swivel is 7/16" from the end of the torque rod. Thread the other swivel horn onto the other ruddervator torque rod the same amount. Compare the two torque rods and make sure both swivels are threaded on **the same amount.**




❑ V3. Use a straightedge and a ballpoint pen to *extend* the centerlines on the stab TE until they meet in the center of F11A. Position the torque rods on the centerlines **so** the swivels are 3/16" apart. Accurately mark the location of the *arm* portion of the torque rods (that fit into the ruddervators) on the TE of the stab.

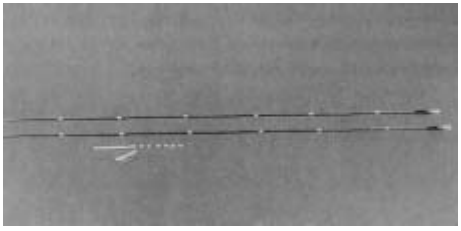
❑ **V4.** Remove the torque rods and fit the ruddervators to the stab with the hinges. Transfer the marks to the LE of the ruddervators.



❑ V5. Drill a 1/8" hole in the **center** of the leading edge of the ruddervators at the marks you made. Cut a groove in the LE's to accommodate the torque rods. Test fit the ruddervators to the stab with the torque rods.

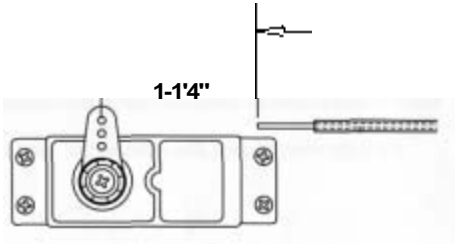
**Hint:** Use a 1/8" brass tube sharpened at one end to cut the grooves for the torque rods.

❑ V6. Cut away former Fl IAV so the torque rods can move back and forth. Reposition the ruddervators with the torque rods and make sure they do not interfere with former F11AV. It should look something like the photo when you're done.



❑ V7. Cut 7"frOm the non-threaded end of a ,074" x 36" **pushrod wire.** Clean residual oil from the wire with a cloth dampened with alcohol or other solvent. Cut six 1/4" long **bushings** from the white inner pushrod tube, then slide the bushings evenly spaced onto the wire. Make sure the bushings at the ends of the wire will not protrude from the guide tube or the control could become stuck during flight. If the bushings slide onto the wire easily, hold them in place with a drop of thin CA. Make sure the CA cures before you proceed so you do not inadvertently glue the pushrods into the guide tubes! Slide a silicone **retainer** onto a nylon **clevis** and thread the clevis onto the wire about 15 full turns. Make a second pushrod the same way.

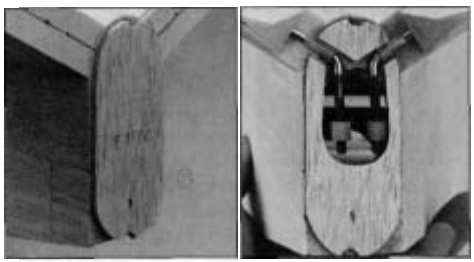
❑ V8. Install the pushrods in the guide tubes. Temporarily connect the clevises to the torque rods and fit the ruddervators to the stab. Place a servo arm on your ruddervator servos.



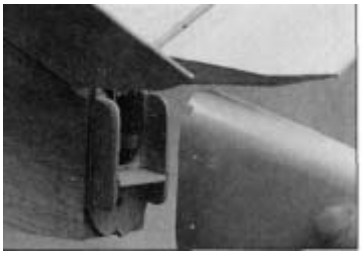

❑ V9. With the servos centered and the ruddervators neutral, use a felt tip pen to mark the pushrods exactly 1-1/4 from the holes in the servo arms. Remove the pushrods from the fuselage. Cut them at the marks you made.

❑ V10. Silver solder a **threaded coupler** onto each wire pushrod. Reinsert the pushrods into the fuselage and thread a nylon clevis onto the couplers. Temporarily connect the pushrods to the servos and ruddervators. Adjust the length of the pushrods if necessary by turning the clevises in or out.

## *FIT THE TAIL CONE*



❑ V1. Glue the die-cut 1/8" balsa tail **cone former** (FIITC) on the end of the fuselage. Remove material as needed to clear the torque rods and pushrods.



❑ V2. Glue the die-cut 1/8" plywood tail **cone mounts** to the tail cone former. Cut U-shaped notches in the **top** of the tail cone to clear the torque rods. Fit the tail cone on the aft end of the fuse and fasten it to the mounts with four #2 x 3/8" screws. **Make sure the screws do not interfere with the ruddervator torque rods.**

❑ V3. After you have fitted the tail cone, skip to ***Sheet the bottom of the fuserage*** on page 50.

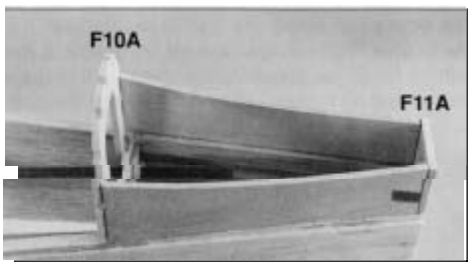
**Beech Fact:** The F33A, it turns out, is one of the most confusing Bonanzas. This is because there were two versions built. The F33 produced in 1970 was the *short cabin* and the produced in 1971 was the *long cabin* (and is the subject of our Top Flite Gold Edition straight tail). The additional 19 inches of the cabin on the ***33A*** matched the baggage space formerly available only on the V-tail. With this additional new-found cabin space other options, such as six place seating and a larger cargo door, were available. Price of the 33A was $41,600 (back then).

## STRAIGHT TAIL INSTRUCTIONS

### MOUNT THE STAB AND FIN

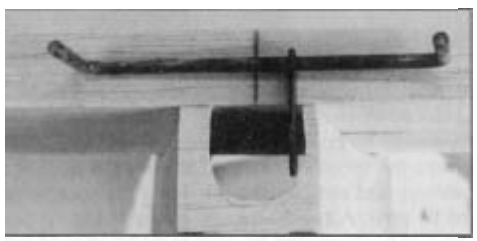
❑ ST1. Glue the die-cut 118" balsa **aft upper former F11A** to former F11.

❑ ST2. Securely glue the die-cut 1/8" plywood **straight tail stab saddles** to the top of the main fuse side stringer and F11A.

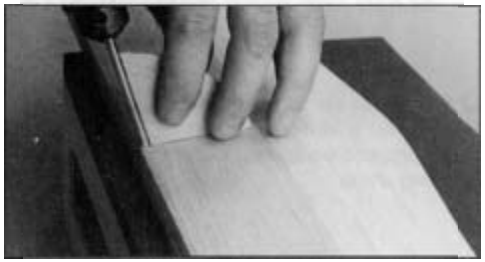



❑ ST3. Glue the die-cut 118" plywood upper former **FIOA** to the top of former F10. Glue the front of the stab saddles to F1OA.

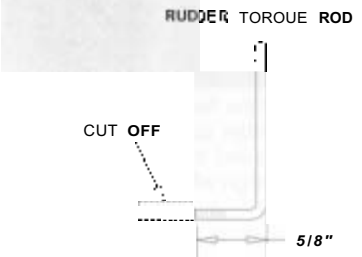
❑ ST4. Use a bar sander with 80-grit sandpaper to sand the front of the stab so the TE will align with F11A.



❑ ST5. Use a hobby knife or a Multi-Pro with a sanding drum to cut F11A to clear the horn on the elevator joiner wire and the rudder torque rod.



❑ ST6. Mark the **center** of the stab 1/8 from the TE. Use the die-cut 1/8" plywood **rudder torque rod drill guide** to drill a 3/16" hole through the center of the stab at the mark. Make sure you drill from the **top** of the stab. **Hint:** A 6" piece of 3/16 brass tube sharDened at one end cuts a clean hole.



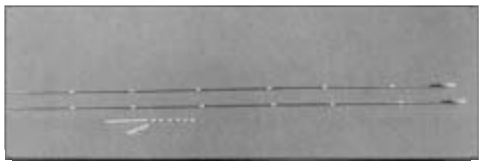

❑ ST7. Cut the threaded end of the **rudder torque rod** so the threads extend 5/8" as in the sketch. Tap threads in the ,nylon **swivel horn** with a 6-32 tap. Thread it onto the rudder torque rod until it is even with the end.

❑ ST8. Insert the rudder torque rod through the hole from the bottom of the stab. You'll have to force it a little because of the bend in the wire.

**Beech Quote:** "The Beechcraft Bonanza is a masterpiece of engineering; it's an airplane that constitutes a modern miracle of aeronautical design; and in our opinion, marks a new milestone in the progress of aviation."

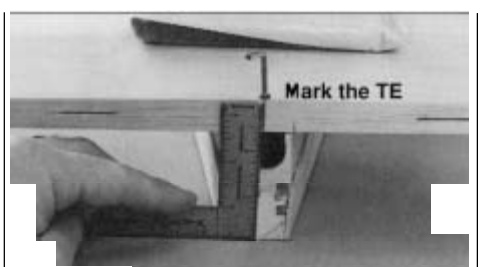
–Walter H. Beech
August 1, 1946

### CENTER THE STAB



❑ ST1. Cut 7" from the non-threaded end of a ,074" x 36" **pushrod wire.** Clean residual oil from the wire with a cloth dampened with alcohol or other solvent. Cut six 1/4" long **bushings** from the white inner pushrod tube, then slide the bushings evenly spaced onto the wire. Make sure the bushings at the ends of the wire will not protrude from the guide tube or the control could become stuck during flight. If the bushings slide onto the wire easily, hold them in place with a drop of thin CA. Make sure the CA cures before you proceed so you do not inadvertently glue the pushrods into the guide tubes! Slide a silicone **retainer** onto a nylon **clevis** and thread the clevis onto the wire about 15 full turns. Make a second pushrod the same way.

❑ ST2. Connect one of the pushrods to the nylon swivel horn on the rudder torque rod and slide the pushrod into the rudder pushrod guide tube in the fuselage. Position the stab on the stab saddle. Place a weight on top of the stab to hold it in place.




ST3. Align the TE of the stab with the center of former F1 1. Mark the TE of the stab above the stab saddles.

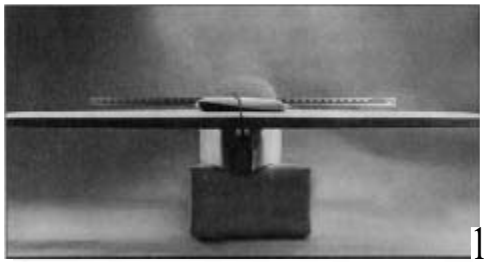
❑ ST4. Insert a T-pin in the **center** of the top of the firewall.

❑ ST5. Tie a loop on one end of a 54" piece of string and connect it to the T-pin in the top of the firewall. Put a piece of masking tape with an arrow on it near the other end of the string. Slide the tape along the string and align the arrow with the corner of one of the stab halves. Swing the tape over to the other corner on the other side of the stab. Shift the stab and slide the tape along the string until the arrow aligns with both corners of the stab.

❑ ST6. Mark the LE of the stab where it aligns with former F1OA.

## *ALIGN THE STAB HORIZONTALLY*

❑ STI. Place two clothespins on the top of former F4 and rest a straightedge on the top of the fuse sides, propped up against the clothespins. See the following photo.

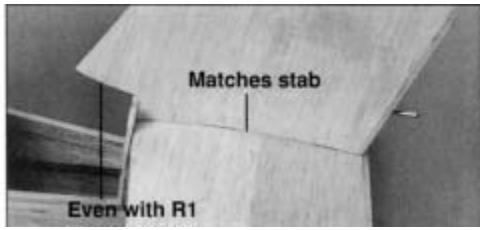


❑ ST2. Stand behind the fuselage and view the stab and the straightedge to see if they align. If necessary, carefully sand one side of the stab saddle so the stab will align with the straightedge.

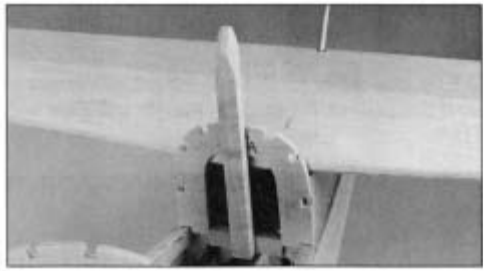
❑ ST3. Move the rudder pushrod wire back and forth to make sure the clevis and horn do not interfere with the fuse sides and the rudder torque rod can move freely. If necessary, adjust the pushrod wire or the *clearance slot* in the stab saddle. **There must not be any possibility of binding here.**

❑ **ST4.** Use 30-minute epoxy to glue the stab to the saddle. Place the stab on the saddle so the marks you made earlier align. Before the epoxy cures, confirm alignment once more using the *pin and string* technique. Do not proceed until the epoxy has fully cured.

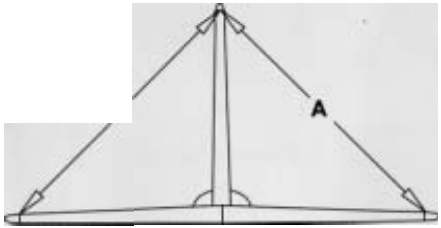
## *MOUNT THE FIN*




❑ STI. Trim the sheeting on the bottom of the fin until it matches the top of the stab. Make sure you trim both sides evenly so the fin sits vertical. Trim the fin sheeting in front of former F1OA so it is even with fin rib R1 as shown in the photo. R1 of the fin should rest on former F10 and the rear of the stab.

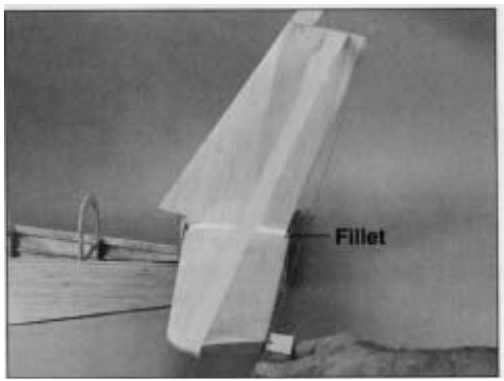


❑ ST2. With the fin on the stab, place the basswood fin post on the front of F1OA and slide it up into the fin until it hits the LE. Hold the fin post in position and remove the fin. Mark the location of the fin post. Apply 30-minute epoxy to the fin post and FIOA. Clamp the fin post to FIOA aligned with the marks you made. **Be certain the fin post is vertical and is centered on former FIOA.** The fin post aligns the front of the fin with the fuselage.




**A=A**

❑ ST3. After the epoxy cures, position the fin on the fin post and confirm that the fin remains vertical. Make adjustments if necessary. Use the *pin and string* technique or a ruler to measure the distance between the tip of the fin and the stab tips.



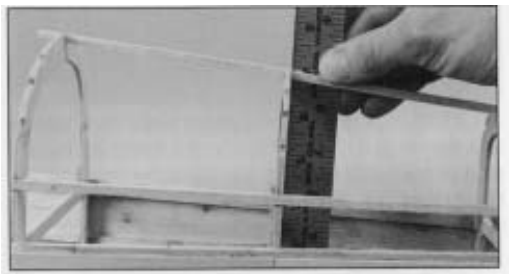

❑ ST4. Glue the top of the fin post to the inside of the fin with 30-minute epoxy and milled fiberglass or microballoons (so all the epoxy won't run down to the bottom of the fin). Glue the base of the fin and fin sheeting to the stab with 30-minute epoxy. Make sure the TE of the fin is **centered** over former F11. Apply a small fillet of epoxy between the stab and the fin sheeting. Use masking tape to hold the fin until the epoxy is fully cured.

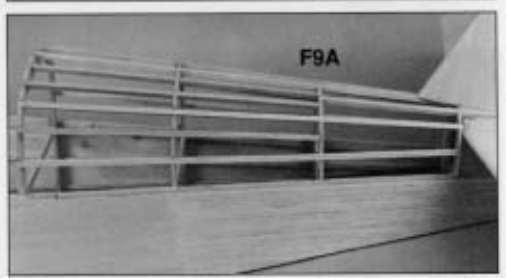
itor and temporarily hook up the pushrods. Make sure you can move the controls without any interference or binding. Make adjustments if necessary.

The twin engine Model 18 was being produced for the military in a variety of configurations. But as unpatriotic as it may have seemed at the time, one had to think ahead to postwar years. The twin would certainly continue but the Model 17 Staggerwing was a question mark–the biplane was on its way out. The trend was continuing toward all metal, light planes (started by Luscombe as early as 1934). **At** Beechcraft, design work on a new model was to be done on a voluntary, overtime basis. After much careful study of the market to find out what type of plane to build, and after hours of design, wind tunnel and static testing, on December 22, 1945, the first Bonanza was on its maiden voyage ilown by test pilot Vern Carstens.

## *BUILD THE TURTLE DECK*

❑ ❑ ST1. Glue formers **F7A, F8A** and **F9A** to the tops of their respective formers.



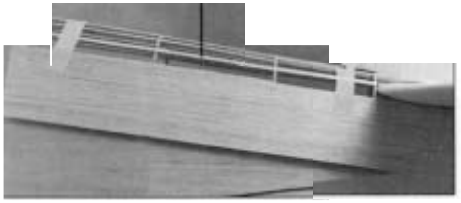



❑ ❑ ST2. Cut the **turtle deck stringers** from seven 3/16" **x** 3/16" **x** 30" balsa sticks. Glue the stringers into the notches of the formers as shown on the fuselage plan and in the photo. Note the arrangement of the stringers at F9A.

**Important:** Align the formers with a straightedge as you glue the stringers to them.

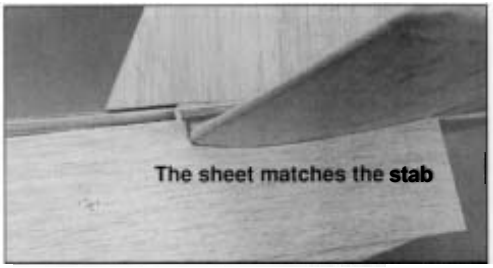
❑ ❑ ST3. Sand the stringers and formers so they blend together.

❑ ❑ ST4. The turtle deck is sheeted with four 1/16" balsa sheets – one sheet on the bottom of each side of the turtle deck and one sheet on the top of each side of the turtle deck. Examine the four 1/16" x 3 x 2 4 balsa sheets and set the two softest sheets aside to be used for the top.



❑ ❑ ST5. Cut one of the bottom turtle deck sheets to a length of 21-1/2". Position the sheet on the left side of the turtle deck so the top edge contacts the bottom of the stab and is parallel to the third stringer from the bottom as shown in the photo.

❑ ❑ ST6. Use a ballpoint pen to mark the bottom of the stab onto the sheet. Remove the sheet and cut along the line you marked.

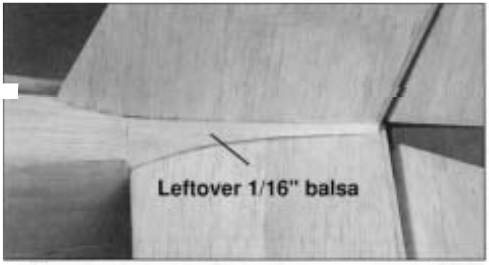



❑ ❑ ST7. Reposition the sheet. Mark and cut it along the line. Do this until the sheet accurately matches the bottom of the stab.

❑ ❑ ST8. Fill in the small *wedge* between the turtle deck side sheet and the fuse side with a leftover piece of 1/16" balsa. See the following photo.

❑ ❑ ST9. Trim the top of the sheet so it *ends* in the center of the third stringer. Trim the bottom of the sheet so it matches the top of the fuse side. Glue the sheet in position.

❑ ❑ ST10. Trim another 1/16" **x** 3" **x** 24" balsa sheet to fit between the bottom turtle deck sheet and the top, **center** stringer. Trim the aft end of the sheet so it fits the fin and ends at former FIOA. Glue the sheet in position. Make a *wedge* from a 1/16 leftover piece of balsa to fit between the two turtle deck sheets in the front.




❑ ❑ STI 1. Fill most of the space between the fin and the stab with a leftover piece of 1/16" balsa.

❑ ST12. Sheet the right side of the turtle deck the same way. Add the *partial fillet* between the fin and the stab.

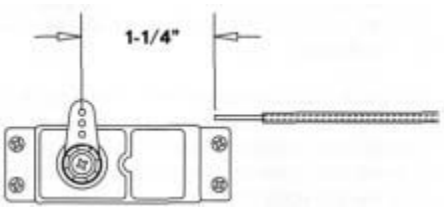
❑ ST13. Trim, then sand the turtle deck sheeting so it is flush with former F7A and A. The sheeting at the front should be even with F7A where it meets the *ledge* on the side stringer.

**IMPORTANT NOTE:** Some modelers prefer to *sand as they build* instead of waiting until the very end. If you prefer to do a little sanding now to even the turtle deck sheeting with the fuse sides, you may do so but **do not over-thin** the 1/16 turtle deck sheeting because the ABS **tail cone** and ABS **cabin** have yet to be fitted and must match the sheeting.

## *HOOK UP THE RUDDER AND ELEVATOR*

**Note:** As on the full size Beechcraft, the elevators and rudder can touch, but the rudder throw will be set so that this does not happen during flight.

❑ ST1. Install the pushrods in the guide tubes. Temporarily connect the clevises to the rudder control horn and fit the rudder and elevator in place.

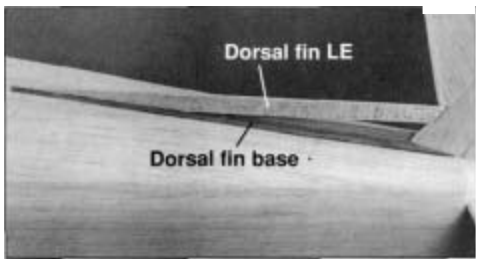


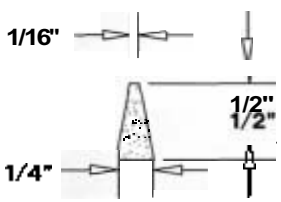

❑ ST2. Place a servo arm on your rudder and elevator servos. With the servos centered and the rudder and elevators neutral, use a felt-tip pen to mark the pushrods exactly 1-1/4" from the holes in the servo arms. Remove the pushrods from the fuselage. Cut them at the marks you made.

❑ ST3. Silver solder a **threaded coupler** onto each wire pushrod. Reinsert the pushrods into the fuselage and thread a nylon clevis onto the couplers. Temporarily connect the pushrods to the servos and rudder and elevator. Adjust the length of the pushrods if necessary by turning the clevises in or out.

## *BUILD THE DORSAL FIN*

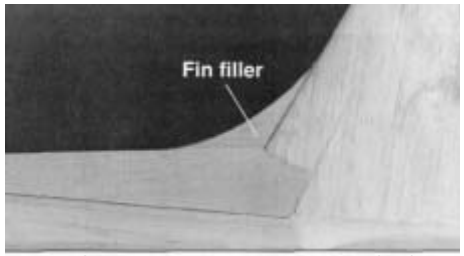
❑ ST1. Use the pattern on the plan to make the **dorsal fin base** from leftover 1/16" balsa. Glue the dorsal fin base to the top of the turtle deck. Make sure the front of the base is **centered** on the fuse centerline.



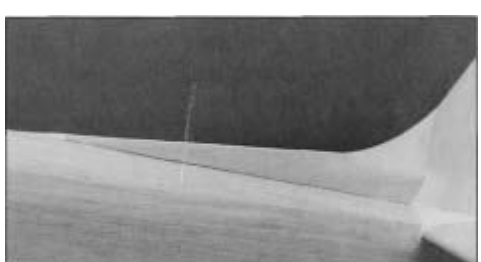

❑ ST2. Cut the 15" tapered balsa **dorsal tin LE** to the shape shown on the plan. Glue the dorsal fin LE to the fin LE and the dorsal fin brace.

❑ ST3. Make two **dorsal** fin sheets from leftover 1/16" balsa sheeting and pattern on the plan. Test fit and glue one of the sheets to the turtle deck and dorsal fin base. Wet the sheet and glue it to the dorsal fin LE. Make sure you do not pull the dorsal fin LE off to one side when you glue the sheet to it. Glue the other dorsal fin sheet in position.



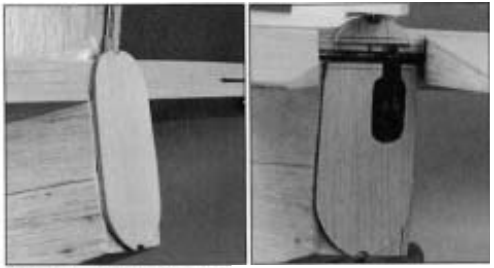

❑ ST4. Glue the 1/16" die-cut plywood **fin filler** to the dorsal fin and fin.

❑ ST5. Apply Hobbylite filler to the dorsal fin and fin filler to blend them to the fin. Apply filler to the front of the dorsal fin to complete the taper and blend it to the turtle deck. Do not apply all the filler in one application but build up thin layers, allowing each layer to fully dry before you apply the next.



❑ ST6. Sand the fillet, blending the dorsal fin, fin filler and fin into one smooth contour.

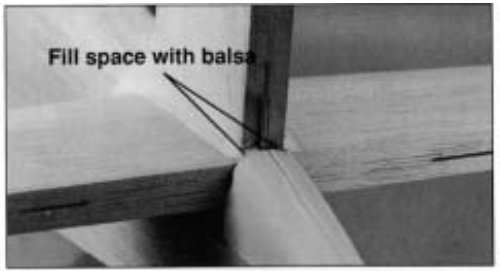
## FIT THE TAIL CONE



❑ ST1. Glue the die-cut 1/8" balsa tail cone former (F11TC) on the end of the fuselage. Remove material as needed to clear the torque rods and pushrods. There must be no possibility of binding here.

❑ ST2. Refer to the photo at step **V2** on page 44. It shows the V-tail but the straight tail is the same. Glue the die-cut 1/8" plywood tail cone mounts to the tail cone former. Cut round notches in the tail cone to clear the joiner wire. Fit the tail cone on the aft end of the fuse and fasten it to the mounts with four #2 x 3/8" screws. Make sure the screws do not interfere with the elevator torque rod.

❑ ST3. Remove the elevators and joiner wire. Mount the tail cone to the fuselage.

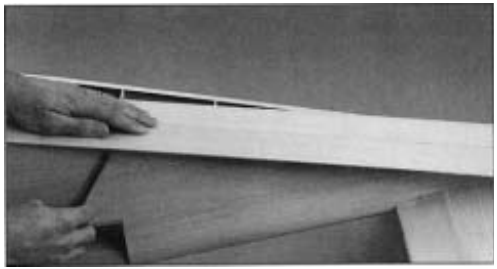



❑ ST4. Fill the small space between the top of the tail cone and the TE of the rudder with leftover balsa. Use lightweight hobby filler to blend the fin to the stab and the tail cone to the fin.

## SHEET THE BOTTOM OF THE FUSELAGE

❑ 1. If you are going to hook up working lights, now is a convenient time to route the wire for the light in the tail. Route the wire through the formers. Glue the wire to the formers with rubber cement or a drop of CA so they don't rattle around. Allow enough wire to extend past former F11 **so** it will extend about 2" past the back of the tail cone.

❑ 2. Cut a 3/32" x 3" x 30" balsa sheet to a length of 28. True both edges of the sheet with a hobby knife and a straightedge. Pin the sheet to the bottom of the fuselage in the 'center so the end butts against the front edge of the tail cone.

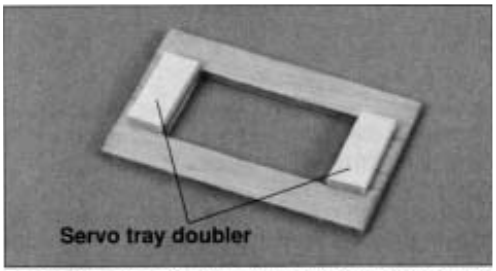


❑ 3. True both edges of another 3/32" x 3" x 30" balsa sheet. Position the sheet on the bottom of the fuselage next to the center sheet. Use a ballpoint pen to mark the side of the fuselage onto the sheet. Cut the sheet along the line you drew. Do the same with the remainder of the sheet on the other side of the fuselage.

❑ **4.** Glue the three bottom sheets together. After the glue dries, sand the fuselage bottom sheet so it is flat and the edges are even. Sand the bottom at the formers and stringers so that they are even and flat. Glue the fuselage bottom sheet to the bottom of the fuselage.

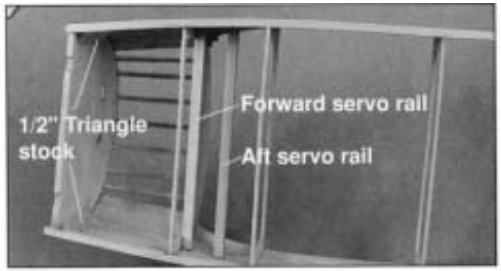
❑ *5.* Shape the bottom ***corners*** of the fuselage as shown in the cross sections on the plan so they blend with the tail cone at the rear.

## MOUNT THE ENGINE




❑ 1. Glue the die-cut 1/8" plywood servo tray doublers to the bottom of both die-cut 118" plywood forward servo trays. Mount your throttle servo to one tray and your nose wheel steering servo to the other tray.

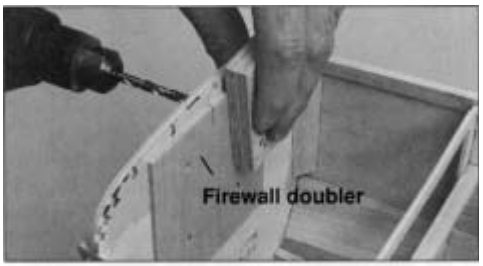
❑ 2. Cut a 8-3/4" ***forward*** **servo** rail from a 1/4" x 3/8" x 36" basswood stick to fit between the fuselage sides behind former F2. Test fit, then glue the servo rail to the fuse sides and former F2 1-7/8" below the top edge of F2.

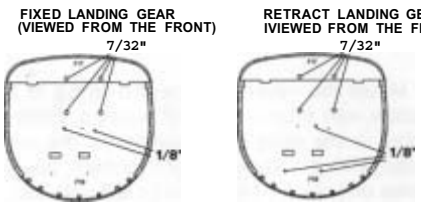



❑ 3. Cut a 8-13/16" ***aft*** servo rail to fit between the fuselage side doublers *7/8"* aft of the forward servo rail. Place the throttle and nose wheel steering servo and tray between the rails. Adjust the position of the aft rail to fit your servos. Glue the aft servo rail in place. Do not glue the servo trays in place until instructed to do so.

❑ 4. Glue the FIT/FIDT assembly to the top of the firewall. Use a straightedge to make sure they align.

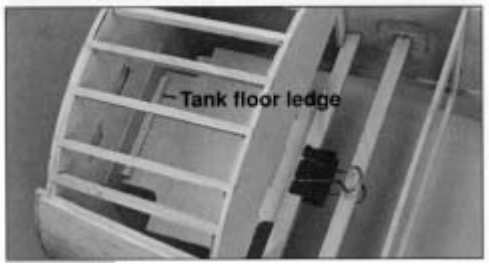
❑ *5*. Glue the die-cut 1/8" plywood **firewall doubler** to the back of the firewall, centered on the engine mount punch marks, 1/8" below the notch in the center of F1DT as shown on the plan.




❑ 6. Drill the correct size holes through the punch marks on the front of the firewall as shown in the sketches above. Tightly hold a **thick** block of wood on the back so the drill does not split the wood when it comes through.

❑ 7. Press four 8-32 blind nuts into the holes on the back of the firewall. Use an 8-32 x 1-1/2" socket head cap screw with some large washers to *draw* the blind nuts into the wood. Wick thin CA around the back of the blind nuts to permanently hold them in place.

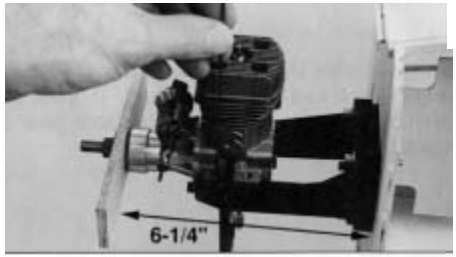



❑ 8. Temporarily clamp the die-cut 1/8" plywood **tank floor** to the forward servo rail so it is centered on the back of the firewall doubler. Turn the fuselage over and push the tank floor up until it contacts the edge of the bottom blind nuts. Glue a 3/16" x 3/16" **x** 3" balsa stick to the back of the firewall under the tank floor to serve as a **forward tank floor *ledge.*** Do not glue the tank floor to the ledge until instructed to do so.

❑ 9. If you have not already done so, sand the fuselage side doublers and fuselage sides so they are flush with the front of the firewall.

❑ 10. Cut the ***spacer bar*** off both **engine mount** halves and trim off any *flashing* so they easily fit together. Loosely bolt your engine mount to the firewall with four 8/32 x 1-1/4" socket head cap screws, **#8** lock washers and flat washers. Adjust the mount so your engine will fit. Tighten the screws to securely hold the mount to the firewall. Use small clamps to hold your engine to the mount so the front of the drive washer (or the back plate of your spinner) is 6-1/4 from the firewall. Mount a flat wood stick or the back plate of your spinner to the engine so you can measure the distance.

**Beech Fact:** In addition to the aforementioned benefits the V-tail offers, others include lower manufacturing costs through fewer parts, fewer parts for Beech dealers to stock, reduced damage from debris thrown from the prop and wheels, and spin recovery superior to that of an airplane with a conventional tail.



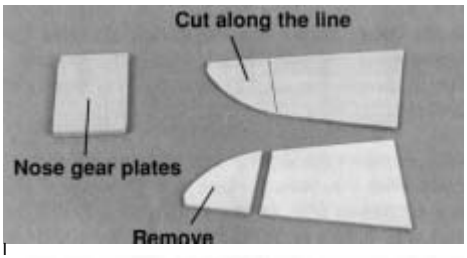

❑ 11. Mark the engine mounting bolt holes on the mount. **Hint:** Mark the holes with a wire rod sharpened at one end. Heat the tip of the rod with a torch to dimple the engine mount in the **center** of the holes.

❑ 12. Remove the engine from the mount and the mount from the firewall. Use a drill press, if you have access to one, or use a hand drill to drill the holes with a #29 or 9/64 drill bit for 8-32 screws. Tap 8-32 threads into the mount. Screw the mount back onto the firewall. Screw the engine to the mount with 8-32 x 1" screws to see how it fits.

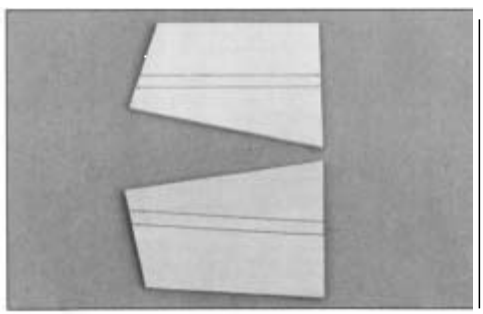
## *MOUNT THE NOSE LANDING GEAR*

**Continue with these instructions if you are installing fixed landing gear. If you are installing retracts, skip to *Retractable gear* on page 53.**

### *Fixed gear*

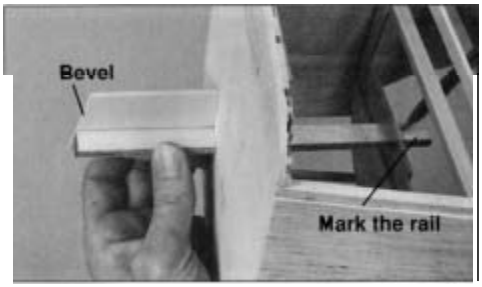



❑ F1. Draw a line connecting the punch marks on both die-cut 1/8" plywood nose **landing gear braces.** Cut the braces off at the line. Glue the two die-cut 1/8" plywood **nose gear plates** together.

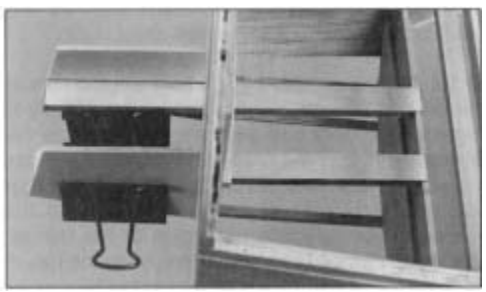


❑ F2. Place the braces over their location on the plan. Mark the location of the 1/4" plywood landing gear rails onto the braces.

❑ F3. Remove the engine mount from the firewall.

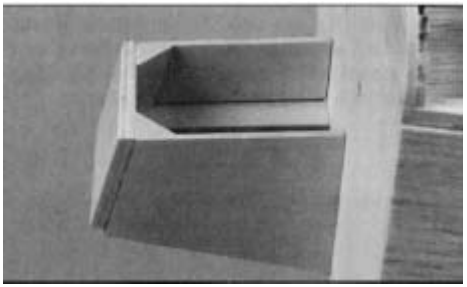



❑ F4. Cut a bevel on the end of the 1/4" x 9/16" x 9" plywood **landing gear rails** to match the angle on the end of the braces. Test fit a rail through the right side of the firewall and in the notch in former F2. Position the right brace and align the front of the rail with the front of the brace. Mark the rail 1/8" aft of former F2. Remove the rail and cut it at the mark. Mark the other rail in the same manner.



❑ F5. Use 30-minute epoxy to simultaneously glue the rails to the firewall and former F2, and the rail braces to the rails and the firewall. Make sure the front of the rails are even with the front of the braces.

❑ F6. Drill 1/8" holes through the punch marks in the nose gear plate. Press four 4-40 blind nuts into the holes in the plate, and secure them with thin CA.

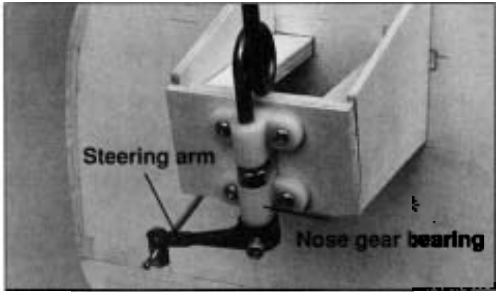


❑ F7. Position the nose gear plate on the front of the braces. Trim the rails so the blind nuts do not interfere. Use 30-minute epoxy to glue the nose gear plate to the rails and rail braces. Hold the plate in position with masking tape until the epoxy is fully cured. Add balsa triangle **braces** as shown on the plan cut from leftover fuse corner stringers. See the photo at step 11.

❑ F8. Mount the nylon **nose gear bearing** to the nose plate with four 4-40 x 1/2" screws. Enlarge the holes in the nose gear bearing for the nose gear strut with a #10 drill bit (if you don't have a numbered drill set, an 11/64" drill bit will work too).

❑ F9. Enlarge the outer hole in the black, nylon **steering arm** with a # 41 drill bit or a hobby knife. Mount the heavy duty **Screw-Lock connector** to the steering arm with the **one-way star washer.** Mount the 3/16 **nose gear wire** to the nose gear bearing with a 3/16" **wheel collar** and **set screw** and the steering arm and a 6-32 x 1/4" socket head cap screws as shown on the plan. Notice that the steering arm is slightly off center when the nose gear is centered.

❑ FIO. Temporarily fit your nose steering servo and tray on the forward servo rails. Fit a servo arm to your servo.




❑ F11. Thread a 4-40 **hex nut** followed by a 4-40 metal **clevis** onto a .095 x 12" **nose steering pushrod.** Connect the clevis to the servo. Connect the other end of the pushrod to the Screw-Lock connector in the steering arm. Cut the pushrod about 1/4" past the connector. Make a slight bend in the pushrod near the Screw-Lock connector so it aligns with the hole in the connector. Temporarily secure the pushrod to the connector with a **set screw.**

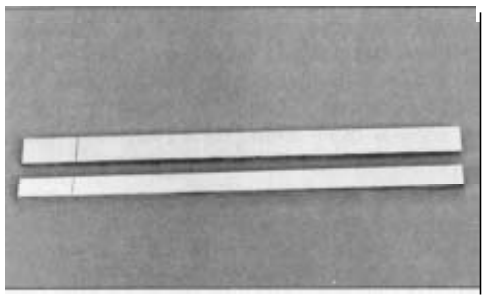
❑ F12. Securely glue the nose steering servo tray to the servo rails. Make sure your servo is centered, and tighten up the 4-40 jam nut on the clevis with a drop of thread lock for extra security. File **small** flat spots in the nose gear strut to securely hold the set screws.

*That was easy wasn't it? Now hook up the throttle. It's just as easy! Skip to* ***Hook Up The Throttle*** *on page 55.*

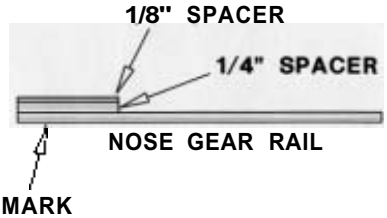
**Beech Fact:** Nearly 10,000 V-tail Bonanzas have been manufactured and over 1,800 of its straight tailed cousins have been manufactured. A very large percentage are still flying today. Experts cite many factors contributing to the Bonanza's success including Walter Beeches' reputation, the Bonanza's *built to last forever* design and appearance, new *Class-A* tooling ordered before the Bonanza went into production^ and its all-around performance.

## *Retractable nose gear*

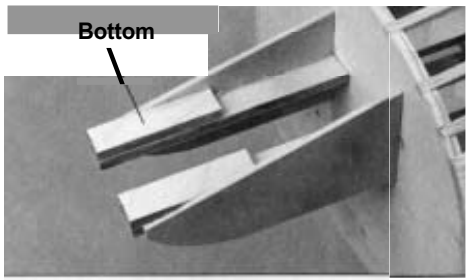
**Note:** While there are other retractable nose gear units that may work in the Top Flite Gold Edition Beechcraft, the Robart 631 is shown in this manual because it rotates 105 and is designed specifically for this model. A 90 unit would work but the mounting position would have to be raised and the rails would have to be slanted upward toward the front of the model in order to achieve the scale appearance of the full size Beechcraft. These modifications are up to you.



❑ R1. If you're using the Robart 631 nose gear retract, mark a line 7-7/8" from one end of both 1/4" x 9/16" x 9" plywood **landing gear rails.** This will position the *pivot point* of the 631 nose gear 7-7/8" from the aft edge of F2.

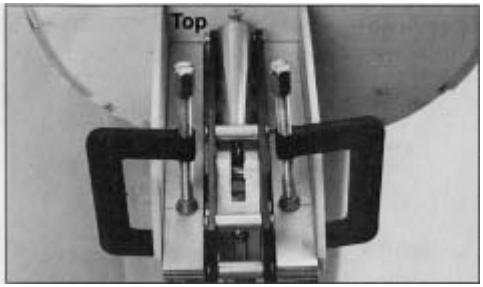



❑ R2. Glue one 114 x 9/16 x 2-1/4 plywood **rail spacer** and one 1/8" x 9/16" x 2-1/4" plywood **rail spacer** on the end of both rails that you made the mark on, but on the other side of the rail.



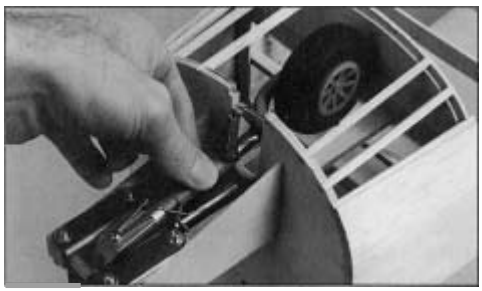

❑ R3. Temporarily place the landing gear rails

❑ R4. Use 30-minute epoxy to glue the rails to the firewall and former F2 and the die-cut 1/8" plywood **landing gear braces** to the rails and the firewall.




❑ R5. Use small clamps to hold the nose gear to the rails so the pivot point (on the Robart 631's) aligns with the marks you made on the top of the rails. Mark the locations of the mounting holes on the landing gear rails.

❑ R6. Remove the landing gear and drill 5/32" holes at the marks you made. Temporarily mount your landing gear with 6-32 x 3/4 screws and blind nuts (not included).



❑ R7. Remove the two 3/16" stringers that interfere with the wheel and strut. Use a Dremel Tool or a razor saw to cut the firewall to accommodate the strut. Retract the nose gear and make sure it does not interfere with the firewall.

**Note:** Adjust the **centering spring** on your retracts so the nose wheel is neutral and make sure the nose wheel is centered on the strut. On the Robart 631 strut we inserted two #8 washers between the wheel and the strut to center the wheel. The nose wheel **must** be **neutral** and **centered** to fit between the rails when retracted.

**Hint:** File or sand a slight bevel to the bottom edges of the rails to guide the nose wheel, in case

❑ R8. If you have your air pump and some quick disconnects handy, temporarily connect them to your nose gear air cylinder and actuate the nose gear with the air pump. This will give you a good indication of any problem areas that you can correct now.

❑ R9. Cut 3/16" off the aft edge of the die-cut 1/8" plywood **nose steering servo tray.** Mount your nose steering servo to the servo tray so the output shaft is on the **left** side of the servo tray as shown on the plan. See the photo at step R11. Note that the servo is *offset* toward the aft edge of the servo

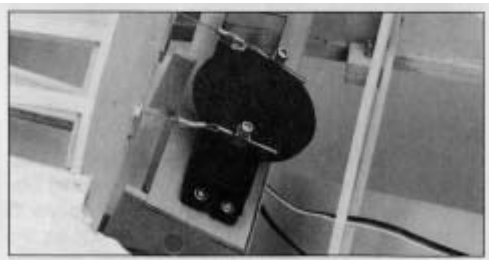
❑ R10. If you would like to mount your air control valve in the same location as in our prototype, drill a 1/2" hole in the die-cut 118" plywood **right nose steering servo tray mount** at the punch mark.

❑ R11. Test fit the servo tray (with the servo) in the die-cut 1/8" plywood **servo tray mounts** and fit the assembly in the servo rails. Position the mounts and the tray so the output shaft of the servo is centered between the 1/8" holes in former F2. Glue the servo tray and the mounts in this position.

❑ R12. Cut two 4-5/8" pieces from the white nose steering cable inner pushrod guide tube and slide the pieces through the holes in the firewall and former F2. Glue the tubes to the firewall and F2.

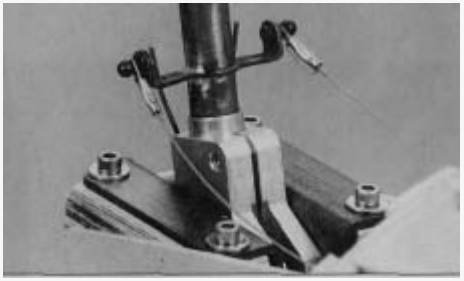
## *CONNECT THE NOSE STEERING PULL-PULL*

Several pull-pull steering cable systems are available that will work in your Bonanza. We selected the Sonictronics #121 *Pro-Control* Cable System.



❑ R1. Enlarge the hole in two Screw-Lock pushrod connectors with a #46 or 5/64" drill bit. Mount the screw-lock connectors to a large servo arm and fasten each with a nylon retainer. Connect one end of a 14" long pull-pull cable to a threaded rod included with the pull-pull steering set using the

*swage* to secure the cable. Fit the threaded rod into one of the Screw-Lock connectors and temporarily lock it down with a 4-40 x 118" socket head screw. Connect another piece of cable to the other Screw-Lock connector the same way, then thread the cable through the guide tubes toward the nose gear strut.



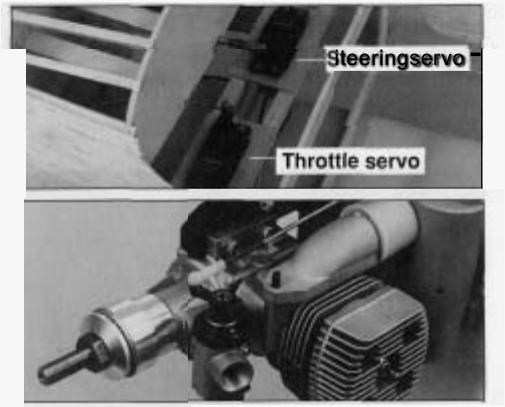
❑ R2. Install a 0-80 threaded ball link ball (not included) onto the arm on both sides of the nose wheel strut with a 0-80 nut. Connect the other end of both cables to the threaded ball links with the swages. Tighten the loop in the cable just enough so it will not come off the ball. Crimp the swages. Temporarily hook up the steering servo to your radio system and test the movement. Adjust the tension on the cables or make other adjustments if needed.

**Note:** If your nose gear steering arms did not come bent 90" as shown, do so now.

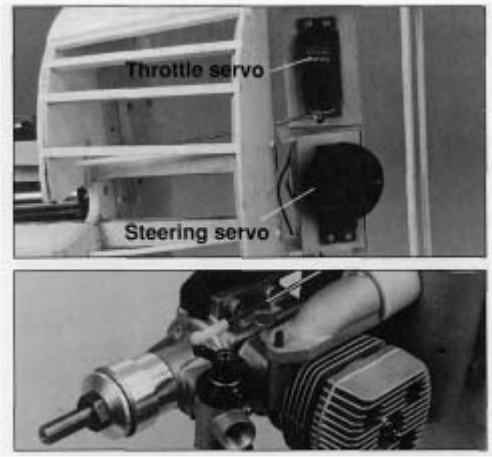
## FINISH CONSTRUCTION

### *HOOK UP THE THROTTLE*

❑ 1. Mount your engine mount and engine to the firewall. Mount your muffler to make sure your throttle pushrod will not interfere.




*This is the throttle servo location for fixed gear,*

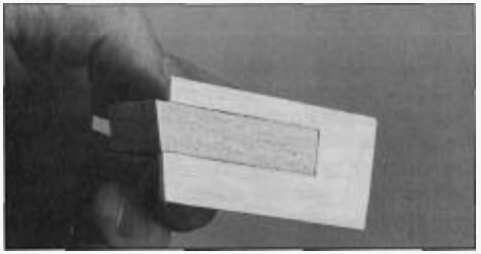



*This is the throttle servo location for retractable gear.*

❑ 2. Place your throttle servo tray with the servo in the rails. Connect the ,074" x 12" **throttle pushrod** to your servo with a small, brass **Screw-Lock connector.** Connect the other end of the throttle pushrod to the engine with a nylon **ball socket** and a 0-80 **threaded ball** and 0-80 **nut.** Use a drop of thread lock on the nut. Glue the throttle servo tray to the rails.

### *MOUNT THE WING TO THE FUSE*

*Remember the wing? Go get it so you can mount it to the fuse.*



❑ 1. Bevel the end of both 1/2" x 1" x 2-1/4" maple **wing bolt blocks** so they match the angle of the die-cut 1/8" plywood **wing bolt block holder.**

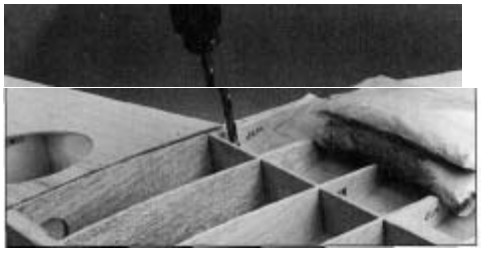
❑ 2. Use 30-minute epoxy to glue the wing bolt blocks and holders in the fuse where shown on the plan. See the photo at step **8.**

❑ 3. Place the wing in the wing saddle on the fuse. Observe *high spots* in the saddle of the **balsa** fuse sides that prevent the wing from fitting. Remove the wing and sand the high spots so the wing matches the fuse as accurately as possible. Do not sand the ply fuse side doublers.

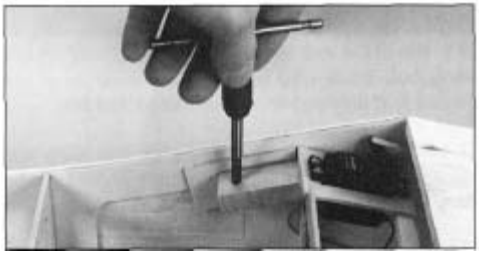
❑ 4. Remember the *pin and string method* you used to align the stab? Get your string out and stick a T-pin in the center of the bottom, middle stringer just ahead of the tail cone.

❑❑ 5. Use the arrow on the tape to align the wing with the fuse the same way you did the stab.

❑❑ 6. Once you have the wing aligned, place weights over the center section to keep it from shifting during the next few steps. Keep your string handy so you can recheck alignment as you proceed.



❑ ❑ 7. Drill through **only one** wing bolt plate, the top sheeting and the wing bolt block on one side of the wing with a #7 drill. Keep the drill bit perpendicular to the wing bolt plate as you drill so the head of the wing bolt will rest flat.



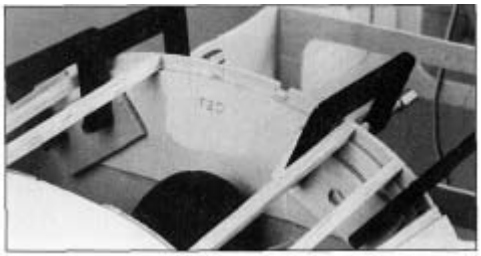
❑ ❑ 8. Remove the wing and tap threads into the wing bolt block with a 1/4-20 tap. Enlarge the hole in the wing bolt plate and the top sheeting with a round file or a 17/64 drill. Replace the wing on the fuselage and bolt it down with the one 1/4" nylon wing bolt.

❑ 9. **Replace the #7 drill bit in your drill.** Repeat steps **5,** 6, 7 and 8.

❑ 10. Bolt the wing to your fuselage and leave the wing bolts barely snug. Realign the wing.

❑ 11. Drill 1/4" holes through the 1/8" x 1" x 2" plywood **wing dowel plates. Slightly** enlarge the holes with a round file or a piece of sandpaper wrapped around something round such as a pen or a piece of brass tube. This will allow you to plug the wing into the fuselage without too much resistance.

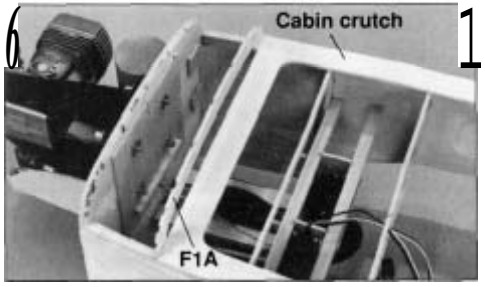
❑ 12. Spread a thin film of 30-minute epoxy on one side of both wing dowel plates and fit them over the dowels protruding through former F2D inside the fuse. Accurately mark the location of the plates on F2D.



❑ 13. Remove the wing. Clamp the wing dowel plates to F2D with C-clamps. Wipe excess epoxy from the holes if any is present.

## *SHEET THE FORWARD DECK AND BOTTOM*

❑ 1. Assemble your fuel tank. Position the tank floor and the tank in the fuselage and determine where to drill the holes for the fuel lines. Drill the holes with a 1/4 drill (or 15/64" drill for a better fit).




❑ 2. Remove the tank and tank floor. Position the die-cut 1/8" plywood **cabin crutch** on the fuse main side stringers so the aft edge contacts former F7A. Position the die-cut 1/8" plywood former **F1A** on the fuse main side stringer so it contacts the crutch. Glue F1A **to the side stringers only.** Remove the crutch.

❑ 3. Cut the stringers from pieces of leftover 3/16" x 3/16" balsa to fit from F1A to the firewall. Glue the stringers in position while using a 90 degree triangle to hold F1A perpendicular to the top of the stringers.

❑ 4. Place 1/4" foam rubber on the tank floor. Test fit your fuel tank with **#32 rubber bands** included with this kit. **Note:** Rubber bands deteriorate over time, so you should replace them at least once a year.

❑ 5. Sheet the forward fuse deck with leftover 3/32" balsa. After you glue the sheeting in position, sand the front even with the firewall. Sand the back even with F1A, but do not sand the rest of the sheeting until you fit the cabin.

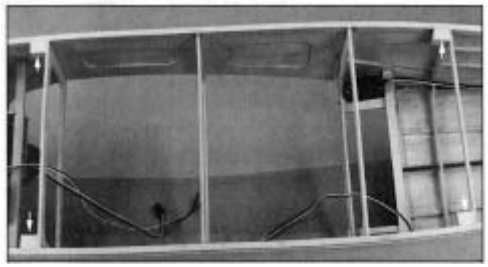
☐ 6. If you're installing retracts, turn the fuselage over and build a small *framework* from leftover balsa to support the sheeting around the nose wheel cutout.

❑ 7. Use leftover 1/16" balsa sheeting to seal the area around the nose gear between F1 and F2. This will prevent fuel and exhaust residue from entering the fuselage.

☐ 8. Use leftover 3/32" balsa to sheet the bottom forward fuse, aft of the cowl. Cut the wheel well for the nose wheel and strut if you are installing retracts.

❑ 9. Remove the tank and foam rubber. Coat the inside of the fuselage between the firewall and former F2 including the back of the firewall with fuel proof paint, epoxy or finishing resin.

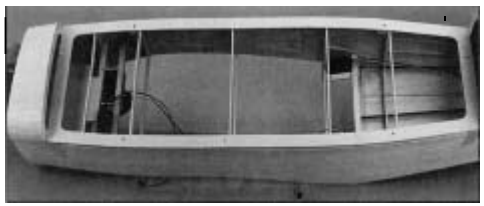
## *FIT THE CABIN TOP*



❑ 1. Bevel one end of four 1/2" x 1/2" x *5/8"* basswood blocks so they fit between the fuse main side stringers and formers F3 and F6 where shown on the plan. Glue the blocks in position.

❑ 2. If your fuel tank is in the fuse, remove it for now.

❑ 3. Place the die-cut 1/8 plywood **cabin crutch** on the fuselage so it is centered and the edges slightly extend past the side stringers. Use masking tape to hold the cabin crutch to the fuselage.



❑ 4. Drill four 1/16" holes through the crutch into the center of the blocks you glued to the fuse. After you drill each hole, temporarily hold the crutch to the fuse with a #2 x 1/2" screw.

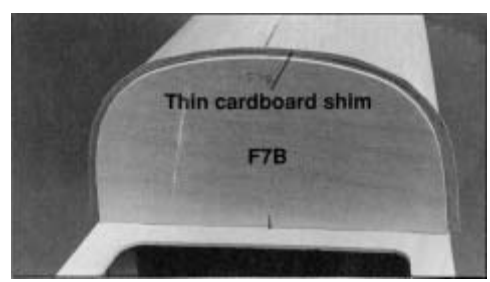
❑ 5. Use a ballpoint pen to mark areas of the crutch that need to be sanded for a perfect fit to the fuse main side stringers. Remove the crutch, sand the edges, and screw it back onto the fuse. A little at a time, mark, then trim the crutch until it accurately fits the fuse main side stringers.

❑ 6. Use scissors to cut the molded ABS **cabin top** along the cutlines (which are most visible from inside the cabin top). The cabin top will be slightly oversize to allow you to trim it for an exact fit to your model. Use a felt tip pen to mark the molded-in center marks at the front and aft edges of the cabin top so they will be easier to see while fitting. Do not trim the cabin top to fit your fuse until instructed to do so.

❑ 7. Lightly mark the center of the front fuse sheeting over former F2A (over the center stringer). Mark the center of the turtle deck sheeting over former F7A (over the center stringer).

❑ 8. Position the die-cut 1/8" plywood **aft cabin former F7B** on top of the crutch so it contacts former F7A. Lightly sand the edges of F7B so there is approximately a 1/16" difference between F7B and F7A to accommodate the cabin top.

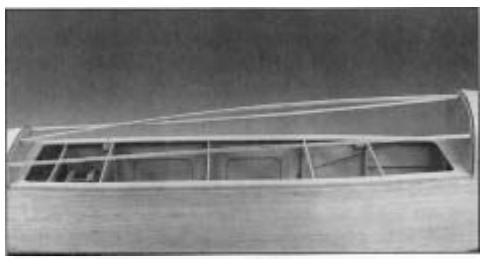
❑ 9. Test fit and shape the die-cut 1/8" plywood **forward cabin former F2B** to former F2A the same way.



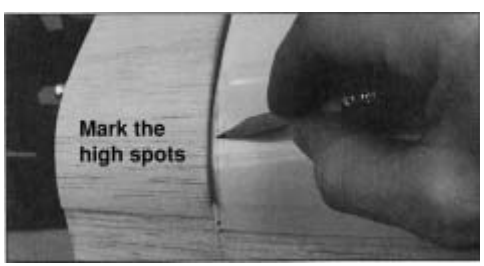

❑ 10. Reposition the aft cabin former on top of the crutch. Place a piece of thin cardboard between the

aft cabin former and F7A. The thickness of the cardboard should be approximately 1/64" or .015". This is to provide a little clearance for painting and covering. Trace the outline of F7A onto the piece of cardboard. Cut approximately 1/4" outside of the line you drew. Reposition the cardboard shim and glue the aft cabin former to the crutch with the shim in place.

❑ 11. Make a shim and glue the front cabin former to the crutch the same way.

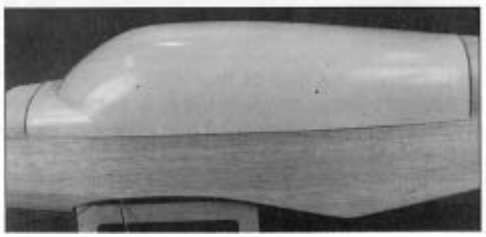


❑ 12. Temporarily position some balsa sticks between the front and aft cabin formers to make sure they and the shims tightly contact the fuse. You are going to fit the cabin top to the shims so the more accurately they fit the fuse, the more accurately your cabin top will fit the fuse.



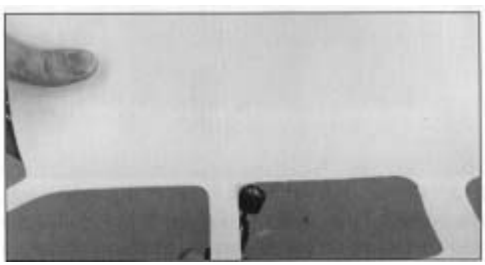

❑ 13. Position the cabin top on the fuse so the front contacts the cardboard shim and the centerline on the cabin top aligns with the centerline on the fuse. Use a lead pencil to mark areas of the front of the cabin top that need to be sanded for a perfect fit. **Carefully and lightly** sand the areas you marked, erase the pencil marks, and reposition the cabin top. Continue to mark, sand and fit the cabin top until the front fits well.

❑ 14. Perform the same procedure to the aft edge of the rear of the cabin top until it fits the rear cardboard shim and the cabin top drops into place.



❑ 15. With the cabin top on the fuse, make your pencil marks where the bottom needs to be trimmed. Sand the bottom edges of the cabin top until it fits.

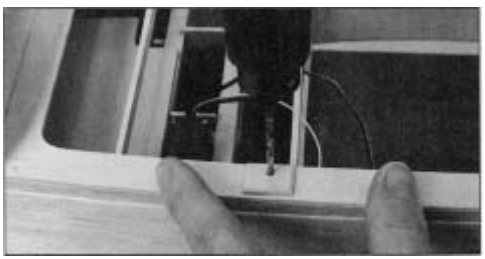
❑ 16. Thoroughly roughen the entire inside of the cabin top with 220-grit sandpaper so glue and paint will stick.



❑ 17. Use a Dremel tool with a carbide cutter or a similar type of rotary tool, or small scissors to cut the window openings along the cutlines inside the cabin top. The window outlines in the cabin top are about 1/16 smaller than the windows themselves. This will allow you to accurately fit the windows later, but do not enlarge the openings yet – just roughlycut them along the cutlines for now.

## *MOUNT THE CABIN TOP*

❑ 1. Remove the screws that temporarily hold the crutch to the fuse. Glue four pieces of 3/4" x 3/4" leftover 1/8" plywood to the crutch over the holes. Using the holes in the crutch as a guide, drill 1/16" holes up through the 1/8" ply pieces you just glued on. Temporarily screw the crutch to the fuse with the screws.

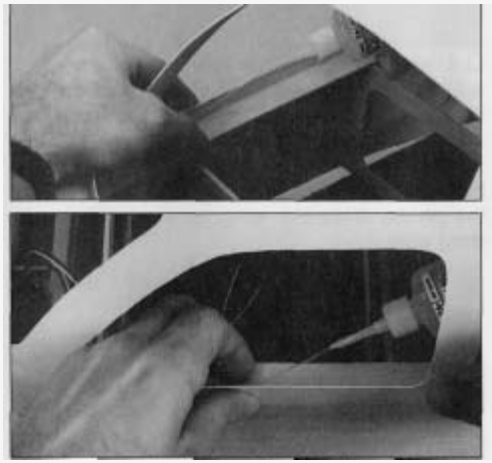


❑ 2. One at a time, remove a screw, and enlarge the hole through the crutch and the blocks in the fuse with a 1/8" drill. After you drill each hole temporarily insert a 4-40 x 3/4" Phillips head screw to hold the crutch in alignment as you drill the rest of the holes.

❑ 3. Remove the crutch from the fuse and press 4-40 blind nuts into the holes in the top of the crutch. Glue them with a little thin CA.

❑ 4. **Lightly** spray the edges of the crutch and crutch formers F7B and F2B with CA accelerator. Place the crutch on the fuse with the cardboard shims. Slip a piece of wax paper between the shim and crutch formers at the back and front of the crutch. Fasten the crutch to the fuse sides with four

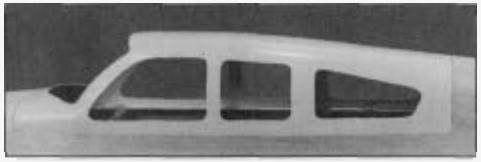
4-40 x 3/4" cap screws and washers accessible from inside the bottom of the fuse (we use a long Great Planes 3/32" Hexdriver Ball Wrench, GPMR8002). Position the cabin top on the crutch. Tape the cabin top to the fuse sides.



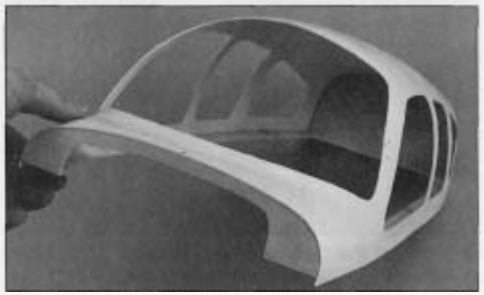
❑ 5. Make sure you have a CA applicator on your medium CA bottle. A little section at a time, simultaneously press the side of the cabin top down and to the side and glue the cabin top to the crutch with a small fillet of medium CA. Do only a small section at a time, making sure the crutch is pressed down to the fuse main side stringer as you glue. You should be able to reach all areas of the crutch through the window cutouts. Since you pre-primed the crutch with CA accelerator, you should have to hold the parts together for only a few seconds. Glue both sides of the cabin top to the crutch.

**Note:** Do not build up a large fillet of CA between the top of the crutch and the cabin sides. Be careful not to glue the cabin sides or the crutch to the fuse main side stringer. This should not be a problem if you do not use too much CA.

❑ 6. Glue the cabin top to the front and aft cabin formers. **Hint:** It will be easier to glue the cabin formers to the cabin top if you **carefully** place the fuselage on its nose and on its tail cone.



❑ 7. Remove the cabin top and add medium CA to areas you couldn't reach before. Fasten the cabin top to the fuse and lightly sand the fuse to match the cabin top.



❑ 8. Cut the front cabin former and the crutch to accommodate the fuel tank.

## *FIT THE WIND0WS*

**Note:** The windows are **individually** cut and glued to the inside of the cabin top.

❑ 1. Cut each of the molded clear plastic **windows** along the cutlines which are approximately 1/8" outside of the raised edges. Sand the edges smooth and even with 220-grit sandpaper. Use care not to scratch the windows.

❑ 2. Fit the **bottom** of one of the windows in the **bottom** of the matching window opening in the cabin top. Observe how much the **top, front and aft edges** of the window openings must be trimmed so the window will fit the rest of the way in. Remove the window and use a rotary tool with a sanding drum or sandpaper wrapped around a dowel to enlarge **only** the top, front and aft edges of the window opening until the window accurately fits. **Do not** trim the bottom edge of the window cutouts so the windows remain in line.

❑ 3. Fit the rest of the windows the same way.

**Beech Fact:** Walter H. Beech and Olive Ann Mellor first met at the Kansas based Travel Air Co. in the late 1920's. Thete, Walter served as president and Olive was the office manager. They married in 1930. In 1932, with two other business associates, Walter and Olive formed the Beech Aircraft Co., whose first plane into production was the Model 17R negative-stagger wing biplane which later became known as the Beech Staggerwing.

## *SHEET THE BOTTOM OF THE WING CENTER SECTION*

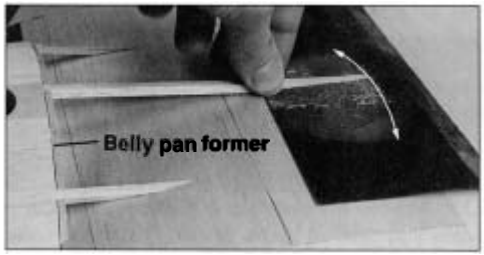
❑ 1. Install your servo extension cords, "Y" connectors and air lines if you are installing retracts. The servo extension cords don't have to be connected to the servos and the air lines don't have to be connected to the retracts but they should be installed so you can finish the sheeting. Plan this carefully. Be certain you have connected both aileron extension cords into the same "Y" connector and both flap extension cords into the same "Y" connector. Give yourself plenty of slack on the wires and air lines so you will be able connect everything after you cover your model.

❑ 2. Sheet the bottom of the wing center section with two 3/32" x 3" x 30" balsa sheets and leftover 3/32" balsa if needed. Before you glue the sheet that goes over the wing bolts, first cut two 1" lengths from the 9/16" diameter x 8" **cardboard tube.** Glue that sheet in position with the cardboard tubes. Glue the cardboard tubes to the sheeting and wing bolt plates. After the glue dries, cut and sand the tubes flush with the sheeting.

**Hint:** Temporarily fit the flaps to the wing and cut the ends of the bottom aft sheet to provide the correct spacing at the ends of the flaps.

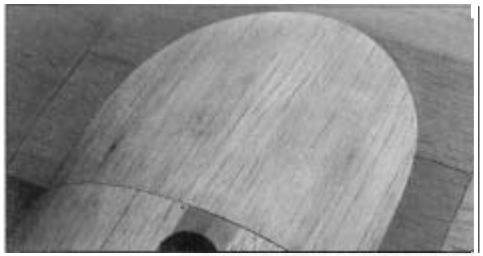
## *MAKE THE BELLY PAN*

❑ 1. Bolt the wing to the fuselage. Place the die-cut 1/8" plywood **belly pan former F2W** on the front of the wing so it is resting against fuse former F2. Trim the bottom of F2W so it sits 3/32" below the bottom fuselage sheeting (to accommodate the belly pan sheeting). Carefully glue F2W to **only the wing.**

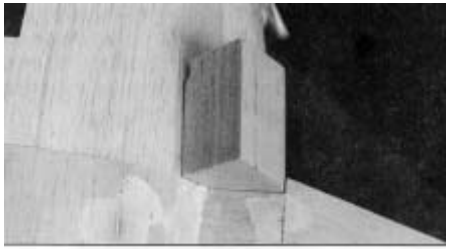



❑ 2. From a 3/16" x 3/16" x 30" balsa stick, cut one 6-1/2" piece, two 4-3/4" pieces and two 2-1/4" pieces to make the **belly pan stringers.** Sand one end of the stringers so they conform to the shape of the bottom of the wing. Glue them in position.

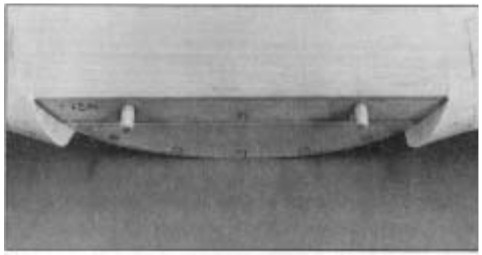
**Hint:** Place a piece of sandpaper on the bottom of the wing and move the stringers back and forth, sanding them to the correct shape.



❑ 3. Sheet the belly pan with leftover 3/32" balsa sheeting. *Feather* the edges with lightweight hobby filler. After the filler dries, remove the wing and sand the belly pan to blend with the fuse.



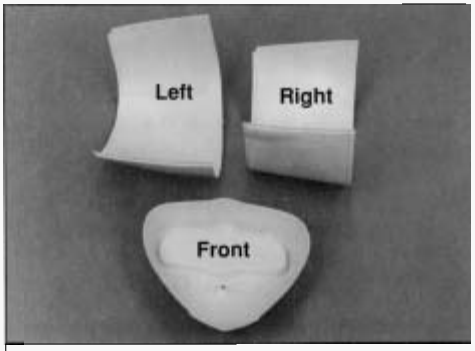
❑ 4. With the wing off the fuse, sand one of the 1" x 1-3/4" x 2" **wing fairing blocks** to match the curvature of the right side of the fuse at the leading edge of the wing. Bolt the wing to the fuse. Sand the side and rear of the wing fairing block so it fits between the wing and the fuse as shown in the photo. Glue the wing fairing block **to the wing only.**

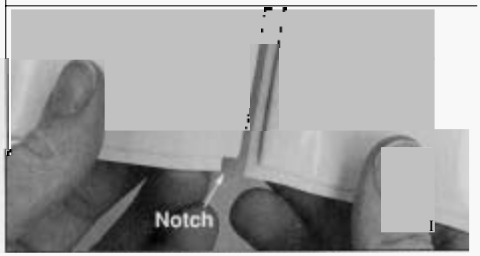


❑ 5. Remove the wing and sand the wing fairing block to match the shape of the **top** of the wing. The fairing block extends below the bottom sheeting, so blend it to the belly pan and the bottom of the wing with filler. Shape and fit the other fairing block the same way.

❑ 6. Use lightweight hobby filler to blend the belly pan to the wing and sand it smooth after it dries.

## *BUILD AND FIT THE COWL TO THE FUSELAGE*

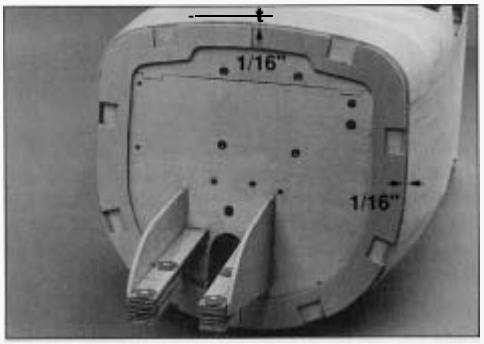


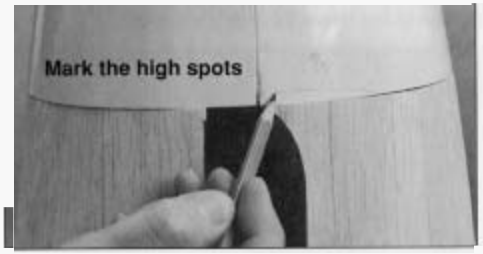

❑ 1. Cut the molded ABS **cowl** left side, right side, and front along the cutlines (seen from the inside). Cut a *notch* in the top of the right cowl half and the bottom of the left cowl half so the lap joints do not interfere. On the **aft** edges of the right and left cowl sides, cut about 1/8" aft of the cutlines. This gives you a little extra material to work with so you can accurately fit the cowl to the fuse. Cut the openings in the front of the cowl. If you have one, use a rotary hand tool with a cutting burr followed by a sanding drum. Sand the edges so they are straight and even.

❑ 2. Thoroughly sand all areas that are to be glued, including a 1/2" strip along the inside edges of the cowl, so the fiberglass reinforcement tape will stick.

❑ 3. Tape the cowl together with masking tape. Test fit the cowl to the fuse. Glue the seams with thin CA.

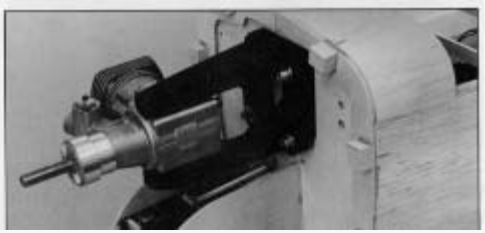



❑ 4. Test fit the die-cut 1/8" plywood **cowl** rings on the firewall. If necessary, sand the edges of the cowl rings so they are inset from the edges of the balsa fuselage sides approximately 1/16". Glue the cowl rings to the firewall.




❑ 5. With the engine mounted, fit the cowl to the fuselage. Mark the *high spots* on the aft edge of the cowl where you need to remove material so it accurately fits the fuselage and aligns with the backplate of your spinner. At first the cowl will be too long but as you *zero-in* on the fit, place the backplate of your spinner on your engine to help you align the front of the cowl. This is a *cut-and-fit* procedure that takes a little time, but it's one of those areas where you can really show your craftsmanship. Take your time and remove small amounts of material at a time.

**Note:** If the head of the engine, the needle valve or carburetor interferes with the cowl, remove them for the time being.



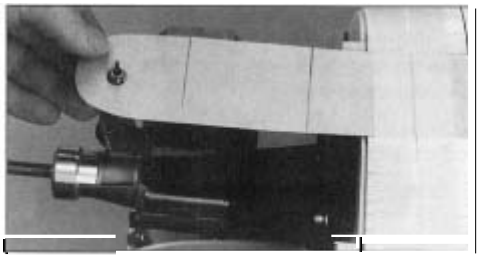
❑ 6. Test fit eight 1/2" x 1/2" x *5/8"* maple **cowl** mount **blocks** in the notches in the cowl ring. Sand the blocks so they match the shape of the cowl. Glue them in place. Mark the center of each cowl mount block on the fuselage. Test fit the cowl to the fuselage to make sure none of the blocks interferes with the cowl.

❑ 7. Securely tape the cowl to the fuselage. Using the marks as a guide, drill 1/16" holes through the cowl and the cowl mount blocks 1/4" in front of the aft edge of the cowl. Hint: After you drill each hole, screw in a #2 x 3/8" screw to keep the cowl accurately aligned as you proceed.

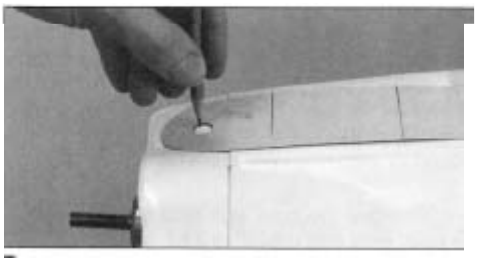
❑ 8. Remove the cowl and enlarge the holes in the **cowl** only with a 3/32" drill bit.

❑ 9. Test fit the cowl to see how it fits. Use #2 x 3/8" screws to hold it in place.

❑ 10. If you have fixed landing gear, cut a slot in the bottom of the cowl to clear the landing gear wire. If you have retractable landing gear, remove whatever material is necessary so the retractable nose strut and steering arm will clear the cowl.

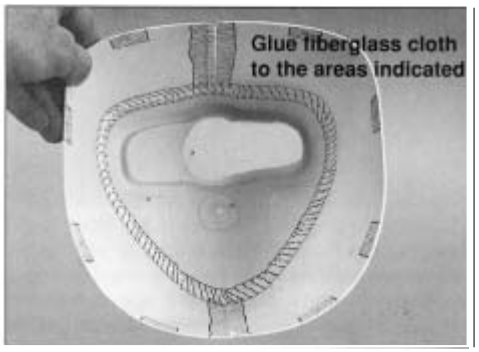


❑ 11. Remove the cowl and make a template out of thin cardboard to locate the needle valve.



❑ 13. Remove the cowl and cut the hole for the needle valve. Start with a small hole. Mount the cowl to the fuselage and check your accuracy. Enlarge the hole while you simultaneously change its position if necessary.

❑ 14. Use the same template method to make holes for the glow plug, exhaust, fueling system and engine head if necessary. The location for the fuel filler valve and retract fill valve are up to you, but we have provided die-cut 1/8" plywood **mounting brackets** for these items. The head on the SuperTigre *.75 barely* contacted the cowl in one area, so we just ground away that small portion of the fins without any ill effect.




❑ 15. Make sure you have thoroughly sanded the inside seams of the fuselage. Use 30-minute epoxy to glue 1" wide **fiberglass cloth** over all the seams inside the cowl. Add 1" squares of glass cloth inside of the cowl over the holes for the cowl mount screws. Redrill the holes after the epoxy cures.

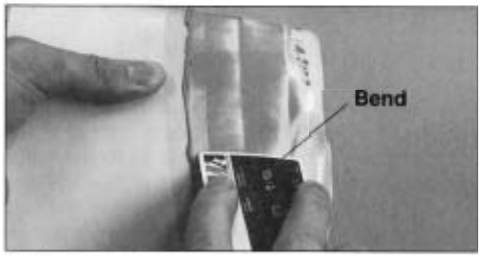
❑ 16. Fill the seams in the cowl with Bondo filler. There are other fillers that you can use, but we have found that Bondo works the best. Squadron Green or White putty also works well but it takes longer to dry and shrinks. You could use Squadron putty for smaller parts like the tail cone.

Here are some tips for applying the Bondo to your cowl:

1. **Thoroughly** roughen all seams and other areas with 150-grit sandpaper where you will apply Bondo.

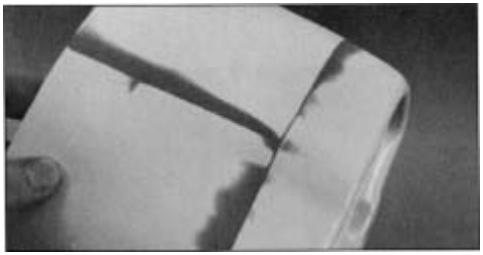
2. Mix the Bondo **thoroughly** but **rapidly** to allow as much time as possible to apply it.

3. Bondo cures within a few minutes, so mix only enough to fill one seam at a time.




4. Use an expired credit card or a piece of plastic as a *spatula* to apply Bondo. Bend your spatula to build up a slight moundover the seam.

*5.* Apply only enough Bondo to fill the seams and uneven edges. It's easier to apply a second coat than it is to sand *gobs* of it off.



6. Wet-sanding is best. Start with 150-grit sandpaper. Transition to finer grits as you proceed and finish with 400-grit sandpaper. When you're done, your cowl should look something like the one in the photo–just enough Bondo left to fill in the low spots near the seams.

**Note:** Refer to the **cowl flaps** on the side view of the fuse plan. If you are installing retracts, the cutout in the bottom of the cowl for the nose wheel will be large enough to allow an adequate air exit for cooling the engine. In this case the cowl flaps are optional. If you are installing fixed gear you will have to build either the **aft** or **forward** cowl flaps to allow adequate air exit. The aft cowl flaps are cut in the bottom of the fuse and are in the scale location. If you add the aft cowl flaps you will have to cut holes in the firewall to allow the air to exit through the aft cowl flaps. The forward cowl flaps are cut in the cowl and are not in the scale location, but are easier to build.

*You've come a long way. This is the end of the construction portion of the model so there's no more woodwork. It's all just details and other last minute stuff before your Bonanza will be ready to paint and cover!*

# FINISHING

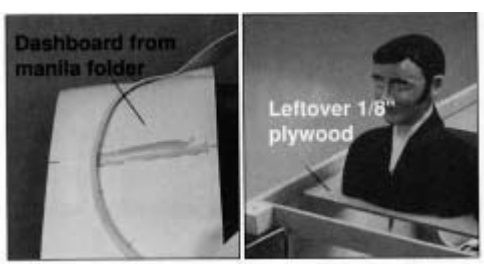
## *FUELPROOFING*

You may fuelproof your model before or after you cover it. Fuelproof all areas that may be exposed to fuel or engine exhaust such as the wheel wells, wing bolt recesses in the wing, the firewall, fuel tank compartment, the front of the belly pan and former F2 in the fuse, etc. Use thinned 30-minute epoxy, finishing resin or fuelproof model paint.

**Note:** Fuelproof the wheel wells and flap wells **before** you cover the wing. Otherwise, the paint may soak through the balsa and add blemishes to your covering.

## *CABIN DETAILS*

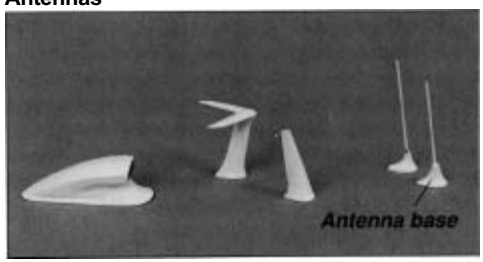
❑ 1. If you have decided to install the Top Flite Beechcraft Bonanza Scale Interior Kit, you may do so at any time, but some *fitting and maneuvering* is required *so* we recommend you install it before you cover and paint your model. It is not necessary to permanently install the interior kit at this time, but you should at least fit it and prepare it for painting. Refer to the installation instructions included with the Scale Interior Kit.




❑ 2. Make sure your windows are fitted **before** you perform this step. If you're not going to install the full Cabin Interior, glue the die-cut 1/8" plywood **instrument panel** to the crutch where shown on the plan. Use the **glareshield template** on the plan to make the **glareshield** from thin cardboard such as a manila folder. Lightly spray the glareshield with CA accelerator. Glue it to the instrument panel and the cabin top. Add whatever other details you would like to the cockpit and mount your pilots to a piece of leftover 1/8" plywood glued between the fuselage sides.

## *SCALE DETAILS*

**Antennas**




This is the fun part (if you're not staying up late rushing to get your model finished for competition). There are many scale details you can add to your Bonanza that will really bring it to life. We added the antennas and the air scoop as shown on the plans. The air scoop is the only one of these that is included with your kit and is molded in two halves. Build the air scoop the same as the cowl and tail cone. The antenna *bases* were carved from wood, then primed and painted white. Use maple, basswood, or a similar dense grain hardwood. Drill a 1/16" hole for antennas made from 1/16" brass tubes. When your scale details are finished, mount them to your model with double-sided tape, or 1/16" double-sided foam tape, or rubber cement. We recommend that you do not *permanently* mount the antennas to your model, so you can replace or repair them in case of hanger rash.

**Cowl**

The *louvers* are molded into the cowl. You can cut the louvers out or just paint them black.

**Scale Lighting**

We've provided details for how to mount your wing tip lights while you were building the wing. The rest of the wire routing and hookups are easy because everything else is open and accessible. Fit the rest

of the wiring and lights. **Temporarily** mount the circuit boards and the battery holders, so you can relocate them in case you need to adjust the C.G. Follow the instructions that come with the lighting kit to hook up and operate your lights.

## *FINAL SANDING*

Nearly all imperfections in your wood structure will show through the covering. Make one last check of the entire structure. Repair dings or scratches with filler. Sand all surfaces with progressively finer grits of sandpaper.

## *COVER YOUR MODEL WITH MONOKOTE FILM*

It is assumed that you are an intermediate to advanced modeler, so we won't go into many details on covering techniques, but here are some tips you should consider:

1. Most importantly, **NEVER CUT THE COVERING DIRECTLY ON THE SHEETING.** The Bonanza depends greatly upon the sheeting for its strength. Modelers who do this tend to cut into the sheeting and this will weaken the structure.

2. Remove all dust from the structure with a vacuum with a brush attachment, compressed air or a Top Flite Tack Cloth.

3. Use a Top Flite Hot Sock to minimize dents in the wood from the iron.

4. Some modelers have three irons going at once: one on high heat without a Hot Sock for stretching the covering around curves like wingtips; one on medium heat with a Hot Sock for bonding the covering to large sheeted areas like the wing and stab; and a Trim Iron for small areas.

5. When you cover large sheeted surfaces such as the wing, bond the covering in the middle and work outward pushing out air as you proceed. Do not move the iron in a circular motion but move it span-wise with the grain of the wood.

6. When you cover smaller parts with square edges such as the elevators and ailerons, cover the ends with separate pieces first. Then all you have to do is wrap the covering around the top and bottom and iron it down.

7. When you cover sharp junctions like where the stab meets the fuse, cut narrow strips of covering (3/8" to 1/2" and apply them in the corners **before** you cover the major surfaces. The larger pieces of covering will overlap the smaller pieces. This technique also eliminates the need to cut the covering after it has been applied.

**Recommended Covering Sequence:**

**Fuselage**
1. Tail junction strips as described above
2. Stab bottoms, then tops
3. Fin (if straight tail) right, then left side
4. Fuse bottom aft, then front
5. Fuse sides
6. Turtle deck (may be done in one or two pieces)
7. Front deck aft of cowl

**Wing**
1. Hidden areas and *corners* such the TE in the flap and aileron area
2. Bottom of center section
3. Bottom of one, then the other outer panel including the wing tips
4. Top of the center section
5. Top of one, then the other outer panel including the wing tips

**Control Surfaces**
1. Ends, bottoms, then tops of elevators, flaps and ailerons
2. End and bottom of tip, then one side, then the other side of the rudder (if straight tail)
3. Flap and aileron servo hatch covers

## *PAINTING*

At this stage all your plastic pieces should have the seams filled with Bondo or putty. Spray all the molded plastic parts and scale accessories with at least one coat of primer. We used Top Flite LustreKote on just about everything that needed to be painted. Wet-sand between coats with 400-grit sandpaper. Use Great Planes 1/8" EZ-Mask Flexible Masking Tape (GPMRI000) for masking fine lines, Kyosho Masking Cover Sheet (KYOR1040) for quickly masking large areas, a Top Flite Tack Cloth (TOPR2185) to remove dust just before paining, and LustreKote paint for a MonoKote matching finish.

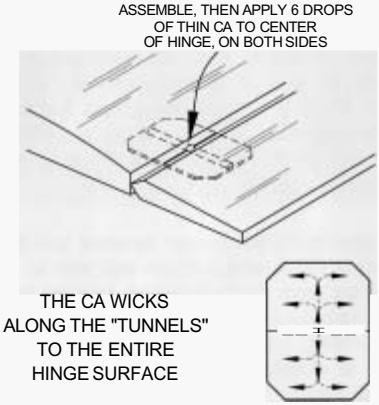
For painting the pilots we recommend acrylic water base paints such as the types found in craft stores. This type of paint looks great on a pilot because it is not glossy, and best of all, it cleans up with water.

We recommend gluing the clear plastic wing tip lenses to your wing before you cover or paint them. We used strips of Top Flite MonoKote Trim Sheets to cover the clear wing tip lenses. Part of the wing tips are to remain clear.

## *JOIN THE CONTROL SURFACES (HINGING)*

These instructions mention the V-tail which uses two torque rods instead of a single joiner wire as used on the straight-tail. If you're building the straight tail, follow these instructions except where the torque rods are mentioned.

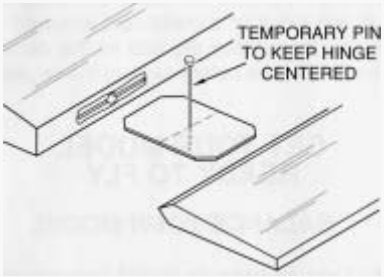
❑ 1. Start with the stab and elevators. Remove a small strip of covering from the hinge slots. For the V-tail, remove a small strip of covering where the plastic bearing tubes contact the TE.




Q2. Drill a 3/32" hole 1/2" deep in the center of the hinge slots on the stab and elevators. A high speed Dremel Tool@with a cutting burr works best for this, but you can use a drill or a sharpened brass tube instead.

❑ 3. If you are building the V-tail, use coarse sandpaper to roughen the part of the torque rods that will be inserted into the ruddervators and the plastic bearing tubes. If you are building the straight-tail, roughen the joiner wire. Use a toothpick to dab a small amount of petroleum jelly on the ends of the V-tail plastic bearing tubes to keep epoxy out.

❑ **4.** Fit the hinges in only the stab or elevators (without glue). Fill the torque rod holes in the elevators with 30-minute epoxy. Install the torque rods in the elevators. Wipe away excess epoxy with a cloth dampened with alcohol.




❑ 5. Join the elevators to the stab with the hinges. If necessary, insert a pin in the center of the hinges to keep them centered in the elevator and stab. Make sure there is approximately a 1/64" gap between the elevators and the stab so you do not glue them together.

❑ 6. Cut a paper towel into 2" squares. Add six drops of thin CA to the center of the hinges on **both the top and bottom.** Use the paper towel squares to absorb excess CA from the hinge gap before it cures.

**Do not use CA accelerator on any of the hinges and do not glue the hinges with anything but thin CA. Do not attempt to glue one half of the hinge at a time. The hinges will not be properly secured and could come out while the model is in flight.**

❑ 7. Glue the bearing tubes to the TE with a dab of 30-minute epoxy.

❑ ❑ ***8.*** Use the same hinging method to join the rudder to the fin (if building the straight tail) and the ailerons to the wing.

❑ ❑ 9. Thoroughly roughen the flap hinges with coarse sandpaper. Mix enough 30-minute epoxy to do one flap at a time. Use a piece of leftover wire to thoroughly coat the holes in one of the flaps and the holes in the wing with the epoxy. Coat one side of the flap hinges with epoxy and insert them into the wing. Coat the other side of the hinges with epoxy and join the flap. Wipe away excess epoxy before it cures.

❑ ❑ 10. Position the flap and the hinges so the flap is centered and fits the wing. Tape the flap in place until the epoxy is fully cured.

❑ 11. Join the other flap to the wing the same way.

❑ 12. Reinstall any pushrods you may have disconnected while covering, and mount the control horns to the ailerons.

## *GLUE IN THE WINDOWS*

❑ 1. Use a special canopy glue such as J & Z Products *Z RC/56* (JOZR5007) to glue the windows to the cabin top. This kind of glue is formulated for plastic and dries clear. Wipe away excess glue with a tissue dampened with water before it dries. Use masking tape to hold the windows to the inside of the cabin top until the glue is dry. If you decide to use CA, use medium CA (not thin). Use it **sparingly** and **do not** use accelerator.

❑ 2. Trim the clear plastic **tail lens** to fit the tail cone.

### *MAKE DOOR AND HATCH OUTLINES*

Use a Top Flite Panel Line Pen to draw the door and baggage compartment hatch outlines or use a Smart Stripe™ to cut narrow strips of MonoKote Film and iron them on. If you use the Panel Line Pen, use a straightedge with a few pieces of masking tape stuck to the underside of the straightedge to keep the ink from *wicking* underneath it. Use the Top Flite Scale Template for rivets, hatches, fuel caps and other details. Some cleaners will remove the ink lines so test your cleaner before you spray it on your model. You can remove mistakes with alcohol. You'll need to touch up some of the lines from time to time because they fade with lots of handling and fuel spillage.

**HOT TIP**

Use the plans to make templates of the doors and the luggage hatch from a clear butyrate plastic sheet. Sand the edges of the templates with 320-grit sandpaper. Stick a few layers of masking tape to the bottom of the templates near the edges to raise it off the surface. This will prevent the ink from *wicking* underneath. Cut a hole in the center of the templates so you can tape them in position without the tape extending over the edges. Position the templates on the fuse. Trace the outlines with a Top Flite Panel Line Pen.

### *APPLY THE DECALS*

The decal sheet does not give you everything you need to completely trim your model, but it does provide most of the intricate detailing and difficult items.

1. Study your documentation package and the photos on the box to decide where to place the decals.

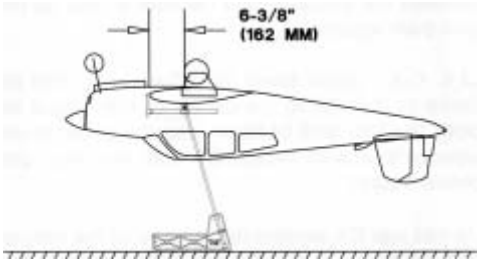
2. Thoroughly clean your airplane before applying decals.

3. Cut out the decals and carefully apply them to your model. You can *float* the decals into position by first applying soapy water (just a teaspoon of dish detergent to a quart of water) to the model's surface. ***Squeegy*** *out* the water and soap with a piece of soft balsa or a credit card wrapped with a tissue. Blot the surface dry and let the decal cure for at least 12 hours before running the engine.

## GET YOUR MODEL READY TO FLY

### *BALANCE YOUR MODEL*

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




❑ 1. See the **Hot Tip** that follows to accurately mark the balance point on the **top** of the wing on both sides of the fuselage. The balance point is shown on the plan ***(CG),*** and is located **6-3/8" (162 mm) back from the leading edge at the wing root** as shown in the sketch and on the plans. This is the balance point at which your model should be balanced for your first flights. Later, you may experiment by shifting the balance up to 1/2" forward or 1/4" back to change the flying characteristics. If you move the balance point **forward** it may improve the smoothness and tracking, but your Bonanza may then require more speed for takeoff and become more difficult to slow down for landing. If you move the balance **aft** it may make the Bonanza more agile with a lighter *feel* and allow you to slow the model more for landing. In any case, **please start at the location we recommend and do not at any time balance your model outside the recommended range.**

**HOT TIP**

**How to mark the balance point.** The balance point is measured from the **center leading edge.** Since the center section of the wing is not visible when the wing is on the fuse, you need to mark the balance point outward a few inches so you can see where to lift the wing when it's bolted to the fuse. To do this, mark the balance point with a felt-tip pen or tape on **both ends** of the center section. Place a straightedge across the marks. Mark the balance point along the straightedge further out on the wing. Mount the wing to the fuselage.

❑ 2. Temporarily place your receiver and battery pack inside the fuselage where you plan to mount them, or lay them on the fuselage over the location you plan to mount them. This is so you can change the mounting location of the battery pack or receiver to change the C.G. without adding any additional nose or tail weight. You can do the same with lighting system components as well (if you are installing the lighting package). Otherwise, all other components should be in the model and it should be in a ready-to-fly condition with the fuel tank **empty.**

❑ 3. With the wing attached to the fuselage, lift the model at the balance point. We use the Great Planes C.G. Machine™ (shown in the sketch) for this. If the tail drops, the model is tail heavy and you must shift your battery pack or other components forward or add weight to the nose. If the nose drops, it is nose heavy and you must shift your battery pack or other components aft or add weight to the tail. In order to save weight, relocate your battery pack and/or receiver or other components before you add additional weight to arrive at the correct C.G. You may easily install nose weight by using a spinner weight or gluing lead weights to the firewall. You may add tail weight by sticking on Great Planes (GPMQ4485) stick-on lead weights on the bottom of the fuselage under the tail. Later, if the balance proves to be OK, you can open the fuse bottom and glue these in permanently. Never stick weights to the cowl because it is not designed to support weight.

### *BALANCE THE AIRPLANE LATERALLY*

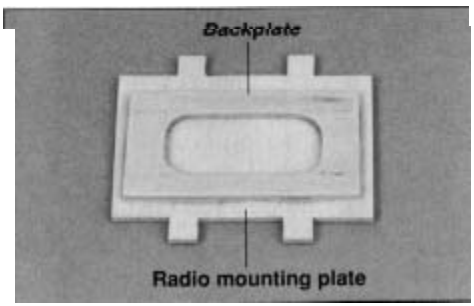
❑ 1. Mount your wing.

❑ 2. With the wing level, **carefully** lift the model by the engine propeller shaft and the fin or tail cone (this may require two people). Do this several times.

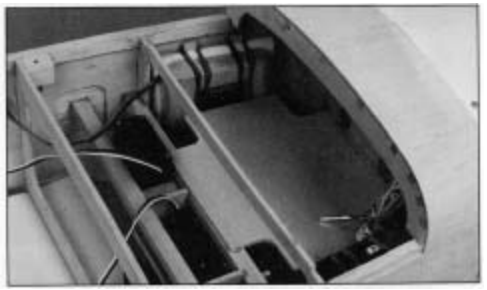
❑ 3. If one wing always drops when you lift the model, that side is heavy. Balance the airplane by gluing weight inside the other wing tip. **An airplane that has been laterally balanced will track better in loops and other maneuvers.**

### *INSTALL YOUR RECEIVER, BATERY PACK AND RETRACT COMPONENTS*

The location of your receiver and battery pack may be determined by the C.G. On our prototypes we mounted the battery pack and receiver nearly as far forward as possible. With this arrangement, no additional ballast was required to achieve the recommended C.G. If this is where you wish to mount your battery pack and receiver, you may use the **mounting plates** provided with this kit or fashion your own method to secure your battery pack and receiver.



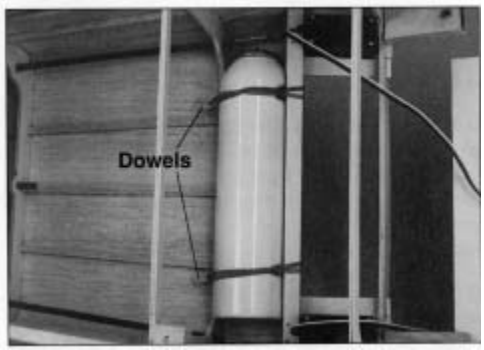

❑ 1. **Securely** glue a die-cut 1/8" plywood **plate back** to the die-cut 1/8" plywood **radio mounting plate.**



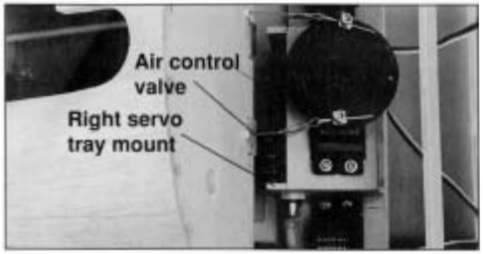
❑ 2. Secure your battery pack to the mounting plate with a few rubber bands and 1/4" thick foam rubber in between. Test fit the battery pack and mounting plate in the front of the fuse as shown in the photo. **Securely** glue the mounting plate to the fuse side doubler.

❑ 3. Install your receiver the same way. Route your receiver antenna through the antenna tube.

**Note:** If in the future you have to remove, then reinstall your receiver or battery pack, first hook the rubber bands to the tabs on the mounting plate. Next, stretch the rubber bands and slide your battery pack and receiver underneath.




❑ 4. Cut the two 1/8" x 1" dowels to a length of 3/4". Glue the dowels into the holes you drilled in the bottom of former **F6.** Cut the aft edges of the servo trays so they are even with the servo rails. Temporarily strap the air tank in place using two rubber bands.




❑ 5. Mount your air control valve and servo. On our prototype we mounted the air control valve to the right nose steering servo tray. Mount yours the same way or find an alternate location. Mount the servo to two rails made from leftover 1/4" x 3/8" basswood. **Note:** It will be easier to connect your air lines to the air control valve **before** you mount the air control valve in the airplane.

❑ 6. Mount your on/off switch and charge jack in a location where it will not get covered with engine exhaust residue.

❑ 7. Connect your battery pack, receiver, switch and servos. Connect the air lines to your air tank with a "T" fitting connected to your air fill valve. If you are installing the Cabin Interior, route the air lines and servo cords through notches in the formers.

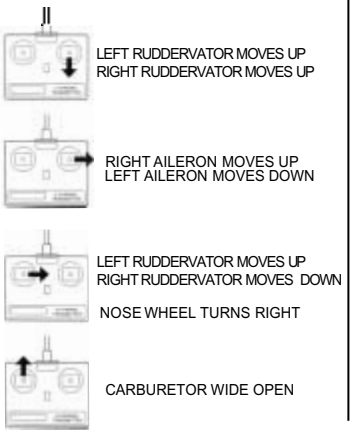
❑ 8. Recheck the C.G.

❑ 9. If you haven't already centered your servos, take the servo arms off all the servos and turn on your transmitter and receiver (this is most important for the flaps). Center the trims and put the servo arms back on your servos and secure them with the screw.

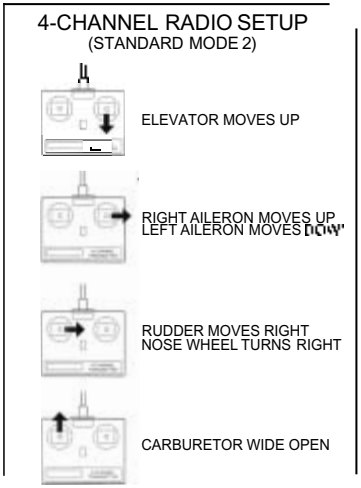
❑ 10. While you're at it, double-check all the servos and make the servo arms are secured and make sure all the clevises have a **silicone retainers.**

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

4-CHANNEL RADIO SETUP
(STANDARD MODE 2, V-TAIL SETUP)




4-CHANNEL RADIO SETUP
(STANDARD MODE 2)




❑ 12. Adjust your pushrod hookups and set up your radio to provide the control surface movements as follows.

## *V-TAIL* CONTROL SURFACE THROWS

These control surface throws are for the **V-tail** model only. We recommend the following control surface throws:

**NOTE:** Throws are measured at the **widest part** of the control surface.

| | High Rate | Low Rate |
|---|---|---|
| **ELEVATOR:** | 15/16" up<br>15/16" down | 518" up<br>5/8" down |
| **AILERONS:** | 3/4" up<br>3/4" down | 1/2" up<br>1/2" down |
| **FLAPS:** | **Takeoff**<br>1" down | **Landing**<br>2" down |

| | Right Elevator | Left Elevator |
|---|---|---|
| **RIGHT RUDDER:*** | 1/4" down | 1/4" up |
| **LEFT RUDDER:*** | 3/4" up | 1/2" down |

*This is the amount of elevator throw with ruddet input only.

**Caution:** Use care when you assemble your Bonanza at the flying field. **DO NOT** lay the fuselage upside down resting on the cabin top, as this could cause the windows to loosen.

### *STRAIGHT TAIL CONTROL SURFACE THROWS:*

These control surface throws are for the **straight tail** model only. We recommend the following :ontrol surface throws:

**NOTE:** Throws are measured at the **widest part** Df the control surface.

| | High Rate | Low Rate |
|---|---|---|
| **ELEVATOR:** | 11/16" up | 9/16" up |
| | 11/16" down | 9/16" down |
| **RUDDER:** | 1" right | 3/4"right |
| | 1" left | *314"* left |
| **AILERONS:** | 3/4"up | 1/2" up |
| | *314"* down | 112" down |
| **FLAPS:** | **Takeoff** | **Landing** |
| | 1-· down | 2" down |

**NOTE: This applies to both the V-tail and straight tail.**

**TRIM MIXING:** If your transmitter has flap to Elevator mixing, we recommend mixing 1/32" of **down** elevator at half flaps and 1/16" of **down** elevator at full flaps. This will keep the nose level when the flaps are deployed.

**The surface throws and balance point listed in this manual are the ones at which the Bonanza flies best. Set up your aircraft to those specifications. If, after a few flights, you would like to adjust the throws to suit your tastes, that is fine. The Bonanza has large elevators and does not require much throw. Too much throw can force it into a stall, so remember... *More* is not better.**

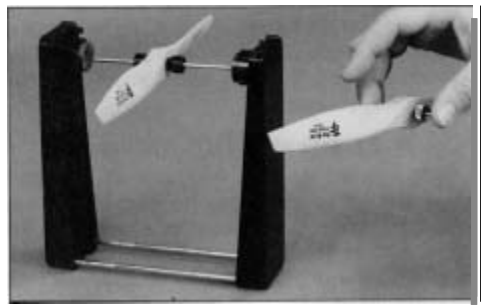
## PREFLIGHT

### *CHARGE YOUR BATTERIES*

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

### *BALANCE YOUR PROPELLERS*

Carefully balance your propellers before you fly. An unbalanced prop is the single most significant cause of vibration that can damage your model. Not only will engine mounting screws and bolts loosen, possibly with disastrous effect, but vibration may also damage your radio receiver and battery. Vibration can also cause your fuel to foam, which will, in turn, cause your engine to run hot or quit.



We use a Top Flite Precision Magnetic Prop Balancer™ (TOPQ5700) in the workshop and keep a Great Planes Fingertip Prop Balancer (GPMQ5000) in our flight box.

### *FIND A SAFE PLACE TO FLY*

The best place to fly your model is an AMA chartered R/C club flying field. Contact the AMA (their address is on page 3) or your hobby shop dealer for the club in your area and join it. Club fields are intended for R/C flying, making your outing safer and more enjoyable. The AMA also provides insurance in case of a flying accident. If an RIC flying field is not available, find a large, grassy area at least six miles from buildings, streets, and other RIC activities. A schoolyard is usually not an acceptable area because of people, power lines and possible radio interference.

### *GROUND CHECK YOUR MODEL*

If you are not thoroughly familiar with the operation of R/C models, ask an experienced modeler to inspect your radio installation and control surface set-up. **Follow the engine manufacturer's instructions to break-in your engine.** After you run the engine on your model, inspect your model closely to make sure all screws remain tight and your pushrods and connectors are secure.

### *RANGE CHECK YOUR RADIO*

Ground check the range of your radio before the first flight of the day. With the transmitter antenna collapsed and the receiver and transmitter on, you should be able to walk at least 100 feet away from the model and still have control. Have an assistant stand by your model and, while you work the controls, tell you what the control surfaces are doing.

Repeat this test **with the engine running** at various speeds with an assistant holding the model, using hand signals to show you what is happening. If the control surfaces do not respond correctly, **do not fly!** Find and correct the problem first. Look for loose servo connections or broken wires, corroded wires on old servo connectors, poor solder joints in your battery pack or a defective cell in your battery pack, or a damaged receiver crystal from a previous crash.

### *ENGINE SAFETY PRECAUTIONS*

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

Store model fuel in a safe place away from high heat, sparks or flames. Do not smoke near the engine or fuel as it is very flammable. Engine

exhaust gives off a great deal of deadly carbon monoxide so **do not run the engine in a closed room or garage.**

Get help from an experienced pilot when you learn to operate engines.

Use safety glasses when you operate model engines.

Do not run the engine near loose gravel or sand; the propeller may throw loose material in your face or eyes.

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

Always be **aware** and very **conscious** of hand movements and be **deliberate** in your reach for the needle valve, glow plug clip, or other items near a spinning propeller.

Keep loose clothing, shirt sleeves, ties, scarfs, long hair or loose objects away from the prop. Be conscious of pencils, screw drivers or other objects that may fall out of your shirt or jacket pockets.

Use a *chicken stick* or electric starter and follow the instructions to start your engine.

Make certain the glow plug clip or connector is secure so that it will not pop off or get into the running propeller.

Ask an assistant to hold the model from the rear while you start the engine and operate the controls.

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

The engine gets hot! Do not touch the engine during or immediately after you operate it. Make sure fuel lines are in good condition so fuel will not leak onto a hot engine and cause a fire.

To stop the engine, close the carburetor barrel (rotor) or pinch the fuel line to discontinue the fuel flow. Do not use your (or any body ekes') hands, fingers or any body part to stop the engine. Never throw anything into the prop of a running engine.

# FLYING

The Top Flite Beechcraft Bonanza is a great flying sport scale airplane that flies smoothly and predictably, yet is highly maneuverable. Compared to other scale models, its flight characteristics are docile and forgiving. The Bonanza also has excellent slow speed flight characteristics. It does not, however, have the self-recovery characteristics of a primary R/C trainer; therefore, you must either have mastered the basics of R/C flying or obtained the assistance of a competent R/C pilot to help you until you are able to safely and competently pilot the model by yourself.

## *FUEL MIXTURE ADJUSTMENT*

A fully cowled engine may run at a higher temperature than an un-cowled engine. For this reason, the fuel mixture should be richened so the engine runs at about 200 rpm below peak speed. By running the engine slightly rich, you will help prevent dead stick landings caused by overheating.

## *TAKEOFF*

If you have dual rates on your transmitter, set the switches to "high rate" for takeoff, especially when taking off in a crosswind. Although this model has good low speed characteristics, you should always build up as much speed as your runway will permit before lifting off. This will give you a safety margin in case of a "flame-out." Use as much of the available runway as possible and practical. When the plane has sufficient flying speed, lift off by smoothly applying up elevator (don't "jerk" it off into a steep climb!), and climb out gradually. Do not use flaps for your initial takeoff. After you have the feel of the Bonanza, takeoffs may be made with the flaps set at 50%. Never use 100% flaps for takeoff ,ecause of the high drag.

**1.20 4-STROKE NOTE:** If you have installed a 1.20 **4**-stroke engine, you must manage the throttle on takeoff and throughout the flight! Use slightly more than half throttle for your first few takeoffs and be ready to apply right rudder to counteract torque as you increase power. Add power gradually until you become familiar with the Bonanza's flight characteristics.

## *FLIGHT*

We recommend that you take it easy with your Bonanza for the first several flights, gradually *getting acquainted* with this realistic model as your engine gets fully broken-in. Add and practice one maneuver at a time, learning how she behaves in each. For ultra-smooth flying and normal maneuvers, we recommend using the low rate settings as listed on page 68 & 69. High rate elevator may be required for crisp snap rolls and spins. With a 1.20 engine the Bonanza really scoots along, so you should manage the throttle when performing high "G" diving maneuvers such as split-esses and loops.

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

### *LANDING*

When it's time to land, fly a normal landing pattern and approach. The Bonanza may bleed off airspeed more rapidly than the sport planes you are used to, but it still tends to *float* once it enters *ground effect.* For this reason, be prepared to add a little power during approach and touchdown. For your first landings, plan to land slightly faster than stall speed and flare a few inches off the runway onto the main wheels.

### *FLAPS*

Full flaps make the Bonanza very steady in the landing pattern. Just carry a little extra power to make up for the increased drag. This drag allows you to make shorter, steeper approaches. Touch down with a slightly nose-high attitude to avoid letting the nose gear contact the runway first. You can execute touch-and-go's and slow flyby's with full flaps, but be ready to use a little more *up* elevator. You should use only *half* flaps for taking off and climbing because the plane will accelerate and climb much better than it would with full flaps. If you have to attempt a *go-around,* your first priority should be to smoothly apply power and establish a steady climb. After you reach a safe altitude, reduce flaps, and then make your turn to get back into the landing pattern.

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

**GOOD LUCK AND GREAT FLYING!**

TOP FLITE

**THIS MODEL BELONGS TO:**

NAME

ADDRESS

CITY STATE ZIP

PHONE #

AMA # SFA #

Cut this placard out, fill it out and place it inside your model.

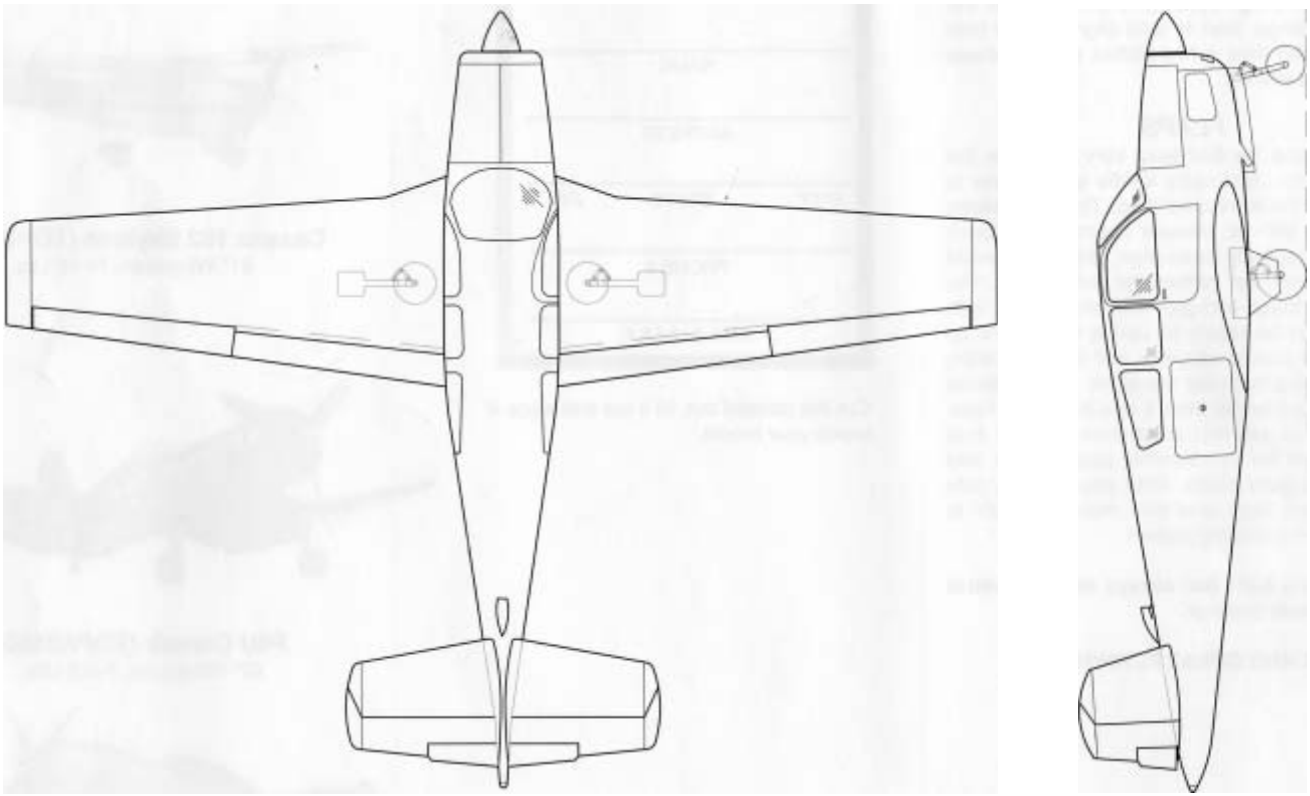
If you enjoyed building the Top Flite Beechcraft Bonanza, try one of these other outstanding .60 size Gold Edition kits as your next project:

**Cessna 182 Skylane (TOPA0300)**
81" Wingspan, 10-12 Lbs.

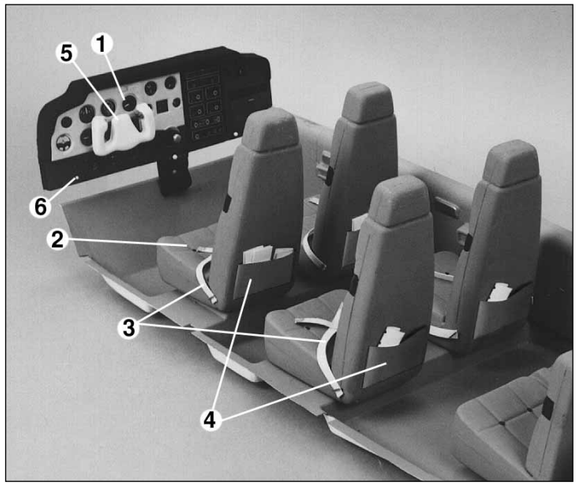
**F4U Corsair (TOPA0100)**
62" Wingspan, 7–9.5 Lbs.

**P-47D Thunderbolt (TOPA0135)**
63" Wingspan, 8.5-10.5 Lbs.

TWO-VIEW DRAWING
Use this layout for planning your trim scheme.



**DETAILING HINTS:**




The numbers on this photo apply to the following steps.

❏ 1. Carefully cut the radios and instruments from the instrument panel decal included in your Top Flite Bonanza Cabin kit and attach them to the **front** of the instrument panel.

❏ 2. Seat and door beading can be made from embroidery “floss” or string. Tack glue a short piece at one end with thin CA, then stretch it to the end of its run. Hold it with tweezers while you CA the floss or string in place.

❏ 3. Seatbelts are cut from 1/4" dressmakers’ elastic (included in this kit). One end is threaded through the eye of a large T-pin and spot glued to itself. The pin is inserted through the floor, bent 90 degrees and glued to the underside of the floor. The buckles are cut from chrome tape or could be made from aluminum foil.

❏ 4. Maps and magazines are made from small pieces cut from the real thing.

❏ 5. The cavity on the back of the control yoke is filled with automotive body filler or epoxy and microballoons. Before the filler sets, insert the yoke arm in the center of the yoke. Be sure it is at the correct angle as shown in the photo. Tape it securely in position until the filler cures.

❏ 6. All knobs and buttons are made from large and small quilters pins (included in this kit). Insert them through the instrument panel, then bend them 90 degrees on the back side. Cut off the excess wire close to where the pins are bent, then glue them in position on the back side.

*Many more details can be added. It’s up to you. A little imagination and craftsmanship is all it takes. Have fun with this project. The results will be well worth the effort.*

**FINAL INSTALLATION:**

❏ 1. Glue the cabin floor into position. We suggest using clear silicone sealer as the adhesive because it provides a good bond between wood and plastic.

❏ 2. Glue the sides into position with Thin CA being used between the plastic parts and silicone sealer between the wood formers and the plastic.

❏ 3. Glue the seats to the floor with CA **after** scraping off any paint from points of contact.

❏ 4. The instrument panel and glare shield are glued to the cabin top. Carefully check their fit and position with the other cabin parts before gluing into position.

❏ 5. The seams of the windows on the cabin top can be dressed up with 1/8" foam strips. If cut carefully, it looks very realistic. The foam can also be covered with thin vinyl material.

**When you take your Bonanza to the field, be ready for the praise you will undoubtedly receive. It is a beautiful aircraft. Happy flying!**

## TOP FLITE GOLD EDITION BEECHCRAFT BONANZA LIGHTING KIT

Custom-wired for the Beechcraft Bonanza, this complete lighting set includes three position lights, one landing light and a variable-speed rotating beacon. Wiring has been measured to the correct lengths for all light locations and is already soldered. A micro switch activates the landing light when retract gear is extended. Also includes a master on/off switch and battery box for the required 6 “AA” or NiCd batteries. – TOPQ7912

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# Beechcraft Bonanza

GOLD EDITION™

## SCALE INTERIOR KIT FOR THE GOLD EDITION BEECHCRAFT BONANZA

**WARRANTY.....** Top Flite Models guarantees this kit to be free from defects in both material and workmanship at the date of purchase. This warranty does not cover any component parts damaged by use or modification. In no case shall 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 buyers are not prepared to accept the liability associated with the use of this product, they are advised to return this kit immediately in new and unused condition to the place of purchase.

TOP FLITE®

**Top Flite Models**
**P.O. Box 788**
**Urbana, IL 61803**
**Technical Assistance - Call (217) 398-8970**

**READ THROUGH THESE INSTRUCTIONS FIRST. THEY CONTAIN IMPORTANT INSTRUCTIONS CONCERNING THE ASSEMBLY OF THIS MODEL.**

Congratulations for deciding to install a fully detailed, scale looking interior in your Top Flite Beechcraft Bonanza. This is a project that can be as detailed or as straightforward as you care to make it – the choice is yours. We have provided the basic kit that can be assembled and painted in a few hours. It represents a stock Bonanza interior as delivered from the factory. The color scheme and minor surface details change from plane to plane, so you may need to add extra goodies like head rests or shoulder harnesses depending on the full-scale plane you modeled. By using this kit, some imagination and your modeling experience, you can create a great looking interior that will “wow” them at the flying field.

**TOOLS AND SUPPLIES**

❏ 1 oz. Thin CA (GPMR6002)
❏ Hobby knife and #11 blades
❏ Lexan® scissors (KYOR1010)
❏ Round file
❏ 150, 220, 340 and 400-grit wet or dry sandpaper
❏ Bar Sander (GPMR6170)
❏ Selection of small paint brushes
❏ White primer paint (Must be compatible with styrene plastic)
❏ Model enamel paint (Testors)
❏ Plastic model putty (Testors), or automotive body filler (Bondo®)
❏ Needle nose pliers
❏ Tweezers
❏ Silicone sealer adhesive

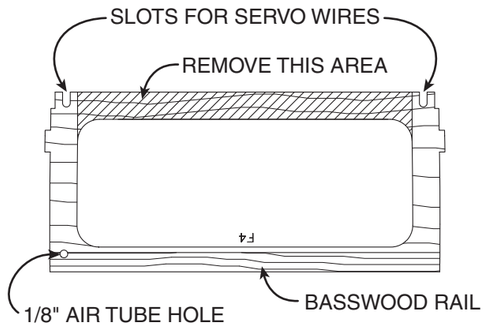
**SCRAPS FROM AROUND YOUR WORKSHOP**

❏ Elastic thread and cloth scraps – for seat pockets
❏ Chrome trim tape – for seatbelt buckles
❏ Large T-pins – for seatbelt attachment

**GETTING STARTED:**
Assembling and installing your scale cabin interior will probably require minor adjustments and "tweaking" to fit your particular model. This is because of variations in building technique, parts alignment and glue fillets that may interfere with proper positioning of the parts. A little patience is all that is required to obtain a good looking installation. Trim parts a little at a time, checking the fit after each adjustment. Remember, you can always remove material, but it's hard to put it back.

❏ 1. Start by trimming **all parts** to the embossed "trim lines." **Be sure to leave a 3/8" lip around the fuselage side panels to provide a gluing surface for the floor.** Use a hobby knife or scissors to "rough cut" the parts. Then, sand the parts with a sanding block to straighten the edges. You can evenly sand the edges by simply taping a sheet of 220-grit sandpaper to your workbench. Then, work the part in a circular motion while pressing down gently.

**NOTE:** Save all scraps of smooth plastic in case you need them later.




❏ 2. Before fitting any of the parts in the fuselage cavity, you will first need to modify some of the formers. You will need to cut and remove the top portion of formers F3, F4, F5 and F6 that extend across the width of the fuselage as shown in the sketch above. If you have not already done so, you should also drill any holes for the retract air tubes as well as cut notches for the servo wires.

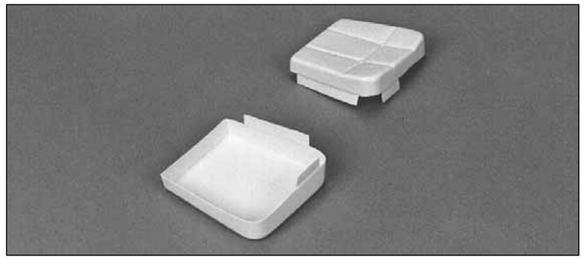
❏ 3. Refer to the exploded drawing to see how the parts fit together. On the floor and side panels you will note several notches that must be cut out to allow the floor to fit around the fuselage formers. Without using any glue (and in the following order), fit the floor, sides and aft bulkhead into the fuselage cavity. Make any adjustments needed for a good fit.

❏ 4. Place the cabin top on the fuselage and mark the crutch where the instrument panel will be positioned. It is important to accurately mark the position so that the instrument panel will mate properly with the side panel when the cabin top is installed. The exploded view shows the area that the instrument will slide into.

**NOTE:** If you have not already done so, we recommend that you glue some reinforcing basswood sticks across the bottom of formers F4 and F6. There was extra 1/4" x 3/8" x 36" material included in the Bonanza kit for this purpose. You must also decide how you will attach the forward portion of the floor (the part that covers the servo area.) We recommend some balsa stick scraps be used for this purpose. This area can be easily accessed from the wing opening.

❏ 5. When you are satisfied with the fit of the primary cabin parts, remove them from the model and set them aside until it's time to paint.

**ASSEMBLE THE SEATS:**

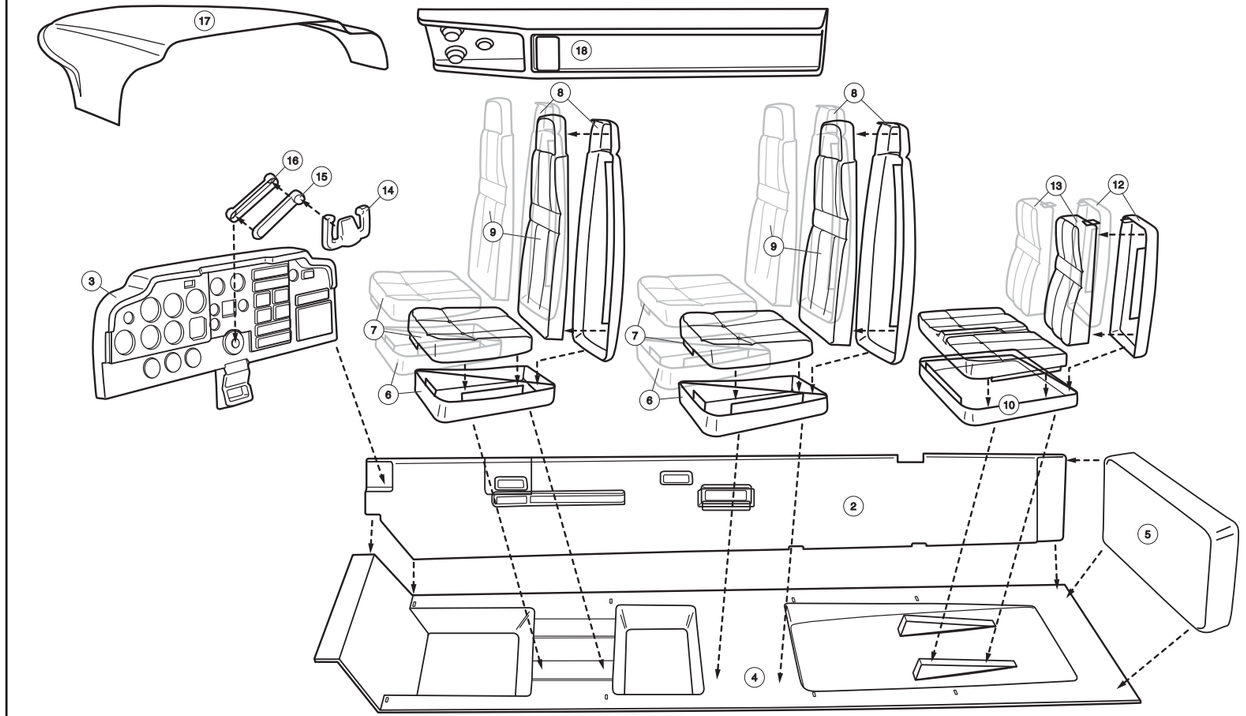


❏ 1. Check the glue tabs on all of the seat fronts and backs to insure that they align and fit properly. Trim and adjust them as needed. Do the same for the seat tops and bottoms.

## DETAILING PARTS LIST

**– NOT SHOWN –**

1 yd.....Dressmakers' elastic – seat belts
6 ea.....Small head pins – dash knobs/buttons
3 ea.....Large head pins – throttle/mixture knobs
1 ea.....Instrument panel decal




## PLASTIC PARTS LIST

1.....1.....Side panel – left (not shown)
2.....1.....Side panel – right
3.....1.....Instrument panel
4.....1.....Floor
5.....1.....Aft bulkhead
6.....4 ea.....Lower front and middle seats
7.....4 ea.....Front and middle seat cushions
8.....4 ea.....Front and middle seat back – rear half
9.....4 ea.....Front and seat back – front half
0.....1 ea.....Lower rear seat
-.....1 ea.....Rear seat cushions
=.....1 ea.....Rear seat back – rear half
q.....1 ea.....Rear seat back – front half
w.....2 ea.....Control yoke
e.....1 ea.....Yoke arm – front half
r.....1 ea.....Yoke arm – rear half
t.....1 ea.....Glare shield
y.....1 ea.....Roof console

❏ 2. Starting with a front seat, insert the seat back onto the seat bottom. Hold the parts in position with a piece of masking tape. The seat back should angle toward the rear of the cabin by a few degrees. Glue the seat back in position by "wicking" a few drops of thin CA into the joint along the bottom and sides. Remove the tape after the CA has cured.

❏ 3. Tape the seat cushion to the bottom half of the seat at a couple of places. When properly aligned, use thin CA to glue the parts together. Remove the tape after the CA cures. Use the same technique to add the seat back cushion.

❏ 4. Assemble the remaining front seat, the two center seats and the rear bench seat the same way.

❏ 5. Use plastic model seam putty or automotive body filler to cover all of the joints. When the filler has cured, wet sand it smooth with 220 or 340-grit sandpaper.

❏ 6. Seat back pockets can be made from elastic thread and thin cloth glued into position.

**PAINTING AND DETAILING**

❏ 1. Before painting, **thoroughly clean** the parts with rubbing alcohol, then allow them to dry completely.

❏ 2. Spray all parts with white enamel primer. Be sure to use a primer that is compatible with styrene plastic (Top Flite® LustreKote™ is **NOT** recommended). Lightly **wet sand** the parts with sandpaper and allow them to dry. Repeat the priming and sanding process if needed.

❏ 3. Paint all of the parts with **model enamel**. Apply the lightest color of paint first. Use a 1/2" wide camel hair brush (or an artist's air brush) to obtain the smoothest finish. The bases on the floor (that the seats are mounted to) should be painted flat black.

❏ 4. Due to the curvature of the floor pans, scale looking carpeting is very difficult to simulate. It is best done with a rough texture paint.